

Colaboração na formação inicial para a construção de conhecimento didático: um estudo no Ensino Superior

RESUMO

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O estudo foi desenvolvido com estudantes de um mestrado profissionalizante. Os objetivos eram: i) identificar as suas representações sobre trabalho colaborativo (através de questionário e de reflexões escritas individuais); ii) compreender o impacto dessas representações na assunção de práticas colaborativas em fórum de discussão online (através de questionário e das mensagens publicadas no fórum); iii) compreender como é que as práticas de trabalho colaborativo em fóruns de discussão online contribui para a construção de conhecimento didático em ensino da ortografia (através de mensagens publicadas no fórum e de estratégias didáticas construídas pelos grupos de trabalho); iv) compreender a contribuição deste conhecimento na conceção de estratégias didáticas focadas em ortografia. Os resultados revelam uma relação entre as representações sobre colaboração e a sua adoção efetiva num ambiente promotor desta modalidade de trabalho. Isso tem impacto na construção de estratégias didáticas pelos estudantes.

PALAVRAS-CHAVE: Colaboração. Abordagem didática da ortografia. Fóruns de discussão online. Formação inicial de professores.

Introduction

Collaborative work in teaching has been recently acknowledged for improving the quality of teaching/learning. However, teachers are not receptive in adopting this method due to lack of time and regular collaboration, or even the difficulty of acknowledging its importance. Initial teacher training could play an important part in reversing this tendency, especially if social web tools, which students already use to socialize and collaborate, are valued. This served as background for a recent study, the results of which will be subject to discussion in this article. Firstly, the theoretical framework of this research is presented, followed by a description, methodology, results and discussion thereof, and final considerations.

Theoretical framework

In the current era, technology, internet and social media are responsible for a rapid production and conveyance of knowledge. This reality has been changing the way information is accessed and disseminated, and how knowledge is (re)constructed (Adams, 2004; Anderson, 2007; Downes, 2008; Lucas & Moreira, 2009; O'Reilly, 2005; Tapscott & Williams, 2008; Tzeng, Liu, & Lin, 2009). It is no longer circumscribed to enclosed spaces or to one person. It is cost-free and can be accessed and edited freely (Attwell, 2008; Castells, 2010; Prensky, 2005; Siemens, 2006). Contemporary society demands individuals adapt to ongoing change rapidly (Amor, 2004), and to develop skills with which they can respond to challenges and demands.

Consequently, educational spaces are now also reconfiguring themselves towards whatever is new.

Actors such as teachers, who hold specific knowledge required for their job, play a vital role in these times of change insofar as they prepare students for active citizenship. In this context, teacher training is responsible for preparing (future) professionals working in Education, an area which has experienced several changes such as the Bologna Process (Bologna Declaration, 1999; Evans, 2010; Leuven/Louvain-laNeuve Communiqué, 2009), ministerial guidelines, and pedagogical innovation, and has gradually resorted to technology, individual-based learning, collaboration and lifelong learning.

Collaboration is of great importance in teacher training. The most informed, substantiated educational practices (carried out in keeping with students' reality) depend on the collaborative work carried out between teachers (or between the latter and other actors in education). Social web tools can provide collaborative experiences in Higher Education (Loureiro, Pombo, & Moreira, 2011; Pinto et al., 2012), and also be easily accepted by students who use them on a daily basis and acknowledge their collaborative value (Attwell, 2008; Brown, 2010; Pais, Santos, & Pedro, 2011; Siemens, 2007).

In these educational environments, online discussion forums have conveyed successful collaborative experiences (Dennen & Paulus, 2005; Wang & Woo, 2007). It is thanks to these tools that online meetings can be extended for longer periods. This means that, by writing asynchronously, users can ease their cognitive effort and memory and still process a considerable amount of information (Garrison &

Vaughan, 2008). In this way, information processing and knowledge construction become easier.

Writing skills are precisely one of the competences students must develop, and for this reason Portuguese teachers should - right from their initial training - understand that learning to write is a demanding, complex process (Barré-De Miniac, 2005; Camps, 2008). This is particularly relevant to primary school teachers, whose students begin to learn how to write. Despite not being an exclusive element to writing, spelling plays an important part in this process. Given that there are other aspects to consider in writing, it is vital that students develop this skill as early as possible. By performing this skill automatically, students are free from the worries of orthography and can dedicate their attention to other more pressing matters concerning this subject. For successful teacher training, teachers should be introduced to didactic principles of teaching and learning spelling, and think - with their peers, teachers and experts - of didactic strategies and activities which encourage the development of the students' writing skills. This served as the background for the study presented hereinafter, with the following elements i) description; ii) presentation of the techniques and data collection tools; iii) presentation of results; iv) discussion; v) final considerations.

Description of the study

This study is part of a wider research project regarding the development of competences in Higher Education (Sá, 2010, 2013). A case study was developed with prospective primary school teachers undergoing a professional master's degree in pre-school and primary education from the University of Aveiro with the following objectives:

- 1) to describe their representations of collaborative work;
- 2) to understand the impact of these representations on the use of collaborative work practices in online forums;
- 3) to understand how the use of collaborative work in online forums contributes to the construction of didactic knowledge when addressing the issue of spelling;
- 4) to understand the contribution of this knowledge in the creation of didactic tools when addressing spelling.

The study was divided into two stages: 1) the first stage focused on two groups of students (GT1 e GT2) of "Didactics of Portuguese Language" during the academic years 2009/2010 and 2010/2011; 2) the second stage focused on a trainee teacher (who took part in the first stage of this study), who attended Supervised Pedagogical Practice (traineeship) of the Seminar 'Educational Research'.

The aim was to understand the collaborative dynamics between students with which they can construct didactic knowledge on how to address spelling in primary education. The first stage aimed to identify and understand what students thought about collaboration (through an online questionnaire and a written text containing a personal reflection), and how representations impacted the development of collaboration in an online discussion forum (through its registrations). The

principal objective was developing collaborative work between the members of each group for the construction of didactic knowledge on how to address spelling. This first stage also aimed to understand how didactic knowledge helps design didactic tools for addressing spelling, using forum registrations and materials designed by the students. The second stage aimed to understand how the first stage of the study helped design, implement and evaluate a spelling-based didactic intervention carried out by a trainee teacher.

A phenomenological qualitative approach was used in this research in order to access (and thus understand) the meanings given by its participants to specific situations. For this reason, the study focused on interpretation and subjectivity intrinsic to individuals, and had a flexible nature, seeking a thorough understanding of the processes involved in the experiences lived by individuals, bearing in mind that the latter are also partly influenced by contexts.

Focusing on the students who agreed to participate, this research was also a case study since it was based on a thoroughly analyzed particular element (Cohen & Manion, 1980; Stake, 1994). In trying to understand its particularity, the customary questions 'how?' and 'why?' of a study of this kind were addressed. This was also a single case study, and so the selected students were the only unit of analysis and their course provided the context. In the following chapter, data collection techniques and tools are presented and described.

Data collection, techniques and tools

This section will include the survey by questionnaire and critical personal reflection, followed by the online discussion forum and the didactic tools.

A) Survey by questionnaire and critical personal reflection

The survey by questionnaire helped identify students' representations on collaboration before participating in the online discussion forum, in which they were expected to develop collaborative work or constructing didactic knowledge on how to address spelling. This questionnaire was available to all students in the class, but only the answers given by those participating in this study were considered.

Part I of the questionnaire aimed to create the student's profile (gender, age, motivations for undergoing initial teacher training, professional experience in education and expectations regarding the course unit they had enrolled in). In Part II, representations on collaboration were identified and characterized (experiences of collaboration, the importance of collaboration between teachers, definition of collaboration, effects on learning, adoption of collaborative work among teachers, causes which encourage/prevent collaboration among teachers, how initial teacher training helps adopt collaborative practice and the role played by the social web).

The idea behind the critical personal reflection was to identify students' representations after having participated in the online discussion forum. For this purpose, guidelines were provided to students, according to which they were asked to mention the skills developed and what they had learned in the curricular unit, the role played by collaborative work in this process, the contribution of the

online forum and their professional expectations regarding the importance of the curricular unit.

B) Online discussion forum 'Ortografias' (Spelling)

The purpose of this forum was to develop collaborative work with peers with a view to constructing didactic knowledge on how to address spelling. The students, organized into work groups (WG), logged in to the forum during the course of three weeks. The forum itself had been divided into three sequential parts covering different aspects: 1) the Portuguese spelling system, 2) the process of teaching and learning spelling, and 3) didactic strategies aimed at developing spelling skills. Students began with a more theoretical approach, followed by the didactic principles underpinning the teaching and learning of spelling, and finally were given a moment to reflect on didactic strategies and design activities that could implement the relevant principles.

There were four topics in each part. Groups could only move on to the next part of the forum once they had explored all topics in the previous part. The first topic instigated the discussion. Statements by various influential authors on the subject in question were presented, and students were asked to reflect individually, posting comments and commenting on their colleagues' messages. In the second topic, students were asked to identify important information included in the previous topic and to jointly draft a document in which they expressed their thoughts. The third topic corresponded to the stage during which groups engaged with the scientific knowledge in the area, by downloading a document containing a summary of views by various experts. In the fourth topic, groups were asked to review their first document, taking into account the reflection prompted by the critical reading of the document downloaded in the previous stage.

The idea was to make the knowledge co-constructed the starting point of a new discussion in the following part of the forum. Once the work in the forum was concluded, the groups were required to plan a lesson collaboratively, as described hereinafter.

C) Didactic tools

The analysis of these data would help identify traces of the relationship between the knowledge co-constructed in the online forum 'Spelling' and the designing of didactic tools for developing spelling skills. Students constructed two types of didactic tools: a lesson plan per group work and a didactic intervention with its corresponding implementation and evaluation by a trainee teacher.

Lesson planning was carried out by the first-stage students and was comprised of two parts: lesson plan(s) and theoretical principles. All planning was based on the work developed in the online discussion forum. A report resulting from the didactic intervention (designed, implemented and evaluated by a trainee teacher, a member of the WGs which had participated in the online discussion forum) was analysed. The trainee mentioned above was the only teacher to focus her intervention on the spelling didactic approach, as part of Supervised Pedagogical Practice of the Seminar 'Educational Research'.

Results

Firstly, the results for each of the objectives belonging to each of the three sets of data collection tools mentioned above are presented. Initially students' representations of collaboration will be described. Then, we will characterize the collaboration developed for constructing didactic knowledge with which, as previously mentioned, the participant WGs addressed spelling in the online discussion forum 'Spelling'. Finally, evidence for a relationship between the knowledge co-constructed in the online forum and the designing of didactic tools for developing spelling skills will be sought.

A) Representations of collaboration

The analysis of data collected from the questionnaire and the individual critical reflection showed that the members of each group shared the same vision of collaboration. With regards to collaboration in initial training,

1) their initial representations showed that:

- both WGs thought that promoting collaboration depended on the encouragement given by the professors of the various curricular units;
- WG 1 had not come across collaborative experiences during their previous studies;
- WG 2 mentioned that collaborative experiences were equally essential and that the knowledge and skills could indeed result from the collaboration adopted during initial training.

2) their final representations showed that:

- WG1 developed collaborative work while attending the curricular unit. It had a positive impact on the construction of knowledge, despite its little relevance to the professional advancement of its members, who added that this method was important in education for its positive social impact;
- WG2 clearly identified the skills and the knowledge developed thanks to collaboration which had an impact of the didactic knowledge constructed, and also on personal and professional advancement.

Regarding collaboration in their professional delivery,

1) their initial representations showed that:

- WG One stated that collaboration between teachers was based on mutuality; the group thought this method was important as its members were encouraged to share, and helped students improve their learning and access new ideas; the group believed that this method could be promoted through training, the improvement of educational relationships and administrative regulation; it felt that individualism, lack of training and concern for the students, administrative regulation and absence of educational relationships tended to limit collaboration between teachers; the group also believed that the reason why teachers did not collaborate was because they did not care about students, set different objectives and had not been required to use this method by school's administration;

- WG 2 defined collaboration based on the characteristics of its process (mutuality, sharing, individual and group reflection), which helped reach certain goals (improvement of practice and learning, professional development); they believed collaboration between teachers was important because it brought advantages at an individual and group level; the group thought that strengthening

educational relationships, administrative regulation and an encouraging attitude were essential to collaboration between teachers; on the other hand, the lack of educational relationships, collaborative practice and the inability to adapt to others were obstacles to collaboration.

2) final representations:

- WG 1 thought that collaboration was important for the development of skills since tasks could be shared; its members valued group discussion, which had repercussions in their professional advancement, for helping improve their way of thinking, acting, and solving problems, thus increasing their chances of success;

WG 2 thought that collaboration fostered the development of skills, thus helping teachers to gain a better understanding of the students, classes and the school.

Initial representations of these two groups certainly had repercussions on the collaborative practices used in the online discussion forum, which will be explained in the next section. Indeed, the groups' final representations mirrored their experience of the forum.

B) Developing collaborative work to construct didactic knowledge for addressing spelling

To help analyze data collected from the online forum, Garrison's and Vaughan's model was used (Garrison & Vaughan, 2008). The use of this model was validated by a team of experts. Thus, we were able to ascertain that:

- in the first topics of each subject, corresponding to the initial stage, both groups responded to the challenge and engaged in discussion - all members posted on the forum, acknowledging the problem or the pertinence of the matter in question;

- in the second topics of the intermediary stage, groups focused on looking for relevant information; however, negotiation and attempts to reach a consensus - processes on which knowledge is constructed - were noticed a lot less in WG 1 than in WG 2; the latter showed more collaboration, as they selected the relevant data gathered in the initial stage of discussion and drafted a summary, thus evidencing the consensus among the group; this did not happen in WG 1 who chose (excerpts of) a post submitted by one of its members during the initial stage, suggesting that discussion and reflection among the members had not taken place;

- in the third and fourth topics, which belong to the initial stage, groups integrated the information or knowledge as requested, identifying the aspects mentioned by the experts to be included in their text; the indicators of the integration stage, such as the relationship between ideas, their systemization and reconstruction, were more noticeable in WG 2 than WG 1; the transition to the resolution stage was equally more noticeable in WG 2, who having confirmed and added information from the document penned by the influential authors, when presenting the edited text; WG 1 replaced the text in the intermediate stage of the discussion with a new text written, copying and pasting part of the document by those authors. Evidently, this collaborative process had repercussions on the knowledge relating to addressing spelling constructed by both groups. The results presented hereinafter will show these repercussions on the relationship with the construction of didactic instruments.

C) Relationship between co-constructed didactic knowledge and the conception of didactic tools for the development of spelling skills

With regards to the planning carried out by the groups, results of the data analysis show that:

1) WG 1

- understood that spelling is only one of the skills required for writing. For this reason, the group planned a lesson in a way that made spelling part of a wider subject (i.e. writing); activities, however, were not sequential, rather they were isolated;

- the sole purpose of dictation was to detect spelling mistakes, without focusing on their discussion; the theoretical principles of the lesson planning, however, included the importance of the spelling mistake as a way of informing both teacher and students of the lacunae and difficulties in learning.

2) WG 2

- carried out the planning, starting with more general activities, which meant addressing other aspects of language, and focusing on writing and elements concerning spelling;

- used students' mistakes for categorization, resorting to a typology of spelling mistakes.

In short, WG 1 seems to have based its work on the reflections made throughout the various stages of the forum 'Spelling', and brought some of that constructed knowledge into activity planning and its theoretical principles. However, there is evidence that some aspect were not made entirely clear for the members and should have been analyzed. In the planning carried out by WG 2, two key-concepts mentioned in the forum had been included: i) planning activities that could be integrated in writing and coordinated with other aspects of language and ii) the importance given to error, using a typology of spelling mistakes.

For fuller understanding of this relationship between co-constructed knowledge and the designing of didactic tools, a traineeship report written by a member of WG 2 was analyzed. The trainee teacher:

- endeavored to integrate spelling in writing activities, thus avoiding an isolated approach;

- analyzed students' productions in order to understand the root of the spelling mistakes;

- designed a dictation activity following the writing activity, which was not limited to identifying spelling mistakes, as it also included the types of mistakes detected in the writing activity.

In addition to these didactic principles developed in the forum, the theoretical framework of the report also showed that the trainee teacher, who had previously been a member of WG 2, had also been inspired by her planning.

Discussion of results

The two work groups showed slightly different perspectives of collaboration. WG1 believed that this method was not fundamental to education, despite recognizing some of its potential and pointing out positive aspects. WG 2 perceived collaboration as an important way of participating in a collective enterprise, with a view to improving Education. In addition, it was clear that WG 1, unlike WG 2, could not identify collaborative experiences which had happened during training. Given that both groups had undergone the same initial training, these conflicting perspectives could stem from their own understanding of collaboration and how to implement it whenever a work group was assigned to them. On the other hand, it was also likely that this method had not been encouraged and valued by the trainers themselves. In fact, Hargreaves (1994) suggests that students were not used to seeing teachers collaborating among themselves, thus appropriating an individual style of learning.

It was inferred from the interpretation of results that the group which had valued collaboration the most were also more receptive to the dynamics the forum had tried to create. Therefore, there was a link between the importance given to collaboration and its actual implementation. In fact, both groups responded to the initial challenge, during which discussion was triggered. The problem and the pertinence of the subject to be discussed were successfully identified. During the exploratory stage, the groups also identified the most pertinent information of the discussion but, unlike WG 2, the other group did not systematize information, suggesting little collaboration between its members. During the integration stage, in which groups accessed the document written by experts and compared it with their own, both groups were generally able to identify the information which confirmed or improved upon their own. However, during the resolution stage, while WG 2 wrote their document in more detail appropriating new information, WG 1 chose to copy parts of the experts' document systematically, with little concern for connecting ideas. It seemed, therefore, that there was not an effective appropriation of information. The last two stages were, perhaps, the most difficult to achieve due to its degree of demand (Garrison, Anderson, & Archer, 2010).

Garrison and Vaughan (2008) characterized the resolution stage as the moment to assess the viability of the solution proposed while being applied, which implies being tested. In this study, this stage took place at the end of each of the three stages in the forum, since the subject discussed in each of them served as the basis for the subsequent stage, thus triggering a new moment for discussion. All three resolution stages helped construct knowledge on how to address spelling, which was subsequently applied in the group class planning.

An analysis of this planning showed that, although having acknowledged the importance of some didactic principles of spelling, WG 1 had difficulty enacting them. Had it been adopted, collaboration could have helped in this task, as happened with WG 2 who operated this method more easily. In fact, the trainee teacher took this approach even further in her didactic intervention. Therefore, it is not sufficient to read the relevant information - it must also be developed and discussed with peers through collaboration. Although WG 1 (appears to have) completed the activities in the forum successfully, as it responded to all the requests, it seems that tasks were distributed, thus influencing the level of knowledge constructed by the group, as transpired in their planning.

Conclusion

Understanding Higher Education in a broader sense, we believe the primary concern of this study was the student-centered learning and teaching set out by the Bologna process (Bologna Declaration, 1999; Evans, 2010; Leuven/Louvain-laNeuve Communiqué, 2009). Traditionally theoretical training courses, during which prospective teachers learn about didactic principles developed in academia, were replaced with the promotion of autonomy and collaboration. As students became the focus of the teaching and learning process, it was essential to start from individual knowledge and thoughts followed by the exchange of point of view and their (re/co)construction, which was then compared with the literature. Students were thus able to value their own knowledge as the starting point for more learning which, by being collaborative, would also be more productive

Collaboration in initial teacher training for constructing didactic knowledge: a study in Higher Education

ABSTRACT

A study was developed with students from a professional master's degree. The aims were: i) to identify their representations of collaborative work (by means of a questionnaire and an individual written assignment); ii) to understand the impact of these representations on the use of collaborative work practices in online forums (through a questionnaire and messages posted in the forum); iii) to understand how the use of collaborative work in online forums contributes to the construction of didactic knowledge when addressing the issue of spelling (through messages posted in the forum and didactic tools designed by the groups); iv) to understand the contribution of this knowledge to the creation of didactic tools when addressing spelling. Results show the relationship between the appreciation of (and failure to appreciate) collaboration and its use in a collaborative environment, which impacts on the knowledge constructed and therefore on the didactic tools designed by the students.

KEYWORDS: Collaboration. Didactic approach to spelling. Online discussion forums. Teacher training.

NOTAS

REFERÊNCIAS

- Adams, S. (2004). Computers and cooperative learning: a literature review. Retrieved from http://scottadams.blogs.com/links/2004/11/computers_and_c.html
- Amor, E. (2004). Littera – escrita, reescrita, avaliação. Um projecto integrado de ensino e aprendizagem do Português. Para a construção de uma alternativa viável. Lisboa: Fundação Calouste Gulbenkian/Serviço de Educação e Bolsas.
- Anderson, P. (2007). What is Web 2.0? Ideas, technologies and implications for education. UK: JISC. Technology & Standards Watch.
- Attwell, G. (2008). Social software, personal learning environments and the future of teaching and learning. In A. A. Carvalho (Ed.), Encontro sobre Web 2.0 (pp. 24–38). Braga: CIED.
- Barré-De Miniac, C. (2005). Ecrire en atelier: pourquoi et comment ? In L. Á. Pereira & A. Moreira (Eds.), Actas Oficinas de escrita e ensino de línguas (pp. 1–16). Aveiro: Universidade de Aveiro.
- Bologna Declaration. (1999). Joint declaration of the European Ministers of Education. Bologna: EHEA.
- Brown, S. (2010). From VLEs to learning webs: the implications of Web 2.0 for learning and teaching. *Interactive Learning Environments*, 18(1), 1–10.
- Camps, A. (2008). Hacia un modelo de enseñanza de la composición escrita en la escuela. In M. I. B. Pardo (Ed.), *Lecturas complementarias para los maestros: Leer y escribir con los niños* (pp. 22–31). Colombia: Fundalectura.
- Castells, M. (2010). *The rise of network society* (2a ed., Vol. I). Malden (MA): Blackwell Publishing Ltd.
- Cohen, L., & Manion, L. (1980). *Research methods in education*. London, England: Croom helm london.
- Dennen, V. P., & Paulus, T. M. (2005). Researching “collaborative knowledge building” in formal distance learning environments. In International Society of the

Learning Sciences (Ed.), Proceedings of the 2005 conference on Computer support for collaborative learning (pp. 96–104). Taipei, Taiwan.

Downes, S. (2008). The future of online learning – ten years on. Retrieved July 23, 2013, from <http://www.downes.ca/files/canaries.ppt>

Evans, L. (2010). Developing the european researcher: “extended” professionalism within the Bologna Process. *Professional Development in Education*, 36(4), 663–677.

Garrison, D. R., Anderson, T., & Archer, W. (2010). The first decade of the community of inquiry framework: A retrospective. *The Internet and Higher Education*, 13(1–2), 5 – 9. doi:<http://dx.doi.org/10.1016/j.iheduc.2009.10.003>

Garrison, D. R., & Vaughan, N. (2008). *Blended learning in Higher Education. Framework, principles and guidelines* (1a ed.). USA: Jossey Bass.

Hargreaves, A. (1994). *Changing teachers, changing times: teachers’ work and culture in the postmodern age*. NY-USA: Teachers College Press. Columbia University.

Leuven/Louvain-laNeuve Communiqué. (2009). *The Bologna Process 2020 - The European Higher Education Area in the new decade*. Communiqué of the Conference of European Ministers Responsible for Higher Education. Leuven/Louvain-laNeuve: EHEA.

Loureiro, M. J., Pombo, L., & Moreira, A. (2011). E-assessment in collaborative blended learning: evolving practices and postgraduate students’ perceptions. In A. Moreira, M. J. Loureiro, A. Balula, F. Nogueira, L. Pombo, L. Pedro, & P. Almeida (Eds.), *Proceeding of: Old Meets New: Media in Education – Proceedings of the 61st International Council for Educational Media and the XIII International Symposium on Computers in Education (ICEM&SIIE’2011) Joint Conference* (pp. 467–479). Aveiro: Universidade of Aveiro.

Lucas, M. R., & Moreira, A. (2009). Bridging formal and informal learning: a case study on students’ perceptions of the use of social networking tools. In U. Cress, V. Dimitrova, & M. Specht (Eds.), *Learning in the synergy of multiple disciplines* (Vol. 5794, pp. 325–337). Berlim: Springer Berlin / Heidelberg.

O’Reilly, T. (2005). What is Web 2.0: Design patterns and business models for the next generation of software. Retrieved from <http://oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>

Pais, F., Santos, C., & Pedro, L. (2011). Personal Learning Environments: concept, technology, opportunities and challenges. In A. Moreira, M. J. Loureiro, A. Balula, F. Nogueira, L. Pombo, L. Pedro, & P. Almeida (Eds.), *Proceedings of ICEM&SIIE'11 Joint Conference* (pp. 309–318). Aveiro: University of Aveiro.

Pinto, M., Souza, F., Nogueira, F., Balula, A., Pedro, L., Pombo, L., ... Moreira, A. (2012). Tracing the emerging use of Communication Technologies in Higher Education: a literature review. In IATED (Ed.), *Proceedings of INTED2012 Conference* (pp. 850–859). Valencia, Spain: INTED.

Prensky, M. (2005). Learning in the digital age. *Educational Leadership*, 63(4), 8–13.

Sá, C. M. (2010). Developing competences in higher education: a case in teacher education. In M. H. Pedrosa-de-Jesus, C. Evans, Z. Charlesworth, & E. Cools (Eds.), *Proceedings of the Annual Conference of the European Learning Styles Informations Network* (pp. 460–466). Aveiro: Department of Education/University of Aveiro.

Sá, C. M. (2013). Developing competences in Higher Education. *Indagatio Didactica*, 5(3), 86–103.

Siemens, G. (2006). *Knowing knowledge*. Vancouver, BC, Canada: Lulu Press. Retrieved from www.knowingknowledge.com

Siemens, G. (2007). PLEs – I Acronym, Therefore I Exist. Retrieved from <http://www.elearnspace.org/blog/2007/04/15/ples-i-acronym-therefore-i-exist/>

Stake, R. E. (1994). Case studies. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 236–247). Thousand Oaks, California, USA: Sage publications.

Tapscott, D., & Williams, A. D. (2008). *Wikinomics: a nova economia das multidões inteligentes*. (J. A. Pinho, Trans.). Matosinhos: Quidnovi.

Tzeng, J.-R., Liu, S.-C., & Lin, W.-K. (2009). A study of a web 2.0-based educative platform. *Systemics, Cybernetics and Informatics*, 7(4), 38–43.

Wang, Q., & Woo, H. L. (2007). Comparing asynchronous online discussions and face-to-face discussions in a classroom setting. *British Journal of Educational Technology*, 38(2), 272–286.

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