

ATAS DO



3º encontro
sobre jogos e
mobile learning

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Atas do 3.º Encontro sobre Jogos e Mobile Learning

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Collaborative learning assessment in mobile-learning using Web 2.0 tools

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Abstract - This study is part of a wider investigation focussed on technology enhancing learning. Among others, the investigation seeks a deeper understanding about *How to assess students' development of critical and reflective thinking in mobile-learning through collaborative activities based on Web 2.0 tools?* Thus, in the first two sections, the added value of mobile-learning assessment and the fundamental requirements for an effective collaborative learning are discussed. In data analysis, Web 2.0 tools are analysed in order to understand its potential in the assessment of the development of critical and reflective thinking, as well as student contribution, progress, involvement and participation in collaborative activities. This study allowed to conclude that collaborative learning assessment using Web 2.0 tools can promote continuous and (self-)regulated knowledge construction, increasing students motivation and involvement levels, as well as improve teachers' assessment strategies in mobile-learning.

Keywords: Assessment; Collaborative learning; Mobile-learning; Web 2.0.

Introduction

The increasing use of mobile devices challenges schools to change educational practices, determining its adaptation to students and teachers' needs and expectations. In addition, twenty-first century skills determine the adoption of pedagogical strategies answering to student's individual needs, as well as supporting interaction and collaboration between peers and student-teacher (UNESCO, 2013). In the last decade, mobile devices potential in teaching and learning process has been underlined by the easier access and production of information, given its portability, customization, availability, adaptability and persistence characteristics (Al-Emran & Shaalan, 2015; Alrasheedi, Capretz, & Raza, 2015; Dahlstrom, Walker, & Dziuban, 2013). Furthermore, mobile-learning has been referred as a privileged environment for student-centered learning, promoting personalized learning (tailored to its needs and pace), seamless (without interruption and in different educational contexts), situated (in the context in which occurs a particular phenomenon) and collaborative (built from sharing, mutual aid and interaction) (Carly Shuler, Winters, & West, 2013; Ignatko & Zielasko, 2012; Sharples, Corlett, & Westmancott, 2002; Sharples, Taylor, & Vavoula, 2005; Tavares & Almeida, 2015). Thus,

mobile technologies can help and enhance holistic and ubiquitous learning experiences, as well as represent a privileged instrument for collaborative learning promotion.

Collaborative learning and mobile technologies

At first, it is important to clarify the adoption of collaborative learning instead of cooperative learning. Both are commonly used by several authors to highlight the importance of social interaction and confrontation of ideas in the teaching and learning process, stimulating students shared cognitive development and greater involvement in learning activities (Peña-Ayala, 2015). The debate around these two concepts is quite complex given its similarities, however a carefully analysis reveals its differences. According to Oxford (1997), collaborative learning involves interdependence, group responsibility, common goals and the development of social skills, while cooperative learning is related to learn to work together. Roschelle and Teasley (1995) give a more detailed explanation, suggesting that cooperative learning involves the division of tasks to each student – each one is responsible for a part of the problem, while collaborative learning establishes the involvement and mutual effort of all students in the same objective – work together to solve the problem.

Literature underlines considerable benefits of mobile technology usage in collaborative learning, namely supporting the development of communication skills, helping to increase collaboration levels and social interactions quality (Lin, 2015; Storch, 2002). Among other aspects, literature also refers collaborative learning as a powerful strategy to promote a positive learning environment, social interaction between students and the development of critical thinking.

Collaborative learning grants lower anxiety levels in students (Lin, 2015), promoting a positive learning environment with positive impact in the ability of students to (re)structure their ideas and (pre)concepts and to exchange their point of views. Mobile technologies can support these constructionist approaches, helping students to expand the scope of discussions and exploit (new) concepts, enhancing learning experiences in different contexts and access different types of information, contributing to shared knowledge construction (Bryant, 2006; Cobcroft, Towers, Smith, & Bruns, 2006). In addition, mobile technologies provide new ways for students to collaborate and communicate, extending their learning environment and so becoming ubiquitous learners.

Regarding the promoting of social interaction, collaboration-based strategies allow students to (re)organize their ideas and background information when confronted by their peers with new perspectives and approaches, facilitating their understanding and meta-analysis (Lin, 2015). Attending to mobile technologies' flexibility and ubiquity, students can be "always on" (Thomas, 2005, p. 1), allowing them to constantly communicate and access collaborative knowledge construction tools.

Finally, given that collaborative learning is based, mainly, on jointly and reflective problem solving, development of students' critical thinking is strengthened through discussion,

clarification, analysis, assessment and (re)definition of facts, ideas and opinions (Lin, 2015). It is, therefore, an expansion of knowledge through cognitive confrontation. Mobile technologies gain special importance when learning activities require content creation, sharing and critical discussion by peers. Attending to mobile technologies' ubiquity, it can occur anywhere and anytime, increasing the range of information and improving collaborative construction of knowledge (Cobcroft et al., 2006; Lin, 2015).

Mobile-learning assessment based on collaborative learning

In collaborative learning, teachers play a crucial role attending to mobile-learning assessment complexity. To ensure its reliability, teachers must design clear and shared criteria with students, defining assessment methodologies to individual and group objectives, and establishing teacher, self- and peer assessment moments (ENQA, ESU, EUA, & EURASHE, 2015; Keppell, 2014).

Kaendler and collaborators (2015) refer that teachers must attend to five key phases in order to plan successful collaborative learning activities: *planning*, *monitoring*, *supporting*, *consolidating* and *reflecting*. In the *planning* phase, teachers must define learning goals, attending to students' characteristics. Teachers also have to define students' roles according to collaboration activities structure, giving clear instructions to ensure individual responsibility and positive interdependence between group elements. Regarding *monitoring*, teachers must compare intended student interaction with real student interaction in three dimensions: collaborative activity (e.g., sharing information), cognitive activity (e.g., quality of questions, explanations and feedback) and meta-cognitive activity (e.g., assessment outcomes). By *supporting*, it means that teachers must decide by adaptive support based on students' needs and outcomes in different situations (e.g., direct support and immediate). In the *consolidating* phase, teachers must define strategies such as, group presentations and discussions to activate students (meta-)cognition (e.g., comparing groups' ideas). Finally, the reflecting phase requires that teachers evaluate the adopted strategies, comparing initial goals to students' outcomes and learning achievements, readjusting strategies to improve students learning and assessment processes.

In line with the exposed, Johnson and Johnson (2002) refer that the two major issues in conducting assessment in collaborative learning are the meaningful and the manageable. Mobile-learning assessment based on collaborative learning requires teachers focus on the process that means to assess all students outcomes and progression in collaborative activities. From the dynamics between students and technological tools, the assessment presents a continuing and persistent nature, allowing teachers real time assessment and students learning path (re)organization (Lin, 2015). This process involves essentially social interactions and students deep reflection. The authors highlight five fundamental requirements for collaborative learning assessment (Johnson & Johnson, 1999), presented below.

In collaborative learning teachers must *assess group interactions*. This assessment requires

regular monitoring of group work and group elements. In addition, assessment can be carried out adopting strategies such as self- and peer assessment. Therefore, in collaborative learning *constant feedback* from teachers and peers is crucial. Feedback related to learning process and/or results of a particular activity should be immediate and should promote students' reflection about possible improvements. Consequently, students must have *time to reflect* about teacher and peers feedback to (re)adapt and improve procedures, as well as assess their own performance in collaborative learning. Based on *group progress assessment*, students must discuss and establish group strategies for problems remediation. Whenever the group presents good results and/or enhance their work, teachers should give positive feedback *valuing group progress* and motivating students to a greater commitment and enthusiasm in their work. In addition, peer positive appreciation also represents a valuable input to enhance students' commitment to collaborative learning.

Problem, research question and study objectives

This study is part of a wider investigation focussed on technology enhancing learning. Among others, the investigation seeks a deeper understanding about *How to assess students' development of critical and reflective thinking in mobile-learning through collaborative activities based on Web 2.0 tools?* According to the foregoing, the study objectives are to discuss the added value of mobile-learning assessment and to analyse the most appropriate Web 2.0 tools to assess the development of critical and reflective thinking, as well as student contribution, progress, involvement and participation in collaborative activities.

Method

For this study it was adopted a qualitative methodology, collecting data from observation and document analysis. To discuss mobile-learning assessment and how to collect data leading to an assessment based on collaborative learning, this study was supported by literature and Web 2.0 state of the art and its analysis. For the review of literature, books, articles, field studies and reports related to *mobile-learning, collaborative learning, assessment using technologies, social software* and *Web 2.0 tools* were considered. The search was performed across ERIC, Scopus and ScienceDirect databases, as well as across reference scientific journals focussed on subjects such as *mobile-learning, Education, Technology, educational technology* and *learning technology* (e.g., *Journal Personal and Ubiquitous Computing; Computers & Education; Technology, Pedagogy and Education*). Among the available Web 2.0 tools, the most appropriate to assess the development of critical and reflective thinking, as well as student contribution, progress, involvement and participation in collaborative activities, were selected and analysed, namely: shared documents; concept maps; online infographics, posters and presentations; forums; wikis; (micro)blogs; educational platforms; and badges.

Data analysis

One of the main constraints in the teaching and learning process supported by technology is to ensure that contribution, participation and learning outcomes are actually achieved by students (Garrison & Anderson, 2003). Collaborative learning stresses its importance by establishing itself as a privilege methodology to mitigate this problem, by allowing teachers to ensure the authenticity of students learning outcomes through various *monitoring*, *supporting*, *consolidating* and *reflecting* strategies. Thus, in mobile-learning it is crucial to diversify moments and assessment tools, as well as use different information sources to facilitate and enrich assessment process.

Crossing teaching collaborative learning strategies with mobile-learning assessment, literature indicates highly benefits of this relationship (ENQA et al., 2015; Keppell, 2014; Lin, 2015). Defining clear learning goals and collaboration activities structure, as well as detailed instructions, can ensure individual responsibility and positive interdependence between group elements, situating students in (collaborative) learning path and expectations. Alongside, *monitoring* strategies maintain and encourage students' involvement in learning process, as well as help teachers to compare expected student interaction with real student interaction in collaborative, cognitive and meta-cognitive activities, allowing them to encourage, stimulate and promote students engagement. Closely linked to monitoring strategies, *supporting* strategies can improve student-centered learning, promoting personalization and seamless by the adoption of adaptive support based on students' needs and outcomes in different situations (instant feedback, anytime and anywhere). Finally, *consolidating* and *reflecting* strategies represent crucial strategies, not only for teachers to assess students learning path and knowledge construction, but also to define moments for students to show and discuss their achievements and ideas. Both strategies require teachers' formative feedback to improve students learning and assessment processes.

Web 2.0 tools can help teachers to assess group interactions through regular monitoring of group work and group elements, maintaining and encouraging students' involvement in learning process. It also can help teachers to assess students learning path and knowledge construction, readjusting strategies and giving formative feedback, promoting consolidating and reflecting moments (Kaendler, Wiedmann, Rummel, & Spada, 2015); as well as help teachers to ensure and improve the assessment of collaborative learning in mobile-learning (Mansor, 2012), as presented below.

Shared documents are allocated files in the cloud that allow students to edit information simultaneously and in real time. These documents assume different formats (e.g., text files, spreadsheets) and support historical features as document revisions and comments from users, enabling students' contribution and involvement levels management in collaborative activities. Shared documents can be used to develop *assimilation* and *production* learning activities as managing and structuring information (e.g., produce stories, reports and newspaper articles) (Siemens & Tittenberger, 2009). These tools have a huge potential to assess students

collaborative critical thinking development and each student contribution, progress, involvement and participation in collaborative activities (*Ibidem*).

Concept maps are tools that allow students to seek ways to relate and consolidate concepts, through its collaborative organization and intersection with peer knowledge. These tools can be used to develop *assimilation* learning activities as searching, discussing and structuring information (e.g., develop concept mapping, brainstorming and mind maps) (*Ibidem*). Concept maps are also highlighted in collaborative concepts clarification and in the development of students critical thinking, through collaborative analysis, synthesis, reflection and construction of meanings (Daley, Cañas, & Stark-Schweitzer, 2007; **Hwang, Yang, & Wang, 2013**).

Online infographics are tools that allow students to collaboratively represent in different ways the same information, combining, for example, images, text and statistics. These tools can be used to develop *communication* and *production* learning activities as discussing and structuring information (e.g., implement reasoning, arguing and debate exercises) (Abilock & Williams, 2014). Infographics invite “students to make sense of complex information by applying multiple literacies” (*Ibidem*, p. 47), representing an asset to assess students' ability to jointly explore and amplify concepts and confront ideas and pre-conceptions (Dantas & Rosa, 2013).

Online interactive posters are tools that allow students to collaboratively represent and connect various information through images, text and video. These tools can be used to develop *communication* learning activities as discussing (e.g., implement sharing ideas, arguing and debate exercises) (Altintas, Suer, Sari, & Ulker, 2014). Posters present advantages in the improvement of students' interactions and ideas transmission, improving clear and concise thinking, allowing to assess students' communication skills and collaborative analysis, synthesis, reflection and construction of meanings (*Ibidem*).

Online interactive presentations are tools that allow students to “prepare material in advance (...) and manipulate items” (Kennewell, 2005, p. 1) improving concepts exploitation. These tools can be used to develop *communication* learning activities as discussing (e.g., implement group work presentations, online guided discussions) (Ghirardini, 2011; Siemens & Tittenberger, 2009). Presentations represent an asset to assess collaborative creatively to present and explore concepts, as well as to assess students' argumentation and reflective skills (*Ibidem*).

Forums are online discussion tools, referred by several authors as collective knowledge construction environments, stimulating students' careful search of information and personal reflection before sharing (**Oliveira & Morgado, 2012**). These tools can be used to develop *assimilation*, *communication* and *production* learning activities as searching, managing and structuring information (e.g., implement brainstorming, debate and discussion exercises) (**Siemens & Tittenberger, 2009**). Forums allow teachers to access highly structured information to assess communication skills, quality of participation in discussions, opinions and information shared (**Ghirardini, 2011**).

Wikis are online tools based on the central idea that any original text can be changed, so that new knowledge is incorporated in the previews. These tools can be used to develop

assimilation and *production* learning activities as searching, managing and structuring information (e.g., develop share information exercises, debate and discussion) (Siemens & Tittenberger, 2009; Zheng, Niiya, & Warschauer, 2015). Wikis can improve peer interaction and promote the sharing and distribution of knowledge amongst students, allowing teachers to assess student's ability to work collaboratively and to jointly analyse, process and produce written information (*Ibidem*).

Blogs and microblogs are online tools like websites, differing by the chronological content presentation. Microblogs are distinguished from blogs for only allowing, average, 200 characters posts (e.g., Twitter[®]). These tools can be used to develop *assimilation*, *communication* and *production* learning activities as searching, managing and structuring information (e.g., implement collaborative writing, debate and discussion exercises) (Gomes, 2005; Holotescu & Grosseck, 2009; Siemens & Tittenberger, 2009). Blogs and microblogs have a huge potential to assess students evolution and learning path complexity, allowing teachers to verify response variations and students participation, interaction and collaboration levels, promoting self- and peer assessment and students reflection about causality, consequence and meaning of their choices and knowledge acquired (*Ibidem*).

Educational platforms, usually designated as *Learning Management System*, *Learning Content Management System*, *Virtual Learning Environment* e *Personal Learning Environment*, allow to automatically manage students learning path (e.g., accessed content) and students' assessment (e.g., tests resolution). In the last decade, educational platforms started to incorporate social features becoming very similar to social networks, resulting in an progressively adoption of collaborative strategies by teachers as forming work groups inside the platforms and launching collaborative activities. In the last years, one of the social features related to assessment that drew teachers' attention were badges (all4ed, 2013). Badges are digital tokens (icons or logos) use in several educational platforms (e.g., Edmodo[®], Moodle[™]) accounted to students when an learning activity is accomplished (EDUCAUSE, 2012). Attending to the increasingly social nature of learning, based on knowledge networks and collaborative work (Siemens & Tittenberger, 2009), badges are powerful tools in students involvement and motivation in collaborative learning activities (Frederiksen, 2013; Tavares & Pedro, 2015). Depending on the proposed activities and students outcomes, badges can be used to assess students' ability to analyse, discuss and present conclusions about a certain subject.

In sum, Web 2.0 tools can facilitate the assessment of group interactions, monitoring group work and group elements; improve teachers' immediate feedback strategies, related to learning process and/or results of a particular activity; increase teachers and students' reflection about possible improvements and/or readjustments; facilitate group progress assessment and the establishment of group strategies for problems remediation; and facilitate teachers' valuing strategies, motivating students to a greater commitment and enthusiasm in their work.

Conclusions

Collaborative learning has significant benefits from the standpoint of promoting interaction among peers and student-teacher and in the development of students' critical and reflective thinking skills. Alongside, collaborative learning assessment using Web 2.0 tools can promote continuous and (self-)regulated knowledge construction, increasing students motivation and involvement levels, as well as improve teachers' assessment strategies in mobile-learning. Combining different assessment tools can be an asset, promoting further clearness and reliability in assessment process, attending to the possibility of crossing and gathering different (sources of) information through the analysis of students' learning path. However, assessment tools selection should be careful, fostering learning objectives and reflecting interaction, collaboration and expected feedback levels. Therefore, the success of collaborative learning assessment in mobile-learning using Web 2.0 tools is highly dependent on teachers' strategies adopted. It is crucial that teachers constantly follow group work and group elements; give constant feedback related to learning process and/or results of a particular activity to promote students' reflection about possible improvements and to maintain students involvement; and value group work and group elements progress, motivating students to a greater commitment and enthusiasm in their work.

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