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ATINER's Conference Paper Series
EDU2016-1901

Production and Sharing of Learning Activities with Technologies: Designing for Learning in Teacher Formation Courses

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This paper should be cited as follows:

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Abstract

Studies about innovation in education show us that pedagogical practices can enhance the way students apply their knowledge in real situations which is something of great importance in the teacher formation process. This study is complementary to an ongoing research project called "Pedagogical practices on cyberspace" and aims to promote the development and the documentation of learning activities with technologies based on Learning Design studies. The research, based on a qualitative approach, was conducted in a teacher formation course, where undergraduate students were majoring in Portuguese/English. This way, the activity with these students aimed to promote the reflection on the use of digital technologies in an educational setting and the production of learning activities based on Learning Design concepts. Results show that the Learning Design approach can be explored in the academic context with the use of conceptual maps as mediation artefacts. Furthermore, the learning activities represented in conceptual maps became available on the web and can be accessed by different subjects and the practices can be adapted and reused in different contexts.

Keywords: educational technology, teacher formation, learning design.

Introduction

The sharing of learning activities with the use of technologies is in the center of the studies of the Learning Design area. Learning Design, being an area of research and development, has two different and complementary paths. In one way it focuses on how to represent teaching practices from a technical perspective. In this case, researches involve how "to build computer systems that would orchestrate the delivery of learning resources and activities" (Falconer et al., 2011, p. 101). The second perspective refers to the need of finding "effective ways of sharing good and innovative practice in technology-enhanced learning" (Falconer et al, 2011, p. 101), and it is the focus of this paper.

According to Dalziel et al. (2016, Chapter 1) "Learning Design can assist educators to describe effective teaching ideas so that they can be shared with, and adapted by, other educators". These learning activities can be shared through mediation artefacts and this process enables the construction of an educational practices database. Thus, these practices can be published and accessed by different teachers who can reuse, modify, and validate them in different contexts.

It's important to highlight that Learning Design (LD) studies are related to studies in the area of open educational resources (OER). LD fosters the use of OER, which are "are any type of educational materials that are in the public domain or introduced with an open license" (UNESCO, 2015). This means anyone can legally and freely copy, use, adapt and re-share these open materials which go from audio, video, and animation to a whole course.

There are a many web tools and OER that can be used to foster educational processes. However, how can educators propose learning activities using all these technology in a way that goes beyond traditional approaches?

According the NMC Horizon Report 2015 K-12 Edition (Johnson et al., 2015), integrate technology in teacher formation and rethink the role of teachers are significant challenges impeding technology adoption in K-12 education. The cited report emphasizes that "teachers are increasingly expected to be effective facilitators, engaging in joint problem-solving with their students. This cannot be accomplished, however, if teachers are unable to implement emerging digital tools in creative ways" (Johnson et al., 2015, p. 28). Through this perspective, it is important to promote and reflect about the use of technology in educational settings in teacher formation courses.

Studies about innovation in education show that pedagogical practices can enhance the way students apply their knowledge in real situations, which is something of great importance in the teacher formation process (OEDC, 2014). Thus, we understand that promoting LD experiences with pre-service teachers can help them turn private teaching ideas into explicit and shared ideas (Dalziel et al., 2016) and also that the representation of learning activities into graphical mediation artefacts allows the visualization of technological tools and resources proposed for an activity fostering an analysis and evaluation of the proposed practice. Besides, it can enhance de use and the authoring of OER.

This study is complementary to an ongoing research entitled "Pedagogical practices on cyberspace", supported by CNPq, and aimed to promote the reflection on the use of digital technologies in an educational setting and the production of learning activities based on Learning Design concepts. The research was conducted in a teacher formation course, where undergraduate students were majoring in Portuguese/English.

This article is organized as follows: in section 2 we present the Learning Design area. Subsequently, in section 3, we present the research path and discuss the results. We finish the paper by presenting the findings and making recommendations for future research.

Learning Design

The activities or tasks are the basic unit of the teaching and learning process. An activity can be a lecture, a debate, a research, an exercise, and others. A sequence of activities is as a set of ordered, structured, and articulated activities in order to achieve certain educational goals. The way the teacher organizes the sequence of activities is an evident trace that determines the educational practice (Zabala, 1998).

The documentation of one sequence of activities allows the sharing of educational practices among teachers. This way, an educational practice can be reused and/or modified and can be used in a different context. However, the production and sharing of educational practices involves the development of a collaborative teaching culture and the need for documentation standards.

According to Agostinho et al. (2011, p. 1), "the underlying premise of learning design is the notion that, if effective teaching and learning practice can be represented in a systematic way, this could then support the process of reuse, which could ultimate lead to improved practice".

The core concepts of Learning Design are guidance, representation, and sharing. Therefore LD consists of "guiding the design process, visualizing/ representing design, and mechanisms to enable educators to share and discuss their designs" (Conole, 2016, Chapter 6).

There are different levels of granularity in the design of teaching and learning activities varying from individual learning activities to a whole course/ program.

A learning activity is a specific task which has to be develop by students in order to achieve educational goals, as the elaboration of a report, the participation in a discussion, and others. According to Beetham (2007, p. 28), a learning activity can be defined "as a specific interaction of learner(s) with other(s) using specific tools and resources, orientated towards specific outcomes". In this case, resources are "content-based artefacts that use various representational media such as texts, images, moving images and sound (Beetham, 2007, p. 33). Tools are the artefacts "designed to support a specific task function rather than to represent content" (Beetham, 2007, p. 35). However, the distinction between a resource and a tool is becoming blurred

because the same tool can be used by the teacher/designer to create content and also by the students to create their own representation of subject matter (Beetham, 2007).

An important aspect of LD is the process of describing the essence of a learning activity. However, how can one capture and represent the practice?

The learning activities can be codified into different forms of representation. These forms of representation are known as mediation artefacts based on their role of mediating the design of the teaching and learning activities (Conole, 2013).

According to Conole (2013) it is necessary to focus on the essence of a learning activity, so that it can be reused in the development of a new learning activity and be used in a different context.

There are different kinds of mediation artefacts like text, visual/graphical representation, taxonomy, etc. Thus, the mediation artefacts have different ways of representation but this implies different levels of abstraction and detailing of the information. This way, different mediation artefacts reveal different aspects of a learning activity,

There are many tools that can be used to design a learning activity. Some of them were developed based on Learning Design concepts like CompendiumLD, Web Instant Collage, and CADMOS. However tools for the development of conceptual maps, like CMapTools, Mindomo (www.min domo.com), Popplet (www.popplet.com) and Goconqr (goconqr.com) can also be used as mediation artefacts for representing learning activities (Conole, 2013, Bassani, 2014).

The documentation of learning activities through mediation artefacts allows the proposed/developed design to be shared and discussed with others.

The 7Cs framework can help teachers/educators to represent their designs.

The 7Cs of Learning Design

Conole (2016) proposes the 7Cs framework of Learning Design "which has been designed to help teachers/designers make design decisions that are pedagogically effective and make appropriate use of digital technologies" (Conole, 2016, Chapter 6). According to Conole (2015), when teachers design a learning intervention they typically focus on content and the 7Cs framework shifts the focus from content to activities.

The 7Cs are: **c**onceptualise, **c**reate, **c**ommunicate, **c**ollaborate, **c**onsider, **c**ombine, and **c**onsolidate. The 7Cs are grouped into four categories as shown in Figure 1.

Conceptualise refers to the vision of the course/module/activity. It is important the educator moves the focus from the content to the learners and the pedagogical approach.

The next four Cs (Create, Communicate, Collaborate, and Consider) refers to the designing of activities and resources. Create guides the educator to think about what learning materials need to be created and the selection of open educational resources that could be used. Communicate involves the methods used to facilitate communication between the learners and the educator.

Collaborate involves the use of mechanisms to enable collaboration or group work. Consider is related to the learning outputs and focuses on "ways learner reflection and demonstration of learning achievements can be promoted" (Conole, 2016, Chapter 6).

The next level, Combine, enables the educator to reflect about the design process (synthesis), and Consolidate refers to the implementation and evaluation of the design in a real-life context.

Figure 1. *7Cs of Learning Design*
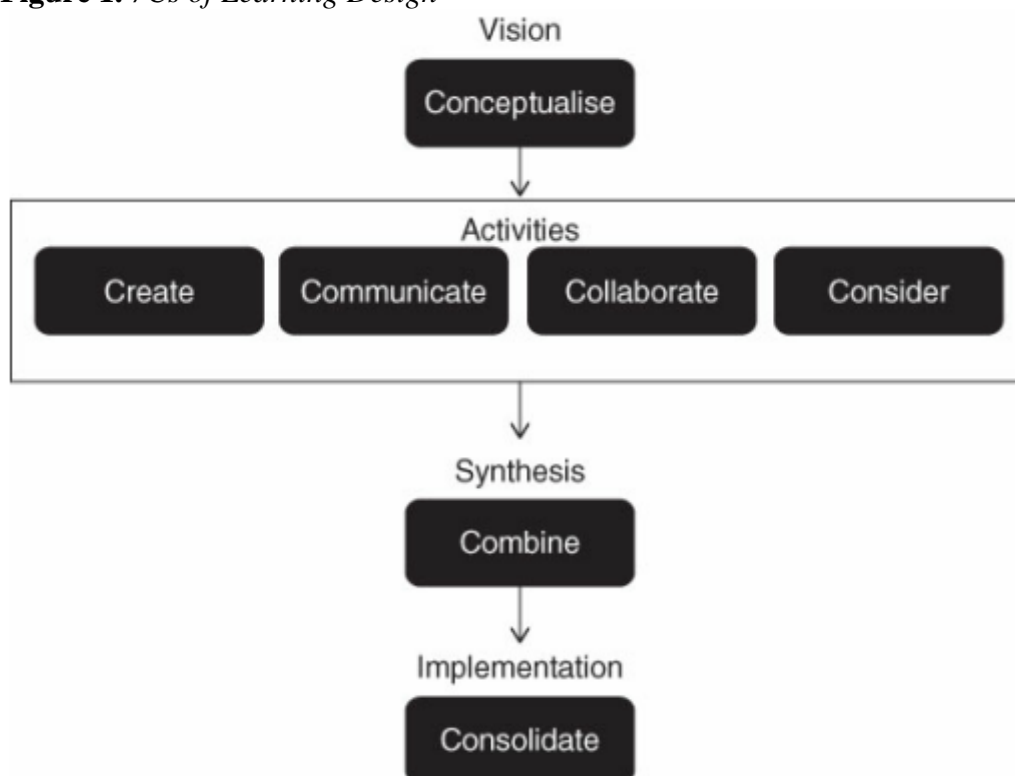
Source: Conole, 2015.

Conole (2016) proposes, for each C, a base theory and a set of Learning Design representations in order to guide the teacher/educator to think about possible practices and make this design explicit.

We assume like Conole (2015, 2016) that the 7Cs framework is an interesting approach to foster creative educational practices with technologies.

The Research Path

This research, based on a qualitative approach, was conducted in a teacher formation course, where undergraduate students were majoring in Portuguese/ English. The proposed activity was developed with students coursing the subject called "New technologies applied to language learning". The activity

was developed with two groups during the year of 2015 first and second semester.

The activity with these students aimed to promote the reflection on the use of digital technologies in an educational setting and the production of learning activities based on Learning Design concepts. Thus, the practice was based on de 7Cs of Learning Design (Conole, 2015, 2016).

Results

The first moment was the Conceptualise phase. The students, in pairs, had to plan a learning activity with technology. Some students had already had an experience as teachers but others hadn't. In this case some questions were proposed in order to guide the activity: What kind of students do you want to propose a learning activity for? What is the content? What is the aim of the activity or project? What is/are the learning outcomes? What is the pedagogical approach?

The students made use of post its, as shown in Figure 2, to draft the first idea of the learning activity, identifying the roles of the teacher and the students, the activities, the resources, and the digital tools.

**Figure 2.** *The Conceptualise Phase*

The second phase involved the designing of activities and resources based on four Cs (Create, Communicate, Collaborate, and Consider).

In the first moment, Create, the students selected the materials to use, like OER, web sites, and mobile applications. They also decided which materials needed to be produced.

They created materials on Prezi, Google Form, and exercises as shown in Figures 3 and 4.

Figure 3. *Activity Developed in Prezi*
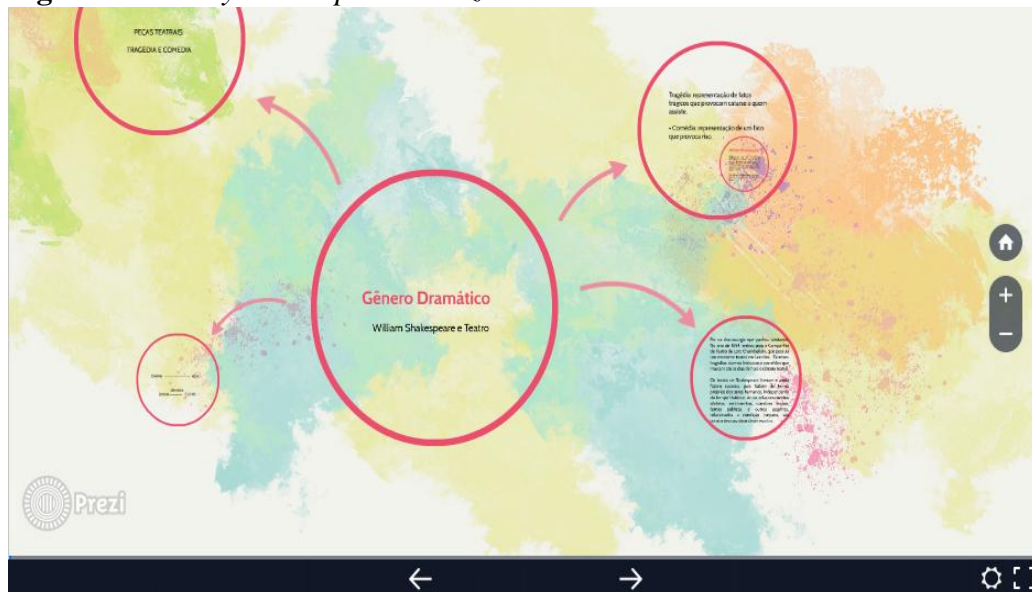
**Figure 4.** *Word Search Puzzle*

The Communicate, Collaborate and Consider phases were planned together. The students analysed the proposed learning activities and reflected on the possibilities of improving the communication and collaboration among students in order to foster learning outcomes.

In the next phase, Combine, they made a synthesis of their work and implemented their design using a conceptual map tool.

With one group of students, in the first semester of 2015, we proposed the use of any conceptual map tool to make the learning design of the activity. They used different tools, like CMap Tools, GoConqr, and Mindomo. Figure 5 shows a learning design produced using Mindomo.

Figure 5. *Learning Design Produced using Mindomo*
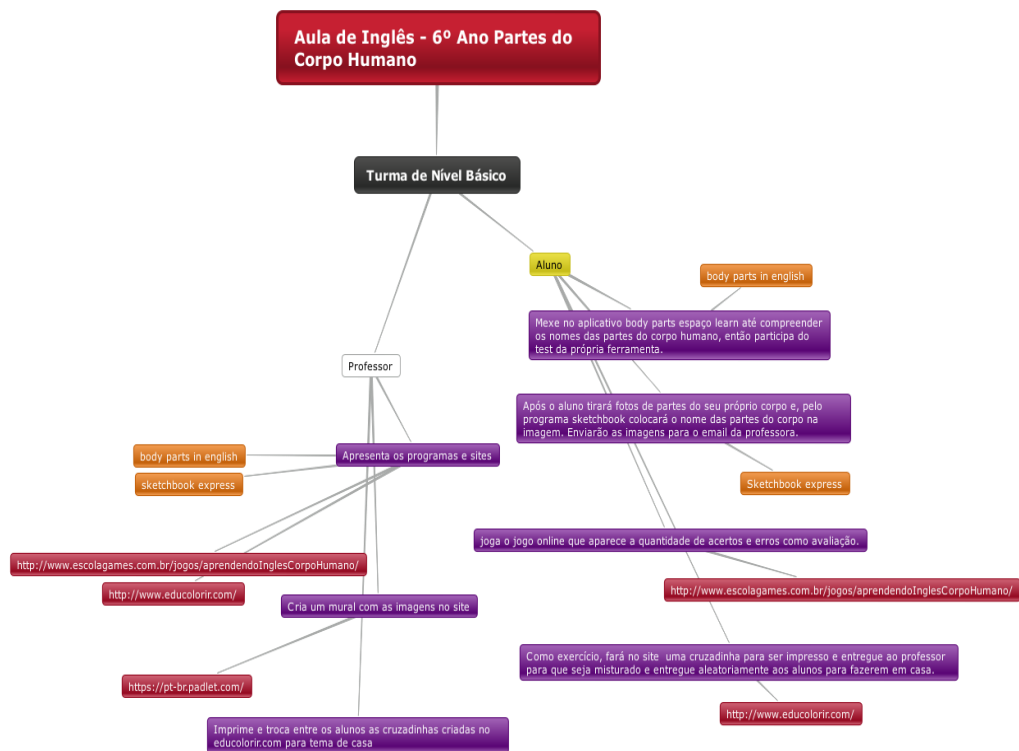
With the other group of students, in the second semester of 2015, we proposed the use of GoConqr.com, an online conceptual map tool. GoConqr is an interesting web tool that allows the creation, the sharing, and the reuse of conceptual maps. Figure 6 shows a learning design produced with GoConqr.

Figure 6. *Learning Design Produced using GoConqr*
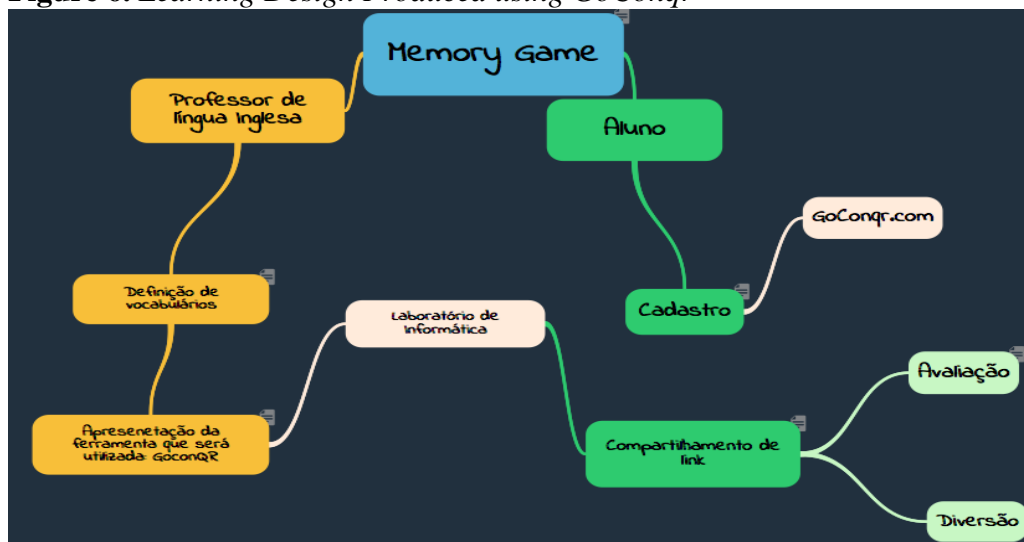
This phase (Combine), according to Conole (2016, Chapter 6), allows the "educator/designer to step back and reflect on the design process". Each pair of

students presented and explained their learning design to the class. This was an interesting experience to re-think the practices and the designs.

Moreover, the students shared their learning designs on the web, using the web tool Padlet (Figure 7).

Figure 7. *Padlet as a Space for Sharing the Activities*
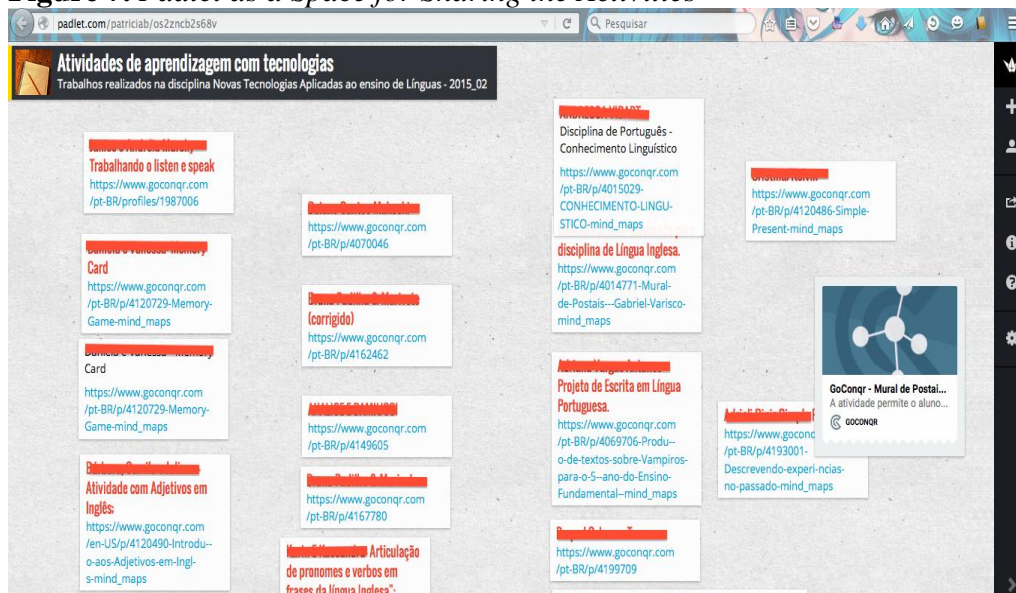
The Consolidate C focuses on the implementation and the evaluation of the design in a real learning context. However, the students didn't have the opportunity to experiment it.

Analysis

The students, during their undergraduate course, have different opportunities for the development of lesson plans and their execution in a real educational setting. However, they usually use mediation artefacts based on texts, following a regular sequence which involves the definition of the goals, the content, the activities, and learning outcomes. In this case, the use of a mediation artefact based on a visual representation was a challenge for the students. The use of post its facilitated the brainstorm overall the vision of the course during the Conceptualise phase. We proposed the use of different colours to represent the actors, activities, the resources, and the (digital) tools. During this phase the students organized and reorganized the learning activity during an interesting process of reflection on pedagogical approaches.

During the second phase, the design of activities and resources based on 4Cs (Create, Communicate, Collaborate, and Consider), the students selected resources but also they created resources. The use of OER was encouraged and they explored repositories, and also web sites, mobile applications, and social media as YouTube. The creation of resources was as important opportunity for the development of digital skills because the students had the opportunity to

explore digital tools such as Prezi and Google Form. Through this perspective they acted as content producers.

In the next phase, Combine, the students implemented their design using a conceptual map tool. As mentioned before, the first group used CMap Tools, GoConqr, and Mindomo. The second group developed the learning design on GoConqr web tool because it allows the creation, the sharing, and the reuse of conceptual maps.

The analysis of the production process of learning designs and its results pointed out important issues:

a) the definition of registration standards: some designs were quite superficial and others were over detailed; although we proposed different colours to represent actors, activities, resources, tools, and learning outcomes, the students created their own patterns;

b) the possibility of sharing and reuse: each conceptual map tool has different characteristics, and this can either make it difficult or facilitate the sharing of the design. For example: the CMapTool is an offline tool and the result can be exported as picture. So, it is necessary to have an online space to share. Mindomo allows sharing by a public link, but doesn't allow the reuse. GoConqr allows the sharing by a public link and the reuse;

c) the promotion of teachers as content producers: the use of OER, web sites, mobile applications, and social media as digital resources was encouraged. However, the creation of resources was important for the development of digital skills and for the promotion of the future teachers as content producers;

d) the reflection on the pedagogical approach: The use of mediation artefacts based on visual representation of a learning activity allows the reflection on the pedagogical approach based on the role of teacher and students within the proposed activity. In some designs we can perceive an active participation of the teacher and a small involvement of the students in the tasks and this visual fact is as interesting experience to re-think and remodel the proposed practices;

e) the importance of repositories for sharing practices: the used conceptual maps allow the sharing of a learning design through a public link. How can we find, though, all these materials published in different web spaces? There are interesting repositories like Merlot, but there is a lack of repositories in Portuguese. In this study, we organized all produced learning designs in a collaborative space using Padlet.

Final Considerations

Masterman (2013, Chapter 4) states that design is both the application of "systematic principles and methods" and also "a creative activity that cannot be fully reduced to standard steps". In this study, we encouraged future teachers to reflect on the use of educational technology in the classroom based on a framework for guiding the production of learning activities. The results showed that the Learning Design approach can be explored in the academic context with the use of conceptual maps as mediation artefacts.

This study had two main aims: to promote the reflection on the use of digital technologies in education within a teacher formation undergraduate course and the production of learning activities based on the Learning Design concept. The analysis of the results shows that these two perspectives are interconnected. Learning Design, as a research and development study area, provides guidelines for technology-enhanced learning, and the learning design, as an artefact for representing practices, allows the viewing of a learning activity and the reflection on the pedagogical approach.

From the point of view of teaching, the observation of the design process within both groups of students revealed that the 7Cs framework provides guidelines that can help teachers to design a learning activity. The selection of resources fostered the use of OER but also promoted future teachers as content producers.

From the point of view of the production of learning designs, we realized that conceptual map tools are easy to use. However, the most important issue that we observed was that the representation of learning activities using a mediation artefact, based on visual representation, allowed the students to visualize their proposal and reflect on it. We also observed the importance of the use of a registration standard aimed to facilitate the comprehension of the different designs. The next step of this research involves studies about representational approaches to facilitate the sharing of learning designs.

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