

PACO-T: A Computational Framework for Planning Cultural Contextualized Learning Activities by Using Common Sense

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Abstract: This paper presents PACO-T, a common sense-aided computational representation for PACO, a seven-step framework to plan learning activities pedagogically suitable. PACO-T offers teachers a technological infrastructure to access common sense knowledge collected from different profiles of people and to use it in planning culturally contextualized learning activities, which is one of the main pedagogical issues discussed in different Learning Theories. The paper presents the tool as well as how the common sense knowledge is offered.

Keywords: Technological infrastructure, common sense knowledge, contextualization, learning activity, pedagogical issues

1. Introduction

In regard to Learning Theories of renowned authors such as Freire [1], Freinet [2], Ausubel [3] and Gagné [4], the importance of contextualizing the learning activity to the target group's previous knowledge is presented as a relevant issue to promote meaningful learning and to make possible knowledge retention. Although those authors express the importance of considering the previous knowledge of the learning activity target group, this knowledge is not easy to recognize.

In this research we consider using the common sense knowledge collected collaboratively through the web to contextualize learning activities, so that effective learning can take place.

This paper presents PACO-T, a tool that makes teachers able to access and to explore common sense knowledge while planning learning activities. It is based on PACO[5], a seven-step framework for planning learning activities pedagogically suitable and it was designed taking into account teachers' needs for a tool that allows them to contextualize their learning activities to their target

group. The common sense knowledge base used was the Brazilian Open Mind Common Sense project (OMCS-Br) [6].

The paper is organized as follows: section 2 presents how common sense can support teachers during the learning activity planned using PACO; section 3 presents PACO-T and how it gives teachers access to common sense knowledge; finally, section 4 presents some conclusion remarks and points to future works.

2. Common Sense and the Planning of Learning Activities

Any kind of knowledge can be considered common sense, since it is widely accepted by the people inserted into the social group which is taken into account. Moreover, common sense is time and place dependent. What it is common sense today may not be common sense in the future. Also, what it is common sense in a certain place possibly it is not common sense in another place. In addition, common sense varies according to the age and the education level of the considered group [6]. In this sense, common sense knowledge can be used for Educators to (i) identify topics of general interest to the target group; (ii) fit the learning activity content to the target group's previous knowledge; (iii) identify suitable vocabulary to be used in the learning activity; and (iv) identify knowledge from the target group's domain to which new knowledge can be anchored so that meaningful learning can be achieved (for instance, using the knowledge to compose metaphors and analogies to be used during the learning activity)[7].

The OMCS-Br project collects Brazilian common sense knowledge through the web. It adopts a template-based activities which guide users in such a way that they can contribute with different kinds of knowledge. The templates are semi-structured sentences in natural language with some lacunas that should be filled out with the contributors' knowledge so that the final statement corresponds to a common sense fact. Further, the contributions are pre-process so that they could be easier manipulated by inference procedures. From this pre-processing, semantic networks are generated with the knowledge represented as binary relations. These semantic networks are called ConceptNets. PACO-T uses the semantic networks and the API provided by OMCS-Br to present knowledge related to the context of the learning activity planning, collected from volunteers with the profile of target group (cf. [6]).

Moreover, PACO-T is based on PACO - a 7-step framework designed to support teachers in **P**lanning learning Activities supported by **C**omputers [5]. The essence of PACO relies on the fact that the definition of the learning tasks and the selection of the computer tools to support their performance should be addressed by pedagogical issues and by characteristics of the target group. PACO has already been used by teachers from different areas who have no previous knowledge in planning learning activities supported by computers [5].

In PACO-T, the target group's common sense knowledge is presented to educators, so that they can assess how people from that target group talk about topics related to the theme of the learning activity being planned and decide which topics they should approach in the learning activity, according to the needs they identify. Through common sense analysis educators can become aware about the learners' level of knowledge, avoiding approaching topics which learners already know and approaching topics which is misunderstood by that learners' profile, since common sense registers myths, believes and misunderstandings of people from whom the knowledge was collected [7].

3. PACO-T

PACO-T design was guided by a Pattern Language for designing web systems aiming to improve the system usability and provide teachers with a pleasant interaction. The interface design issues for PACO-T are approached in a forthcoming paper already accepted for publication.

The tool has seven steps as the framework on which it is based, each one with several sub-steps that comprises the tasks that teachers need to perform to get the learning activity planned. It maps the questions which teachers should answer during the planning of a learning activity, according to PACO's proposal, and offers teachers access to the common sense knowledge stored in the OMCS-Br knowledge base. For that, it uses the semantic networks and the API (Application Program Interface) provided by the OMCS-Br Project.

The first sub-step of PACO-T gives teachers access to the common sense knowledge stored in the OMCS-Br knowledge base. There teachers define the learning activity's target group's profile and, consequently, tell the system to which ConceptNet it should connect.

Figure 1 presents the interface that follows the sub-step "Define the target group's profile". This interface illustrates how common sense knowledge is presented to teachers and how they can explore it. On the right in the interface, the common sense support available for this step can be seen.

In order to analyze how people talk about subjects of interest, teachers have to provide some keywords in the search text field and click on the button "Search". Doing that, the system sends the keywords to the OMCS-Br API, which processes the entry and retrieves relevant information for the context. After finding words related to the context, PACO-T sends the words whose relevance to the context is greater than 30% to the *DisplayNode()* function. This function receives a word or a phrase and returns the relations in the ConceptNet which have a node equal to the words or the phrase. Thus, the words returned by the *GetContext()* function are sent one by one to *DisplayNode()* and it is considered five relation at most of each relation type returned. Those relations are then mapped into natural language and presented to teachers who can interact with them. Note that the items are presented

as links. Clicking on the link, the system performs a new search in ConceptNet, using as keyword the link text, and updates the information in the common sense support box. This allows teachers to navigate among the concepts previously presented and to analyze how people with the same profile of their target group talk about related subjects. Through the analysis they can get the support mentioned in section 2.

PACO-T
Planning learning Activity supported by COmputer - Tool

Help
Log out

Step 1 Step 2 Step 3 Step 4 Step 5 Step 6 Step 7

Define the learning activity's title

Define the target group's profile

Define the theme

Define the objectives

Additional Information

What is the learning activity theme? (example)

The continuity of care of a sick person at home.

What is the learning activity's justification? (example)

(i) the health professionals have to be prepared to orient the population about how to home care a sick person; (ii) there is no

there is the possibility of the Nursing Department provide extra courses to complement the learning formation through a DL approach; (iii) in order to provide a suitable orientation, the health professionals might know the social context into which the caregiver is inserted.

Hide common sense support

Define or refine the learning activity's theme and/or the justification analyzing how people from your target group talk about related subjects. (explain how)

Enter the search keywords*

home care a sick person Search

Generalizations about home care a sick person:

- home care
- home
- care
- sick person
- person

Motivation of home care a sick person:

- love
- make the person happy
- not have money
- save money

Property of care a sick person:

- boring
- tiring

Conceptually related to:

- relative

* Please, separate the keywords by comma

<< Define profile Save Interrupt Cancel Define theme >>

Figure 1. PACO-T Step 1 – Define the theme

The common sense support box is always presented when there is the possibility of teachers to decide something based on this kind of knowledge. By following the steps of the computational representation of PACO, answering the questions presented in each step and exploring the available common sense knowledge, teachers can plan their learning activities taking into account pedagogical issues and fit it to their target group needs.

4. Conclusions and Future Works

This paper has presented PACO-T, the computational representation for PACO, a framework to plan pedagogically suitable learning activities. The tool aims to support teachers in planning learning activities, taking into account the seven steps defined in PACO. For that, a study about the information that teachers should provide in each step in order to build up the learning activity plan was performed. Moreover, the case study allowed identifying how common sense knowledge can

be useful to teachers in order to help them to answer some questions that are inherent in the learning activities planning.

With the tool, it is intended to make the task of planning learning activities easier to teachers and to give them conditions to plan learning activities that fit to their target group's needs and that can promote effective learning. As it was discussed in the paper, the use of common sense knowledge in the learning process to promote effective learning is defended by renowned author from Pedagogy such as Paulo Freire [1] and Celestin Freinet [2], and this knowledge can also be used to attend pedagogical issues related to David Ausubel's [3] and Robert Gagné's [4] Learning Theories, as it is explained in [7].

As future work, it is proposed to perform other case studies in which learning activities should be planned using the tool in order to assess its usability. From the usability tests it will be possible to improve the tool so that teachers can interact with it easily and with satisfaction.

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