A CROWDSOURCING-BASED APPROACH FOR THE CREATION AND IMPROVEMENT OF EDUCATIONAL MATERIALS
(*UN ENFOQUE BASADO EN 'CROWDSOURCING' PARA LA CREACIÓN Y MEJORA DE MATERIALES EDUCATIVOS*)

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Summary. *One way of increasing the quantity and quality of educational materials that are available on-line is to apply collaborative and crowdsourcing techniques during the production and creation process of learning content. Crowdsourcing educational resources involves in general a crowd of trainers or teachers, learners and content authors. The idea of involving groups of learners working together is an educational approach to teach and learn called Collaborative Learning (CL). One way of applying the CL approach is by using a collaborative authoring platform such as SlideWiki. This project presents a crowdsourced-based approach for involving students in the creation and improvement of educational materials using the SlideWiki platform.*

Keywords: *Aprendizaje Activo, Aprendizaje Colaborativo, Inteligencia Colectiva, OpenCourseWare, Recursos Educativos en Abierto (REA)*

1. Introduction

Open Educational Resources in general and OpenCourseWare (OCW) in particular can be shared and reused, thus fostering knowledge interchange among teachers and learners. Currently, there are different OCW platforms that open new horizons for knowledge sharing and e-learning. However, there is a lack of on-line educational content due to the fact that their creation and maintenance is tedious, time-consuming and expensive.

Costs associated to the creation of educational materials as well as quality of those materials can be improved by applying collaborative techniques during the creation process [1]. Collaborative authoring has improved the efficiency, effectiveness, quality and timeliness of content creation in different domains such as text, geospatial content, and software code. Therefore it is to be expected that in the educational domain, a crowdsourcing approach helps to increase the quantity and quality of OCW.

The idea of involving groups of learners working together to solve a problem, to complete a task, or to create a product is an educational approach to teaching and learning called Collaborative Learning (CL) [2]. One way of applying the CL approach is by using a collaborative authoring platform such as the SlideWiki platform[1]. The SlideWiki platform allows users to collaboratively create and maintain OCW (e.g. slide presentations) in a crowdsourcing and on-line fashion. This platform is part of the so-called Web 2.0 technologies in which users can be active contributors rather than just passive observers.

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[1] https://slidewiki.org/

In this project we present a novel method, based on a crowdsourcing approach, to involve students in the creation and improvement of educational materials that serve for the study and/or self-learning of knowledge included in university subjects. This collective intelligence can be used for both instructors and students to create education materials that can have great value [3]. In order to validate our proposal, the method is applied in different courses. This document is organized as follows: Section 2 is devoted to explain our crowdsourced-based method; Section 3 presents some preliminary results as part of the evaluation of the method; and Section 4 briefly shows several conclusions.

2. Our crowdsourced-based method

The general idea of our educational method is based on the execution of different activities in which students can actively participate to create and improve educational materials. The active participation of students will be done following a crowdsourcing approach. This crowdsourcing approach helps increase both the quantity and quality of educational materials in an online environment.

The educational activities proposed in the method will be carried out using the SlideWiki platform. These activities have been selected from a catalog of activities[2], created as part of the European SlideWiki project[3]. This catalog serves as a support to teachers in the preparation of the tasks that students must complete in the courses.

The involvement of students in the creation and improvement of educational materials will allow (a) having many of the contents expressed in a language closer to the student expressions as well as (b) having explanations and examples more easily understandable. In addition, our proposal allows the development of a wide library of learning materials that can be shared and reused within the educational community.

Educational activities in our method. Our proposal focuses in the following educational activities:

- To provide feedback to a selection of educational content. The goal here is to improve the clarity of the slides provided by teachers, to find errors, to explain the concepts in ways closer to the students vocabulary, and/or to propose suggestions in theoretical and practical content.
- To summarize in 5 points. The idea here is to ask students to summarize in 5 sentences a certain topic relevant to a particular subject.
- To create questions for self-evaluation. This activity consists in the elaboration of a set of questions (together with possible answers, including the correct answer(s)), that serve in the process of self-evaluation of the subject.
- To create solutions for proposed exercises. The idea here is to compile solutions to exercises in a collaborative way. Possible exercises to be used in this activity may consist of finding errors in given solutions, classifying elements, completing incomplete and/or erroneous sentences, to mention some possibilities.

These educational activities are carried out in a total of six subjects of different educational levels (undergraduate and master's degrees) and in diverse courses. All the subjects belong to the Artificial Intelligence area. This diversity of educational scenarios is proposed with the objective of analyzing whether the educational level and/or the course taken by the students has some implication in the degree of motivation and participation of students in this type of innovative educational activities.

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[2] https://slidewiki.org/deck/108357/learning-activity-catalogue-for-students-and-participants

[3] https://slidewiki.eu/

EDUCATIONAL LEVEL	SUBJECT	COURSE	PERIOD	PLANNED EDUCATIONAL ACTIVITIES
Bachelor	Logic	First Course	September-November 2018	• To provide feedback to a selection of educational content • To summarize in 5 points • To create questions for self-evaluation • To create solutions for proposed exercises proposed
	Artificial Intelligence	Third Course	September-October 2018	• To provide feedback to a selection of educational content • To summarize in 5 points.
	Logic Programming	Third Course	March-May 2018	• To create questions for self-evaluation
	Semantic Web and Linked Data	Fourth Course	September-November 2018	• To create questions for self-evaluation
Master	Intelligent Systems	First Semester	September-November 2018	• To create questions for self-evaluation
	Information Retrieval, Extraction and Integration	Second Semester	April-May 2018	• To summarize in 5 points

Table *1* shows the set of subjects, divided according the educational level (Bachelor and Master), selected for the project. For each subject, we provide information about the course, the period in which the educational activities are scheduled, and the subset of learning activities that are planned to be performed.

Table 1. Subjects and Learning Activities in the project

3. Evaluation

One of the processes in our crowdsourcing-based approach is the design and creation of questionnaires to gather the opinions of the students. The purpose of these questionnaires is to know how useful and interesting are the learning activities performed in a collaboratively fashion during the courses. The feedback received via questionnaires serves to evaluate the impact of the approach as well as to improve it.

The questionnaire we have created is composed of three parts as shown in Figure 1: (a) one question about the learning activities performed using the SlideWiki platform;

(b) three questions[4] related to the impressions and feelings about such activities; and (c) four questions with respect to general comments.
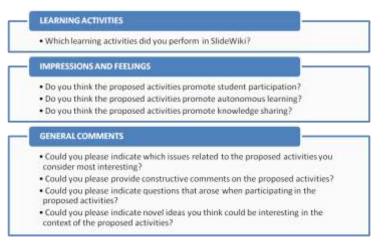

Figure 1. Questions for gathering students' opinions

After the completion of the proposed educational activities, we gathered students opinions and analyzed the data collected in the questionnaires. At the moment of writing this document, learning activities have been completely performed by students in 2 of the 6 planned subjects; while for the rest of the subjects activities are being currently performed.

- In the case of "Logic Programming" (Bachelor Level), 19 students performed the activity of creating questions for self-evaluation. From their responses to the questionnaire, we infer that students perceived positively the activity of creating questions for self-evaluation. Most of them (around 80%) considered that this initiative promote student participation and autonomous learning as well as the knowledge sharing. According to several students "*the most interesting aspect is that you can share exercises that you have performed yourself ... and your classmates can review them and try to correct them and understand them*".

- In the case of "Information Retrieval, Extraction and Integration" (Master Level), 10 students performed an activity focused on preparing a particular assignment. This activity can be seen as a combination among the activity of summarizing in 5 points and the activity of creating solutions for proposed exercises. After analyzing the responses to the questionnaire, we consider students were skeptical with respect to the learning activity performed: only 40% of the students considered that this initiative promote student participation, autonomous learning as well as knowledge sharing.

4. Conclusions

The objective of the crowdsourced-based method proposed in this project is twofold: (a) to encourage the active participation of students in the creation and improvement of educational materials that serve for the study and/or self-learning of university disciplines, and (b) to create a collection of educational materials, produced and improved by the students themselves. This collection will be available, in the form of slides, on the SlideWiki platform, and thus available to the entire educational community.

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[4] These questions should be ranked from 1 to 5 based on how much students agree with them (5 means that you strongly agree; 1 means that you strongly disagree).

Preliminary results shows that students' active participation increase in the subjects that applied the crowdsourced-based method proposed in this educational project. In addition, preliminary data from surveys shows that our crowdsourced-based method is perceived well by students; although some improvements need to be included specially in the case of master courses.

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