Chapter 8
Crowdsourcing with University Students: Exam Questions

Sofia Estelles-Miguel, Gregorio Rius-Sorolla, Marta Palmer Gato and José Miguel Albarracín Guillem

Abstract Incorporation into the European Higher Education Area (EHEA) has demanded the deployment of major changes in the teaching culture of University academic institutions. The utilization of educational strategies, based on the use of active methodologies that encourage students' active role, the importance of "learning to learn," and the ability to work together as a core competence are essential in change. Thus, active learning has become a priority in the development of curricula, and the center of gravity of the process should move toward methodologies that help students develop their professional skills, interpersonal relationships, and abilities to solve conflicts to apply theory to practice. The authors of the present article decided to do a crowdsourcing experiment with students from course 4 in the Faculty of Business Administration and Management who were studying the Production Management and Logistics (PML) subject. This subject used the PoliformaT platform. The crowdteaching technique optimizes lecturing by enabling the sharing and exchange of lecturing material following subject curricula. With crowdlearning, students learn by execution in collaborative projects. This article intends to demonstrate that students obtained better results when these techniques were applied.

Keywords Collaborative projects · Crowdsourcing · Crowdteaching · Methodologies actives · Generic skills

S. Estelles-Miguel (✉) · G. Rius-Sorolla · M. Palmer Gato · J.M. Albarracín Guillem
Departamento de Organización de Empresas, Universitat Politècnica de València, Valencia, Spain
e-mail: soesmi@omp.upv.es

G. Rius-Sorolla
e-mail: greiuso@upv.es

M. Palmer Gato
e-mail: marpalga@doe.upv.es

J.M. Albarracín Guillem
e-mail: jmalbarr@omp.upv.es

F.J. Garrigos-Simon et al. (eds.), *Advances in Crowdsourcing*,
DOI 10.1007/978-3-319-18341-1_8

8.1 Introduction

Crowdsourcing is a problem solving and task performance model that is being increasingly used. The term "crowdsourcing" was first coined in 2006 by Howe (2006), who defined it as "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and general large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaborative), but is also often undertaken by sole individual." Crowdsourcing allows a person, institution, or company to benefit from the work, ideas, or wisdom of the Internet crowd.

"Crowdsourcing is a type of participative online activity in which an individual, an institution, a non-profit organization, or a company proposes to a group of individuals of varying knowledge, heterogeneity, and number the voluntary undertaking of a task via a flexible open call. The undertaking of the task, of variable complexity and modularity, in which the crowd should participate by bringing their work, money, knowledge, and/or experience, always entails mutual benefit. The user will receive satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the crowdsourcer will obtain and utilize to what the user has brought to the venture to their advantage, whose form will depend on the type of activity undertaken" (Estellés-Arolas and González-Ladrón-de-Guevara 2012).

The emergence of crowdsourcing has been made possible thanks to the evolution of the Internet and social media technologies that have enabled communities to come together more quickly, and to collaborate and exchange information (Isman et al. 2012). It is the intersection of the "Crowd," "Social Web," and "Outsourcing" elements (Saxton et al. 2013). One of the main advantages of crowdsourcing is that it enables the possibility of iterative contributions of different people (Zhang et al. 2011).

By applying this definition to teaching, crowdsourcing techniques can become a natural framework for learning. However, crowdsourcing itself cannot offer the best educational experience. But by applying appropriate methods, it offers improved education by increasing the efficiency of workflows and optimizing personalized curricula (Weld et al. 2012) without disconnecting the basic "Crowd," "Social Web," and "Outsourcing" elements of the term crowdsourcing.

8.2 Crowdsourcing Techniques in Higher Education

The introduction of crowdsourcing techniques into higher education finds applications in aspects that can improve alumni performance. Crowdsourced knowledge building offers the possibility of collaborative projects where both teachers and students can interact and exchange information. For instance, teachers can share learning resources as a repository of high-quality materials, which can improve the quality of lessons and save time in preparing lectures. Students' interaction in crowdlearning also implies bringing different skills to a common project to help

solve a given problem. Students would like to receive personalized education according to their abilities and learning style (Weld et al. 2012). This learning form allows contacts to be made between the teachers and students interested in accurate specialized training. Students acquire practical knowledge that adapts to their demands.

Teachers need to change the dynamics of traditional education based on rote learning to one whereby students play an active role and take responsibility for their own learning (Whitehead 2008). Active learning methodologies emphasize student participation (Braxton et al. 2000 and Huber 2008). Students should play a responsible active role in both learning planning and interacting with teachers and peers to boost intrinsic motivation based on interest and curiosity (Cannon and Newble 2000). Teachers are no longer the main source of knowledge and inquiry, but assume the role of facilitator and guide by accompanying and guiding students through their learning process (Álvarez 2005). With the emergence of web technologies in the last decade, online learning has evolved significantly by using adaptive online environments that facilitate social learning (Corneli and Mikroyannidis 2012). In this chapter, we use these techniques:

CROWDTEACHING: In this approach, the lecturing staff shares and puts together lecturing material following the subject curricula. Crowdteaching as an evolving movement in which thousands upon thousands of educators from all around the world are uploading high-quality educational content online—all free of charge (DeWitt 2012).

CROWDLEARNING: Literally defined as the learning of crowds. This crowdsourcing technique is based on the "learning by project lecturing scheme." Crowdlearning can be defined as learning through real-case projects with the participation of several students ("crowd"). Broadly speaking, the method consists in contacts being made between teachers or experts in specific matters and an alumnus who seeks specialized practical training. The key lies in anyone being able to offer anything to others, and everyone has something to learn.

Finally, it is noteworthy that one of the main reasons for using active teaching methods is to provide students with a deeper understanding of the subject.

8.3 Experiment

It is worth indicating that since teaching is given in a Polytechnic University, the use of new technologies is widespread, and both attitude and teacher training facilitate their implementation to a great extent (Paredes and Estebanell 2005). Therefore, practically since the intranet was set up in the university, the means by which notes, support materials, scientific articles, problems, etc. have been made available to students has been the web. So our situation is enviable when compared to other faculties (Marin et al. 2011). During the 2002/2003 course at the Polytechnic University of Valencia (UPV), an educational platform was set up on

the web which facilitates and stimulates the use of new working strategies through forums, chats, as were new evaluation forms. The introduction of this platform and its use, as a result of new technologies, has been a turning point which has led us to consider the present study.

The practical character of this matter is suitable for implementing crowdlearning and crowdteaching.

8.3.1 Context and Sample

Educational innovation forms part of the PML subject taught in course 4 of the Business Administration and Management degree at the UPV. This subject is a core subject that consists in 9 credits. In recent years, 200 and 300 students have registered every year on average. This subject has not been taught since the last course because new study plans have appeared and old ones have terminated. Traditionally, this subject has generated a high percentage of failed exams and, therefore, many students resit exams and take the course again, which meant subsequent failure in incorporating proposed competences. This situation has led the teachers of this subject to often reconsider the approach that is to be applied to teaching it in order to improve the teaching–learning process and to, therefore, increase students' academic results. Finally, 183 students registered for the 2013/2014 course.

8.3.2 Description of the Experiment

As this subject is not being taught in the present course, the following actions have been taken:

All the documents required for the subject (notes, slides, recorded classes, solved problems, questions, etc.) have been uploaded on the intranet platform (PoliformaT).

A teaching guide has informed students about the way the subject is evaluated.

An open platform has been set up on which students can pose problems, solve their own problems or those considered by other students, and can correct problems solved by other students. Students can begin to pose a problem and other students should finish solving it if only the description is published. In this case, a score is given to the group.

Those problems posed by other students will be evaluated on a Likert-type scale from 1 to 5 to evaluate the originality, difficulty, comprehension, and the relation of contents. Based on this evaluation, 10 awards of 2 points can be obtained, which can be awarded to only one person or to the group of people who pose and solve the problem.

Those students who find errors in problems solved by other students will also obtain additional points (from 0.5 to 1.5) depending on the errors found and the number of problems corrected.

8.3.3 Objectives of the Experiment

The following objectives are considered:

Encouraging students' autonomy, reflexive and critical thinking, teamwork, professional skills, and their capacity to evaluate tasks performed by others.
Acquiring and developing the capacity to identify, pose, and solve problems relating to practical subject contents.
Continuous evaluation so that the questions and problems posed by students are corrected while they are worked on and so that students learn from their own mistakes.
Helping students improve their marks and scores.
Arousing interest in the subject so that posing problems involves assimilating knowledge and tools.

8.4 Results

At the end of the experiment, a survey was sent to students and the following results were obtained.

Figure 8.1 shows that of the 183 who registered for the subject, 119 participated in the experiment. In Fig. 8.2 we can seen that 107 of these 119 participants considered that the experiment helped them better learn the subject.

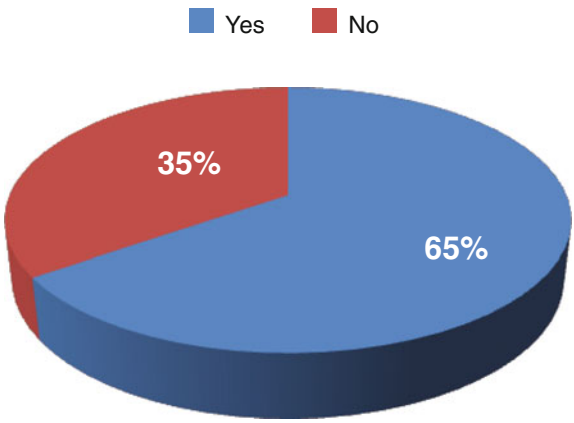

Fig. 8.1 Participation in the experiment. *Source* Own

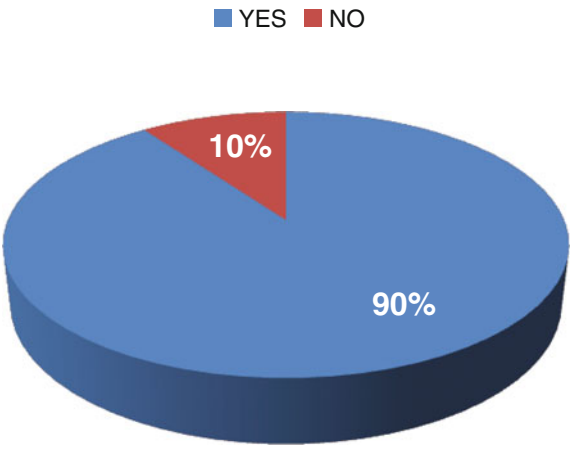

Fig. 8.2 Participants who believe that the experiment was positive for their learning. *Source* Own

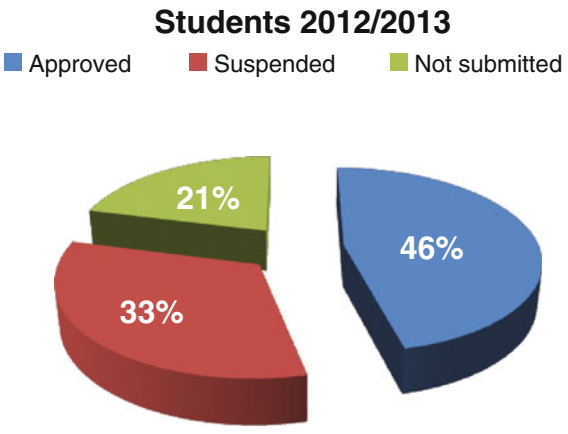

Fig. 8.3 Students 2012/2013. *Source* Own

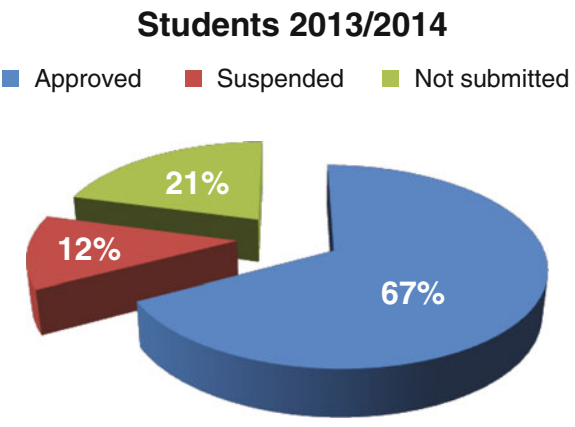

Fig. 8.4 Students 2013/2014. *Source* Own

8.5 Conclusions

This chapter provides a comprehensive approach to the application of crowdsourcing techniques that can be applied to Higher Education institutions. We must highlight the excellent perception that students stated they had about using this tool. This methodology helped clarify the general framework of the work performed and centered students' conversation with their peers.

Each student provides the different skills needed to solve the posed problem as a whole. Students share ideas and teach each other, which improves their preparation (Bloom 1979).

As regards the capacities developed while the subject was underway, in their opinion, students indicated teamwork in particular, along with communication skills (listening, considering other alternatives to solve problems, arguing one's own viewpoints, etc.), as well as organization and coordination skills. Apart from doing much more work than they personally thought they would do at the start of the process, when the experiment was underway, they began to understand that they could do more things than they initially believed they would. Moreover, when they saw other students' examples, they understood that they too were capable of participating and adopting new approaches which, in turn, would encourage other classmates and motivate them to continue on the path that had opened up among them all. All this enabled the collection of solved problems to grow as a repository, and with much more imagination than if considered by one person alone. Students also considered that the concerns of the problems posed by classmates were more like their own.

As demonstrated in Figs. 8.3 and 8.4, the number of pass marks increased since fewer students failed exams. However, the number of students who did not sit exams remained constant. Although data have not been collected, the number of outstanding and excellent marks rose, and the number of passing grades lowered. So we can state that applying crowdsourcing to university teaching is able to improve marks, students become more involved and they perceive a greater sense of belonging.

References

Álvarez, M. B. (2005). Adaptación del método docente al Espacio Europeo de Educación Superior: La motivación de los alumnos como instrumento clave. *Estudios sobre Educación*, 9, 107–126. http://dspace.si.unav.es/dspace/bitstream/10171/8911/1/NB.PDF.

Bloom, B. S. (1979). Taxonomía de los objetivos de la educación. Marfil.

Braxton, J. M., Milen, J. E., & Sullivan, A. S. (2000). The influence of active learning on the college student departure process: Toward a revision of Tinto's theory. *Journal of Higher Education, 71*(5), 569–590.

Cannon, R., & Newble, D. (2000). *A handbook for teachers in universities and colleges*. London: Kogan.

Corneli, J., & Mikroyannidis, A. (2012). Crowdsourcing education on the Web: a rolebased analysis of online learning communities. In: A. Okada, T. Connolly & P. Scott (Eds.), *Collaborative learning 2.0: Open educational resources* (pp. 272–286). Hershey: IGI Global.

DeWitt, T. (2012). Hey science teachers—make it fun TEDxBeaconStreet. Filmed Nov 2012. http://www.ted.com/talks/tyler_dewitt_hey_science_teachers_make_it_fun. Accessed 30 Sept 2014.

Estellés-Arolas, E., & González-Ladrón-de-Guevara, F. (2012). Towards an integrated crowdsourcing definition. *Journal of Information Science, 38*(2), 189–200.

Howe, J. (2006). The rise of crowdsourcing. *WIRED magazine*, 14(06), http://archive.wired.com/wired/archive/14.06/crowds.html. Accessed 5 Sept 2014.

Huber, G. (2008). Aprendizaje activo y metodologías educativas. Revista de Educación, No. Extra, pp. 59–81.

Isman, M., Bennet, J., Judah, J., Glenzer, A. (2012). Effectiveness and efficiency. Tapping new sources of innovations and ideas through crowdsourcing, Booz Allen Gamilton Inc.

Marin, M., Polo, F., & Mateos, A. (2011). Las metodologías activas en la docencia universitaria de contabilidad. In: *En Las metodologías activas de aprendizaje en la Facultad de Administración y Dirección de Empresas* (pp. 15–28). Valencia: Universitat Politècnica de València.

Paredes, J. & Estebanell, M. (2005). Actitudes y necesidades de formación de los profesores antes las TIC y la introducción del crédito europeo: un nuevo desafío para la educación superior, Revista de Educación, núm. 337, mayo-agosto (pp. 125–148).

Saxton, G. D., Oh, O., & Kishore, R. (2013). Rules of crowdsourcing: Models, issues, and systems of control. *Information Systems Management, 30*(1), 2–20.

Weld, D. S., Adar, E., Chilton, L., Hoffmann, R., Horvitz, E., & Koch, M et al. (2012). Personalized online education—A crowdsourcing challenge. In: *Human computation AAAI technical report WS-12-08* (pp 159–163).

Whitehead, D. P. (2008). Thoughts on education and innovation. *Childhood Education, 85*(2), 106–118.

Zhang, H., Horvitzy, E., Millerz, R. C., & Parkes, D. C. (2011). Crowdsourcing general computation. In: *ACM conference on human factors in computing systems*. May 7–12, Vancouver.