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The use of crowdsourcing mechanisms in management learning

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ABSTRACT

While management education increasingly uses creative crowdsourcing techniques (e.g. hackathons and innovation crowdsourcing) to help students apply their knowledge to real business problems, this research examines crowdsourcing as a learning approach that enhances students' learning experience, not by giving access to knowledge resources, but rather by creating a process that generates value and learning experience through active participation. Using an exploratory research (i.e. observations and *in situ* interviews) and a quantitative assessment (i.e. survey-based design), our findings show that students' learning experience can be leveraged in the pre-activity stage (i.e. initial instructions, creative idea generation), and during and after the crowdsourcing activity (i.e. feedback from the company and from the instructor). We show that the learning experience is not only predicted by the informational value, but also by the social and enjoyment value, which can be enhanced through specific crowdsourcing activities. Further, our findings question the role of competitive settings in such learning conditions



KEYWORDS

Management learning; creative crowdsourcing; hackathon; active learning; learning experience

Introduction

Creative crowdsourcing, or hackathons, are regularly used by universities and schools, like Harvard, to enrich students' learning experience (Harvard Newsletter, 2021). Management education particularly welcomes such experiential pedagogy (Dean et al., 2020). Namely, crowdsourcing practices are in line with educational approaches that aim to ensure continuous student satisfaction based on a learner-centred approach (Mesny et al., 2021; Suhonjic et al., 2019).

In this research, we consider crowdsourcing as the use of the general principles of crowdsourcing in the education domain (Alenezi & Faisal, 2020; Prester et al., 2019; Suhonjic et al., 2019; Uskov et al., 2019). Crowdsourcing for education is a type of activity in which an educational organisation asks several groups of students, via a flexible open call, to find and suggest a solution to a given management problem (adapted from Jiang et al., 2018). As part of their university courses, students are invited to find ideas to solve business problems in an online or offline work environment. They are accompanied by

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tutors or coaches from the organising platform and/or the company (Page et al., 2016; Prester et al., 2019).

However, the use of creative crowdsourcing approaches (e.g. hackathons, innovation crowdsourcing, and creative contests) lacks scientific insight despite its growing success. In particular, Alenezi and Faisal (2020) found that 47.8% of learning activities used crowdsourcing approaches. Crowdsourcing mechanisms might contribute to improved learning when complementing existing educational approaches (Solemon et al., 2013; Weld et al., 2012). In contrast with existing research and other types of crowdsourcing such as crowd voting (participants merely vote for a favourite option, Chen & Liu, 2020) or micro-tasking (participants execute a simple task requiring no skills or creativity, e.g. Benedek et al., 2015; Brabham, 2010), creative crowdsourcing encourages creativity and sometimes even more advanced skills in some specific domains for problem-solving (e.g. business management or marketing) (Schenk & Guittard, 2012). In particular, creative crowdsourcing requires participants to generate new ideas or products, or to reorganise existing ideas in novel ways (ref.). In contrast with problem- or project-based learning, the crowdsourcing approach focuses on the balance-finding between levels of novelty and usefulness and includes gamification in the creative process.

In this research, we consider the creative crowdsourcing approach as a process in itself, in which the process rather than the outcome improves students' learning experience and knowledge (Steils & Hanine, 2016). This research examines how crowdsourcing techniques can improve students' learning experience in management education and which crowdsourcing techniques might leverage the learning experience the most in the pre-activity stage (i.e. initial instructions, creative idea generation), and during and after the crowdsourcing activity (i.e. feedback from the company and from the instructor).

The paper is organised as follows. After introducing the crowdsourcing approach, we examine how crowdsourcing has been investigated in educational research. Next, we present the two studies carried out in this paper (i.e. a qualitative study approach for the development of a pedagogical framework and a quantitative survey to assess the benefits of crowdsourcing techniques for management education). Finally, we discuss the findings of the two studies, their contributions and limitations. This research thereby contributes by approaching crowdsourcing as a process that improves learning and knowledge rather than simply considering it as a source of information giving access to educational material or 'open educational resources' (e.g. Alenezi & Faisal, 2020; Benedek et al., 2015; Porcello & Hsi, 2013).

Theoretical background

Creative crowdsourcing: Benefits and challenges

Since 2006, crowdsourcing techniques have been increasingly used for obtaining services, ideas, or content by soliciting contributions from a large group of people (Howe, 2006). Surowiecki (2004) discovered that 'under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them'. Resorting to this collective intelligence, crowdsourcing has been recommended for management practices as it is useful for gathering ideas to solve business problems or improving corporate strategies (Solemon et al., 2013). Among the different crowdsourcing types, creative

crowdsourcing (or crowd creation projects) are particularly used for creating or co-creating products, services, communication material, or ideas (Solemon et al., 2013).

Given the lacking insights of crowdsourcing for management learning, we review the literature of crowdsourcing in project management, which offers a common view on the benefits of a crowdsourcing approach. In particular, this literature says that crowdsourcing presents benefits of accessing diverse skills of participants (e.g. Mason & Suri, 2011), profile diversity (e.g. Satzger et al., 2013), reduced costs (e.g. Goodchild & Glennon, 2010), faster result delivery (e.g. Franzoni & Sauermann, 2014) and equal quality of the results when compared to those of professional employees (e.g. Poetz & Schreier, 2012). However, the risks of creative crowdsourcing initiatives refer to result quality, confidentiality, security and social risks (e.g. Marjanovic et al., 2012). Hence, the above presented crowdsourcing approach offers a multitude of tools and benefits, which have rapidly been recognised by management educators and encouraged them to include creative crowdsourcing projects in management education.

Crowdsourcing mechanisms for the delivery of management classes

Up to now, researchers trying to approach education from a crowdsourcing angle have mainly considered crowdsourcing as a source of information giving access to educational material or 'open educational resources' (e.g. Alenezi & Faisal, 2020; Benedek et al., 2015; Porcello & Hsi, 2013) rather than considering it as a process in itself, in which the process rather than the outcome improves learning and knowledge (Steils & Hanine, 2016). In the extant literature, crowdsourcing has mainly been investigated from the angle of micro- and/or macro-tasks (e.g. Benedek et al., 2015). However, creative crowdsourcing has been suggested to be a pedagogically relevant method for quality education in management sciences (Solemon et al., 2013). The few papers discussing crowdsourcing for education mention that education represents a beneficial direction for crowdsourcing research because crowdsourcing mechanisms help delivering quality education and because its techniques can complement existing approaches for education (Prester et al., 2019; Weld et al., 2012). However, the literature focused only on these specific tools and did not consider crowdsourcing as a process in itself.

The crowdsourcing approach is different from other active learning methods (see Table 1). Project-based learning and problem-based learning are both instructional approaches that involve students in actively researching, analysing, and solving real-world problems or challenges. They can be effective approaches for engaging students in meaningful and authentic learning experiences. While these approaches share some similarities, they have some key differences that educators should consider when deciding which approach is best suited for a particular learning situation (Chen, 2015; Larmer, 2014). One key difference between project-based learning and problem-based learning is the focus of the activity and students typically work towards a final product or presentation (e.g. completing a specific project or task; Larmer, 2014). In contrast, problem-based learning places more emphasis on the problem or challenge being addressed. The goal is not necessarily to create a specific product, but rather to develop critical thinking and problem-solving skills (Leggett, 2014; Savery, 2006). In contrast with both approaches, the crowdsourcing-based approach investigated here, differs on the objective and the learning process. First, the topics students work on can vary from open- to close-ended

Table 1. Comparison of crowdsourcing-based learning to existing active learning methods (adapted from: Chan et al., 2015; Larmer, 2014; and completed by; Steils & Hanine, 2016).

Active learning			
<i>Hands-on approach to teaching, in which the focus is on building students' ability to develop creative, realistic, tangible solutions to sometimes difficult problems through teamwork.</i>			
	Project-based learning	Problem-based learning	Crowdsourcing approach
Emphasis	Focus of the activity	Focus on completing a specific project or task	Focus on generating creativity (balance between novelty and usefulness)
Objective	Project-Based Learning focuses on real solutions to a problem. The emphasis is on the end product. Attention then turns to designing and developing a prototype of the product or detailed definition of the service.	Problem-Based Learning engages students in the process of problem solving: how to think about the problem and to find possible solutions. The emphasis is on acquiring new knowledge and the solution is less important. Challenged with a complex, real-world problem, students work in collaborative groups or teams to understand the problems which often do not have an obvious solutions.	Crowdsourcing-based learning focuses on creativity, including balance-finding between levels of novelty and usefulness in a gamified context. The emphasis is also put on multidisciplinary groupwork and the creative process (divergent first, convergent second)
Process	<ul style="list-style-type: none"> ● Students analyse the problems and generate solutions. ● Students design and develop a prototype of the solution ● Students refine the solution based on feedback from experts, instructors, and/or peers 	<ul style="list-style-type: none"> ● Students are presented with an open-ended, authentic question. ● Students analyse the question ● Students generate hypotheses that explain the phenomena by seeking additional data 	<ul style="list-style-type: none"> ● Students are presented with projects ranging from open to close-ended questions ● Students generate various ideas in the divergent thinking process ● Students converge towards one idea (convergent process) combining novelty and usefulness criteria while striving for competitiveness with other groups ● Students develop their idea
Teaching modalities	Students mostly work on their own. They refine the solution based on feedback from experts, instructors, and/or peers	Students mostly work on their own. They refine the solution based on feedback from experts, instructors, and/or peers	Students mostly work on their own following specific stages (divergent first, convergent second). They refine the solution based on feedback from experts, instructors, companies and/or peers

questions requiring students to 'think-out-of-the-box' while striving for a balance between novelty and usefulness (Steils & Hanine, 2016). The process is 'divergent first', and 'convergent second' and is facilitated in multi-disciplinary groups (Amabile et al., 2005). Finally, crowdsourcing-based learning includes gamification, mostly a competitive setting among students including rewards for best proposals (Morschheuser et al., 2017).

Weld et al. (2012) presents three challenge areas for crowdsourcing in education, which highlight the gaps in the literature and point out the contribution of this research:

- (1) **Content creation and curation.** Questions like ‘How can the process of creating educational content be assisted by the crowd?’ are raised by the authors. Even though previous literature mention forums and authoring tools as potential solutions (Aleahmad et al., 2009; Jiang et al., 2018), they do not fully respond to the problem. Other solutions include iterative improvements (Little et al., 2009) or so-called ‘find-fix-verify’ workflows (Bernstein et al., 2010).
- (2) **Personalization and engagement.** Poor interactive content reduces students’ engagement (Murillo-Zamorano et al., 2020; Weld et al., 2012). These authors suggest that social mechanisms and incentive programmes including game mechanisms as potential but not complete solution areas.
- (3) **Providing rich feedback.** Even though peer-evaluation constitutes a popular solution, it is far from being perfect for complex and creative workflow processes, in which useful and constructive feedback is required. Indeed, feedback requires skills that go beyond the learned material (Weld et al., 2012).

In this research, we will combine the call for research in management learning (Weld et al., 2012) with the knowledge gathered from the traditional crowdsourcing literature to fill the scientific knowledge gap in management learning. To increase the benefits and reduce the risks of creative crowdsourcing challenges, the traditional crowdsourcing literature suggests that in-depth preparation in the pre-challenge stage (e.g. proper problem framing and instructions), and ongoing communication and feedback during and after the challenge are recommended (Hanine & Steils, 2018). Contest managers can intervene in the crowdsourcing process before the beginning of the challenge by giving insightful and guiding instructions to participants, but also during the challenge by providing coaching and feedback opportunities to participants (Steils & Hanine, 2016). Creative crowdsourcing seems thus especially adapted to educational areas in which criteria change from one year to another, and the evaluation of students is subjective and feedback is essential (Weld et al., 2012). In creative crowdsourcing, interactions occur not only among group participants but also outside the boundaries of the group (Bullinger et al., 2010). More precisely, interacting with other participants or with the organiser, that is, receiving or giving feedback, not only increases participants’ intention to submit creative ideas (Chan et al., 2015) but also leads them to submit ideas scoring higher in perceived novelty. This is because they gain diverse perspectives on a problem (Bullinger et al., 2010) which helps companies driving more radical innovations (Chuang et al., 2015).

Overall, these three types of practices (instructions, coaching and feedback) help to improve the creativity and feasibility of participants’ contributions (Steils & Hanine, 2016), but their usefulness to enhance the learning experience in management studies has not yet been examined. Given the lack of empirical evidence assessing the benefits of a creative crowdsourcing approach (tools and techniques) used to enhance the learning experience in the education of management sciences, the following research questions are set:

RQ1: How can crowdsourcing techniques improve the learning experience in management education?

RQ2: Which crowdsourcing techniques leverage the learning experience the most in the pre-activity stage (i.e. initial instructions, creative idea generation), and during and after the crowdsourcing activity (i.e. feedback from the company and from the lecturer)?

Empirical studies

In order to investigate the crowdsourcing approach as a different learning approach to management learning, we carried out a two-step investigation composed of an exploratory study design and a quantitative survey. A qualitative approach was first required as the theoretical arguments alone were insufficient to build a quantitative conceptual model which could be assessed in the later survey. Qualitative studies are particularly used in new situations in which little is known about a phenomenon (Yin, 2011). This study uses observations and *in situ* interviews from three crowdsourcing settings in which we implemented a same crowdsourcing activity in three different settings to better understand this practice, but also to guide and prepare the quantitative survey. Based on the exploratory results, a conceptual model is created that aims to quantify the impact of individual crowdsourcing activities on students' learning experience in management sciences.

Study 1: exploratory study for the development of a pedagogical framework

Method

A general framework of the implementation of a crowdsourcing activity in management education has been developed based on recommendations from the educational and crowdsourcing literature streams. The literature review has revealed that the main techniques that characterise creative crowdsourcing are the initial instructions provided (or 'brief'), a creative brainstorming session, but also feedback during and after the activity (e.g. Steils & Hanine, 2016). In an educational context, this feedback can be provided by the company, but also by the professor. We therefore distinguish two types of feedback (company or professor) during and after the crowdsourcing activity, which aimed to comment on the strengths and improvements needed on students' work. Finally, the literature suggests the usefulness of gamification techniques (i.e. collaboration, competition or co-competition), so that adding competitiveness in creative crowdsourcing activities increases participation motivation and creative effort (Bullinger et al., 2010; Martinez, 2017). This competitive setting being less usual in an educational approach, we decided to apply the competitive setting to two classes, and a non-competitive setting in the last class to observe first student perceptions before developing a conceptual model to be tested based on a quantitative survey. The crowdsourcing approach for management education which was applied to the three separate classes is summarised in [Figure 1](#)

Next, we applied this approach in three different study contexts, and thus management courses, with a total of 150 students involved. Students came from a French or Belgian context, which are both considered as 'neutral' on Hall's culture context scale (Hall

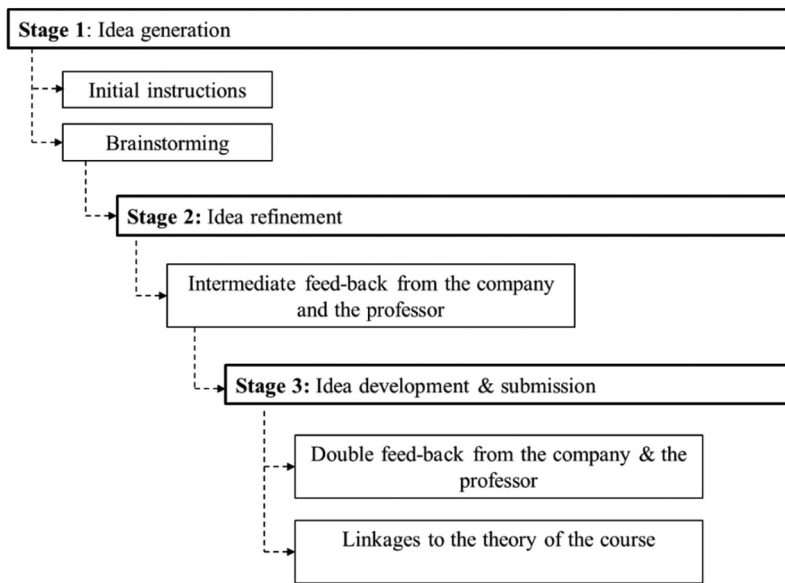


Figure 1. Suggested crowdsourcing approach for management education based on the literature.

& Trager, 1990), meaning that they value both, individualism and group membership. The three settings' characteristics are summarised in Table 2. The classes were selected based on their suitability to the study context, as well as the willingness of their lecturers and invited firms to collaborate on the experimental conditions of the learning setting shown in Figure 1, while ensuring for diversity among groups and settings in order to offer greater research validity. In each setting, we employed a crowdsourcing approach that included, among other things, a competitive environment, creative brainstorming, and the different steps of coaching and feedback as illustrated in Figure 1. The settings differ based on participants' profile, the managerial task concerned, and the competitive setting. While the profile was homogeneous in settings 1 and 2 (marketing students), their profile was heterogenous in setting 3 (mix of hard and soft science students, working on a management project). The competitive setting (gamification characteristic) was present in settings 1 and 2 (all groups competed against each other to offer the best proposal to the company) and not present in setting 3 (each group offers a proposal for one company each so that there is no competition among groups).

This first study being exploratory, the analytical approach used to examine each study context was participant observation (i.e. notes taken by the researcher) coupled with regular short student interviews (i.e. *in situ* interviews), and a final qualitative questionnaire inviting students to provide a feedback on their learning experience. The classes were chosen based on voluntary participation of their teachers. Students were shortly interviewed before, during and after the crowdsourcing project, in their class, about what they appreciated and less appreciated in the activities. Using content analysis, we explored how they perceived their learning experience. Following open and axial coding, we identified three stages of the crowdsourcing approach implementation and a total of five sub-elements that

Table 2. Description of exploratory settings.

	Setting 1	Setting 2	Setting 3
Students	Homogenous (marketing students of a digital marketing class, master level), $N = 60$, French (neutral context culture, Hall, 1990)	Homogenous (marketing students of a strategic marketing class, master level), $N = 60$, French (neutral context culture, Hall, 1990)	Heterogeneous (hard and soft sciences, master level), $N = 30$, Belgium (neutral context culture, Hall, 1990)
Environment	Competitive: all students suggest ideas for the same organisational problem	Competitive: all students suggest ideas for the same organisational problem	Non-competitive: each group of students suggests ideas for another company
Objective	Strategic planning and developing managerial recommendation based on primary and secondary data. In particular, the goal was to come up with a viral communication plan for an NGO that seeks to creatively involve youth in ecological projects and territorial development.	Strategic planning and developing managerial recommendation based on secondary data. In particular, the goal was to implement a management and communication plan for a cultural song contest across a variety of platforms in a creative and attractive way; without limitation in terms of format and content.	Strategic planning and developing managerial recommendation based on secondary data. In particular, goals varied depending on the company. For example, redefining a novel HR management strategy for a company, or collecting creative ways of promoting an organic fertiliser.
Company needs	1 NGO in the ecological sector Create engagement of foreign citizens in ecological purposes	1 NGO in the cultural sector Suggest ideas for encouraging people to participate in a song contest online	6 for-profit companies Various needs: e.g. developing communication strategies, business solutions
Groups	Groups of 3–4 students	Groups of 3–4 students	Groups of 4–6 students
Duration	20 h course	20 h course	1 intensive week
Material	Presentation by the NGO and access to internet for desk research.	Presentation and additional documents by the NGO and access to internet for desk research.	Presentation and additional documents by the NGO and access to internet for desk research.
Evaluation	Grade based on written report and oral presentation. Feedback provided by the instruction and the NGO.	Grade based on written report and oral presentation. Feedback provided by the instruction and the NGO.	Oral presentation and feedback from the company (no grade)

categorised and evaluated students' sub-experiences at each stage (refer to [Figure 1](#)). In particular, we coded and analysed students' learning experiences for each sub-experience and classified them into three higher-order categories corresponding to the three stages illustrated in [Figure 1](#).

Findings

Participant observations showed that the three-stage approach suggested in the pedagogical framework (i.e. idea generation, refinement, development and submission) naturally appeared as relevant breakdowns in the pedagogical activity as they could easily be organised into separate sessions (or days) to facilitate the course's organisation. At the end of each stage, a deliverable could be requested so that the overall crowdsourcing activity could be planned around three major sub-activities.

Moreover, students were all unanimous when evaluating the usefulness of the crowdsourcing techniques and tools that were planned before, during and after the activity. For example they appreciated the initial problem framing (verbatim 1) but also the interactions with the company (verbatim 2 and 3).

The fact that we are doing this assignment for a real case makes the project very interesting and it allowed us to invest in the course. We can really see its usefulness. And to understand the specificities of the course (Verbatim 1: Student setting 2)

[I loved] having a **feedback** on the benefits of our work for [NGO name] (Student setting 2)

[I appreciated] **meeting** and **discussing** with the [NGO name] team (Verbatim 2: Student setting 2)

A subtle difference in students' opinion could be found when it came to the competitive setting. While students in settings 1 and 2 mentioned they would have preferred choosing their own topic related to the company's issue, verbatim 4 (from setting 3) suggests that the non-competitive setting increased the relevancy of the **interaction** with the company, their **liking** of the crowdsourcing activity and what they **learn** from this experience:

'As we were working for **one** company, we really felt like consultants. The **exchanges** with the responsible company were more intimate and the ongoing communication was stimulating. It was enriching to see how each group dealt with different issues of the different companies. I also appreciated the experience for being able to **connect** the theoretical courses directly to our case study and **being in a group** with completely different profiles. We got to know and work with each other's, which was really stimulating. I **liked** it and **learned** a lot'. (Verbatim 4: student setting 3)

Discussion

This exploratory research thus led to two reflections on the pedagogical framework suggested in [Figure 1](#): First, it appeared that the competitive setting might not necessarily be a beneficial driver of students' learning experience, and second, students evaluate their learning experience as an experience that generates learning, liking, and interaction (cf. verbatim 4), which we will respectively name 'informative value', 'entertainment value', and 'social value' in line with the interactivity theory developed by Ko et al. (2005). Given the lacking agreement on the dimensions of interactivity, these authors decided to conceptualise and develop a measurement model for interactivity. Even though they tested it in an advertising context, their informative, entertainment and social dimensions have found to be similar to the ones described in our qualitative data. These two reflections helped us to refine our quantitative model for study 2 (cf. [Figure 2](#)).

Study 2: quantitative assessment of the crowdsourcing model for management learning

Development of the conceptual model

For the development of the conceptual model for study 2, we used the crowdsourcing tools and techniques identified in the pedagogical framework ([Figure 1](#)) as predictors of the learning experience in order to assess the extent to which each tool or technique improves students' learning experience. Moreover, based on the conclusions drawn from study 1 we included intermediate variables, namely informational, social and enjoyment value to assess students' appreciation of the crowdsourcing activity. This three-dimensionality has already been used to assess online experiences in an online context (Ko et al., 2005). Also, we included the competitive setting as a moderating variable, which shows to affect

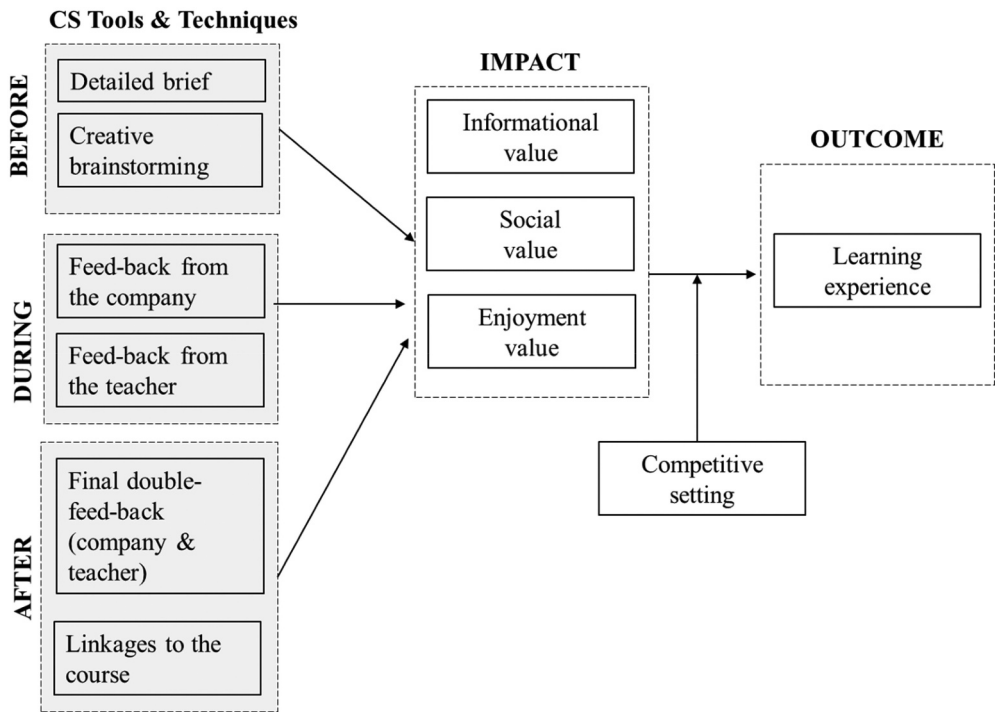


Figure 2. Conceptual model for study 2.

participation and creative effort in creative crowdsourcing (e.g. Martinez, 2017) but appears to show ambiguous results based on our study 1's findings. The moderating role is examined on the relationship between these three learning values on students' overall learning experience given the observations from the third setting when compared with the two former ones. For clarification purposes, we classified the crowdsourcing techniques according to the moment of use in the pedagogical activity (before, during or after). Students had to evaluate these techniques at the moment of their occurrence in the crowdsourcing activity. The overall conceptual model is summarised in Figure 2.

Method

To test our conceptual model, we presented a simplified and fictive crowdsourcing activity that followed the same procedure as described in Figure 1 and which was pretested in our exploratory study. As part of their course, and in collaboration with a fictive company, called 'Greenscope Bank', they were told to imagine the cooperative bank of tomorrow. In particular, students had to read the brief including brief background information about the company and instructions regarding the creative crowdsourcing task. In particular, they were asked to rethink reception spaces in the bank from a cooperative perspective and show that the project could be feasible for the bank, both operationally and financially. This task required applying concepts of operational and strategic management, and budget management learned during their courses. After receiving these and other initial instructions, they were told that a brainstorming was organised following which three ideas were retained. During the brainstorming sessions,

Table 3. Measurement scales used in study 2.

Construct	Nb of items	Cumulated variance	Cronbach's alpha	Source
Usefulness instructions	3	67.4%	0.757	Cox and Cox (2002)
Usefulness brainstorming	3	69.22%	0.771	
Usefulness of half-way feedback from company	3	68.54%	0.766	
Usefulness of half-way feedback from the university	3	76.01%	0.842	
Usefulness end-of-course double feedback	3	70.53%	0.788	
Usefulness of regular linkages with the course	3	79.42%	0.869	
Informational value	3	79.06%	0.865	Ko et al. (2005)
Social value	3	75.89%	0.834	Ko et al. (2005)
Enjoyment value	3	81.11%	0.883	Ko et al. (2005)
Appreciation of the competitive setting	3	76.53%	0.845	Roehm and Roehm (2005)
Learning experience	5	77.215%	0.924	Sundar et al. (2004)

all groups could benefit from the instructors' coaching, who helped to stimulate creativity suggesting students a variety of brainstorming techniques. Next, a short feedback from the company and from the professor was provided about the quality of their idea and suggestions for improvements, which lead to the retention and development of one idea. Finally, students received a short double feedback from the company and the professor, and the professor finished the contest by reminding and concluding the linkages between the crowdsourcing activity and the course.

Students had to evaluate the usefulness of the different tools and techniques just after being faced to them (e.g. usefulness scale received just after the brainstorming or feedback from the company). At the end of the activity, students had to give their opinion regarding the other constructs of the conceptual model. All measurement scales were drawn from the crowdsourcing and psychological literature, and analysed using a factor and reliability analysis (Cronbach's alpha). Scale items, sources, and results from both analyses for each scale can be found in Table 3.

As part of their new product development class, 128 students from a different marketing master than in study 1 and blind to the study object participated in the survey (64.9% women) with a mean age of 25.12 (SD = 7.49), from which 40.3% were in a work-study programme. On average, they appreciated the learning experience (mean = 5.59/7, SD = 1.13).

Findings

In order to test our conceptual framework, we first analysed the impact of the crowdsourcing tools and techniques on each type of value (i.e. informational, social and enjoyment value). Next, we tested the impact of the three types of value on students' perceived learning experience. We performed a moderation analysis to observe the conditional effects of value on learning experience depending on students' appreciation of the competitive setting. Consequently, we used a multiple regression analysis on each type of value (SPSS 24), and three moderation analyses using Hayes Process Macro (model = 1, bootstrap = 5000, confidence interval = 95%). All results are summarised in Table 4, and outlined and discussed in the following sections.

Table 4. Results of the multiple regression and moderation analyses (study 2).

	Model 1: Y – Informational value		Model 2: Y – Social value		Model 3: Y – Enjoyment value	
	b	t	b	t	b	t
Y= Value types						
X ₁ : Instructions	0.241	2.989**	0.147	1.970*	0.237	2.900**
X ₂ : Brainstorming	0.013	0.145	0.187	2.260**	0.084	.927
X ₃ : Company Feedback Halfway	0.000	0.005	0.089	1.020	0.067	0.695
X ₄ : University Feedback Halfway	0.214	2.069**	0.028	0.294	-0.009	-0.085
X ₅ : Double Feedback	-0.037	-0.401	0.055	0.637	-0.044	-0.463
X ₆ : Linkages with Course	0.181	2.264**	0.059	0.795	0.184	2.265**
	R ² _{adj.} = 0.315		R ² _{adj.} = 0.284		R ² _{adj.} = 0.226	
	F(6, 121) = 10.72**		F(6, 121) = 9.41**		F(6, 121) = 7.17**	
	Model 1: X ₁ - Informational motivation		Model 2: X ₂ - Social motivation		Model 3: X ₃ - Enjoyment motivation	
	b	t	b	t	b	t
Y= Learning Experience						
X ₁ : Informational value	0.781	5.694**				
W: Competitive setting	0.488	2.757**				
X ₁ *W	-0.062	-2.039*				
X ₂ : Social value			0.806	5.394**		
W: Competitive setting			0.549	2.767**		
X ₂ *W			-0.067	-1.987*		
X ₃ : Enjoyment value					0.857	6.214**
W: Competitive setting					0.604	3.369**
X ₃ *W					-0.082	-2.691**
	R ² _{adj.} = 0.566		R ² _{adj.} = 0.536		R ² _{adj.} = 0.552	
	F(3, 123) = 53.47**		F(3, 123) = 47.44**		F(3, 123) = 50.44**	

*p < .05, **p < .01, bold= significant results, X = independent variable, Y = outcome variable.

Among the predictors, informational value was the most important predictor of students' learning experience ($\beta = 0.344$, $p = 0.000$), followed by the enjoyment value ($\beta = 0.324$, $p = 0.000$), and the social value ($\beta = 0.232$, $p = 0.007$; $F(3, 123) = 73.50$, $p = 0.000$).

Findings showed that the informational value of the experience was enhanced by the initial instructions ($b = 0.241$, $p < 0.01$), professors' feedback halfway of the project ($b = 0.214$, $p < 0.01$), but also the concluding linkages with the theoretical course ($b = 0.181$, $p < 0.01$).

The social value could mainly be enhanced by the creative brainstorming session ($b = 0.187$, $p < 0.01$). Finally, the enjoyment value could be maximised during the delivery of the initial instructions and the final linkages with the course, which respectively correspond to the first and last activity of the crowdsourcing approach.

For the moderation analyses, we used the three values as independent variables, the learning experience as a dependent variable, and students' perception of the competitive setting as a moderator. In each model, the findings showed that the competitive setting was a lesser predictor of the learning experience than the three types of values. But regarding these three predictors, we observed that the more students appreciated the competitive setting, the lower the impact of the informational, social and enjoyment value on the learning experience (cf. Table 4).

Discussion

The findings from study 2 validated our conceptual framework and highlighted the moderating role of the competitive setting. Results hereby contribute to the extant literature by analysing the process, the antecedents and boundary conditions of creative crowdsourcing as a learning approach. Findings are further discussed in the next section.

Conclusion

General discussion and theoretical contributions

The aim of this research was to examine the usefulness of crowdsourcing activities for enhancing students' learning experience. The results lead to three categories of contributions to the current management education literature.

First of all, this research is the first to consider crowdsourcing as a beneficial activity that enhances learning experience not by giving access to pedagogical tools, but by creating a process based on different crowdsourcing activities that generate value and learning experience through active participation. We thereby contribute to extent the view of crowdsourcing as a source of information giving access to educational material or resources (e.g. Alenezi & Faisal, 2020; Benedek et al., 2015), and rather encourage considering crowdsourcing as a process that generates different types of value before, during and after the learning activity. Furthermore, we participate in creating better understanding on creative crowdsourcing as opposed to micro-tasking crowdsourcing, which has been the main focus of education research so far (e.g. Benedek et al., 2015).

Second, our results not only suggest a pedagogical framework but quantitatively measure the outcomes of crowdsourcing as a learning activity. We hereby contribute by showing that different pedagogical activities create different value types in the learning experience. The integration of a variety of crowdsourcing tasks and techniques in a unique model allowed us to present a holistic perspective of the crowdsourcing determinants for education using empirical evidence from two studies. Results show that the informational value can be enhanced by integrating more cognitive tasks in the crowdsourcing process (i.e. initial instructions, feedback from the company, and linkages with the theoretical course). Furthermore, we highlight the diversity of learning values by showing that the learning experience is not only predicted by the informational value, but also by the social and enjoyment value, which can be enhanced through crowdsourcing activities (e.g. brainstorming sessions for greater social value, or initial and final 'get-together' feedbacks to create enjoyment value). We thereby contribute to education research by showing the relevancy of crowdsourcing activities as an innovative pedagogy approach to experiential education and student satisfaction (Dean et al., 2020; Mesny et al., 2021). In contrast with previous research that presented the different uses of crowdsourcing for education (Jiang et al., 2018), and their usefulness for companies or schools (e.g. Solemon et al., 2013; Weld et al., 2012), our findings show the interest of creative crowdsourcing to students themselves (value and learning experience).

Finally, our findings contribute by questioning the role of gamification techniques like competition in an education context, in particular in creative crowdsourcing activities with students. While previous research mentioned that gamification might increase motivation and output quality (Murillo-Zamorano et al., 2020), our results show that

even if competition is a driver of the learning experience, a competitive setting can also reduce the informational, social and enjoyment value in a student's learning experience. Organising crowdsourcing activities for education within a competitive setting should therefore be considered with caution.

Practical implications

The present research is of interest to both, crowdsourcing organisers (or intermediation platforms) and instructors alike.

For crowdsourcing professionals, emphasising the learning experience as an output can be an important driver of participation through appropriate communication and marketing of creative crowdsourcing. When designing creative crowdsourcing competitions, they have to take into account the different predictors of learning (e.g. informational value), which can be enhanced through rigorous organisation and management of the activities (e.g. planning intermediate coaching sessions or ensuring information sufficiency in the initial instructions). The identification and assessment of these predictors in our results also help to combine the determinants of user (or student) experience and provide a blueprint for the organisation of creative crowdsourcing.

For instructors, the results of this research represent an opportunity to make the courses more attractive and engaging. Our findings show that the informational value is not the only predictor of learning experience, but that the social and entertainment value of the teaching activity contributes to enhance learning as well. The social value could be assessed by the level of interaction in the classroom while the enjoyment value can be assessed through students' willingness to repeat the learning experience in the future or their satisfaction with the experience of participation. Moreover, this research identifies the determinants of each type of value, and thus, practical levers that can be used to trigger each of the three types of value perceptions.

Finally, our results question the usefulness of a competitive setting in educational activities as they may reduce the perception of informational, enjoyment and social value. Crowdsourcing organisers should therefore prefer suggesting different topics for a same company, or collaborating with different companies or NGOs.

Limitations and avenues for future research

Despite the novel character of the research topic, the findings suffer from some limitations.

This paper analysis creative crowdsourcing organised as group competitions by studying the impact on informational, social and enjoyment value. Despite the central role of social value, we did not analyse collaborative tools that students could use during the challenge to work together in a more efficient way. Previous research has highlighted the usefulness of collaborative tools or peer-evaluation techniques that contribute to team and project management (Benedek et al., 2015; Cho & Cho, 2011). Future research might thus analyse the moderating role of tools of technologies, software, but also team management on the efficiency of creative crowdsourcing as an educational approach. On the opposite, it could also be interesting to investigate how our findings differ in individual crowdsourcing projects when compared with group projects. Another

interesting avenue for research would be to conduct an experimental study to compare the effect of collaborative tools and competitive ones on participants' engagement in crowdsourcing competitions and in their courses.

Moreover, even if the learning experience was evaluated individually by students, we did not take into account individual traits when analysing the experience of tools. As skills and profiles are known to be heterogeneous in crowdsourcing activities (Mason & Suri, 2011; Satzger et al., 2013), students' profiles within heterogeneous groups might thus increase or reduce the ease of application of some techniques depending on their profiles (e.g. brainstorming, competitive setting). Given that we focused on creative but not complex crowdsourcing projects, advanced skills were not required to take part in the crowdsourcing projects. It could thus be of interest how the learning experience is affected when the project is more difficult and requires more advanced knowledge and know-how.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Data availability statement

Part of the data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to restrictions, which could compromise the privacy of research participants.

Ethics approval

According to the declaration of Helsinki, non-interventional studies such as surveys do not require ethical approval.

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