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Chapter

A Social Platform for Fostering Ethical Education through Role-Playing

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Abstract

Nowadays the complexity of knowledge, the specialization of labor and the pervasiveness of ICT in human activity, lead individuals to frequently make complex decisions with ethical implications. The educational system has a fundamental role in preparing specialized human capital in every discipline, however, it also faces the challenge of educating individuals with ethical discernment capabilities and behavior. In this book chapter, we describe the design, implementation and validation of EthicApp-RP, a social platform aimed at higher education settings, for fostering reflection and moral reasoning around ethical cases through a role-playing activity. We present an application of EthicApp-RP involving a cohort of undergraduate business students ($N = 85$), based on a case in which students play political and public leadership roles in the midst of the COVID-19 crisis. The results indicate that students and teachers acknowledge the learning environment's capacity to stimulate reflection and argumentation around ethical issues, while providing all students with equal opportunities for participation. In addition, the tool offers high technical and pedagogical usability, based on the Systems Usability Scale and the Pedagogically Meaningful Learning Questionnaire. EthicApp-RP can contribute to the improvement of ethics education, especially in scientific and technological disciplines, wherein students are quantitatively inclined by nature, in spite that ethics, a humanistic subject often foreign to them, must live at the core of their preparation.

Keywords: ethics education, higher education, human capital, social platform, educational technology

1. Introduction

Sometimes, people's behavior falls into unethical situations. Such behaviors are dependent on the context in which they occur, the points of view of those involved, the social norms in which people are framed, and what is considered morally correct [1]. In the world, several infamous cases of unethical conduct have come to light in academic [2, 3], governmental [4, 5], or corporate [6] contexts, among others. For example, in the Chilean national context, there are cases of collusion where various institutions have been involved, such as

pharmaceutical corporations, radio stations, food companies, paper product companies, medical doctors, airlines, supermarkets, public transportation, etc. [7]. Internationally, one of the most notorious and recent cases of unethical professional conduct is that of the Cambridge Analytica scandal [8], which adds to dozens of other corruption cases that have occurred in different parts of the world [9]. Likewise, the impact on the environment, and technological advances in areas such as machine learning, cybersecurity and big-data, have generated new ethical dilemmas and situations in which professionals are expected to be able to deal with ethically [10].

One way to minimize breaches of ethical behavior involves incorporating ethics education into higher education, so that instructional activities and learning environments are provided, with the capacity to stimulate reflection, argumentation, ethical discernment and moral reasoning around ethical issues. In addition, it is of utmost importance that these opportunities equally reach all students in higher education, notwithstanding their gender, cultural background or whether their field of study is in the sciences or in the humanities. Higher education institutions have become aware of the urgency and relevance of these skills [11–15], considering them an essential and transversal component of academic curricula [16].

The literature identifies a growing need and relevance of ethics education in various learning domains and occupations, such as information systems [17, 18], auditing [19], marketing [20], taxes [21], among others. In the domains of computer science and software engineering, the software industry has been faced with an ethical crisis [22, 23], as users are increasingly aware about their personal data being utilized by platforms and services for various uses, including production of discriminatory profiles [24], and disinformation and fake news through massive manipulation of public speech, which has included electoral interference [25].

Professional and academic associations, as well as accreditation boards and agencies in a variety of fields, including engineering [26], computer science [27], business [28] and accounting [29] have taken notice of the importance of ethics in higher educational curricula and professional practice. In accreditation, there has been an increasing demand for the inclusion of courses in the areas of ‘social, ethical and professional issues’. For instance, according to ABET [26], accredited computer science programs must cultivate “an understanding of professional, ethical, legal, security and social issues and responsibilities”.

Although ethics is nowadays present in business and engineering school curricula, and it is part of the competencies in many of undergraduate and graduate profiles in universities around the world, teaching ethics in business [13, 30] or engineering [14, 15] is not a simple task, since there are epistemological, methodological and pedagogical differences in how teachers and students perceive ethics. Although there is a growing consensus that ethics teaching is important, there is little consensus on how to do it. Traditional forms of ethical training, including lecturing and case-based analysis dominate classrooms. These offer limited possibilities for students’ active participation, which is highly desirable in their ethical training, [16, 31]. The activities in ethical training promoting the socialization of points of view, participation in discussions, reflection, and the development of ethical discernment are not those that predominate in traditional pedagogy. The ethical debates around ethical cases or dilemmas assume that students must not only demonstrate the ability to apply moral reasoning and develop ethical judgments, but also to communicate these processes competently and meaningfully, expecting to be heard, understood and respected by their classmates and the teacher [29].

2. Research context

With the intent of fostering the development of ethics skills in higher education, in the period 2018–2019 the present authors developed a collaborative web application called EthicApp, compatible with any current desktop computer or mobile device, including smartphones. EthicApp supports teachers in preparing and executing pedagogical tasks involving students' ethical discernment and reflection around ethical cases, in either face-to-face or online settings [32, 33]. Our early research with EthicApp focused on promoting higher level thinking processes, including reflection, argumentation, ethical discernment and moral reasoning. In addition, with EthicApp we strove to provide students equal opportunities for participation in ethics classes.

The first version of EthicApp consisted of a pedagogical flow comprising successive phases in which the students conduct ethical judgments individually, then in a small groups. The design sought that students express their judgments without inhibitions, so interactions among students were kept anonymous, even while working collaboratively. On the other hand, the teacher could monitor the activity and easily notice the groups of students presenting the greatest differences in the ethical evaluation of the case discussed. Lastly, the teacher could engage the entire class group in a discussion, for reflection on divergent ethical judgments found, and encourage students to further reason, argue and debate considering different points of view.

We conducted an initial pilot study of EthicApp, reported in [32], involving 35 Civil Engineering students from the Faculty of Engineering and Applied Sciences at Universidad de los Andes, Santiago, Chile. The analysis of students' behavior revealed that ethical judgments tend to be stable in the successive phases of the activity. However, it was observed that judgments tended to change more in groups where greater discussion occurred, and that the converse also happened. For this reason, we then considered that a desirable modification to the activity would consist in automating group composition, in such way that students with different views are brought together. Heterogeneous student grouping was thus hypothesized to increase students' interest in discussing the ethical case, and therefore, fostering a space where students have greater opportunity of modifying their ethical judgments as a result of argumentative and reflective processes in a social setting.

In [33], an experimental study was conducted with EthicApp in online mode, involving a cohort of 72 Civil Engineering students in the Professional Ethics Seminar course, in the same institution as in [32]. Greater chat interactions were observed among group peers in the heterogeneous grouping condition than in the random condition. In addition, it was identified, both in the heterogeneous and random grouping conditions, that the more chat messages were exchanged among the students, the more they produced argumentative discourse. Highly significant correlations were found among these variables. Lastly, it was found that male and female students benefit equally from the learning opportunities that are possible with the heterogeneous equally under the heterogeneous grouping condition, as no interaction effects were found among the quantity of chat message exchanges and gender.

In this chapter, we report on the development of EthicApp-RP, a social platform aimed at higher education settings, for fostering reflection and moral reasoning around ethical cases through a role-playing activity. In the following sections, we present the theoretical underpinnings of this research, the design principles of EthicApp-RP, the description of its instructional design, and a pilot study with business students to attest its technical and pedagogical usability, as well its effectiveness at fulfilling desirable qualities of role-playing activities in ethics education.

3. Theoretical and practical background

3.1 Ethics

According to [34, 35], ethics is a systematic approach to understand, analyze and distinguish issues of right and wrong, good and bad, admirable and deplorable in their relation to well-being and relationships between sentient beings. Ethics is an active process rather than a static one, which is why some ethicists use the expression 'doing ethics'. When people 'do ethics', they need to support their beliefs and claims with sound reasoning. In other words, even if people believe that ethics is totally subjective, they must be able to justify their positions before others through insights, reflections and arguments based on theory, context, rules, and rationality. In addition, feelings and emotions are a normal part of everyday life and can also play a legitimate role in ethics. However, people sometimes allow their emotions to outweigh good decisions related to ethics. Evaluations generated through the practice of ethics require a balance of emotion and reason. In contrast to ethics, morality is the set of beliefs, behaviors and specific ways of deriving from ethics. Morality can vary in a given population, depending on people's education, beliefs, social situation and culture. A person's morals are considered good or bad through systematic ethical discernment and reflection. The converse of morality is immorality, which means that a person's behavior is contrary to accepted social, religious, cultural or professional ethical standards and principles. Examples of immorality include dishonesty, fraud, murder, and acts of sexual abuse. Amoral is a term used to refer to actions that can normally be judged as moral or immoral, but which are performed with a lack of concern for good behavior. For example, murder is immoral, but if a person commits it without any feeling of remorse, or perhaps even a sense of pleasure, they act amorally.

According to [13, 35], ethics is a set of concerns, rules, principles, virtues, values and decision processes that allow people to live together and pursue their common and individual interests. As already made clear above, in the news everyday situations are seen that violate ethical principles in general, with a wide range of consequences for companies and citizens. Therefore, pedagogical artifacts and practices must be provided, which meet usability criteria [36], designed to help students from a wide variety of professionals, to be more ethical when making decisions in their future work fields. Ethical decision-making and moral reasoning are fundamental for future professional success and can be achieved by developing the skills of reflection, argumentation, discernments and moral reasoning, while students participate and communicate among them with equal opportunities [12, 37, 38].

3.2 Ethical discernment, reflection and argumentation

Ethical discernment is a characteristic of people that allows them to recognize the existence of an ethical dilemma, [20, 39]. The recognition of an ethical dilemma implies perceiving a problem or conflict in some situation or decision, whose dilemma becomes an ethical problem. It is considered that, if the ethical problem is not perceived, the process required to argue and reflect on ethical judgments will not happen [20, 39]. Therefore, it is necessary to distinguish both concepts: ethical dilemma and problem. An ethical dilemma exists when there is a situation where someone will consider one or more alternatives of action, including not acting at all, that are different consistent or inconsistent with some formal or informal rule, code or ethical norm [20]. An ethical problem does not exist until it is perceived as such, and then it happens that an attempt is made to resolve ethical dilemmas; that is, it occurs when a person perceives that their duties and responsibilities towards one

group are inconsistent with their duties towards another group, including themselves. For the model developed by [20], only important ethical dilemmas will have an intense ethical conflict, provided that these are perceived as a type of problem. People often approach ethics with an initial expectation that there will be a correct answer to every question posed. It is important to help them accept the fact that there will not always be a correct answer, but one that requires personal judgment [40]. According to Kohlberg [29], ethical training should be encouraged, without limiting students to the role of mere spectators who only seek to apply the most appropriate ethical standard to each situation; but rather to carry out activities in which they participate, express, and make it easier for them to carry out their ethical evaluations, argued in an honest and authentic way, without feeling inhibited by their peers.

In [37, 40, 41], it is indicated that the key skills of ethical discernment are the following: a) **analytical skills** [41]: develop an aptitude for clear and logical thinking, where students learn to think reflectively, critically and solve complex problems supported by arguments that prove or refute the positions taken; b) **flexibility and independence of mind**: considering issues from multiple perspectives or points of view, encouraging a willingness to challenge orthodoxies, as well as the courage to set aside one's personal convictions to pursue a discussion wherever it leads; c) **making reasoned decisions** [41]: exercising coherent principles of thought and action, to learn to determine what types of evidence are needed to support their views and choices and that are justified by means of arguments that support the positions adopted; d) **communication skills**: learning to express points of view verbally and in writing, emphasizing group discussion and the articulation of arguments in direct response to verbal; and e) **group and collaborative work skills**, [37, 41]: create a supportive environment for the development of ethical discernment that is group and collaborative, where students feel safe, there is a climate of mutual respect and confidentiality is ensured. According to [40], the group and collaborative work skills required by a person who is dealing with an ethical dilemma are: a) share their ideas, either verbally or in writing; b) express their opinions without interruption; c) express their criticism, directed at arguments and not at individuals; d) be able to handle conflictive situations; e) encourage others to generate constructive criticism of their beliefs; f) encourage the search for commonalities between opposing points of view; and g) be open to considering different points of view.

3.3 Ethics in higher education

According to [35], there is a growing need for well-established ethical frameworks and practices in ethical training in business schools [13, 28, 42–44], and in engineering education [14, 15, 45, 46]; who have the responsibility of providing their students with training in their ethical discernment, argumentation and reflections [30]. According to [40], if a business or engineering schools provides what we call 'reactive' ethics education, which only serves to inform the practice of statutory and regulatory requirements and responsibility to shareholders, it is most likely that the organizations introduce procedures that merely comply with legal ethical business practice. However, for organizations to adopt an ethical stance and socially responsible thinking, they also need to be 'proactive', with fundamental ethics programs taught by business and engineering schools. A 'proactive' ethics education implies the development of flexible but ethical managerial thinking and practice, that can be applicable to different contexts. For this, it is necessary that business and engineering schools establish the importance of contributions that increase moral reasoning, the improvement of ethical training and the development of decision-making skills with an ethical approach and leadership. Boo and Koh's research [47] identifies that top management support, with links between ethical

behavior, professional success, and ethical organizational climate are all that is necessary for effective ethical codes. It could be argued that corporate malfeasance, as in Enron and Parmalat [48], would have been prevented by properly employing and monitoring 'reactive' and 'proactive' business ethics practices and procedures. Clearly more profound changes in culture are necessary, and values are needed in organizations to deal with these types of problems.

According to Holsapple et al. [15], teachers in engineering schools often describe ethics education as a balance between knowledge of ethical codes of conduct and understanding of ethical rights and errors. However, graduates often report that their ethical training relied almost entirely on the application of codes, implying less depth and complexity in the analysis of ethical dilemmas. While ethics is intended to be a central component of today's engineering curriculum, it is often perceived as a marginal requirement that must be met [14]. According to [45], the pedagogy of ethics for engineers must consider the characteristics of thought inherent in the scientific training of students and their future professional approach. The authors characterize the mentality of engineers with the following description: the real world is what can be touched and measured, the prototype of rational thinking is mathematical-deductive reasoning, and the best results are obtained by following standard procedures. Therefore, it is a priority to recognize the difficulties of engineering students to recognize the value of ethics, along with moral discernment and reflection. In a systematic review of the literature on interventions for teaching engineering ethics in the USA, Hess and Fore [49] report that the most common methods involved exposing students to codes or standards, using case studies (case-based learning) and discussions. They emphasize the need to develop learning experiences where students reflect on their own emotions and those of others, with greater empathy with the actors involved and the situations.

3.4 Instructional approaches in higher ethics education

In [37], a quantitative grouping procedure was carried out to derive a typology of instruction in ethics education with respect to four categories of instruction. These include content, processes, methods of delivery, and instructional activities. Eight instructional approaches were identified through this grouping procedure, each with different levels of effectiveness based on one of nine commonly used ethical criteria. Viable approaches to ethics training, of which effect size estimates (i.e., Cohen's d) are known, include 'professional decision processes training' ($d = 0.50$) and 'field-specific compliance training' ($d = 0.46$). Professional decision processes training uses a variety of techniques, including case-based learning, role-playing learning, problem-based learning, team-based learning and discussion. Next, articles that report on methods for developing ethical discernment and reflection in higher education contexts are described, comprising case-based learning, and role-playing activities.

Case-based learning (CBL) consists of the use of fictitious or real cases associated with specific curricular disciplines, in which ethical dilemmas are presented, and pedagogical activities of ethical discernment are instantiated. Students read and analyze a 'case' described in detail, usually adopting the role of decision makers [50]. Some examples of the use of this methodology are described below.

In the Faculty of Economics and Business at University of Chile, based on the contents of the cases described in [51], a methodology is applied based on a) case reading, b) identification of relevant actors, c) identification of premises in conflict, d) evaluation of alternatives and decision-making, and e) plenary discussion and conclusion in teams of 5 to 7 members, with the support of the socrative.com application to collect opinions. This methodology is applied in various courses

requiring ethical education, such as Management and Business, Costs and Budgets, Business Income, Tax Economics, and Introduction to Economics, among others. Several advantages have been observed, including that the group discussion permits listening and analyzing diverse perspectives, improving the depth of analysis and discussion of the case and the ethical dilemmas identified. The moderator facilitates aspects to be debated and opens instances to spur students' critical reasoning. The use of socrative.com allows to have a record of the conclusions of the groups, thus facilitating the teacher's review after the session is finished. Among the cons, not all students' opinions can be effectively captured, because some students are apprehensive about openly exposing their comments. Moreover, limitations on the quantity and quality of the interactions arise due to time restrictions, and that the activity is done in a single class session.

In [52], to establish the case, face-to-face interviews with people directly or indirectly involved with business ethical dilemmas in real life are organized in class, so the experience of the actors involved is counted on. Then a discussion is held among the participants based on a specific ethical dilemma. The advantage of this variant is that, by being in contact with the person interviewed, it is possible to have a more direct contact with the various ethical dilemmas that are experienced in the professional field. It is expected that this level of proximity to the problem will allow the generation of greater affective empathy in the students and thereby improve their decision-making in real situations, taking advantage of the 'sensitization' of the students as a benefit of the process. In addition, while discussing during class, students learn from each other by presenting their own arguments that support the decision made. As for the disadvantages, it requires great preparation to be carried out, since it implies counting on a person involved in a real case. A record of what was discussed with the interviewee is not generated, but only what was noted by the interviewers, so the teacher does not know the points discussed by the group at the time of generating the discussions. This methodology was applied to ethics courses at Kenan-Flagler Business School of the University of North Carolina at Chapel Hill.

The CBL is a useful method to bring students closer to real ethical and professional decisions, without the consequences that decision making entails for case roles and stakeholders in real situations. The method manages to generate both the capacity for critical analysis and cognitive empathy. Despite being a method with many advantages, its main disadvantage is its structuredness. Preparation of structured cases is required, with sufficient contextualization and depth to understand the problem and achieve a connection between the students and the roles. In contrast, real life scenarios are often ill-structured and decision making relies on limited information.

Role-playing Learning (RPL) Role-playing is the exercise of changing one's behavior to take on a particular role. For this purpose, it is a conscious change to represent an adopted role, extracted from a context or problematic in analysis. It is a method that is regularly combined with the roles of people who are described in a case. Some examples of the use of this methodology are described below.

The method used in the York University School of Engineering [46] applies role-playing with theatrical elements to teach decision making on controversial ethical issues. The activity encompasses the following phases: a) role assignment: each student receives information on their role based on a script prepared by the teacher; b) discussion: the teacher presents questions about the case, and each student exposes and discusses their points of view, based on their role, in relation to these questions with their classmates; c) deepening: at some point in the discussion, the students can elaborate more detail about their positions, and expect their classmates to do so as well. With additional details provided by each role, the students can complete their analysis of the situation; d) plenary: after the discussions, the teacher begins

a closing phase, in which the analyses achieved previously for each question are synthesized. Theatrical elements are used through the role-playing process, including costumes, music and other recorded media, which allow to further increase the credibility of the recreation. The authors who propose this activity [46] indicate advantages compared to other traditional methods, similar to those found other RPL designs, such as greater student involvement, engagement and dynamism in interactions. Among the disadvantages, it is indicated that a high degree of preparation is required, including the activity script, the description of the roles involved, as well as the theatrical resources that complement the exercise.

According to [43], who proposed an RPL activity that was incorporated into a financial management course for undergraduate and graduate students, RPL has the advantage of creating low-risk conditions so that students can express their opinions and perceptions with minimal teacher intervention. For RPL to be successful, the activity needs to be potentially conflictive, and ideally allow the majority of students to identify with some role, in order to encourage participation. The roles should result in personifications by which students can feel comfortable and immersed. Otherwise, the students will unlikely be able to imagine the actions the role would likely perform, nor relate their own experiences emphatically with the situation as experienced by the role.

The RPL is a dynamic and simple method to understand, and it allows to keep students more involved in the case or problem, since they internalize themselves from their role to defend their positions, and from where it is attractive to keep participating. As a general disadvantage, it is observed that identifying with a unique role in the game and defending their position from the perspective of that role, can cause students to then focus the solutions on the character they had to interpret, closing the possibility to the other characters or, sometimes, reducing the role of the decision-maker in the case.

4. Design of EthicApp-RP

4.1 Design principles

Based on the analysis of literature in the field of ethics education already exposed in [32, 33], this section present the design principles for EthicApp-RP, comprising relevant functions for supporting case-based learning in ethics [31, 53, 54] and role-playing [43, 44, 46]. Its design principles are as: 1) embeddable in traditional courses, 2) easy to use, 3) implicit interactions to support student and teacher roles, 4) multidimensional judgements, 5) anonymity, 6) support for reflection, discussion and argumentation, 7) domain independency, 8) efficient information management, 9) combine individual work and group work, 10) Flexibility, and 11) device independence.

All these principles are explained in detail in section 5.1 of a previous research which instructional design were based entirely on a case-based learning methodology, and applying differentials to the selection of statements [32]. Regarding to requirement 2) a desirable level of technical usability is given by mean score equal or above 75 in the System Usability Scale (SUS) [36]. For requirement 4) applied to EthicApp-RP, the students must express their ethical judgement on the given case by ordering (i.e., prioritizing) a set of actions, according to a prescribed criterion, and by providing justification on the ordering of one or more of the actions. The criterion prompts the student to reason according to their assigned role, and based on that specific perspective, prioritize decisions considering their effect on different stakeholders, with the intent to reach the most beneficial (or least

detrimental) solution pathway to the ethical problem. In order to attest the qualities of requirement 6), mean scores in the range of 4 to 5 points in the constructs of the Pedagogically Meaningful Learning Questionnaire (PMLQ) [55], are considered a desirable objective. Regarding 19), EthicApp-RP supports flexibility in its pedagogical flow; that is, while the activity must always begin with a mandatory individual phase to collect students' initial appraisal of the case, the successive phases, i.e., individual or collaborative, shall be optional and configured on-the-fly, thus allowing different phase configurations depending on timing constraints and pedagogical goals in which the activity is enacted, [37, 41].

4.2 Instructional Design of EthicApp-RP

The design of EthicApp-RP permits the teacher conducting role-playing activities comprising an arbitrary number of phases, including both individual and collaborative work. In spite of this flexibility, activities based on EthicApp-RP will commonly follow the jigsaw Collaborative Learning Flow Pattern [56]. Under this pattern, the activity is structured based on the following successive phases:

Prerequisites and Setup: To create and configure an activity, the teacher must set up its configuration, see **Figure 1(a)**. For this, they indicate its title, a brief description, and provide a PDF file containing the description of the case involved. In addition, the teacher defines a set of roles involved in the case, inputs a list of actions that the different roles must hierarchically order, enters the criteria by which the actions must be ordered by the students, each of them assuming a specific role. In addition, several other parameters can be configured by the teacher, including which actions require the students' written justification, whether the next phase of the activity is individual or collaborative, the type of groups that shall be formed (i.e., 'expert groups' or 'mixed groups'), and whether students' anonymity is required.

Individual Work: Each student reads the case presented and issues their first ethical assessment individually, according to their role. To carry out the ethical judgment, the student has to order the presented case actions according to the

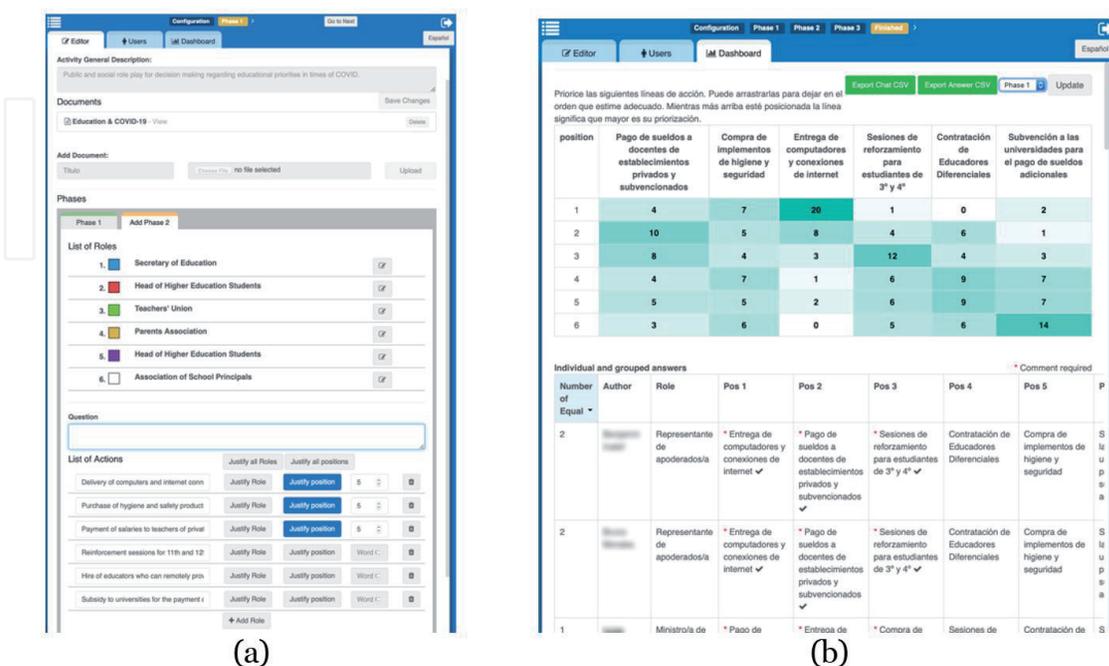


Figure 1. (a) Activity configuration panel, which allows the teacher to configure and start activity phases with different configuration parameters on the fly, (b) Teacher's progress dashboard, where students' and groups' progress can be seen.

required criteria, see **Figure 2(a)**. In addition, the student may need to provide written justification for the specific ordering of one or more actions, according to how the activity had been previously configured by the teacher. While the students work on this phase, the teacher can monitor their progress through a dashboard, see **Figure 1(b)**. The dashboard displays a matrix showing the frequency with which students place actions in the different orders that are possible. In addition, the teacher may see details of the response of any individual student.

Expert Groups: When the teacher transitions to this phase, EthicApp-RP implicitly groups students homogeneously, i.e., forms groups comprising students with the same role. The students discuss their prior individual responses, by means of anonymous text-based chat, see **Figure 2(b)**. They may re-elaborate their responses if they choose to do so or may maintain their response unchanged as in the previous phase. As in the previous phase, the teacher is presented with a dashboard through which they can monitor student' activity. The dashboard continues to present the matrix previously described, along with students' responses, and the possibility to see the groups' conversation through chat messages.

Mixed Groups: After the 'Expert Groups' phase finishes, students keep their role and EthicApp-RP forms groups composed of mixed roles. The number of students per group relates to the number of roles in the activity. EthicApp-RP's grouping algorithm attempts to form groups in such way that a single representative of each role is present in each group. Students in mixed groups must defend the interest of their assigned role, while at the same time pay respect to and consider their peers' different points of view. Like in the previous phase, students can modify their response after considering their peers' points of view and arguments.

Plenary Discussion: After the 'Mixed Groups' phase is over, the teacher can advance to a Whole Class Discussion phase, where they can present conflicting ethical judgments from different groups to the class and ask students to express their points of view and private assessments on the case. The teacher should be careful to select contradictory or divergent judgments judiciously to stimulate a discussion that will lead to an ethical based case resolution. The objective is for students to recognize the virtues of the resolution reached in this final discussion, which can help them build ethical schemes, as well as ethical meanings that they can transfer to different cases in their future as students or professionals in the workplace.

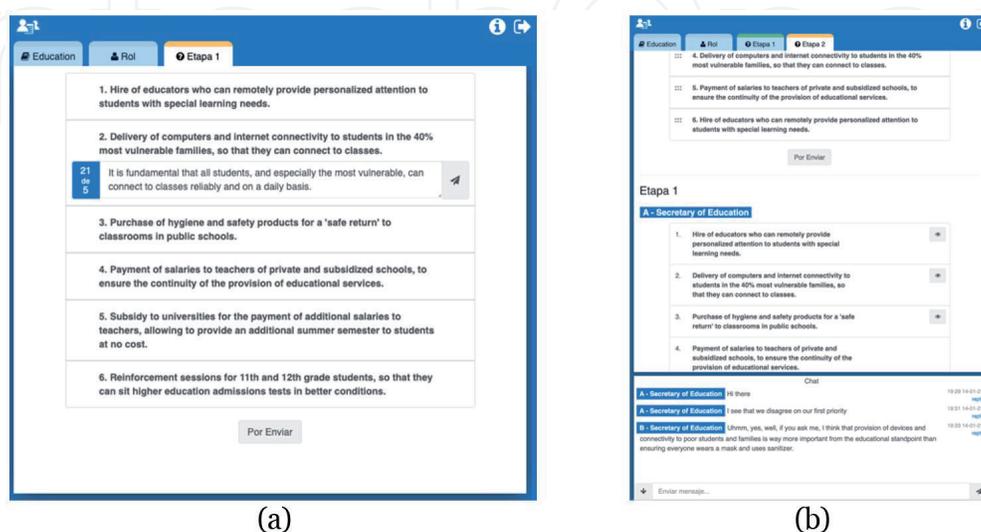


Figure 2. Students' user interface, showing (a) the Individual Response phase, in which the student ranks actions and provides justification for it, (b) the 'Expert Groups' phase, in which students with the same role discuss their responses anonymously.

5. Pilot study

‘Social and Professional Environment’ is a compulsory, first-year course, in the curricula of ‘Information Engineering and Management Control’, and ‘Accounting and Auditing’ degrees at the Faculty of Economics and Business (‘Facultad de Economía y Negocios’, FEN) at Universidad de Chile, Santiago, Chile. This course aims that students reflect on current socio-environmental challenges in relation to their future professional occupations. Since 2013, Ethical Discernment (ED) was integrated as a transversal skill at FEN, thus it ceased being taught as a dedicated course. The ED competence is defined at FEN as “*the use of a set of criteria that guide the projection of effects and consequences in decision-making in the field academic, professional and/or labor, considering norms, values and good practices*”.

The course is focused on five main themes: 1) Sustainable Human Development, 2) Poverty and Inequality, 3) Education, 4) Citizen Participation, and 5) Multiculturalism and Gender. Critical discussion is fostered based on these themes, for which students are provided the pertaining literature. In each course topic, special attention is paid to students’ ability to analyze social problems and ethical issues raised, as well as establishing links with professional practice, and proposing possible solutions to the problems. Consistently with this rationale, the analysis of ethical dilemmas is part of the course methodology.

	T	Description (T: Time in Minutes, A: Asynchronous)
Before class	A	Students were announced that an ethical discernment activity would take place next class. They were asked to create their account at EthicApp-RP, and read the case text, available at the course website.
Briefing	5	The students were welcomed to class, and the objective of the activity was presented. A general summary of the case was then displayed.
Ethical Case Reading	5	The students entered EthicApp-RP with their credentials, and found the text of the case, so that they had it available during the activity.
Individual Work Phase	5	Each student was assigned one of the following roles: Secretary of Education, Secretary of Finance, Head of Higher Education Students, Parents Association, and Association of School Principals, Teachers’ Union. Details about the assigned role and their participation in the case were provided as well. Each student had to individually adopt their role and prioritize the actions.
Expert Groups Phase	15	Groups of 4–5 students were formed, with all students having the same role. Each group was asked to first reflect on the case and the actions proposed. Then, students in their assigned roles were asked to take a position in the case, by prioritizing the actions, and providing justification for the chosen prioritization.
Mixed Groups Phase	15	New groups were formed, this time composed of students with different roles. Each student had to defend the interests associated with their role. Then each student was again asked to prioritize the lines of action, and to provide justification for the prioritization, considering the discussion that just took place in the mixed group.
Plenary Discussion	15	A final plenary session was held, where each heterogeneous group (i.e., from the previous phase) presented their prioritization to the rest of the class. The discussion emphasized the importance of considering the stakeholders of interest in the decision-making process, as well as the changes in prioritizations found through the three previous activity phases. Lastly, the students were asked to share their impressions and feedback on the activity through a survey at menti.com.

Table 1.
 Description of the role-playing activity based on EthicApp-RP.

ID	Action	Description
A1	Hygiene & Security	Purchase of hygiene and safety products for a 'safe return' to classrooms in public schools.
A2	Special Educators	Hire of educators who can remotely provide personalized attention to students with special learning needs.
A3	Devices and Connectivity	Delivery of computers and internet connectivity to students in the 40% most vulnerable families, so that they can connect to classes.
A4	Teacher Salaries	Payment of salaries to teachers of private and subsidized schools, to ensure the continuity of the provision of educational services.
A5	11-12th Grade Tutors	Reinforcement sessions for 11th and 12th grade students, so that they can sit higher education admissions tests in better conditions.
A6	University Funding	Subsidy to universities for the payment of additional salaries to teachers, allowing to provide an additional summer semester to students at no cost.

Table 2.
List of actions prioritized by the different roles in the activity.

Due to the COVID19 pandemic in 2020, the development of the course was faced with the challenge of maintaining the active learning methods in an online format, as these were customary in face-to-face classes. For this reason, it was decided to pilot EthicApp-RP in the course, in order to facilitate conducting role-playing activities in the third course unit. An ad hoc ethical dilemma was written, based on the challenges that the country was experiencing due to the pandemic. The dilemma closely resembled the national reality at the time of the activity.

In total, 85 students participated in the trial activities, divided into two sections of 49 and 36 students, respectively. In both sections the activity lasted one hour, however, it was conducted at different times and guided by different teachers. Participation was entirely online, with use of Cisco Webex for synchronous communication.

5.1 Role-playing learning activity

Table 1 summarizes the steps followed in the pilot activity. Before class, the students had to study the case, which basically described the state of events in the Chilean education system in the midst of the COVID-19 crisis. In synthesis: The education system had been challenged with the need to migrate all levels of education to online formats. Adoption of online education meant that all educational levels had to sacrifice learning outcomes and contents, due to reduction of effective class time.

In the individual work phase, each student was assigned the role of a decision maker, automatically, by EthicApp-RP (see **Table 1**). According to the assigned role, each student had to prioritize a set of actions to cope with the crisis (see **Table 2**). The intent was that each student prioritized the actions considering resource limitations, and the interests of the stakeholders they represented and society as a whole. Next, the 'Expert Groups', 'Mixed Groups' and 'Plenary Discussion' phases ensued.

6. Quantitative results

The entirety of the cohort, i.e., 85 students, connected to EthicApp-RP at the beginning of the activity. However, two students entered late and were not assigned to a group, thus only 83 participated in the first phase, and 81 thereby submitted their response. In the role assignment performed by EthicApp-RP in phase 1

(i.e., ‘Individual response’), there were between 13 and 15 students assigned to each role. The roles were assigned to the students in the following quantities: Secretary of Education to 15 students, Secretary of Finance to 14, Head of Higher Education Students to 14, Parents Association to 13, Association of School Principals to 13, and Teachers’ Union to 14 students.

In phase 2 (i.e., ‘Expert Groups’), 81 students participated. In the first section, the groups were more numerous, composed of 7 to 9 students, while in the second section, the groups involved from 5 to 7 students. Finally, in the third phase (i.e., ‘Mixed Groups’), 80 students submitted responses.

Regarding chat messages, a significant increase was observed between phases 2 and 3 (see **Figure 3-left**), especially in the roles of Secretary of Education, Secretary of Finance, and Head of Higher Education Students. This is an expected behavior in mixed groups, since in previous studies it has been determined that in groups where there are different points of view, the discussion is greater than in groups with more homogeneous views [32].

The distributions of chat messages per student considering the different roles follow a similar trend to that observed with respect to the totality of messages by role (see **Figure 3-right**). In particular, in phase 3, certain outliers are observed for the roles of Secretary of Education and Secretary of Finance.

Through the successive phases of the activity, all roles placed action A3 – ‘Devices and Connectivity’ as the first priority, and the last priority was that of A6 – ‘University Funding’ (see **Figure 4**). It can be seen that the priorities evolved throughout the three phases; however, the first three priorities remained relatively stable. Apart from the first priority already mentioned, in second place of priorities, the action A4 – ‘Teacher Salaries’ dominated in the three phases, and in the third place, there was a similar number of preferences for A5 – ‘11-12th Grade Tutors’, A4 – ‘Teacher Salaries’, and A2 – ‘Special Educators’.

Figure 5 shows Sankey networks depicting how first priority preferences evolved in each of the roles through the three phases. It can be seen that the first priority varies according to each role. Notably, in the first phase, the first priority

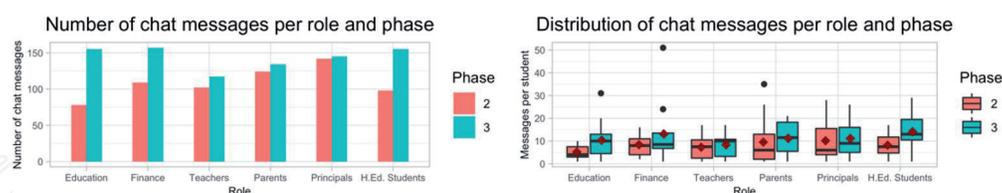


Figure 3. At the left, number of chat messages per role and phase. At the right, distribution of chat messages per role and phase.

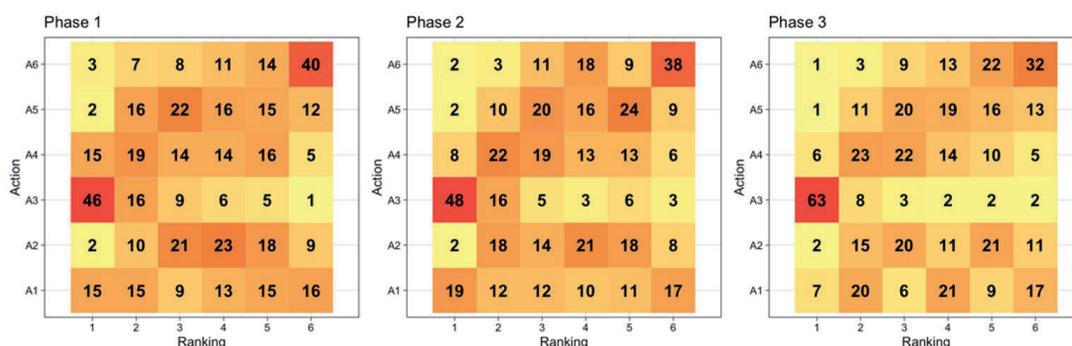


Figure 4. Frequency of action rankings per phase.

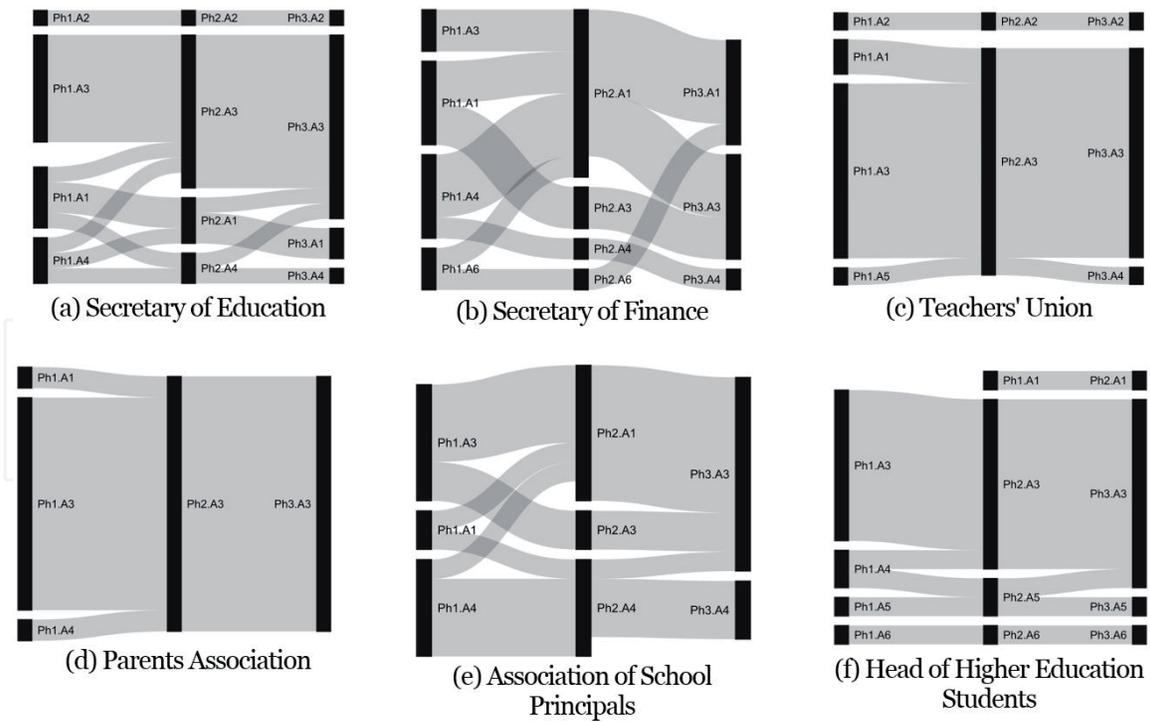


Figure 5. Sankey charts depicting the evolution of the first priority chosen by students with different roles throughout the activity.

for the secretaries of Education (a) and Finance (b) is distributed in four actions. In contrast, for Teachers’ Union and Parents Association, the action A3 – ‘Devices and Connectivity’ clearly dominates. In the case of Principals, there are three priority actions, and in the case of the Head of Higher Education Students, action A3 is dominant, and three other actions have less weight.

In the second phase, of expert groups, the first priority was changed in each of the roles. In the case of the Secretary of Education, A3 starts to acquire major importance. In the case of the Secretary of Finance, A1 – ‘Hygiene and Security’ acquires much greater importance than in the first phase. For the Teacher’s Union role, A3 increases its importance, with only one participant who maintained their preference for A2 – ‘Special Educators’. All of the students with the role of Parents Association representatives prioritized A3 first. The representatives of the Association of School Principals maintained the same actions in first priority, increasing in importance A1. Finally, for Head of Higher Education Students, A3 increases its importance and a student appears prioritizing A1 first.

In the third phase, only the role of Secretary of Finance maintains a prioritization where A1 and A3 are equally divided in first place. For all other roles, action A3 takes on the highest importance.

6.1 Technical usability of EthicApp-RP

To determine the students’ perception of technical usability of EthicApp-RP, the SUS questionnaire, based on 10 Likert 1–5 scale items [36] was administered in online format to the participating students, [57]. A total of 39 responses were gathered, of which two responses were ruled out as invalid, thus 37 responses are considered in this analysis. The distribution of scores is shown in **Figure 6**. The mean score was 78.6/100 (SD = 13.8), the minimum was 47.5 points, the median 75, and the maximum 100. Only four students (11% of responses) gave a score lower than 68, which is considered average usability according to [36].

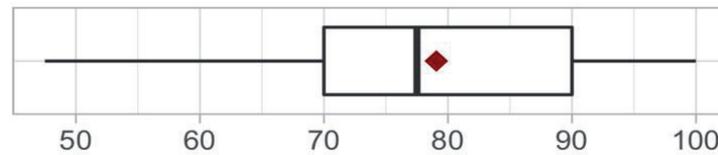


Figure 6.
 Distribution of EthicApp-RP SUS scores.

N	Item	M	SD
1	I think that I would like to use EthicApp-RP frequently in university courses.	4.38	0.70
2	I found EthicApp-RP unnecessarily complex.	1.80	0.85
3	I thought EthicApp-RP was easy to use.	4.25	0.63
4	I think that I would need the support of a technical person to be able to use EthicApp-RP.	2.20	1.04
5	I found the various functions in EthicApp-RP were well integrated.	4.25	0.71
6	I thought there was too much inconsistency in EthicApp-RP.	1.88	0.79
7	I would imagine that most people would learn to use EthicApp-RP very quickly.	4.30	0.52
8	I found EthicApp-RP very cumbersome to use.	1.52	0.72
9	I felt very confident using EthicApp-RP.	4.03	0.80
10	I needed to learn a lot of things before I could get going with EthicApp-RP.	2.17	1.01

Table 3.
 EthicApp-RP Usability Scale results.

Construct	Abbrev.	Items	M	SD
Applicability	AP	5	4.48	0.45
Added Value	AV	3	4.42	0.55
Cooperative/Collaborative Learning	CL	3	4.57	0.59
Feedback	FE	3	4.41	0.54
Flexibility	FL	4	4.44	0.50
Goal Orientation	GO	3	4.47	0.55
Learner Activity	LA	3	4.13	0.61
Learner Control	LC	4	4.35	0.60
Motivation	MO	3	4.53	0.45
Valuation of previous knowledge	VP	3	4.49	0.52

Table 4.
 Results of the PMLQ instrument, by construct.

Table 3 shows the items from the SUS questionnaire, with their respective descriptive statistics. Students consider the use of the relevant tool in university courses (question 1). On the other hand, it is observed that the application was, on average, easy to learn to use (question 3), without the students having received training prior to the activity carried out. Also, the functions are easy to remember (question 4) and understand (question 5) for most students.

6.2 Pedagogical usability of EthicApp-RP

The evaluation of Pedagogical Usability, that is, the appraisal of the pedagogical qualities of the design and the use of EthicApp-RP, was carried out through an adaptation of the Pedagogically Meaningful Learning Questionnaire (PMLQ) [55], with a total of 34 Likert items in a 1–5 scale, [58]. This instrument allows evaluating pedagogical usability considering a series of criteria, as shown in **Table 4**. PMLQ was applied in conjunction with SUS, hence the same number of valid responses was obtained, i.e., 37 out of a total of 39.

It is observed that in every construct the average score obtained is in within the range of 4–5, which meets the pedagogical usability goals established at the outset of EthicApp-RP’s development process.

7. Qualitative results

Students’ written justifications in the EthicApp-RP activity were analyzed for complexity of ethical reasoning. For this, the rubric of the Association of American Colleges and Universities (AAC&U) on Ethical Reasoning was used [59]. This rubric was preferred, since it was developed by teams of faculty experts representing colleges and universities across the United States, “*through a process that examined many existing rubrics and related documents for each learning outcome and incorporated additional feedback from faculty*” [59]. A specific criterion of the rubric, namely ‘Evaluation of Different Ethical Perspectives/Concepts’ was considered for rating all students’ justifications (see **Table 5**). These were 1465 in total, considering the three first phases of the activity, and that the students had to justify the hierarchical ordering of six actions.

Each of the students’ justifications was analyzed and scored by one of the researchers. Later, another researcher assigned scores and the differences were discussed. Only in four cases out of 717 registered justifications it was necessary to make an adjustment to the assigned score.

Students who were assigned a score of 1 to their justifications (46%), normally used the same measure as justification or stated comments as ‘it was the most important’. Students who were assigned a score of 2 (40%), were able to relate at least one variable or different perspective as part of the justification but did not explore

Level	Description
Benchmark (1)	Student states a position but cannot state the objections to and assumptions and limitations of the different perspectives/concepts.
Milestone A (2)	Student states a position and can state the objections to, assumptions and implications of different ethical perspectives/concepts but does not respond to them (and ultimately objections, assumptions, and implications are compartmentalized by student and do not affect student’s position.)
Milestone B (3)	Student states a position and can state the objections to, assumptions and implications of, and respond to the objections to, assumptions and implications of different ethical perspectives/concepts, but the student’s response is inadequate.
Capstone (4)	Student states a position and can note the objections to, assumptions and implications of and can reasonably defend against the objections to, assumptions and implications of different ethical perspectives/concepts, and the student’s defense is adequate and effective.

Table 5. Ethical Reasoning Value Rubric (AAC&U) criteria used in classification of students’ justifications, according to [59].

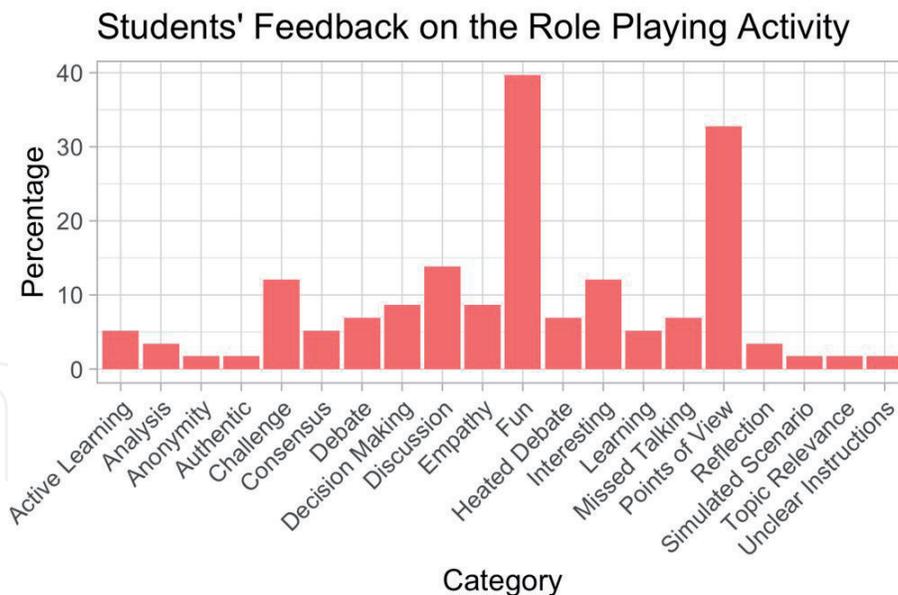


Figure 7.
 Theme categories found in students' feedback.

further possible implications in their statements. The students who had a score of 3 (5%), managed to incorporate different perspectives, but their base assumption was inadequate, so the justification lost sense. Lastly, 9% of the students reached the maximum score. This result was expected, because the students are in the first year of their studies, and the ethical discrimination competence is developed throughout the duration of the entire program. Those students who achieved the maximum score, probably had a previous development of the competence, because this was the first activity of this type that was developed in the subject.

7.1 Students' feedback on the role-playing learning activity

At the end of each session in the trial, the students were asked to give their opinion on the activity through a short comment. The collection of this information was carried out through menti.com. In total, 58 comments from students were collected. In sum, 20 different themes were identified in the responses through an inductive process. **Figure 7** shows the percentage of responses found involving each of the themes. The dominant themes were that the activity was fun (39.7%), interesting (12.1%), and that it allowed the students to share different points of view (32.8%) through discussions (13.8%) and debate (6.9%). In some cases, the students declared having engaged in heated debates and arguments with their peers (6.9%). Many highlighted the challenge of reaching a consensus (12.1%), given the different views that the adoption of the different roles led to. On the other hand, some of the students stated that the activity required them to think empathically (8.6%) with regard to the implications of their decisions in the lives of people affected by the pandemic, as well as the decisions made by other roles.

8. Conclusions

In this chapter we presented EthicApp-RP, a social platform aimed at fostering ethical reasoning, discussion and argumentation in higher education students, through a role-playing learning activity based on the jigsaw pattern. The results of the pilot activity show that the instructional design can be well enacted with business students in a synchronous online setting, that technical (see section 6.1)

and pedagogical usability (see section 6.2) are positively regarded by the students, and the pedagogical goals of the activity were effectively fulfilled. The latter included eliciting students' reflection, argumentation, ethical discernments and moral reasoning through role-playing, while providing all students with equal opportunities for participation.

Sankey network analysis revealed that the students made decisions throughout the activity phases in ways in which their effective role personification was achieved, while they were doing discernment, reflection and argumentation processes by online chat messages. In addition, the justifications with which the students ranked the actions hierarchically, shows that 40% of the cohort was able to give an elaborate argument for their decisions, and 9% provided justifications of an outstanding level, which is a positive result considering the cohort was composed of business freshmen. The students considered the activity to be fun, interesting and that it fostered discussion and sharing of different points of view.

Compared to other role-playing learning activities, EthicApp-RP requires minimal logistical preparation, as the tool transparently guides students through the process, facilitating information sharing and synchronous communication among them. Furthermore, the teacher can follow the development of the activity using a progress dashboard in real time that EthicApp-RP has as a functionality. Requirements for case specification remain similar to other role-playing learning activities reported in the literature. These include the elaboration of a case based on a real or fictitious situation comprising one or more ethical dilemmas, and the definition of several decision-making roles with different interests and priorities. EthicApp-RP's requirements and features make it applicable to a wide variety of learning domains and contexts in higher education, including disciplines in both science and the humanities.

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