

Integrating Global Sustainability Challenges in an Organizational Management Course

Ing. Javiera Constanza Jofré, Universidad Andres Bello, Chile

Javiera Jofré is Director of the Industrial Engineering Program and the Engineering in Logistics and Transportation Program at the Universidad Andres Bello, Santiago, Chile. Also, she is an Assistant Professor and a Researcher at the School of Engineering at the Universidad Andres Bello. She holds a bachelor's degree in Industrial Civil Engineering from the Universidad de Chile and a Master's degree in Marketing from the Universidad Autonoma de Barcelona, Spain. For the last ten years, her undergraduate teaching expertise focuses on management, marketing, and organizational studies for engineering majors. Her main research areas are higher education on sustainable development, management education, and gender issues in STEM education. Recently, she is a member of a Gender Issues Committee that will focus on empowering women in Industry and Innovation by analyzing the current situation and proposing actions towards equity.

Prof. Angeles Dominguez, Tecnologico de Monterrey, Mexico; Universidad Andres Bello, Chile

Angeles Dominguez is a Professor of the Department of Mathematics within the School of Engineering, a researcher at the School of Education, and Associate Dean of Faculty Development at the School of Medicine and Health Sciences at the Tecnologico de Monterrey, Mexico. Also, she is currently collaborating with the School of Engineering at the University Andres Bello in Santiago, Chile. Angeles holds a bachelor's degree in Physics Engineering from Tecnologico de Monterrey and a doctoral degree in Mathematics Education from Syracuse University, NY. Dr. Dominguez is a member of the Researchers' National System in Mexico (SNI-2) and has been a visiting researcher at Syracuse University, at UT-Austin, and at Universidad Andres Bello. She teaches undergraduate courses in Mathematics, graduate courses in Education, and is a thesis advisor on the master and doctoral programs on education at the Tecnologico de Monterrey. Her main research areas are faculty development, teaching methods, and gender issues in STEM education.

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Abstract

Previous studies indicate that there is a link between a country's engineering capacity and its economic development. Future professionals must be capable of integrating the social and environmental fields into their engineering solutions. Their vision of the world must answer a new development model that ensures resource availability and well-being for current and future generations. Thus, it becomes essential to update course assignments considering these new challenges to foster a model of engineering that incorporates a sustainable criterion. This study aims to measure the impact of a sustainable curriculum integration experience using problem-based learning in the organizational management course module in the School of Engineering at a private university in Chile (Universidad Andres Bello).

This study is a two-group design, having experimental and control groups. The intervention in a course module consisted of problem-based learning and teacher-led interventions. Both groups covered the same topics and similar activities. Data collection included surveys, class activities, and evaluations in both groups. The results showed that the intervention positively impacted students, particularly in how students' prejudices changed. However, the expected impact on their commitment to and awareness of equality was not as expected. Reflections made within the course assignment were relevant when taking an informed stand. A single course module intervention indicated that students improved sensitivity to sustainable development goals, but it was insufficient. The authors recognized the importance of including contextual problems with social and environmental considerations in future course modules, especially at the beginning of the course. The incorporation of other approaches during engineering training requires intention on the teacher's part and must be supported by different instances of curricular advancement.

This study's relevance rests on the fact that the management tradition in Chile only incorporates the economic dimension of problems, so this experience leads us to seek how to improve the current engineering training by developing sustainable and equitable solutions to change the way companies currently operate.

Keywords: sustainability, higher education, educational innovation, Sustainable Development Goals, future challenges

INTRODUCTION

In 2015, the United Nations (UN) world leaders committed to sustainability through 17 Sustainable Development Goals, commonly known as SDGs [1]. The achievement of these goals requires a sustained planetary-level effort for a new development model to ensure current and future generations' well-being. What is the role universities play in these new challenges? How can universities incorporate this vision as their own? As training centers, we have a fundamental role to play since there is a notable gap between current training associated with economic paradigms and sustainable practice related to the SDGs.

To facilitate implementing sustainable education, the United Nations Educational, Scientific and Cultural Organization (UNESCO) defined the learning outcomes students should attain for each of these goals. The current challenge is to integrate them across the board into curricular networks. According to UNESCO, to undertake such a move requires assailing one or more inflection points. "Education can and must contribute towards a new vision of a sustainable world development" [2]. The time is now to start implementing them.

One of the goals set for 2030 is to ensure that all students acquire theoretical and practical knowledge that promotes sustainable development. That is possible through education in sustainable development and the adoption of sustainable lifestyles, human rights, gender equality, advocacy of a culture of peace and non-violence, world citizenship, and the appreciation of cultural diversity and cultural contribution to sustainable development. [1].

BACKGROUND

Evidence indicates a link between the engineering capacity of a country and its economic development [3]. Training of engineers who may make decisions using sustainability criteria, considering the social, environmental, and economic dimensions, is urgent to change the model from its current emphasis on development to one based on sustainability. How do we generate engineers to have a social impact aligned with the SDGs? How do we get engineers to incorporate SDGs into their decision-making? There are several ongoing discussions in this regard, such as teaching strategies and real contexts in engineer training that would allow them to analyze how companies operate today and in the future comprehensively. Evidence indicates that problem-based learning is an effective teaching strategy for topics such as sustainability. There is ample literature that reflects the need and urgency to change current engineering education paradigms to incorporate sustainable development. Some possible ways are to:

- Take a course on sustainable development.
- Integrate sustainability criteria into current curricula, which may redirect current course assignments.

Besides, an effective strategy to integrate non-technical approaches into technical subjects is through a problem-based learning methodology. In this setting, contextual considerations play a prominent role in problem-solving, resulting in solutions that better solve real-world, complex situations.

Chile ranks first in the 2020 Latin America Sustainable Development Ranking, published by the University of Cambridge. However, the Center for Sustainable Development Goals considered progress as modest in the region, and inequality and discrimination in Chile remain evident, as witnessed by international organizations' different world rankings and studies. According to economic theory, the current engineering focus continues to be project assessment, often without considering any social and environmental impact.

According to [3], the social crisis in Chile in October 2019 demanded equality and finished abuses, an apposition of a hierarchical society in which a group has greater power or status. This demand is directly related to the social sustainability indicated by the SDGs. Given this context, there is already an approach to equality for students who participated in this study.

METHODOLOGY

This research work evaluates the impact of problem-based learning (PBL) on sustainability criteria for people and company management problem-solving. This study measured impact in two ways: before and after the intervention and at a final individual evaluation; both instances had an experimental (Figure 1) and a control group (Figure 2). Figures 1 and 2 present the parallel between both groups. The essential difference occurred during the in-class activities.



Figure 1: Stages of the methodology process for the experimental group.



Figure 2: Stages of the methodology process for the control group.

The process consisted of 5 stages that occurred at the same time for the experimental group (Figure 1) and control group (Figure 2):

- Pre- and post-intervention survey. Instrument to measure the impact of the intervention. Based on a previously validated survey [9]. Survey implemented to both groups during the first and the last stage of the methodology.
- Interventions (experimental group). The instructor moderated the discussions about news to raise awareness about discrimination by gender, economic status, race, and nationality. These discussions occurred only in the experimental group sessions.
- Group Project. Students in both groups analyzed an organization to propose improvements according to the given criteria. In the experimental group, improvements centered at one of the SDGs, while in the control group, improvements focused on any traditional management situation.
- Individual test. Analysis of responses to open cases. Both groups, experimental and control, took the same test under the same conditions. The only difference was that the experimental group was prompted to refer to the SDG in their arguments.

Based on the literary review, the authors designed a survey focusing on three issues: 1) degree of prejudice, 2) commitment to equality, and 3) degree of awareness of inequalities regarding gender differences, race or ethnicity, or social hierarchies. The methodology chosen was a comparative study with an experimental group and a control group. The intervention is fully described below under the Intervention subsection. Also, in that subsection, the parallelism and differences between both groups are detailed.

Context

The curricular integration took place in the Organizational Management course for engineering students in their 5th year and last semester in the Industrial Civil Engineering degree offered by a private university in Chile, Universidad Andres Bello. The objective of this course is for the student to learn organizational intervention techniques and human resource management. It is the only subject in their curricula to study topics of people management in an organization.

a) *Selecting SDL learning objectives*

To define the Sustainable Development Goals (Figure 3) to incorporate in the intervention, the authors analyzed the 17 SDGs. The objectives of all SDGs are essential and relevant. However, based on the Organizational Management course topics during the intervention and the focus on the impact, the authors selected the most salient SDG.



Figure 3. Goals of SDGs. Source: UN (informational purposes, no permission required).

To define the SDG to integrate and assess in the intervention, the authors completed the following procedure.

- After reviewing the 17 sustainable development goals and their corresponding goal targets, the authors selected the two most pertinent for the course topics, namely:
 - SDG 5 - Gender equality: to achieve gender equality and empower all women and girls [1].
 - SDG 8 - Good jobs and economic growth: to promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all [1].
- Based on the Learning objectives stated by UNESCO in the Education for Sustainable Development Goals [2], the authors chose three learning objectives to integrate:

- The student understands gender inequality and discrimination within the labor market.
- The student understands the opportunities and benefits offered by equality and full gender participation in the labor market and decision-making.
- The student understands that inequality is an essential generator of social problems and individual dissatisfaction.

Participants

A total of 58 students enrolled in the two groups of a management course for engineering, namely Organizational Management, taught by the same lecturer. The experimental group had 30 students, while the control group had 28 students. However, not all enrolled students answered the surveys nor completed the semester, so results were not available for 58 students, only for 44 participants. The experimental group had 30 students enrolled (23 participated), while the control group had 28 students (21 responded).

Instruments

This section elaborates on the different data collected according to the methodology processes applied in both groups (Figures 1 and 2). A detailed description of the intervention for the experimental group is presented in a separate subsection.

a) Stage 1 and 5: Pre- and post-test

With the three learning objectives defined above, the authors looked for validated surveys to implement as pre-and post-test corresponding to stages 1 and 5 of the methodology, respectively (Figures 1 and 2). The selected two validated instruments were:

- Inequality perception analysis through a diagrammatic perception of inequality [8]
- The scale of prejudices and egalitarian goals [9].

Next came the language validation, that is, vocabulary and relevance to the subject. The resulting survey contains 31 statements on a 5-point Likert-type scale and a question on the diagrammatic perception of inequality (S32). Table 1 shows the statements of the survey organized by scale. These three scales came from validated instruments [8], [9]. Both instruments were in Spanish; however, this validation helped to ensure that the language was suitable for Chilean students and the didactic objective of the course.

- *Grade of prejudice scale* uses theoretical aspects on the acceptance or rejection of prejudice. It includes 14 statements (S1, S3, S8, S12, S14, S17, S18, S19, S20, S21, S22, S24, S29, and S30).
- *Commitment to equality scale* includes items related to ideological orientations. Focuses on actions that reflect the struggle for equality. This scale consists of 12 statements (S2, S4, S5, S6, S9, S10, S13, S15, S23, S26, S27, and S28).
- *Grade of inequality awareness scale* assesses the degree of awareness of existing inequalities between groups. (Statements: S7, S11, S16, S25, S31, S32).

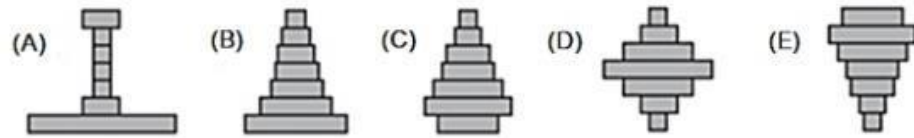
Table 1. Statements on the survey implemented as pre and post-test on both groups (experimental and control). The survey focused on discrimination and inequality.

Scale	Item	Statement
Grade of prejudice	S1	Men and women cannot do the same jobs.
	S3	I'm not too fond of differentiated treatment if belonging to an ethnic group or country of origin.
	S8	I believe that the differences in opportunities between men and women are justified.
	S12	I like the hierarchical system of society, just as it is.
	S14	Differences in status between ethnicities or people of different nationalities should not exist.
	S17	Status differences between men and women should not exist.
	S18	Differences in social status must exist for society to organize itself.
	S19	Differences in status between men and women are justified on biological grounds.
	S20	I consider it unfair that people from different groups are not treated in the same way.
	S21	I do not consider it fair that there are differences in status between groups.
	S22	I think that the differential treatment of people based on their gender is unfair.
	S24	Differences in status between people of different ethnicities or nationalities are justified on biological grounds.
	S29	I believe that the differences in opportunities between people of different ethnicity or nationality are justified.
	S30	Women and men should be treated the same.
	Commitment to equality	S2
S4		I try to persuade people to struggle against the differences between social groups.
S5		Not considering the differences in social status to be fair drives me to discuss the subject with my acquaintances
S6		Not considering the differences in status fair drives me to discuss the issue with my relatives.
S9		I collaborate in the creation of associations or platforms to fight against social inequalities.
S10		I usually try to remain egalitarian with men and women.
S13		I have been involved in organizing events against (social) inequalities.
S15		I usually keep in mind to be egalitarian with people regardless of their ethnicity or nationality.
S23		I often attend marches or demonstrations related to women, such as the International Day against Gender Violence on March 8.
S26		For me, volunteering is an important part of my life.
S27	Participating in actions that eliminate inequalities between groups is an important part of the image that I have of myself.	
S28	When there is a demonstration against (social) inequalities, I do everything possible to go.	
Grade of inequality awareness	S7	Although women were discriminated against before, they now have the same opportunities as men.
	S11	Although there used to be discrimination based on gender, nowadays, there are no longer differences in treatment for this reason.
	S16	It is possible that in some situations, I have been treated differently because I am a man or a woman.
	S25	Although there used to be discrimination based on ethnicity or nationality,

nowadays, there are no longer differences in treatment for this reason.

S31 The differences in income in Chile are way too large.

S32 In terms of economic income, to what type of society does Chile correspond today?
Which of the following diagrams best represents this?



Note: For the negative statements S1, S7, S8, S11, S12, S18, S19, S24, S25, and S29, the answers were reversed.

b) Stage 2: In-class activities

The students read three news items in each group, stage 2 of the methodology (Figure 1 and 2). For the control group, reading topics were labor market issues in general. For the experimental group, the readings focused on discrimination and inequality in the labor market in Chile. Both groups read about the labor market, but the experimental group reading aligned with the study learning objectives. The research design of the activities maintained this parallelism between all assignments in both groups. Also, the in-class sessions aligned with the PBL teaching methodology.

c) Stage 3: Group project

Students worked in teams of three or four members. The instruction was to contact an organization in Chile to invite them to participate in a semi-structured interview on their current state of human resources. This information had educational purposes to see how theory applies to practice in an authentic context. After the interviews, teams in the control group wrote a report indicating three improvements that the organization could implement and sustained their arguments in theory discussed in the Organizational Management course. Similarly, teams in the experimental groups argued three improvements aligned with SDG 5, Gender Equality, and SDG 8, Good Jobs and Economic Growth.

d) Stage 4: Individual final test

Based on final examinations from previous semesters, the lecturer selected seven contextual situations for the individual final test. These contextual situations were presented as cases to solve, presenting arguments discussed in class. The students were familiar with this type of analysis due to the PBL method. This analysis was an important step to ensure that the test was non-biased and appropriate for the experimental and control groups. Table 2 shows all cases.

Notice that the cases are open-ended. That is, there is no one correct answer. The most important aspect was the justification based on different decision-making criteria. The lecturer designed a guideline before the evaluation step, focusing on the criteria presented or not in the arguments. For this study, this guideline minimized any bias to favor one group over the other.

Table 2. The individual final test consisted of seven cases based on previous individual final examinations for the same course.

No.	Case
C1	<p>A region of Chile is faced with the dilemma of authorizing the installation of energy sources that would solve the country's energy crisis. However, it would seriously affect its primary industry, tourism, having a significant impact on nature, its main tourist asset.</p> <p>The government and the company offer sufficient subsidies to relocate people if they want, dedicatethemselves to something else, and receive psychological support in dealing with the changes.</p> <p>This Municipal Board of Directors is responsible for deciding whether the project should move on and under what conditions. Please indicate all decision-making variables.</p>
C2	<p>A state railway company is reorganized and has to decide whether to sell land it holds in central areasof the city and reduce its workers' salaries by 15% to invest in technology and regain competitiveness. The other option would be to lay off 40% of the 2,500 workers that the company has.</p> <p>This board of directors is responsible for deciding if the project is carried out and under whatconditions. Please indicate all decision-making variables.</p>
C3	<p>A Chilean construction company discovers a construction system that essentially uses native wood,namely <i>coihue</i>. Its implementation would solve the lack of permanent housingin Chile at a 50% lower cost. Future homeowners ask for brick houses because they feel discriminated against when receiving wooden houses, as it reminds them of their life in camps, and they consider them to be at high risk of burning.</p> <p>This board of directors is responsible for deciding if the project is carried out and under whatconditions. Please indicate all decision-making variables.</p>
C4	<p>According to the latest report published by the Organization for Economic Cooperation and Development (OECD), Chilean workers worked 2,015 hours per year (on average) in 2014. Ranking third out of 34 among the nations that work the most hours per year, yet with low productivity, as in the 2015 Global Competitiveness Index from the World Economic Forum, Chile fell to 35th place.</p> <p>As an industrial engineer and using organizational management, what measures would you take to increase productivity in companies in Chile? Please indicate at least three possible measures.</p>
C5	<p>Chile has much to gain by improving female participation in the labor market. The female activity rate remains well below the OECD average, as in 2014, only 47% of women in Chile held a job, compared to 62% in the OECD area. The Chilean government has taken steps to remedy this situation, for example, extending parental leave for maternity and postnatal birth. However, to attack the roots underlying low female participation in the workforce, the government will need to take other actions. Concerning this topic, propose an action plan, and answer why it is important to implement it, statingany probable impacts stemming from its implementation.</p>
C6	<p>Indicate in a detailed and substantiated manner, using organizational management, what interventions you would carry out like a boss in the following cases: Workplace harassment from employee Juan to another employee. Diego, because of nationality.</p>

C7 Indicate in a detailed and substantiated manner, using organizational management, what interventions you would carry out like a boss in the following cases.
Constant sexual harassment from employee Julia to another employee, Felipe.

Description of the intervention (experimental group)

The intervention was carried out in the experimental group (Stage 2 in Figure 1), employing the same activities in the control group, with a difference in focus (Table 3). The instructor used a problem-based learning (PBL) strategy and considered the current challenges that companies faced in both groups. The difference was that solutions in the experimental group were based on respect for SDGs chosen. In contrast, the control group considered the Chilean business culture as the backdrop for any solution ventured. Both groups took a pre and post-test and the same final individual exam.

Table 3. Intervention design for both groups, experimental and control.

Activity	Control group	Experimental group
In-class intervention	<ul style="list-style-type: none"> - No change - Reading 3 news items relating to the current labor market - In-class discussions 	<ul style="list-style-type: none"> - Instructor brought SDG into the discussions in-class - Reading of 3 news items from the current Chilean labor market showing discrimination based on gender, race, nationality, and social status. - In-class discussions.
Individual final test	<ul style="list-style-type: none"> - The test consisted of 9 cases; 7 could be solved using the traditional economic development paradigm (Table 2). - The other two questions were theoretical. Both groups responded to these questions. - A guideline was aligned with the topics of the cases 	<ul style="list-style-type: none"> - Same test as the control group; 7 questions could be solved using sustainable development paradigms (Table 2). The other two questions were the same as the control group. - A guideline was aligned with the topics of the cases, looking for discussion based on the SDGs covered in the course.
Group project	<ul style="list-style-type: none"> - Group project on current challenges companies faced, given Chilean culture 	<ul style="list-style-type: none"> - Group project on current challenges companies face, given the UN challenges.
Survey	<ul style="list-style-type: none"> - Pre and post-test. Both groups took the pre and post-test during the same period to maintain a parallel implementation 	<ul style="list-style-type: none"> - Same as the control group, same test, same dates, same form

The formal intervention lasted two weeks between November and December 2020. However, in the experimental group, SDGs were included informally two weeks before the intervention. The objective was to create awareness and have students familiarized with the existence and purposes of the SDG. Students did not have a formal assignment on the SDG; the lecturer casually included the SDG in the class discussions.

RESULTS AND ANALYSIS

The data available to measure the impact of the intervention for the experimental and control group are a) results from the pre-and post-intervention survey; b) results from the final individual examination.

Results of the survey applied before and after the intervention

The analysis of survey results considers three constituent parts: Degree of prejudice, commitment to equality, and degree of awareness of inequality.

To measure the impact per question, only students who answered the survey in the two requested instances were considered. The agreement range (agree and strongly agree) responses and the disagreement range (disagree and strongly disagree) were grouped and their frequencies. The frequencies were converted to a percentage and interpreted as the variation in the acceptance or rejection of the statements.

Considering that each statement has a desired directionality, we calculated the total gains for each scale. If the computed "gain" was greater than zero, it meant that the intervention had the desired effect on that scale. The formula to calculate the gain is $(\text{Post-Pre}) / (1 - \text{Pre})$. Since the survey consisted of three scales, we computed three gains considering the corresponding statements for all the students in each of the groups.

Degree of prejudice: This category investigated the degree of prejudice that students had about differences in gender, ethnicity, or race and social hierarchies. This section qualifies answers to aspects raised at the theoretical level on acceptance or rejection of a particular prejudice.

Figure 4 shows the percentage of agreement versus the percentage of disagreement for the degree of bias of the experimental scale. The intervention had a positive impact and reduced the degree of prejudice in questions S1, S3, S8, S14, S18, S19, S20, S22, S24, both in those who accepted the prejudice and the neutrals. In questions S12, S17, S29, S30, the percentage of agreement remained the same, while in question S21, the percentage of agreement decreased

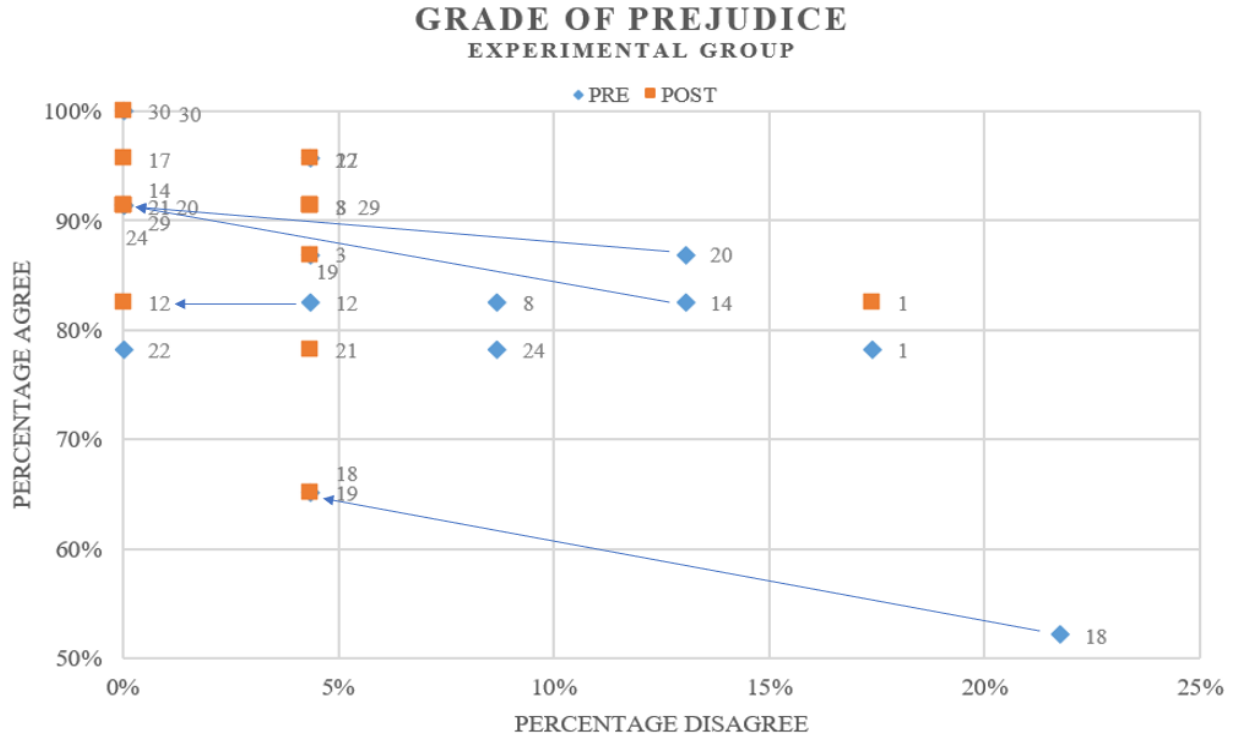


Figure 4. Prejudice level / experimental group. Blue dots are for pre-test, and orange squares are the post-test percentages per item.

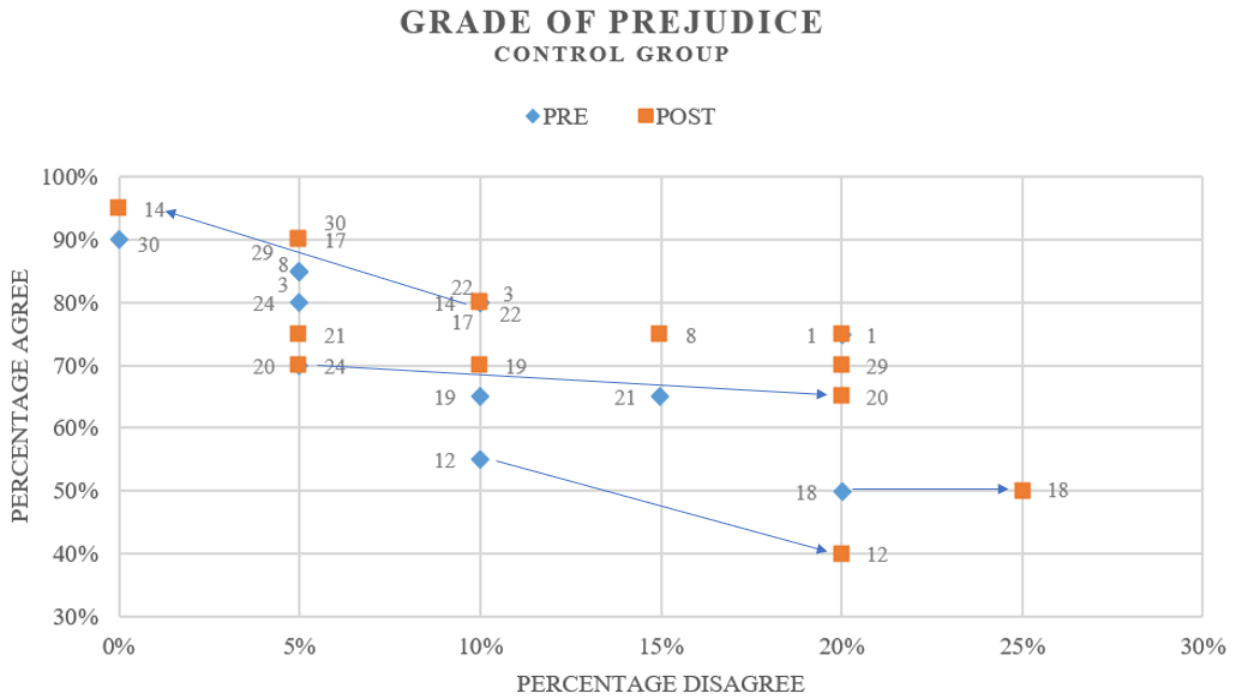


Figure 5. Level of prejudice for the control group. Blue dots are for pre-test, and orange squares are the post-test percentages per item.

Comparing the control group with the experimental group, it becomes evident that there were changes between the initial and final survey for most of the prejudices. The total gain seen in the experimental group was 5.3%, while the control group only gained 0.7%. It can be seen from Figure 4 that results for each question before and after the intervention had more dispersion than those in Figure 5, which depicts the control group.

Furthermore, in this dimension, items S14, S17, S19, S21 showed clear trends towards less prejudice, above 70%. There is a lot to work with these students to reduce their prejudices.

Commitment to equality: this is an assessment of the degree of commitment a student has in acting on his or her ideological orientation. These questions qualify actions that are aligned with ideals.

The results obtained in this aspect in the experimental group can be observed in Figure 6. In questions S4, S5, S6, S9, S10, S13, S15, and S26, there was a negative impact on the students, who went from positive to neutral. On the other hand, in question S23, the commitment was maintained, while in questions S2, S27 and S28, there was a positive impact towards commitment.

Therefore, the intervention's impact on students' commitment was primarily negative. There were no recurrent actions that students undertook to become activists despite current inequalities seen day-to-day at a national level. This trend may be explained because the intervention only discussed theoretical assumptions regarding changes and did not encourage such measures.

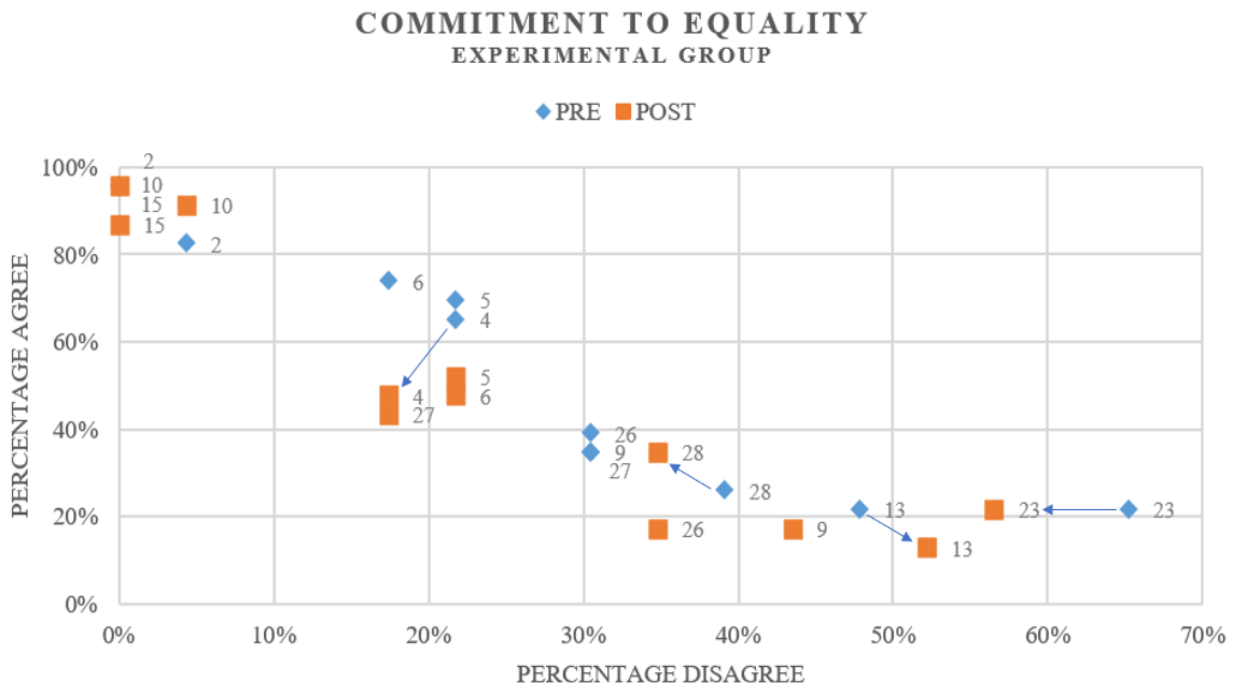


Figure 6. Level of commitment to equality for the experimental group. Blue dots are for the pre-test, and the orange squares are the post-test percentages per item.

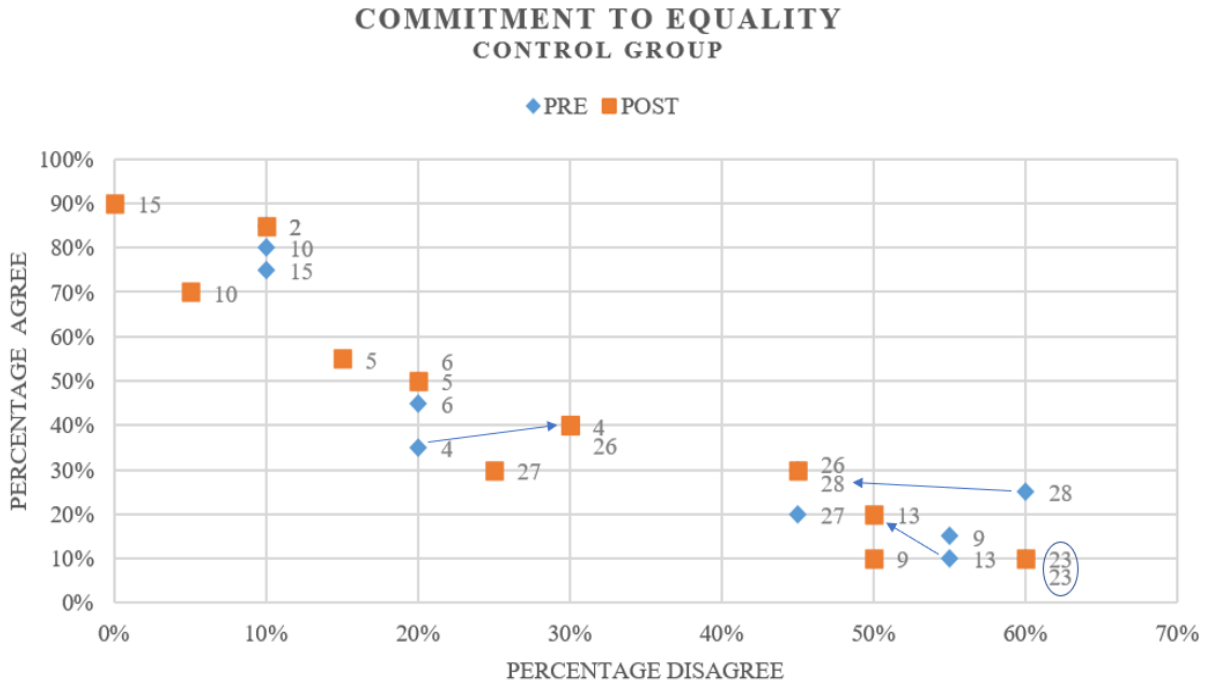


Figure 7. Level of commitment to equality for the control group. Blue dots are for the pre-test, and the orange squares are the post-test percentages per item.

The quantitative analysis of this dimension showed that the experimental group had a negative growth while the control group had a positive gain of 3%. Thus, the intervention did not have the expected impact. Results for the control group are shown in Figure 7.

In addition, some ambiguities when answering specific questions may be seen in this survey section, like in the case of S2, as not all students may have the same belief framework. However, it can be argued that they applied it nevertheless.

S4, S5, S6, S13, S15, S26, S27, and S28 had positive displacement in the control group, while S9 and S10 had negative displacement. On the other hand, S2 and S23 maintained their percentages.

Degree of awareness about inequality. It assesses the degree of awareness held about inequalities between groups.

The results for this dimension can be seen in Figure 8 as follows: Question S7 showed a positive impact because of the number of students who declared themselves neutral and aware. Questions S11, S16, and S25 demonstrated a negative impact that tended towards a neutral awareness. In question S31, the impact was negative, as the students demonstrated decreased awareness.

GRADE OF AWARENESS ON INEQUALITY EXPERIMENTAL GROUP

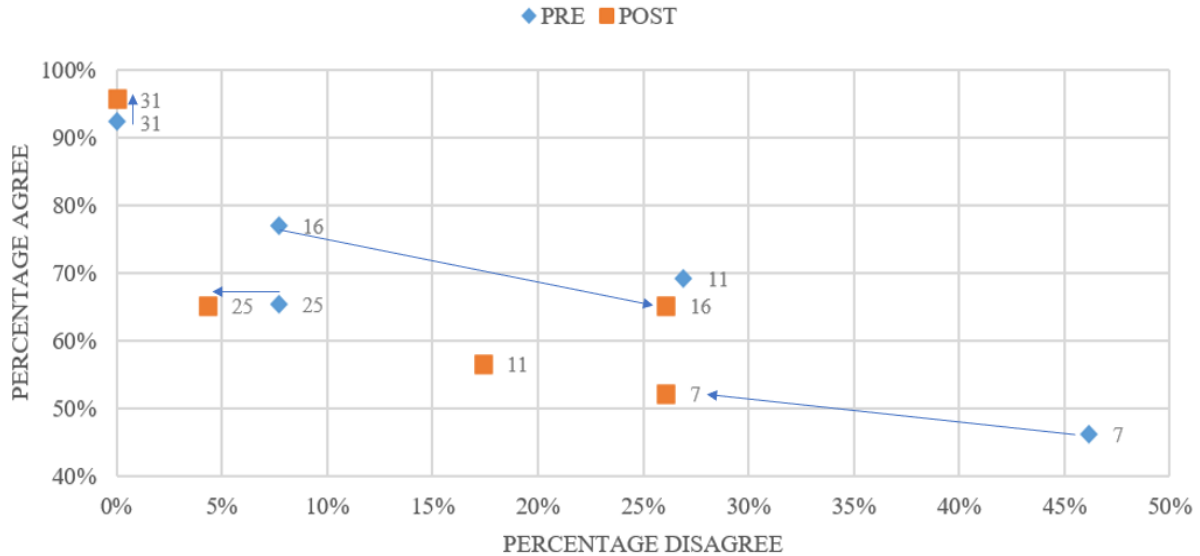


Figure 8. Level of awareness about inequality: experimental group. Blue dots are for pre-test, and the orange squares are for post-test percentages per item.

The results corresponding to the degree of awareness about inequality for the experimental group (Figure 8) and the control group (Figure 9) were slightly better in the experimental group. Some differences were S7 with a shift towards awareness compared to the negligible shift in the control group. Another notable shift was S25: although the experimental group remained almost the same (displacement was only neutral and to a lesser extent), the control group displayed a negative shift. Statements S7, S11, and S25 refer to the awareness of discrimination (negative statements responses were inverted for analysis). The shift in the control group was negative or almost neutral, indicating that the students did not perceive or were unaware of this type of discrimination (Figure 9).

GRADE OF AWARENESS ON INEQUALITY

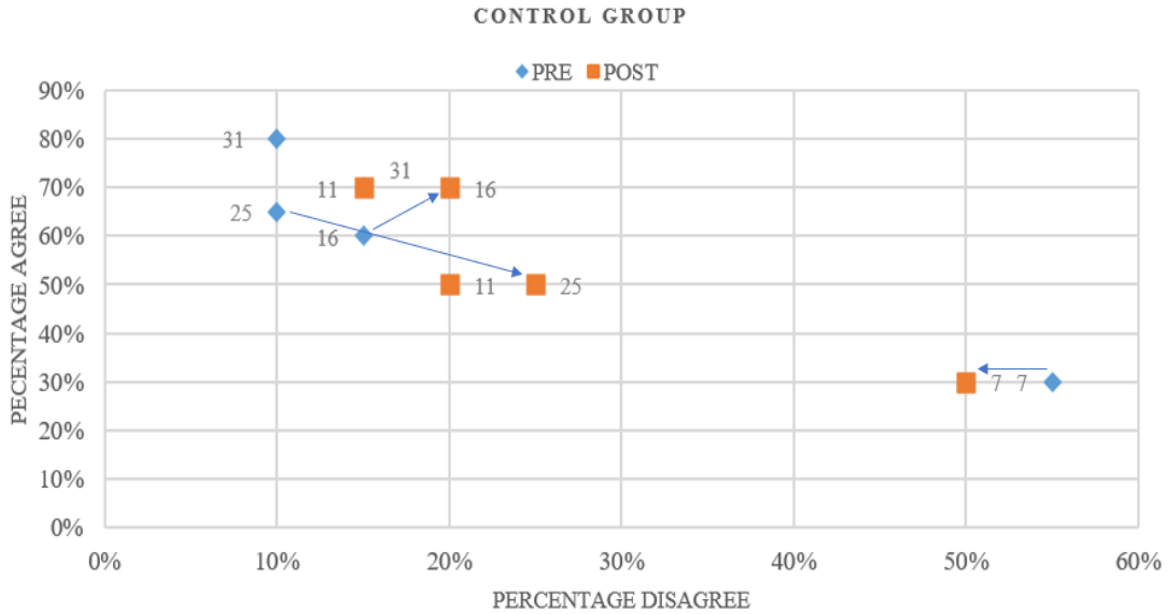


Figure 9. Level of awareness about inequality: control group. Blue dots are for pre-test, and orange squares are the post-test percentages per item.

The last item of the survey was a different type in the sense of the possible responses. Item S32 read “*In terms of economic income, to what type of society does Chile correspond today? Which of the following diagrams best represents this?*” (Figure 10).

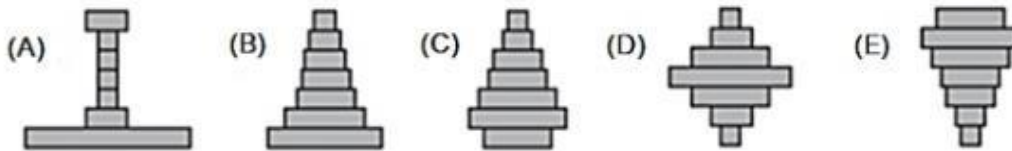


Figure 10. Options for question 32. The diagrams represent possible types of economic growth of Chilean society.

Table 4 presents the frequency of responses for each option of S32. That was the only question that did not have a Likert scale, and a minority of students before and after the intervention stated agreement that Chile is a society made up of a small elite class, small middle class and the great mass of people comprising the rest (21.8% and 26.6%, respectively). The above situation indicates that students are impervious to income distribution, even though the awareness percentage increased slightly post-intervention. In a future design, it would be essential to generate greater awareness regarding this issue that directly impacts the quality of life.

Table 4. Frequency of each option selected for question 32 in the pre-and post-test.

Question 32	A	B	C	D	E
Pre-test	5	8	2	1	7
Post-test	6	8	5	0	4

Results of the individual final test

Table 5 was prepared to account for the 49 individual tests taken by the students, categorized according to the evaluation rubric when answering each case. The cases could address four main dimensions: people, environment, economic inequality, and discrimination (by gender, ethnicity, or nation). As expected, students argued all seven cases based on the people dimension. In general, the experimental group responses were more consistent in bringing the people dimension to the discussion. This resonates with the discussions conducted in the class during the intervention.

C3 is an interesting case to analyze. It targeted two dimensions: people and economic inequality. The experimental group consistently based their arguments on these two dimensions. We want to highlight that the instructor did not include the environmental dimension in the rubric because it required a deeper level of reasoning beyond the expectation of the course. However, some students included the environment in their arguments coherently. This was satisfying for the instructor, given that one of the in-class discussions touched upon the difficulties in accessing housing opportunities and the costly surcharge.

Table 5. Final individual test results by dimension by type of group for each case.

No	Case	People		Environment		Economic inequality		Discrimination	
		Exper.	Control	Exper.	Control	Exper.	Control	Exper.	Control
C1	Energy and general sustainability	78%	31%	100%	92%	-	-	-	-
C2	Transportation and redundancies	57%	23%	-	-	43%	12%	-	-
C3	Housing and poverty	100%	31%	(43%)	(12%)	87%	23%	-	-
C4	Country and company productivity	52%	19%	-	-	48%	4%	-	-
C5	Women, parenting, and the labor market	65%	23%	-	-	-	-	57%	27%
C6	Immigrants and discrimination in companies	91%	38%	-	-	-	-	83%	35%
C7	Sexual harassment in <u>companies</u>	30%	23%	-	-	-	-	13%	12%

The results from this review and categorization (Table 5) demonstrate that the issue where the intervention had the least impact was associated with C7 about sexual harassment in companies. This result could be attributable to various reasons, such as how the case was written and low in-class discussion about that topic. In a deeper analysis, some students' responses indicated that companies should not promote ways of addressing this issue or establishing internal policies or at least determining social interaction norms. They argued that the situation does not affect production or work in some cases, and it would be difficult to define if it is a work-related or

personal issue. This alarming result indicates the need to discuss this topic with the students by bringing more real-world cases to analyze consequences and impact on the persons involved and the working environment.

In general, the final test results could indicate that the intervention sensitized students in the experimental group, impacting most of the responses in comparison to the responses given by the control group.

CONCLUSIONS

The intervention generated impact and awareness in students belonging to the experimental group, as per study aims. However, more targeted interventions are needed to raise their awareness of discrimination and inequality. The intervention had a significant impact in some areas, while others require further work to achieve the SDG objectives.

The findings of the instruments indicate that:

- Regarding the survey analysis, the intervention positively impacted the section dealing with the degree of prejudice, but not on a commitment to equality and awareness of inequality. However, it was also found that there is no direct relationship between the degree of prejudice and behaviors indicating a commitment to equality; one may have low levels of prejudice but also a low commitment level.
- A student's change in the degree of prejudice or behavior should always be evaluated from an initial standpoint. When carrying out an intervention in a group of people, the students do not necessarily have a homogeneous starting profile in the three areas evaluated.
- Regarding the individual test analysis, the intervened students incorporated environmental, social, discrimination and inequality issues in a higher proportion than students from the control group. Given that the impact in all three areas measured was not homogeneous, it becomes essential to review the prejudice and discrimination profile students hold to focus on those areas that need further reinforcement. In addition, continuous review in needed cases is recommended to ensure that they remain relevant and adequate for the study's objectives.
- In these present times, when Chile is experiencing myriad social and political crises (including feminist demonstrations, conflict with native peoples, economic crises arising from the social crisis and the pandemic), this type of intervention at the university level must be taken seriously by students because these topics are discussed at the national level. Both groups were exposed to this same context, but the experimental group proved more sensitive to the issues when answering the individual test.
- Prior work on active methodology was verified. The methodology was efficient in delivering results in the multidisciplinary field of sustainability applied to businesses.

It allowed the student to solve problems effectively from different perspectives, including economic, social, and environmental aspects.

In future applications, we are planning to increase the number of students in both groups, adapt the intervention according to the analysis of the initial test, extend the intervention period to mirror the course assignment, implement brief classroom discussions, and exhaustively review cases to be solved to ensure they are relevant to the current student context.

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