ASEE 2022 ANNUAL CONFERENCE
Excellence Through Diversity
MINNEAPOLIS, MINNESOTA, JUNE 26TH-29TH, 2022 ASEE
Paper ID #37103

Proposal for the design of a professional practice program for geology and mining engineering students through a community outreach project

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Study on the design of a professional practice program for geology and mining engineering students through a community engagement project

Abstract
Community engagement projects for engineering students' learning are crucial in skill and knowledge development. While Universities are committed to training engineering professionals to respond to social demands based on their abilities and acquired knowledge, it is well known that current interest in studying careers in Science, Technology, Engineering, and Mathematics (STEM) areas is not as high as in other specialty areas. Therefore, it is crucial to generate instances that promote interest in these areas at an early age while children are attending school. Our motivation is to propose a professional practice structure for Geology and Mining Engineering students to realize how they may impact society through their skills and knowledge acquired while at college. It is also essential to evaluate the impact of this type of project in the community through stakeholders' opinions of children in K-12 school education. The participants were four undergraduate geology and mining engineering students who worked collaboratively to design and implement four workshops: 1) Geomechanics, 2) Paleontology, 3) Ocean Circulation, and 4) Mineralogy. Professors supervised professional practice students from the geology, mining engineering, and STEM research education areas. The present paper address on a qualitative level the motivations that prompted participating professional practice students to get involved in a Community Engagement Project; their experiences regarding the design and implementation of the workshops; the perceptions of their performance during the workshops, and; the impact that the realization of this professional practice may have had on their engineering studies. In addition, we report the effect that STEM content workshops outside of traditional student/teacher classes had on stakeholder groups to support and increase understanding, awareness, and interest in STEM disciplines. Finally, we describe how these findings may inform the design and structure of professional practices focusing on Community Engagement Projects in engineering areas.
Keywords: community engagement projects; earth sciences; professional practices; STEM careers; K-12; stakeholders

I. Introduction

Modern society has a well-recognized need for more professionals in Science, Technology, Engineering, and Mathematics (STEM) disciplines. As a result, countries like the United States have increased their participation in these areas [1]. According to the Pew Research Center [2], increased labor demand has been one of the main drivers of this phenomenon (79% since 1990). These demands have been replicated worldwide, mirroring the need that every country has in attaining societies with optimum development levels. In Chile, according to recent statistics from the Higher Education System (SIES, in Spanish) [3], the student body is divided into the following study programs; Technology (25.8%), Health (19.9%), and Business Administration (9.6%), the most significant increase is seen in Law (10.1%), Social Sciences (9.7%), Health (9.6%) and Agriculture (9.5%). In 2021, in those careers seeing the highest enrolment, the most significant increases compared to the previous year were seen in Nursing (19.8%), Medicine (15.0%), Veterinary Medicine (11.9%), Computer Engineering and Computer Science (11.7%) and Psychology (11.7%). On further analyzing these figures, it can be seen that science and engineering degrees are missing, while academic programs related to Earth sciences fail to appear. Thus, the need arises to visualize and promote the study of these types of university degrees.

A strategy to promote and encourage the disciplines mentioned above is community engagement programs (CEP). Engagement programs are "so important in Chile that it is regulated by Higher Education Law No. 21,091 (art. 18, point 4) and is mandatory for all Universities in their accreditation processes. There must be demonstrated policies and systematic mechanisms for bidirectional linkages with their significant local, national, and international environments, and with other higher educational institutions." [4]. Community Engagement Programs (CEP), from an institutional point of view, are a series of engagements within various disciplines, be these artistic, technological, productive, or professional, whose purpose is to improve the performance of institutional functions, facilitating the academic and professional development of institutional members and their updating or improvement, or in meeting their institutional objectives. In the School of Engineering of the Andres Bello University, students undertake curricular activities within a course framework known as a professional practice I and II. This coursework is used to apply acquired knowledge to a real context and develop skills and values such as effective communication, teamwork, problem-solving, leadership, and professional ethics.

This research presents a community engagement project (CEP) in which an interdisciplinary group of engineering researchers and lecturers put forward a professional practice program for Geology and Mining Engineering students. The project consisted of workshops aimed at children between 9 and 12 on geomechanics, mineralogy, paleontology, and ocean circulation. The professional practice students were responsible for designing the workshops, obtaining the necessary materials, and implementing them, using a limited budget, in an interdisciplinary and collaborative fashion. They were supervised and mentored by experienced professors in Mining Engineering, Geology, and STEM Education, who currently work within the faculty in teaching, educational management, and research. The initiative was presented to the University's community engagement committee, and a corresponding fund was assigned.

The main objective of this present work is to propose a structure of professional practice for university students in Geology and Mining Engineering, which may allow them to realize just how much they can impact society using skills and knowledge acquired at University. The CEP affects two significant areas, the first mentioned as a study aim. At the same time, the second area seeks to influence school students at an early age so that they may become aware and be more familiar in general to Geology and Mining disciplines, seeking to peak their curiosity in studying these disciplines. Although this article does not report findings on perceptions held by school students, it does report on the fathers, mothers, and guardians of said students (from now on, stakeholders), who are an essential community element and to whom this present work is aimed. The following sections describe the details of the proposed workshops' design and structure, the methodology used for this current study, results obtained, discussions enabling interpreting and extrapolating results obtained in consideration of any perspectives that other authors may have, and finally, findings described.

A. Workshop design, structure, and content

The following shows how the Geological Science Workshops for School Education (GSW4SEd) were designed. It is essential to clarify that, although professional practice students designed the presentations and chose the final workshop content, they were guided throughout by the teachers in charge of the project. In addition, professional practice students were provided with the design and structure of how the workshops should be presented and were trained in having a facilitator role (active learning). Likewise, they did not go to the

workshops by themselves; there were always teachers who accompanied them and gave them immediate feedback to improve continuously.

1. Worksheet Design

The theoretical foundation for worksheet design is based on Tutorials on Introductory Physics [5]. The structure consisted of:

1) Evoke. Call up the concepts that students already know through questions or brainstorming activities; this is so that students may contextualize the rest of the workshop contents.
2) Predict. Written and verbal questions were made to elicit predictions and see the level of prior knowledge and ascertain if adequate.
3) Experiment. Materials are manipulated to carry out guided experiments and check whether any predictions were proved correct.
4) Confront. Through reflective and comparative questions, predictions are compared with observations and experimentation.

Instructors (professional practice students) guided school students to clarify doubts without giving concrete answers but inviting discussion and self-reflection so that children may better understand certain phenomena and concepts.

2. Workshop structure

The workshop structure was based mainly on Interactive Lecture Demonstrations [6], considering some limitations, as mentioned later in this paper. Initially, it was thought that workshops could be held in groups to promote collaborative work with a 90-minute duration; however, the school itself requested that the workshops last 60 minutes each with individual experimentation. The structure of the workshop is shown below:

1. Trigger questions aimed at evoking prior subject knowledge.
2. Contextualize the workshop content with a short PowerPoint presentation.
3. Response to worksheets (Prediction).
4. Children shared their answers, and a discussion was generated on the phenomena and concepts given their previous knowledge (Q&A).
5. Experimentation and demonstrations. They were provided with material to experiment with, while students had to answer the worksheets by writing down their observations (Experimentation). A demonstration was given to the whole group (Ocean circulation). However, simple material was also provided for them to manipulate, experiment with, and observe the phenomena.
6. Questions about experimentation. Children were encouraged to discuss and reflect on what they observed during the experimentation and/or demonstration.
7. Response to worksheets to record final reflections and conclusions.

Note: In those parts where there were questions, these were made verbally by the workshop instructors (professional practice students), and the children voluntarily participated by raising their hands.

The workshop design, structure, and implementation had some limitations since it would have been ideal for school students to work collaboratively to collectively create opportunities to discuss and share comments during experimentations and reflect collectively, among other initiatives. However, due to health security restrictions (Covid-19 protocols), room capacity was reduced to 8 or 10 children, and each child had to stay in their place and interact with their material. In addition, on one occasion, all children had to get together to see a demonstration in the ocean circulation workshop up close (due to the complexity of repeating the experiment).

3. Thematic content of the workshops

The workshops addressed four subjects, as shown below:

- Geomechanics: Geological study of soil and rock behavior, how they deform until they may eventually fail in response to stress changes, highlighting deformation types. The children were given different materials to experiment with various types of deformation.
- Mineralogy is the science that studies minerals' physical properties, chemical components, and symmetrical characteristics. A collection of minerals were shown in the workshop, of which two minerals with specific characteristics were given to the school children so that they may observe and analyze the physical properties (habit, hardness, brightness, color, and scratch).
- Paleontology is the science that studies organic beings that inhabited the Earth in the past and whose remains are fossilized. It is based on evolution and studies fossils. The workshop involved the excavation of fossils buried in the sand with a subsequent explanation according to age and geological environment.
- Ocean circulation results from several processes, especially the force of the wind acting on the water surface and interactions with different densities. It is a complex system in which the atmosphere and the ocean interact, where the ocean captures infrared light and, due to the high specific heat of the water, can retain the absorbed heat. In the workshop, the water's difference in density and temperature is experienced; thus, the behavior in ocean circulation and marine life is analyzed.

As described, schoolchildren had the opportunity to experience and observe interactive demonstrations. After the workshops, we received positive comments from both students and school staff; however, it would have been necessary to know how professional practice students had felt during their experience as workshop instructors. The following section shows the methodology followed to ascertain further details on the participation of professional practice students in these CEPs.

II. Methodology

A Qualitative methodology was used based on surveys and interviews. The characteristics of the participants and the data collection techniques are described in detail following.

A. Participants

The participant selection method was not probabilistic since the project requirement meant that students had the need and were interested in carrying out their professional practice (either at professional practice level I or II). Table 1 shows the student profile that participated in the study (n=4).

TABLE 1

CHARACTERIZATION OF THE PARTICIPANTS (PROFESSIONAL PRACTICE STUDENTS)

	Dina	*July*	*Adam*	*Paul*
Studies	Geology	Geology	Mining Engineer	Mining Engineer
Age	26	26	24	26
Year started	2016	2017	2019	2019
Type of professional practice	II	I	I	I
Subjects pending	2	10	14	15

As can be seen from Table 1, students were from two different programs from the School of Engineering, Geology and Mining Engineering. For both degrees, professional practices are instances that allow working in Community Engagement projects. Except for Dina, the rest will finish their degree in 2 or 3 semesters. The sequence of their professional practices dictates how they onboard their future working world. The professional practice I and II have a minimum duration of 320 chronological hours. Professional practice I can be undertaken when the student has passed all their subjects up to the sixth semester of their degree course, and Professional practice II may be undertaken after having passed Professional practice I. They are evaluated in terms of passing (A) or failing (R). The final grade awarded to the professional practice program is given by the School Directorate, who in turn asks for a report on professional practice student performance from the hosting company or institution.

B. Stakeholders

An essential part of CEPs is the people involved. There are several stakeholders, yet this work only sought to delve into perceptions and opinions held by the group of stakeholders classed as students who were part of the Geological Science Workshops for School Education. Since there was no direct contact, an online survey was sent out, receiving 17 responses. The educational profile of stakeholders breaks down as follows; 5.9% hold a technical degree, 70.6% have a university education, and 23.5% have a postgraduate degree. The professions and trades held by the group were as follows: contract administrator, analyst, project coordinator, designer, teacher, housewife, bank employee, entrepreneur, statistician, fitness instructor, computer engineer, broadcaster, psychologist, and tourism operator. The survey they were asked to respond to is included in a later section.

C. Data collection techniques

Information was collated using two surveys (one answered by stakeholders and the other by professional practice students), and a semi-structured interview was held with professional practice students. Both surveys were validated by four academic experts, who reviewed each question, considering its relevance in relation to the objectives that guided this research. Additionally, questions were designed that could probe those elements that the survey was not capable of probing. The following sections describe each of these instruments.

1. Survey aimed at professional practice students

The aims of this work were several; to ascertain the motivations that led professional practice students to get involved in a community engagement project, their experience in workshop design and implementation; their perception regarding their performance and participation during project execution; and the impact that this professional practice may have in their degrees (for both Geology and Mining Engineering). Therefore, a survey was designed to meet these aims, adapted from one reported by [7].

In the first section of the survey, the main statement read: I gained or enhanced the following skills from participating in the “GSW4SEd”. Then, using a Likert scale (where 1 is “strongly disagree” and 5 “strongly agree”), students had to determine their level of agreement with a series of skills, as shown below:

a) Deepened understanding of course material.
b) Make good decisions and accomplish things without having to first think about or plan for them.
c) Flexibility.
d) Listening skills.
e) Team work.
f) Understand both assets and needs in communities.

g) Apply what I have learned during my degree to a real and educational environment
h) Meet others who enjoy serving the community and build personal networks.
i) Gain hands-on experience in a community setting.
j) Build professional connections useful for future professional practices or jobs.
k) Cross-disciplinary collaboration.
l) Scientific communication skills.
m) Project planning.
n) I enjoyed participating in the "Geological Science Workshops for School Education".
o) I have added this project to my resume, or plan to add it in the near future.
p) Whether I liked it or not, the "Geological Science Workshops for School Education" project was valuable for my learning.

In the second section of the survey, three open-ended questions were asked to students:

A. In your opinion, what was the most valuable part of participating in the community outreach project "GSW4SEd"?
B. If you could go back to the beginning of the project, what would you do differently to improve the workshops and results obtained? Please elaborate your answer. You can add anything you think that you could improve upon if you had that chance.
C. What would you remove from the project? Elaborate on your answer and, if possible, justify it.

In the third and final section, they were asked to complete a self-assessment questionnaire on four criteria, using a seven-point scale, (where 7 is the highest possible score).

1) Workshop participation design (designing the questions, activities, and the presentation).
2) Participation as workshop moderator (teacher).
3) Participation as part of a collaborative group.
4) General participation in the “geological science workshops for school education”.

In addition, there was an optional opportunity to have an open-ended question for final comments.

2. Interview for professional practice students

The interview had a semi-structured design, in which questions were asked to further probe issues addressed in the survey, as shown below.

- What were your main drivers to participate in this project? Why?
- How has your motivation changed over the weeks?
- How was your experience in the design of the workshops, the successes, mistakes... how did you feel that you evolved in each workshop that you were giving?
- What did you learn about workshop design?
- What is important in a workshop for children to learn the concepts and become interested in the subject?
- How do you think this type of workshop impacted students in the school?
- How do you consider your performance was in designing the workshops?
- Do you consider it important to be part of the design so as to achieve a good workshop execution?
- How did you feel when giving the workshops, was it difficult, did it make you nervous, how did you feel, how did this feeling change over time?
- Which workshop or workshops did you most enjoy participating in? Why?
- Which workshop or workshop do you think the school students enjoyed and learned the most from? Why?
- How was your experience of working in an interdisciplinary fashion?
- How do you relate interdisciplinary working to your future academic and work

activities?

3. Procedure for obtaining interviews

The coordination of the interviews was personal and by telephone. Once the four appointments were scheduled, the interviews were carried out through Microsoft Teams; the average duration of the interviews was 45 minutes. The interview itself followed a specific protocol, asking after all interview elements, including ethical elements (welcome and introduction, signing of the informed consent, the interview itself, and farewell). The meetings were recorded and transcribed.

4. Stakeholder survey

Drivers for this part were to inquire about stakeholder perceptions on studying STEM careers, their own experiences with these areas, on this type of project, and their interaction with their children regarding these workshops. The survey was obtained from [8], which is aimed at students, adapted for stakeholders, and relevant statements were added for this study. Using a 5-point Likert scale ranging from "strongly disagree" to "strongly agree," they were asked to rate the following 21 statements.

a. Science is hard.
b. The study of science in general is only for men.
c. Science is easy to learn.
d. Science workshops at school opened up my son/daughter's perspective for new and interesting jobs that they may pursue in the future.
e. When I was in school I had the opportunity of having science workshops.
f. I think we should all learn science at school.
g. I commented and discussed with my son/daughter about the activities they carried out in their geological sciences workshops.
h. I think that the science my son/daughter learn at school will help them have a better job in the future.
i. It is important that Universities promote among younger generations studying university degrees in STEM areas (science, technology, engineering and mathematics).
j. Science workshops increase my son/daughter's curiosity about things they don't already know.
k. It is important for my son/daughter's motivation and learning that I get involved in their activities regarding geological science workshops.
l. Universities ought to get more involved in the things that children in basic and secondary education do.
m. The workshops increased my son/daughter's interest in the study of science and in experimentation.
n. I would like my son/daughter to become a more scientifically orientated.
o. The study of science in general is only for women.
p. It is important to know about science, although I am more interested in other areas (social, artistic, political, etc.)
q. I consider it important that science workshops be held at school.
r. My son/daughter came home wanting to share and tell us about their experience in the geological sciences workshops.
s. In the future I would like my son/daughter to have a university education related to science.
t. I think it's good that students from the Faculty of Engineering share their knowledge and experiences with my son/daughter through workshops.
u. Science is interesting.

At the end of the survey they were asked to make comments using the following instruction: We would like to know your opinion about the workshops carried out these last four weeks. The relevance that these types of activities may have for your child's learning, what do you think about students and teachers from the Engineering Faculty of the Andres Bello University being interested in promoting the study of geological sciences through practical workshops, how these initiatives help the community in general, etc.
The following section shows results obtained after applying the surveys and interviews described earlier.

III. Results

Research results are presented below. Results from surveys and interviews carried out with professional practice students are presented first, followed by results of surveys carried out with the stakeholders.

A. Results from surveys on professional practice students

TABLE 2 shows responses in percentage achievement of skills obtained or improved by professional practice students.

TABLE 2
SURVEY RESPONSES FROM PROFESSIONAL PRACTICE STUDENTS, WHERE STATEMENTS ARE DESCRIBED IN THE SECTION ON DATA COLLECTION TECHNIQUES

	Strongly disagree	*Disagree*	*Neither agree nor disagree*	*Agree*	*Strongly agree*
a)					100%
b)			50%		50%
c)					100%
d)				25%	75%
e)				50%	50%
f)				25%	75%
g)					100%
h)					100%
i)					100%
j)					100%
k)			25%		75%
l)					100%
m)					100%
n)					100%
o)			25%		75%
p)					100%

As seen in Table 2, there was no disagreement, with no completely disagree or disagree responses. Only in items b), k) and o) did professional practice students show neutrality with respect to their perceptions on skill development, such as decision-making and planning.

B. Results from interviews held with professional practice students

Some of the reflections made by professional practice students regarding the value of participating in this project are the following:

- *"... being able to encourage participation and interest in children in these subjects so scarcely mentioned in the school process."*
- *"…to be able to teach in a practical way, applicable to children's daily life, the various aspects of geology."*
- *"…contribute to the formation of critical thinking and the development of the scientific method in students…"*
- *"…deliver the knowledge I have acquired during my degree studies to an educational community…"*

These expressions show the level of impact that professional practice students had when participating and developing the project with school students.

When reflecting on improvement opportunities, several phrases stand out, such as:

- *"seeking opportunities so children may go to the university laboratory."*
- *"…improve planning, look for learning methods that could be a little more interactive…"*
- *"…have more time in the classroom for workshops."*
- *"... planning activities so that they may be carried out in an easier and more understandable manner..."*
- *"…it would improve communication between teachers and student in professional practice…"*
- *"... I would hold meetings and proposals earlier, allowing for good organization and results..."*

Regarding the possibility of eliminating certain aspects from the project, professional practice students expressed their general opinion as follows:

- *"...I would change some of the activities of the experiments carried out..."*
- *"...I would change the order of the workshop in the theoretical aspects, I would rather start off each workshop with these aspects first, to then dwell on practical aspects..."*
- *"I wouldn't remove anything from the project because in my opinion everything worked as expected and there were no problems..."*

In the self-assessment section, workshop design and general project participation were the items best evaluated with an average score of 7. While the item evaluated with the lowest rating was the one related to collaborative work, with an average of 6.5. The second item rated on average less than 7 was the self-assessment made by professional practice students on them acting as workshop moderators, rating this with a 6.8.

Finally, some final comments from professional practice students are shown.

- *"…this experience was unique and it leaves us with a tremendous learning regarding school child knowledge …"*
- *"…how I handle myself in the topics presented in the workshops is much more versed now than before they began, so it was a great help in my learning of these classes."*
- *"…it allowed us to work as a team with students from other degrees linked to ours and allowed us to share experiences that were very useful in project development as well as for some other aspects of university."*
- *"Undoubtedly, the project was a great help and tool useful for us as professional practice students due to that mentioned earlier, when working with colleagues from other degree areas, but also the fact of working in the real world..."*

C. Results from the stakeholder survey

Table 3 below shows survey results from stakeholders. The response percentages are shown according to a Likert scale, the statements are shown in the data collection techniques section.

TABLE 3

SURVEY RESPONSES FROM STAKEHOLDERS, WHERE STATEMENTS ARE DESCRIBED IN THE SECTION ON DATA COLLECTION TECHNIQUES

	Strongly disagree	*Disagree*	*Neither agree nor disagree*	*Agree*	*Strongly agree*
a.	11.8%	47.1%	23.5%	17.6%	
b.	94.1%	5.9%			
c.		11.8%	52.9%	29.4%	5.9%
d.				17.6%	82.4%
e.	23.5%	29.4%	23.5%	11.8%	11.8%
f.				23.5%	76.5%
g.	5.9%			17.6%	76.5%
h.			23.5%	35.3%	41.2%
i.				35.3%	64.7%
j.				17.6%	82.4%
k.			5.9%	29.4%	64.7%
l.				23.5%	76.5%
m.			5.9%	41.2%	52.9%
n.			52.9%	23.5%	23.5%
o.	88.2%	5.9%	5.9%		
p.			17.6%	47.1%	35.3%
q.			5.9%	23.5%	70.6%
r.			5.9%	23.5%	70.6%
s.		5.9%	47.1%	17.6%	29.4%
t.			5.9%	11.8%	82.4%
u.			5.9%	11.8%	82.4%

Table 3 has the answers to open-ended question made to stakeholders. The answers are fairly concentrated, where there is more observable dispersion is in responses to statements a, c, e, and s, which bear relation to perceptions held by stakeholders towards science in general.

Among main stakeholder reflection are expressions such as:

- *"…they were fascinated by each of the classes, telling me what they were doing, that was so gratifying, and seeing that a university holds activities with younger students, well I personally loved it, because they are sowing the seeds that will open up the minds of these children in the future."*
- *"I found the workshops interesting; it is a way of learning through experience and experimentation, rather than just modules and PowerPoint presentations…"*
- *"…I wish there were more science workshops."*
- *"It is important to open-up a child´s curiosity in all fields and especially to show that science can be entertaining."*
- *"I think it is important for children to experiment in different areas of knowledge and thus, given their own experience, identify where they want to learn more."*
- *"I think the main contribution to the school community was to awaken the interest of the children in science workshops, as the school mainly promotes the artistic and sports areas in extracurricular activities"*
- *"My daughter left classes fascinated, very motivated, telling even her grandparents what she had learned"*
- *"...my son was very motivated and he was not disappointed with the workshops, continuing to be motivated until now."*
- *"...a very positive idea that of holding workshop of this type, since it opens up knowledge to the children involved, where through play mechanisms they become interested in science, leaving behind a significant learning for them."*

The following section discusses results reported.

IV. Discussion

Given the findings, it may be said that the Community Engagement Project that hosted the Geological Science Workshops for School Education, facilitated by professional practice students from the Geology and Mining Engineering careers, had a positive impact, both for the professional practice students themselves in their capacity as workshop moderators as for stakeholders. As can be seen from Table 2, professional practice students expressed having developed various skills, such as collaborative working, active listening, flexibility, decision making, planning, scientific communication, and project planning; interestingly, Benitz and Yang reported very similar results [7]. In the subsequent interview held with professional practice students, it can be seen that, in general, the four students engaged in this role were satisfied with their project participation. As in [9], students stated that this experience helped them better understand some of the issues seen in their degree studies.

In accordance with the suggestions by Natarajarathinam et al. [10], an attempt was made at interdisciplinary participation and to make relevant inquiries. The interviewed students express that it is of relevant value to collaborate with people from other areas since this brings them closer to fulfilling an integrated project, making them fully aware of realities that they will have to face in future labor contexts. Although the grades they awarded themselves in their self-assessment as part of a collaborative group were not top grades, their perception of their participation was still considered very well.

In light of the reference timeframe mentioned by Benitz and Yang [7] regarding the duration for these types of projects, workshops were held for four consecutive weeks, seen as enough time for the professional practice students to be involved, engaged, and integrated into the initiative. This length was found to be an adequate time reference for future projects of this nature. Essential to mention some issues related to communication between teachers in charge

of the project and professional practice students. Additionally, students expressed that they would have liked to have had more time to be involved in project design from the very beginning. As mentioned in [10], logistical barriers are the primary conflict issues seen in projects of this nature. It is also pointed out that other academic commitments students had proved to be a difficulty when designing and executing the workshops, as some students had to postpone evaluations and final deliveries from other subjects to fulfill commitments this project required.

Regarding answers given by stakeholders, a somewhat negative perception towards science is seen since answers on the issue seemed scattered. However, stakeholders thought this project was perfect for their children and helped peak their interest in science. Stakeholders in general mention this as a motivating, enriching, and entertaining experience; then they bore witness that their children came home talking about the activities carried out, showing materials used, and awaiting the next workshop with high expectations.

V. Conclusions

The present paper is a research piece whose aim is to propose a structure for professional practices for students in Geology and Mining Engineering degrees, which may allow them to realize just how they may be able to impact society through the skills and knowledge acquired at University. By allocating funds for undertaking Community Engagement Projects, students were called to be part of this activity. Surveys and interviews made it possible to inquire about students' perceptions regarding their participation in the GSW4SEd, where findings revealed that this activity allowed them to consolidate their knowledge on various career-related issues. In addition, professional practice students were able to appreciate the value of interdisciplinary collaborative work, acknowledging that being part of this project allowed them to improve their communication, planning, and collaborative working skills, among others.

Improvement areas are related to timely planning, communication between teachers in charge of the project and professional practice students, and time constraints in carrying out all activities that studying for a university career entails. In addition to the design and execution of the workshops, students were at the end of their semester and had end-of-term assessments and final project submissions to deliver, among other commitments. Given the responses found within the stakeholder surveys, it was possible to ascertain from their comments that the workshops generated a positive attitude and promoted discussion between parents and their children regarding what was seen in the workshops. Although this may not be conclusive, it is a positive sign regarding project implementation.

In addition, the administration of the host school of the project stated that they found the project attractive. Moreover, because they do not offer instances in the scientific field for their students, they immediately accepted the invitation to participate in the experience since they were sure that experimental education is the best means of disseminating knowledge.
This research paper focused mainly on students in practice and stakeholders' perceptions (parents and guardians of children). However, as future work, it is planned to study the impact of geological science workshops on school children, considering other stakeholders' opinions, such as the headmaster and school teachers.

Acknowledgments
We thank Andres Bello University's Community Engagement Project Fund. Likewise, we want to thank Professors Maria Elena Vivanco and Jean-Baptiste Gressier, who were an essential part of the design and execution of the workshops. We also thank the school that allowed us to carry out this project with their students. Finally, we recognize the hard work done by the professional practice students who designed and exceptionally executed the workshops.

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