24-076

Building Our Future Project: Inspiring Young People to Follow Their Dreams and Aspirations

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ABSTRACT

It is our responsibility to promote responsible and sustainable mining with new generations, promoting a culture of equality and respect. To fulfill this commitment, we are working with the SME UNC Student Chapter team, Newmont Yanacocha, BRG Women and Allies and the Museo de Agua y Tierra (MAT) to carry out the "Building our future" project.

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This project seeks to instill in new generations the importance of mining, integrating sustainable development objectives. We have the participation of Newmont Yanacocha and external professionals, who share their life stories and inspire participants from rural and urban educational institutions to pursue their dreams and aspirations.

We believe that this project is important because it will help new generations understand the importance of mining and its role in the development of the country, covering the economic, environmental and social spheres. Since its inception in 2022, the project has positively impacted more than 500 participants.

INTRODUCTION

In this complex and dynamic society that faces socioeconomic, environmental and cultural challenges and problems that directly influence people's lives. In this context, it is essential to explore and understand social problems to effectively address and build a more equitable and sustainable environment. Due to these situations, social projects are carried out that address specific problems or needs within a society (Tavira & Herrera- Tapia, 2016).

Taking a brief tour of some successful social projects where children and adolescents are involved is the Pabellón Minero Infantil that from 2014 to the present has managed to impact 25 thousand primary school students. This project consists of taking a tour of an underground mine, talking about mining, safety standards, glass manufacturing and mineral recognition. (Santoyo, 2023).

Through the achievements obtained by the Pabellón Minero Infantil project, which is part of the inspiration to create the project "Building our future" that aims to change the perspective about mining in the new generations of our region, we being protagonists of mining in Cajamarca observed the need for an educational space for children and adolescents from different educational institutions where they can talk about mining from the experience of successful professionals in the field, through games and other activities according to age promoting a culture of equality and respect in mining.

The objective of the project is to change the perspective on mining in the new generations and inspire them to achieve their dreams, and build their future in the sciences and develop professionally in the mining sector contributing to the development of our country.

We have been developing the project since April 2022 in Cajamarca, Peru in the facilities of the Museo de Agua y Tierra (MAT).

METHODS

In this chapter we dare to know our project activities carried out using the Deming cycle methodology.

Deming Cycle Methodology

The Deming cycle methodology consists of four steps (Plan, Do, Check, Act). This approach has provided us with a sequential structure for our activities, facilitating planning, execution, monitoring and continuous improvement of our actions. (Illanes, et al. 2022).

Following the stages of the Deming cycle we have:

Plan

In this phase, meetings were held with the organizations of the SME UNC Student Chapter, Newmont Yanacocha, BRG Women and Allies and ALAC Yanacocha (Museo de Agua y Tierra facilities). In this section we considered:

- The structuring of the "Building Our Future" project.
- Development of the project.
- Determination of the target audience.
- Activities to be developed in each day.

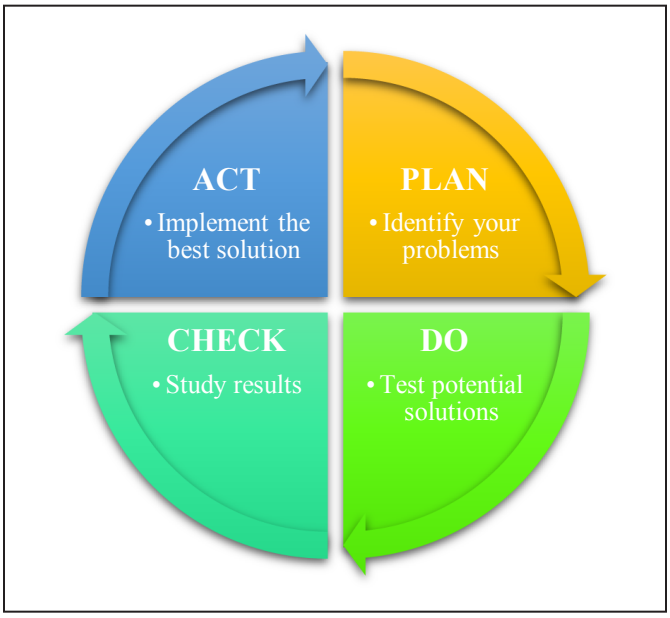

Figure 1. PHVA cycle model

Do

In this phase, the planned activities were carried out:

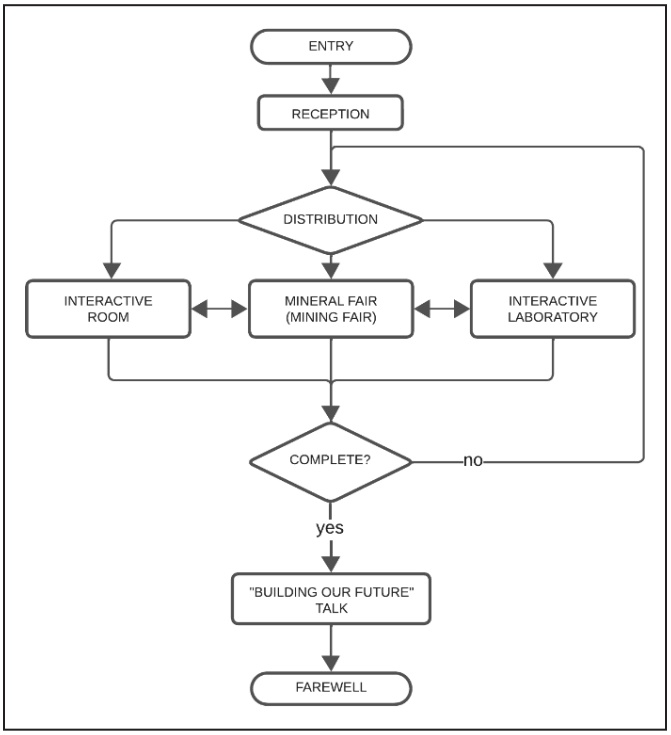

Figure 2. Flow chart of the development of activities in the TMA

Admission

Data verification and attendance of participants from the different institutions.

Reception

All attendees are welcomed, and a form is filled out (entrance survey) to learn about their perception of mining before the day's activities. In addition, groups are created and led by a volunteer for the tour in the different environments.

Distribution

The groups start their tour in each interactive environment (duration 20 min), which are alternated until passing through all the rooms.

Interactive Room

In this environment, activities on the earth, space, the water cycle, minerals, electricity conductivity and various interactive activities are developed, always guided by the volunteers responsible for the group.

The Mining Fair (Mineral Feir)

In this environment participants learn about minerals and fossils. In these activities the participants can observe, touch, test the hardness, color and chemical composition of minerals. In fossils they are introduced to the organic remains left by animals and plants.

Interactive Laboratory

In this environment the participants appreciate the processes of mining operation, having access to a subway mining scale, within the mining simulation experiments that awaken the curiosity of the participants for science are performed.

Inspirational and Motivational Talk

After all groups have toured the interactive environments, participants gather in the main room where the guest professional gives a lecture on his or her success stories and how he or she achieved his or her accomplishments. This is followed by a round of questions from the audience. Before the end, there are dynamics about inclusion and mutual respect.

Farewell

Participants fill out the form (exit survey) on perception in mining. Then, certificates for participation are delivered to students and teachers. Finally, thanks are given to all the participants and volunteers in the interactive day.

Check

In this phase, the measurement data collected on each day is analyzed. Additionally, to obtain the impact of the "Building Our Future" Project, the following items are analyzed:

- Participants impacted 2022 and 2023.
- Institutions affected (urban and rural).
- Age range of participants.
- Gender distribution.
- Perception of mining (Likert scale).

Act

In this last phase, we analyze the impact generated by the "Building Our Future" project and evaluate the feedback. In addition, this data allows us to broaden the scope of the impacted population and make our 2024 projection.

Once the data on participants reached by the project is obtained, adjustments are made to improve and continue to grow, based on feedback.

RESULTS

This project evaluates the change in the perception of children, adolescents and adults regarding the influence of mining on their lives and/or environment:

Impacted Participants 2022–2023

From the beginning of the "Building Our Future" project in April 2022 to October 2023. There has been a positive growth in students participating in interactive mining events.

Figure 3 shows a 46% increase in the number of participants by the year 2022, that is, a total of 114 participants among children, youth and adults from the different institutions.

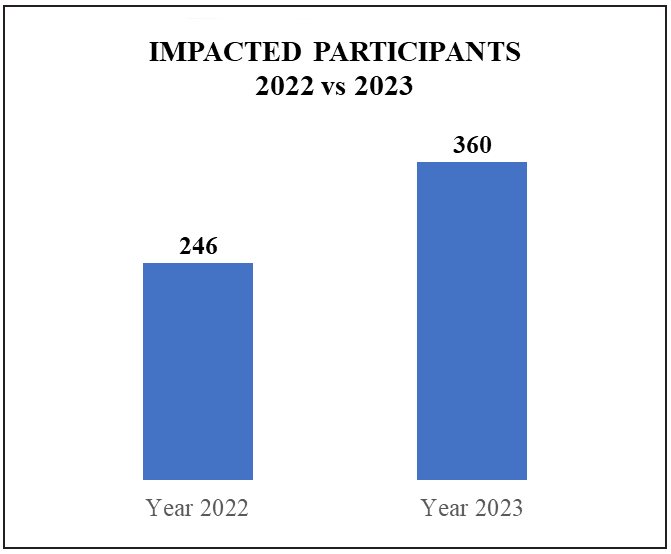

Figure 3. Participants impacted during the years 2022 and 2023

Place of Origin

Cajamarca is a city marked by the centralization of areas such as education, technological development, among others, which generates a disadvantage and a notorious difference in knowledge between the educational institutions in the city and the communities far from it.

Consequently, the Project seeks to eliminate these differences by having a greater number of participants coming from institutions in the rural area as we can see in the following Figure 4.

In the Figure 4, shows that schools in rural areas (mining influence zone) are being impacted 8% more than those in urban areas.

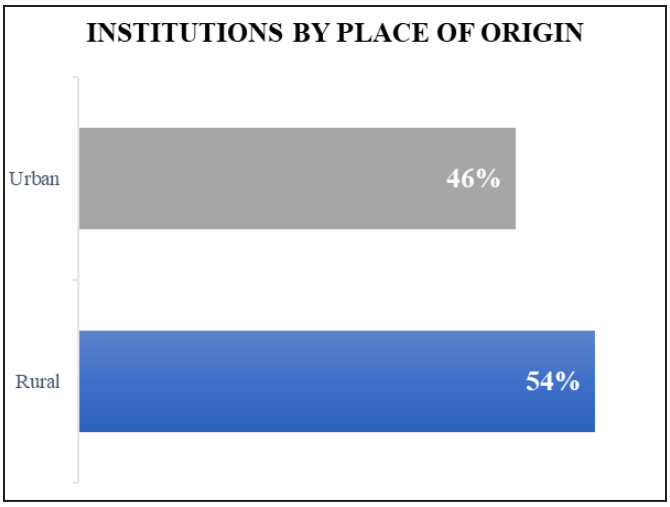

Figure 4. Institutions impacted by place of origin in 2022 and 2023

Age Range

The age range of our participants is a point that we have taken into account in order to direct each edition of the Project according to their own age needs. This implies making adjustments in the talks, mineral fair, learning tools, dynamics, and number of support people per edition.

Figure 5 shows three age groups: The first and with the largest number of participants have been adolescents between 12–17 years old the same that belong to an educational level close to choose their vocation and profession.

The second group are children between 6–11 years old who have been learning from an early age about the possibilities of developing in science, awakening their curiosity and initiating their knowledge about responsible mining and the use of minerals.

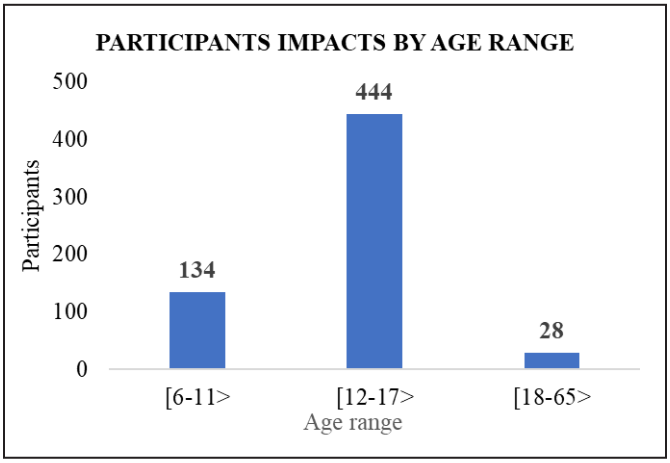

Figure 5. Participants impacted by age range (children, adolescents, young and adults)

Finally, the third group, with a smaller but equally significant number because they are teachers and parents who by changing their perspective can generate change in their homes and institutions that each one represents.

Gender Distribution

In the interactive workshops there is no gender discrimination among children, adolescents and young adults, so workshops are held for both males and females.

During the two years of the project, 345 male students and 261 female students from different rural and urban institutions have participated. This helps us to effectively work on a culture of equality and respect during the development of the program that can be replicated in their daily lives.

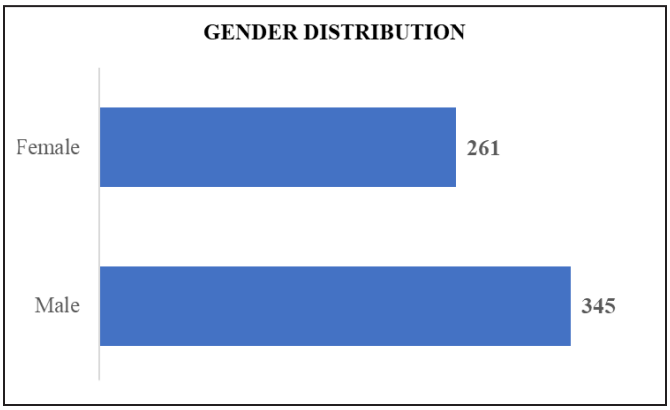

Figure 6. Gender distribution in the year 2022 and 2023

Perception of Mining

Everyone has a perception of mining, whether positive or negative, due to the social and cultural problems associated with mining projects.

To find out if the Project met the objective of the audience that participated in each day, we conducted a survey at the beginning and end of each day. This survey was measured with the Likert scale, which was analyzed as follows and gave us the following results.

Applied Question:

What is your perception of responsible mining is?

For the evaluation of this question, one weight has been considered for each item:

For the evaluation of the indicators according to the level of the score obtained by the indicator question, at the end a general sum is made and the action is verified in Table 2.

Table 1. Likert Scale Score

	Very Negative	Negative	Neutral	Positive	Very Positive
Score	1	2	3	4	5
Emotion					
					

Table 2. Rating levels for the Likert scale

Value	Range	Count	Action
1	0%–20%	0–606	Reevaluate
2	21%–40%	607–1212	Improve
3	41%–60%	1213–1818	Maintain
4	61%–80%	1819–2424	Relevant
5	81%–100%	2425–3030	Excellent

In the initial survey for all the sessions provided to the 28 institutions, both urban and rural, the value is 970 points, which indicates that the perception in mining is in need of improvement.

In the final survey for all the sessions provided, the value obtained is 2681 points, which indicates an excellent action.

Mining Projection

The "Building Our Future" Project is always about continuous improvement. It seeks to improve workshops for children, adolescents and young adults. In addition, it is seeking to impact a greater number of participants from different institutions in urban and rural areas.

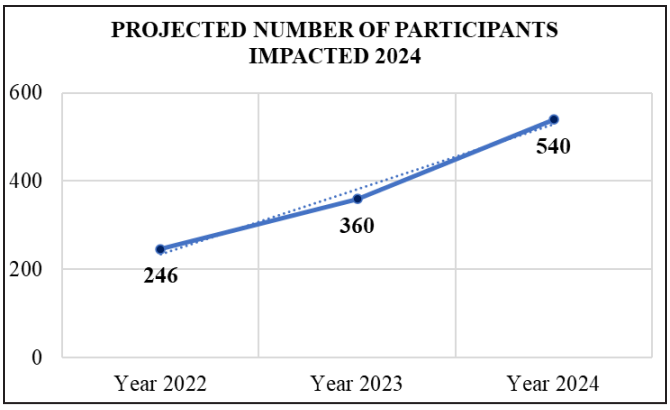

Figure 7. Projection of participants in 2024

DISCUSSION

The results of our study show that the project has a positive impact on changing perceptions about mining, among participants of different ages and backgrounds.

The Building Our project increased the average of the Likert scale, according to the scale and the results, it increased from 970 (value 2) to 2681 (value 5), which represents a large number of people who changed their perception about mining responsible and sustainable.

The annual increase in participants compared to 2022 and 2023 (Figure 3) is a positive indicator for our project, since we noticed people's interest in learning about responsible mining, which has allowed us to implement more sessions and involve to more volunteers and professionals from the mining industry to continue meeting the objectives of the Project.

In the results obtained according to the origin of the participants, the rural area, which is the area of direct influence of the mining projects in Cajamarca, represents a greater number of participants than the urban area.

This motivates us to continue inspiring new generations in rural areas and they see that opportunities are also within their reach and that they take an active part in positive change in their communities.

Part of our objective is to be able to impact a greater number of students, by the year 2024, for this we have decided to set a goal of impacting 50% more participants compared to the year 2023, this represents a total of 180 participants of increase.

In addition, we are developing the plan to move the days to other places and events where there is massive attendance of people, as well as taking advantage of the time not only during school time but also during vacations by holding summer workshops for children, adolescents and their parents, opening thus an opportunity to impact a greater number of adults.

CONCLUSIONS

In this study, we evaluate the impact of the Building Our Future Project, which seeks to improve the perception of mining in Cajamarca, Peru.

Over the past 2 years, the Building Our Future Project has seen a notable 46% increase in participation compared to the previous year. This growth reflects people's growing interest in understanding the reality of responsible mining.

The presence of women in these workshops has reached 43% of the total attendees, which allows us to work on

gender equality in a diverse environment. This change is significant, since previously, due to myths or beliefs, the active participation of women in the mining sector and in these issues was considered impossible.

The analysis of the distribution by age, in Figure 5, reveals an increase in the interest of teachers and parents in joining and deepening their knowledge about responsible mining. This indicator reflects the need and importance of educating not only children and adolescents, but also the adults responsible for their training.

We managed to share the project through this detailed report so that it can be replicated and/or improved for its application in places with social conditions similar to our region and thus achieve the impulse and development of responsible mining that allows building a sustainable and sustainable future in each city and country.

REFERENCES

Tavira, N. B., & Herrera-Tapia, F. (2016). Proyectos sociales. notas sobre su diseño y gestión en territorios rurales. Convergencia-revista De Ciencias Sociales, 72. doi.org/10.29101/crcs.v0i72.4131

Santoyo, J. (2023, 9 mayo). Es el Pabellón minero infantil un programa de una madre de familia minera: Elizabeth Araux. MineAcademy. mineacademy.mx/es-el-pabellon-minero-infantil-un-programa-de-una-madre-de-familia/

Illanes J., Acosta R., Moroni F., Moore M. 2022. Algorithm development and implementation for georeferenced particle size distribution (psd) data. Instituto de Ingenieros de Minas del Perú (IIMP). 1–12. www.onemine.org/documents/algorith-development-and-implementation-for-georeferenced-particle-size-distribution-psd-data

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Quantifying the Texture of Coal Images with Different Lithotypes through Gray-Level Co-Occurrence Matrix

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ABSTRACT

The Coal Pillar Rib Rating (CPRR) technique has been developed to assist in rib support design in underground coal mines. One major challenge of the data collection process is the measurement of coal strengths in the field. Schmidt hammer has been verified as a useful tool to determine coal strength. An alternative approach is to obtain the representative strength of coal mass by determining the coal lithotypes in the field based on the coal brightness profile by experienced geologists or mining engineers. In this paper, image processing techniques have been used to quantify the texture of coal images of different lithotypes with the purpose of classifying coal lithotypes. The coal images were collected from the pillar ribs with exposed surfaces in underground coal mines, and the coal lithotypes were identified when taking the images. The method of Gray-Level Co-Occurrence Matrix (GLCM) was used to analyze the textures of coal images of different lithotypes, and the texture parameters, such as contrast, homogeneity, energy, and entropy, were compared. The results show that the images of coal with different lithotypes have different textures, which can be quantified through the image processing. The results from this study demonstrate the potential of classifying coal lithotypes using rib photos and easing the data collection process of CPRR.

BACKGROUND

Coal ribs, which are the walls of coal pillars intentionally retained during mining to support overlying rock strata, play a crucial role in maintaining the structural integrity of underground coal mine excavations. The occurrence of rib falls presents severe safety risks, encompassing injuries, fatalities, and equipment damage. Researchers from the National Institute for Occupational Safety and Health (NIOSH) have been working on the development of an engineering-based approach for coal rib stability analysis and support design.

NIOSH researchers have developed the Coal Pillar Rib Rating (CPRR) technique to quantify the bearing capacity of coal pillar ribs (Mohamed et al. 2020). The CPRR technique considers homogeneity, strength, bedding condition, rock parting condition, face cleat orientation with respect to entry direction, and coal unit thickness. The calculation of CPRR requires various input parameters that need to be measured in the field, like the number of coal units, the thickness and strength of each coal unit, and the thickness and strength of rock partings that separate a rib into different coal units. One of the major challenges for the data collection process of CPRR is the determination of coal strengths in the field, and Schmidt hammer has been used as an indirect tool to determine coal strength (Rashed et al.