



## Original Article

## Teaching cleaner and responsible mining through songs



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## ABSTRACT

This article explores the use of music as a tool through which to teach social and environmental aspects to mining engineering students. Mining engineering students are often exposed to a highly technical learning environment. As a tool, music can facilitate open dialogue between peers about the impacts of the industry. This methodology has been used for more than 15 years at the Department of Mining Engineering at the University of British Columbia, and has provided a benchmark in the education of future mining leaders. The faculty's Mining and Environment, and Mining and Society courses cover social and environmental issues related to mining that range from detailed aquatic chemistry, to concepts of sustainable development and poverty alleviation in developing countries. A different song is introduced every week to highlight the lessons of that week to students. This paper covers five songs that discuss current issues in mining, and the ways in which perception is shaped around these topics. The mining industry needs to respond to these issues, and to do so, students must be aware that focusing on technical aspects alone is not the most well-rounded or efficient way to go about changing perceptions.

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## 1. Introduction

According to Ernst and Young (2015, p. 1) a social license to operate (SLO) is becoming an increasing concern to the mining industry since “the frequency and number of projects being delayed or stopped due to community and environmental activists continues to rise”. An SLO is a company's capacity to maintain an equitable relationship with local communities, environmental groups and non-governmental organizations that allows them to operate within a given region (Hilson, 2012). Developing and implementing an SLO requires fully understanding of the social fabric, cultural nuances, and the local history of the society a company is working alongside. Poor development or the breakdown of an SLO can spark conflicts between a company and locals.

Environmental issues are commonly used to justify tensions and oppositions but in fact, are often unresolved underlying social and/or political issues, or the initial approach of the mining company was not well accepted by the communities. These conflicts originate from lack of understanding of the risks and benefits inured by stakeholders over mining projects (Kemp et al., 2011). The mining industry must respond to the demands of local societies for cleaner technologies, sound environmental management and social responsibility vis-à-vis

stakeholders (Hilson and Murck, 2000). The lack of SLO has recently been stressed as one of the major issues facing mining companies (Hilson, 2012). Even when all of a company's environmental permits are in good standing, public perceptions of a mine, along with hidden political interests, can prevent a project from materializing (Prno and Slocombe, 2012). Such was the case with Infinito Gold at its Costa Rican operation. Here, during the project's exploration phase, a significant number of jobs in a range of economic activities were provided to the local community. But complications soon arose after influential politicians with ties to international NGOs persuaded the local people that the company, if permitted to operate, would release cyanide into the natural environment and “kill everything” (DaSilva, 2010). Similarly, in the case of the Marlin Mine in Guatemala, several environmental groups have suggested that the population is vulnerable to cyanide spills, despite facilities being in place which ensures the regeneration of the cyanide used at the mine (Dougherty, 2011).

Conflicts between mining activities and local communities are not necessarily a result of companies' lack of planning. But action plans tend to be developed at company headquarters that are located vast distances from operations, and in many cases, the companies use local employees to implement their policies. It is often the case that problems arising from poor communication between a company and a community are the result of infrequent participation by the inhabitants of this community in the decision-making process

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surrounding the project (UNECA, 2004). International social scientists are often hired as consultants to establish the strategies through which to engage the public in the project. The plans can be brilliant, but their successful execution requires the permanent presence of trained employees with sensibility concerning, and knowledge about the social issues surrounding the mines (Xavier, 2013).

## 2. Engineering curriculum focus

Historically, engineering has focused on technical details, and has largely ignored the big picture of how best to integrate with the social, environmental or fiscal aspects of a project (Beder, 1999). With no formal training on social or cultural issues, mining engineers are not necessarily aware of or sensitive to the traditions, cultures and idiosyncrasies of the local communities that they are working in. However, mining projects are vulnerable to road blocks, demonstrations and other forms of protest from locals, popular actions taken to express their disapproval of specific environmental and social aspects of a mining operation (Bebbington et al., 2008). The participation of engineers should, therefore, not be limited to technical issues. They must be prepared to broaden understanding of the power hierarchies that exist in the local communities they are working in, and aim to respond to the pressures imposed by them. The main challenge for engineers representing their companies is to engage in equitable partnerships with the impacted community in order to create a sustainable relationship (Veiga et al., 2001).

Most engineering schools have viewed education on social issues related to natural resource extraction as a topic of a secondary importance. Accordingly, the *status quo* is that this topic can be addressed through a non-technical elective course, provided that the student develops an interest in the subject. The engineering curriculum is dominated by science courses, leaving little time for students to take non-technical electives (Beder, 1999). The limited scope of engineering curricula reduces students' capacities to develop other useful skills such as judgement, the understanding of social complexities and creativity (Beder, 1999).

## 3. The role of mining companies

Even though the mining industry is currently being monitored by the media, stakeholders and non-governmental organizations (Cech, 2014), few academics choose to bring the socio-political context to engineering classrooms. The role of mining in promoting development and reducing poverty has been challenged since there is no clear evidence that this is actually taking place (Pegg, 2006). The primary criticisms that have been levelled at mining companies relate to their attitudes and performance worldwide.

Some engineers still believe that the misunderstandings between the companies and communities must either be resolved using legal interventions or through a more charitable approach which emphasizes the delivery of immediate benefits to locals. In many instances, especially in developing countries, the populations of rural communities hold little faith in their political representatives. These groups have lived in relative isolation for centuries, without political clout and receiving few if any benefits from their central government. This is the case in the Brazilian Amazon town of Paraupébas, which has approximately 110,000 inhabitants, and which is located near the giant Carajás Project run by the multinational Vale. Here, mining activities in the Carajás Ore District are responsible for 70% of the town's Gross Domestic Product. In 2000, the municipal government received US \$12 million from royalties from iron-ore mining alone, which is just a fraction of the taxes it receives from the all mines in the region. But despite this revenue, about 44% of the total population lives below

the poverty line (Costa, 2008). Clearly, the wealth generated by the mines is not being utilized to benefit the community as a whole. The perception of the people living in many rural communities, particularly in South America, is that the 'closer' a company is to the government, the farther they are from the local community. This is due to a lack of government presence in rural communities except predictably, during election campaigns. Companies have been shown to respond to the requests of local communities, in particular when conflicts are imminent, by providing immediate benefits such as schools, health posts, clean water or power lines. Such benefits do often alleviate pressure in the short term but in many cases, are not sustainable and run the risk of ending when the mineral resources are depleted. Hospitals without doctors, schools without teachers, railroads without operators and water without treatment – these are a few examples what can happen when a mines closes down. Jobs, culture, friendship, and respect are important social factors and values in mining communities. Combined, these factors can contribute to a legacy of self-esteem which could function to perpetuate a positive community–company relationships that can be more sustainable than financial benefits.

Companies are often not prepared to diversify the economic bases within the communities in which they operate. Instead, they prefer for this responsibility to be assumed by government. This allows resource extraction companies to keep an arm's length from community groups, which are then forced to rely on the government for benefits from the royalties that are collected from the mining operations. Unfortunately, and as noted, this rarely yields positive outcomes in developing countries, where many towns created by mining become slums after activities cease. Hilson (2007, p. 42), among others, has criticized the poor behaviour of some mining companies in implementing projects in developing countries by stating that they "are generally implementing community development programmes that are incapable of alleviating rural hardship".

In most mining engineering schools, the importance of environmental legislation is stressed. Students are typically expected to memorize environmental protection laws and to familiarize themselves with other policies; but without enforcement, regulations will have little impact. Sousa et al. (2011, p. 748) stressed that, "in the last decades, the use of jargons such as sustainable development, green technology, clean process, chemical-free, etc. became almost a mandatory fashion in most laws and policies addressing the environment". However, these policies are not clearly implemented on the ground. Laws are important, but they cannot replace voluntary initiatives and an ethical approach that is embedded in sustainability (Sethi and Emelianova, 2006).

Educational practices within academia need to reflect this necessity for change by fostering a creative environment in the classroom, specifically with respect to developing a multidisciplinary approach towards compliance and permitting. Treating these issues as secondary legal obligations that can be resolved by bureaucrats undermines their importance in the eyes of students. Students are not taught to think about, or even to feel, their responsibilities. As such, environmental and social issues have simply been relegated to being part of a business model, and do not constitute an actual ethical approach. This is not sustainable, and through its avoidance of focusing on this important issue head-on, academia is providing a disservice to society through its method of training new generations of mining engineers.

## 4. Changing the perception of mining education

The career options for mining engineers have become much broader than they have been in the past. The concepts of environmental management and social responsibility are becoming more of a focus in the training for future leaders in the industry.

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