

Are there interesting cultural interconnections between the sciences, technologies and traditional societies?

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Abstract

The focus of this paper is the importance of dissemination and application of sciences and technologies on science's teaching into cultural circles of traditional societies. It was developed from a preliminary qualitative study of public opinion with 30 individuals from different social groups of American countries. An open question was employed for data collection: Do you believe that societies living in direct contact with nature (e.g. indigenous) require dissemination and application of science and technology in their cultural backgrounds? Justify your answer. The answers were analyzed inductively about their content. They were grouped into two categories indicating that most of the participants (76.67%), agree that traditional societies need to access and use of science and technologies. On the other hand, 23.33% of the participants indicated that traditional societies do not require to access and use of science and technologies. We conclude that sciences and technologies are important and should be a shared component of science teaching with traditional societies. However, the process will need to avoid cultural overlap, and guarantee a mutual respect. The study will continue with a broader sample and participation of individuals belonging to traditional societies.

Keywords: Science and technology; Traditional societies; Cultural interconexión.

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Introduction

Knowledge growth moves between societies in order to improve life. For example, in terms of health systems, we know that in the past, many people died by of hereditary diseases such as cancer. Nowadays, thanks to the genetics and related technologies improvements, it is possible to treat these patients, in terms of drugs and / or surgical procedures.

Technology development occurs in parallel to societal development, and contributes significantly to the dissemination of scientific knowledge and practices. This way all individuals have access to, and therefore have an active participation in societies scientifically and technological influences. More emphatically, it was from the seventeenth century, with the emergence of modern science and then by its paradigmatic changes, that the sciences have provided a new vision of the natural world. Before, it was strongly philosophical and faith-based, now it is often rational and fact-based. Thus, from the Modern Age, the ultimate foundation of knowledge is driven by reason and objectivity (Vasconcelos, 2002).

Despite the influence and benefits of science and technology in many societies around the world, it is known that some people live without their a great technological impact, especially in American countries, where ancestries and everyday experiences with the surroundings form the basis for construction, reconstruction and transmission of their knowledge and practices to their offspring (Posey, 1997). Even that these countries have been colonized by Europeans who brought with them the modern Western science as a form of domination of their local cultures. According to Cobern & Loving (2001), when Europeans explored and colonized other continents, they brought Western science to those lands and its inhabitants, resulting in a progressive integration of values, knowledge and action patterns in the culture of these people and, consequently, a disintegrating effect on the values, knowledge and traditional ways of living. To Toledo (1996), the European expansion brought with it the imposition of scientific knowledge as the only valid form of knowledge and therefore the disqualification of any other way to see the world. In the view of Toledo (1996), science was used by European settlers as a tool to overcome other knowledge systems from the assumption of epistemological superiority of scientific thought. A similar process was applied with traditional indigenous communities, African-descendants, coastal, farmers, artisan fishers, and others. The term “traditional communities” refers to both indigenous people and populations that, throughout the historical process, developed, and further develop, particular modes of existence, adapted to specific environmental conditions (Diegues & Arruda, 2001).

Given this assumption, the question is: *Do traditional societies need knowledges of science and its technologies for their survival?* In this paper we discuss the importance of dissemination and application of science and technologies into science teaching in traditional societies’ cultural circles. This is a qualitative study involving public opinion from different countries of the American continent.

Methodology

The research had a qualitative and quantitative approach based on open questions. According to Bogdan & Biklen (2003), one of the basic characteristics of qualitative research is that it is descriptive and is not concerned with numbers. Instead, it seeks to understand, based on the collection of descriptive data, the meanings that people give to things and life, within the context of which they are part. In qualitative research investigators are more interested by the process than the results and data analysis tends to be inductively (Bogdan & Biklen, 2003). There is no data collection or evidence in order to confirm or cancel hypotheses previously built. Instead, abstractions are built as the particular data that have been collected are being grouped.

Data were analysed intuitively, based on content analysis of the responses (Bardin, 2001), which were categorized with subsequent analysis and discussion based on literature of science teaching and philosophy of science (Chalmers, 1993; Matthews, 1994; Teo, 2013; Gondwe & Longnecker, 2015).

The study took place in 2015 and involves individuals from the following countries: USA, Mexico, Colombia, Brazil, Paraguay, Peru, Chile, Argentina and Spain. These individuals form part of the friendship network and in some cases even colleagues of the authors. It was launched an open question which generated data for writing this paper: *1- Do you believe that societies living in direct contact with nature (e.g. indigenous) require of dissemination and application of science and technology in their cultural backgrounds? Justify your answer.*

In order to ensure the respondents’ privacy, their names will not be disclosed. Instead, it will be mentioned their name’s initials, followed by the country where they are from. As examples: P.P., Brazilian; A.V., Spanish, and so on.

Results

The study included a total of 30 participants (N=30), male and female, distributed as follows: 15 (fifteen) from Brazil, 3 (three) from Paraguay, 6 (six) from Colombia, 2 (two) from Mexico, 1 (one) from Peru, Chile, Argentina and Spain. Regarding their qualification; 11% where professors; 22% graduate

student; 24% undergraduate; 35% undergraduate student and 8% never studied any undergraduate course.

The answers were grouped into two main categories and revealed various opinions, the first of which had the largest number of representatives: 1- Yes, traditional societies need to access and use of Science and Technologies and 2- No, traditional societies do not need to access and use of Science and technologies. Some examples of data found for each category are presented next:

3.1 Category 1: Yes, traditional societies need to access and use the Science and Technologies through sciences' teaching into schools

A total of 23 participants are into this category, namely, 76.6% of the sample. The answers indicate that for them, it is necessary that all societies around the world, including the traditional, to have contact and make use of science and technologies, as this would contribute to expansion of their knowledge and practices, which could enable the improvement of their life quality and their active participation in decision-making in scientifically influenced societies. This line of thinking is exemplified from the following responses:

Yes, of course. The science helps to understand the nature, but you can see that it depends on the society and not all societies live exclusively "in direct contact with nature". Many societies have contact with artefacts technologically derivatives from the Western scientific knowledge. Others do not have any contact. So, for the latter, I believe that they do not want and do not need the "dissemination and use of science" and "their technologies". Now, for those who have contact, any device or foreign learn already introduce changes in the group's culture, then, if something related to the science is there why not understand it according to that view? On the other hand, if the community has another knowledge and technologies derived from the contact with nature, why did not understand it through the eyes of Western scientific world? It can bring benefits and improve the community's life quality as well. It can broaden their horizons. Perhaps the question can then unfold to: Which autochthon communities feel the need of Western modern science and its technologies and why? (P. P., Brazilian).

Emphatically yes. The human being, in its expansion across the planet earth and throughout its history has been exploring territories and consequently its ecosystems and biological resources for use and consumption (in a word: to survive). In this way it has developed a Traditional Knowledge (TK) linked to the handling and management of biodiversity. Obviously this TK is not uniform, quite the opposite, it is diverse and varied, as well as cultures have developed. Varied not only by adaptation to these ecosystems, but also its eclecticism, because it thrives on what other cultures

have brought with it (clear example in our Mediterranean region, where in countries like Spain, Morocco, Italy and France, the TK in the XXI century is dotted with lexicons, techniques or traditions/rituals already employed more than 2000 years ago by Romans and Greeks). All this shows us that the TK is dynamic, which is used endures and what does not be forgotten; but a community's TK itself does not disappear, it evolves, adapts to the new changes and contributions that come from other societies/neighbouring cultures. The new generations (youth) of a society/people are more permeable to these changes and therefore they are the ones who collect and adapt to their needs and therefore to the society where they live (A. V., Spanish).

I think the diffusion could be useful for them according to their needs. First, to consider if they really need a change, what kind of change or information, etc., according to the economic activity they are developing or according to the environmental problem they need to solve. I think there is knowledge, or low impact technologies, which they can access, and make their life easier or solve community problems. Many of these problems are presented as a negative impact of urban development. For example: solutions for decontaminating waters, to store water, conserve grains (or other foods). They can also be: forms of food preservation; low-impact cultural knowledge of plants consumed but not yet marketed (to access markets and generate revenue), conservation means and soil improvement (for populations that are transferred or re-located, or the formation of "colonies") (A. P., Paraguayan).

3.2 Category 2: No, traditional societies do not need to access and use of Science and technologies through sciences' teaching into schools

Into this category, they were only 7 (seven) participants, 23.33% of the total sample. The main argument used by these participants is that traditional societies have their own worldviews and life goals that differ from modern Western science and this has allowed them sustainable adaptations with fewer problems with their surrounding natural environment.

No, it is not necessary for tribal societies to have contact with Western science and its technology. Studies have shown that both societies can be successful in their survival and "development", as both have world views, life principles, adaptation strategies and projection objectives as a society that, being different, have allowed them to stand up today without any difficulty. In fact, it has been ensured that indigenous societies with their particular ways to build knowledge and develop technologies that are appropriate to their natural context, with greater connection with Mother Earth, could be more sustainable societies that have evolved from artifices (M. V. C., Colombian).

I think they do not require diffusion of Western science, since they have their knowledge built into their communities, equally strong. However, the major culture – Western – has a structure of knowledge's economic control, plus some advances in health issues that cannot be ignored, and where the use of Western science is valid. As noted, it is a paradox because not knowing the Western cultural system, the traditional knowledge is in high condition of vulnerability, of disappearing or being taken and missed. I do not advocate scientific literacy, but I recognize the need to know it to take away from it (Q. A. S., Colombian).

I believe that these societies do not require of modern Western science. They do not need it, because these knowledge systems have emerged independently and under other schemes. Their identity, their traditional knowledge does not need scientists, they have emerged and have been maintained for generations without them. Now, that all knowledge systems are dynamic and integrate new content is indisputable, as example, indigenous cultures integrate knowledge and practices that are useful, wherever they come from, whether from scientific disclosure or from contacts with other human groups. Certainly a challenge for these societies is to combine traditional knowledge and practices with scientific data and methods, not always compatible, a good example can be the popular medicine systems with Western medicine (J. F., Spanish).

Discussion

The participants' answers into these two categories agree that many traditional societies have established numerous relationships with their natural environments and surroundings and that these relations allow their adaptation and survival (Toledo & Barrera-Bassols, 2008). As the Kayapó, an indigenous group living on scattered villages next to the rivers which crosses the Brazilian central plateau. According to Posey (1997), the Kayapó have a rich body of knowledge and practices about the ecological zones of their natural surroundings, the animal behaviour of these ecosystems, the plant/soil/animal relationships, etc., that ensured a sustainable existence.

Many of these societies face serious health and nutrition issues (Lemos, 2008), on which the sciences and technologies could greatly contribute solutions. It is the case of the Guaraní people from Brazil and Paraguay – that by consequence of a slow and silent ethnocide process initiated by the Spanish and Portuguese around 1500 – are confronting serious problems with agriculture and soil infertility (Colman, 2007). Among them, malnutrition and health problems.

In the answers it is also possible to observe restrictions, although some participants have taken an

affirmative or negative position with regard to the dissemination and application of science and technology in traditional societies. For example, in the answer of a Paraguayan participant when she says that we must "... take into account if they really need a change, what kind of change or information, etc., according to the economic activity they are developing or according to the environmental problem they need to solve" (A. P., Paraguayan).

Thereby, it is considered imperative that any initiative to disseminate science and technologies as sciences' teaching content into schools of these communities must be guided by intercultural dialogues to include their own knowledge, interests and needs. The dialogue is an argumentative process where the presentation of different ideas is needed (Mortimer, 2002). With respect to dialogue, the reasons that individuals think as they do are exposed, listened and evaluated by criteria that are of their own origin context and applicability (Lopes, 1999). This way, the intercultural dialogue is a communication relationship with exposure of reasons that are proper to the scientific culture and to the people's cultural world. To Kim et al. (2014), intercultural dialogue contributes to the participants – when participating critically and reflectively – to improve their way of scientific knowledge construction. It is necessary to take into account that some traditional communities have never established any contact with Western sciences and, perhaps, they do not have an interest in such science. This is the case of the Korubo tribes, located into the Javari Valley, into the Amazon (Brazil) that have their own culture and ways of being and living (Brazil, 2015).

The initiative to consider and respect the knowledge and expectations of traditional peoples for dissemination and use of science and its technology become relevant to the success in any project with these communities. This includes schools, health services, media, etc. in the way it will abandon scientism, an ideology that tends to impose Western science as the only legitimate source of valid knowledge and practices for humanity. While minimizing the frequent discrimination that takes place on these people since the beginning of America's colonization and influences of modern Western science. As established by Trigo (2003, p. 39), "[...] the scientific knowledge as cultural construction is a typical knowledge, differentiated, not necessarily a world vision that has to be chosen".

Conclusion

In this paper, we present and discuss the importance of dissemination and application of science and technology into the cultural circles of traditional societies. The research involved the opinion of 30 individuals from different social groups of American countries.

Based on the results and discussions presented in this work, we conclude that the Western sciences and

technologies are important and would be shared between traditional societies, to help them to expand their knowledge and practices, being a positive interference in their life quality. However, we cannot lose sight that Western science and technologies' diffusion into traditional societies cannot be considered as an imperative for cultural overlap, but rather of mutual respect. This, in turn, requires intercultural dialogue with these people based on the feedback of knowledge and practices. As mentioned by Freire (1987), that knowledge is constructed basically by dialogue, which is confronting the formation of critical awareness. To Vygotsky (1979), in the dialectical interactions with each other and with the environment occurs the cognitive development. The human being is built in its relationship with the other, in social media where lives, having the culture as a mediator of this process. Thus, it becomes imperative to create interactions to share people's opinions through dialogue on the use and applicability of science and technologies in their communities. This study is intended to continue with a broader sample with the aim to know the relationship between the participants' views and their school training. Also, to involve people belonging to traditional societies, in order to identify and discuss their knowledge, practices, opinions and needs.

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