

Science clubs, social inclusion and political engagement

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Abstract

The scientific education, understood as a paramount component of citizenship, demands a deep rethinking of the ways it is carried out. We need an education engaged with the scientific literacy of the population as a whole, an education that empowers people to get actively involved in bringing up solutions for the many problems posed by contemporary societies. Science Clubs are non formal education ambits where pupils volunteer to gather supervised by an adult, generally a teacher. Due to the vast variety of activities they develop, such clubs are privileged environments to deploy strategies that facilitate the dissemination as well as the construction of knowledge, favouring an active commitment with significant issues, making possible the appropriation of reality, thus turning it historical and modifiable. They ease work in concrete projects in a creative and enjoyable environment, enhancing communication skills, problem solving, team cooperation (instead of competition), significant learning as well as a fluent exchange with their communities. Unlike ordinary STEM Clubs, in Argentina science clubs cope with a vast range of fields, including Social Sciences. They are created from the initiative of the civil society, and the research projects are suggested either by the teachers or by the pupils. In the majority of the cases the raised issues are linked to close problems. Taking into account all that has been stated above, such clubs are exceptional channels for citizenship construction, social inclusion and political engagement.

Introduction

The neoliberal paradigm crisis in our region (South America) triggered deep processes of change carried out by effective and true democracies that govern for the vast

majorities. This involves counter hegemonic onslaughts, both in the material and symbolic dimensions of societies. Therefore, paradigm shift makes its way among conflicts and tensions as a result of the changing correlation of power. In the cultural realm, we are experiencing a deep rupture in relation to the value system of neo-liberalism.

Such democracies need empowered citizens well aware of the social field of forces.

The scientific education, understood as a paramount component of citizenship, demands a deep rethinking of the ways it is carried out. We need an education engaged with the scientific literacy of the population as a whole, an education that empowers people to get actively involved in bringing up solutions for the many problems posed by contemporary societies. Scientific literacy that should be broadly conceived. "...For Freire literacy was not a means to prepare students for the world of subordinated labour or "careers", but a preparation for a self-managed life. And self-management could only occur when people have fulfilled three goals of education: self-reflection that is, realizing the famous poetic phrase, "know thyself," which is an understanding of the world in which they live, in its economic, political and, equally important, its psychological dimensions. Specifically "critical" pedagogy helps the learner become aware of the forces that have hitherto ruled their lives and especially shaped their consciousness. The third goal is to help set the conditions for producing a new life, a new set of arrangements where power has been, at least in tendency, transferred to those who literally make the social world by transforming nature and themselves"¹.

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¹ Giroux, Henry (2010), Rethinking Education as the Practice of Freedom: Paulo Freire and the Promise of Critical Pedagogy

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My approach will be mainly framed by the theoretical contributions of Raymond Williams and Paulo Freire. The latter is a kind of pedagogic compass. And since I consider science clubs of a major cultural relevance, the analysis will be presided by Raymond Williams' key concept of "structures of feeling", that is "... a particular sense of life, a particular community of experience hardly needing expression, through which the characteristics of our way of life that an external analyst could describe, are in some way passed, giving them a particular and characteristic colour (...) it is as firm and definite as "structure" suggests, yet it operates in the most delicate and least tangible parts of our activity. In one sense this structure of feeling is the culture of a period: it is the particular living result of all the elements in the general organization"²

Communities are also a central component in Williams' work because they are where the relationships between self and other are formed. Structures of feeling suggest the way this relationship comes to be lived and play a central role in building a new legitimacy.

Club itineraries, empowerment and citizenship construction

According to the students' own views³, we are entitled to infer that science clubs are meaningful places:

- They are a way of life: they help their members and their community.
- Most research projects are related to local problems, and students feel helpful.

² Williams, Raymond, *The Long Revolution.*, pp.64

³ Conclusions of the group work with science clubs' students during the First and Second National Science Clubs Meetings (2012 and 2013), organised by the Ministry of Science, Technology and Productive Innovation.

- Science clubs are relaxed and democratic environments: pupils have a say and are able to choose what to do, they have fun and make friends with whom they share the same interests.
- They deal with interesting tasks and learn through practice and inquiry, whereas at school they get bored, nothing happens and what they study is far from everyday life.
- Students go there freely: they learn more, their performances are better, even in those cases of school failure.
- Clubs provide an atmosphere of confidence and containment.
- They are not stressed by exams or assessments, hence they are not afraid of making mistakes.
- They learn playing and play learning.
- Teachers are highly respected (they frequently work in the Clubs for free).
- Science Clubs foster self esteem.

Therefore, clubs enable a meaningful learning. Their members identify a problem linked to their community or to the society as a whole and figure it out by doing research, sometimes interacting with academic institutions and/or different areas of public administration. Frequently they even bring up proposals, accomplishing the circuit of citizenship construction by submitting them to a governmental office.

Even though the students might not be researching social problems, the mere fact of freely joining a learning ambit, choosing the issues to engage in, devote leisure time to an intellectual activity, is certainly empowering. They must acquire the discipline to meet several hours per week, study, develop communication skills and strategies to raise few funds (raffles, festivals, selling home made food, etc.) in order to keep the activity going on, buy equipment, attend meetings, print the Club's journal, etc.. It is important to emphasise that science clubs are more than just research workshops: they involve an active exchange with their communities despite the research features.

If the subject raised by the teacher or a group of members involves a community problem, this means a qualitative leap since it implies the appropriation of

reality in its several dimensions in order to achieve an accurate understanding, ~~shaping~~ critical thinking and an enriching approach to problem solving and socio emotional development. In this regard, it is useful to recur to Freire's views:

“We must realize that the aspirations, the motives, and the objectives implicit in the Meaningful thematic are *human* aspirations, motives, and objectives. They do not exist “out there” somewhere, as static entities; *they are occurring*. They are as historical as human beings themselves; consequently, they cannot be apprehended apart from them. To apprehend these themes and to understand them is to understand both the people who embody them and the reality to which they refer. But — precisely because it is not possible to understand these themes apart from people — it is necessary that those concerned understand them as well. Thematic investigation thus becomes a common striving towards awareness of reality and towards self-awareness, which makes this investigation a starting point for the educational process or for cultural action of a liberating character.

(...)

Thematic investigation, which occurs in the realm of the human, cannot be reduced to a mechanical act. As a process of search, of knowledge, and thus of creation, it requires the investigators to discover the interpenetration of problems, in the linking of meaningful themes. The investigation will be most educational when it is most critical, and most critical when it avoids the narrow outlines of partial or “focalized” views of reality, and sticks to the comprehension of *total* reality. Thus, the process of searching for the meaningful thematic should include a concern for the links between themes, a concern to pose these themes as problems, and a concern for their historical-cultural context.”⁴

Clubs' concern for their contexts

Science Clubs' concern for their social, economic, cultural and/or historical context involves a vast range of themes, being dominant those linked to environment, pollution and the need to recycle, sexual education, alternative energies, eating habits,

⁴ Freire, Paulo: *Pedagogy of the oppressed*. Chapter III, pp. 43-44.

health, youth conflicts, the rescue of productive patterns and culture (mainly among indigenous people)

Here are some emblematic examples:

Science Club : YAPANAKUY

Location: Valle Grande, Jujuy province, NW of Argentina.

Inhabitants: 2523.

Projects:

1-Indigenous people in their own voices

Many indigenous people of Valle Grande keep on suffering the consequences of historical injustice, including discrimination, marginalization, dispossession of their lands and resources.

The students set out the hypothesis that either they are unaware of their rights, granted by national and international legislation, or they are not taken into account when claimed.

The target of the Club's research was to assess the compliance with the legislation regarding indigenous people's rights at a local and provincial level as well as analyzing the social and economic conditions especially in education and health. The Club carried out this research by means of interviews, surveys and bibliographical and web inquiries.

They confirmed their hypothesis: the vast majority of the indigenous people ignores its rights and despite the existence of legislation, these rights are frequently violated not only at a local level.

Therefore, the Club is carrying out training and meetings with the community in order to revert this situation. Youngsters make the rights known to grown ups in an interesting and enriching role change.

2-Recouping the "Minga"

The Minga is a collaborative work system that dates back to the Incas. At present in South America it refers to community work when a member of the neighbourhood is in

need. Once the task is accomplished, the minga beneficiary organises a party: everybody is rewarded with “chicha”⁵, “coca leaves”. They eat, drink and dance.

Since this tradition had disappeared in Valle Grande, by rescuing the minga the students intended to rescue a part of the Ocloya culture.

They carried out interviews among different age groups. The elderly knew it, had participated but were no longer able to. The middle aged people knew about it but were not willing to participate. Youth knew very little about it or nothing at all.

So the students organised meetings as well as a minga within the school to make it known. They cleared the ground of a public area in order to sow. Unfortunately they were deprived of this piece of land. Nonetheless, now youngsters in Valle Grande and nearby villages know what the minga is and are willing to participate.

Even though the community takes interest in their proposals, it is important to stress that in both projects it is generally them who approach the people. Last but not least, Club members work to develop and strengthen self esteem.

Science club: En Guadalcázar juntos podemos (In Guadalcázar together we can)

Location: national border school, Formosa province, NE of Argentina

Inhabitants: 350.

At present they have between 3 and 4 hours of electricity per day, provided by a generator. They have great expectations that this insufficiency will be solved soon: the electric net is just 70 km from the town (and the asphalt road just 15 km).

Projects:

1-Fighting brucellosis

The death of a school mate due to brucellosis in 2013 triggered this project. This disease is transmitted by the goats’ meat they eat within the framework of subsistence family economies.

To cope with this issue, the Club interacted with the provincial ministries of Human Development and Production, acting as a link between the different governmental

⁵ Maize liquor

areas and the community, communicating and training. The National Institute of Agricultural Technology (INTA) provided leaflets. The Club carried out interviews and records in order to detect infected families.

The detection of infected animals and the improvement of pen handling by the Production ministry are still pending.

2- Organic school and family vegetable gardens

The goal of this experience supported by the INTA is to better a diet based mainly on goat meat. It was an initiative of the teacher.

Guadalcázar is an arid area with very little water. The Club raised a few funds through raffles in order to buy equipment and some tools, but many others were home-made: dripping irrigation facilities with recycled plastic bottles, spades, rakes.

The production of these vegetable gardens is family consumption orientated. 20 families are permanently involved and between 70 and 80, scattered.

The target is to educate for life withholding the population, preventing young people from migrating.

Science Club: LIBREPENSADORES (FREETHINKERS)

Location: Lanús, Greater Buenos Aires.

Inhabitants: 453.500.

Project: The cattail purifies (Schoenoplectus Californicus)

This project is triggered by two students. It focuses the pollution of the Matanza-Riachuelo basin. While carrying out the enquiries, they came across the concept of phytoremediation that is the existence of vegetable species with purifying properties. And in relation to this the cattail the cattail came up, more precisely the *Schoenoplectus Californicus*, a plant that grows in ponds and backwaters. They carried out experiments at the school lab as well as field work. The tests yielded that the *Schoenoplectus Californicus* has the capacity of absorbing heavy metals. Since the students wanted to develop the experiment in a natural environment they got in touch with the Matanza-Riachuelo Basin Authority, who is carrying out experiments of phytoremediation and is in charge of the sanitation of this basin since 2010.

This project genuinely stems from the students' concern regarding contamination. Even though it's not innovative, since there are other researches that follow the same line, their work is consistent and proves the phytoremediation capacity of the *Schoenoplectus Californicus*. In the event of being able to implement it, the destiny of the polluted plants should be determined, since other researches don't take this important fact into account. They are in touch with the Environment Secretariat of the Municipality of Lanús, and have submitted this project for legislative address. They also have the possibility of going on with it at the National University of Lanús. Finally, they intend to make an educational video about phytoremediation, to be shared with other schools of the district.

Science Club : NEVADO DE CACHI (SNOW -CAPPED OF CACHI)

Location: Cachi, Salta province, NW of Argentina

Inhabitants: 7000.

Project: Solar collector

Cachi is a growing town at almost 3000 metres above sea level, with plenty of solar radiation, devoted mainly to agriculture and handicrafts. The electric net is 2 km from town. A project to reforest with native trees came up, but the need of wood for cooking and heating would lead it to failure. So a student considered the possibility of producing a solar collector made of recycled materials. The Club worked together with a nearby technical school that produces solar stoves. The Municipality hands out photovoltaic panels. So the merging of the Club with the school and the Municipality would mean the supply of a whole solar kit. The collector is still under tests in Mendoza province, in order to evaluate how long the water heating lasts. The Club is interacting with the National University of Salta, the National Institute of Industrial Technology (INTI) and the INTA.

Science Club: AMUN KAMAPU

Location: Santa Rosa, capital city of La Pampa province, Centre of Argentina.

Inhabitants: 105.312.

Project: Sewing equities

In this particular case, a project born within school work gave birth to the Club. Together with the teacher, the pupils developed a sewing machine for disabled people. Since they wanted to improve the project and go in depth they created the science club. They went on developing it, won prizes and draw the attention of the National Ministry of Social Development, who sent an engineer to see it. The club is about to submit some manufacturing details.

At present they are also developing machine tools for handicapped persons.

Science Club: SANTA BÁRBARA

Location: Río Turbio, Santa Cruz province, (Patagonia) S of Argentina.

Inhabitants: 6700.

Project: What do the inhabitants know about the installation of a huge power station?

The research started between 2011 and 2012. The first stage was to investigate the awareness the people of Rio Turbio had in relation to the huge thermoelectric power station that was being built there. The surveys yielded that they knew very little. The students analyzed the environmental, social and economical impact studies submitted by the experts. And as an ending of the research, they started communicating in a simple language the information acquired, organising meetings, handing out leaflets, uploading articles in their blog. This club also carries out a very active exchange with the community, that involves a radio programme, a journal, and various workshops devoted to entrepreneurship, environmental protection, computer science, health, vegetable gardens.

All the cases presented so far allow us to conclude that science clubs help to accomplish the many stages of citizenship empowerment: they show concern for their communities hence for their history, objectify problems, do research in order to understand them, even suggest solutions trying to modify their societies, and interact with their social environment and governmental areas. This commitment that moulds the relation between “self” and “other” is a key component of a new structure of feeling.

Conclusion

We are unfinished human beings and thus “become” as we learn. The cognitive domains are inextricably linked to the affective ones, being hope an essential condition of human existence.

“Without hope, humans would despair in the face of their unfinishedness and would become immobilised. (...)

It is hope, in other words, that drives us ever onwards as travellers, wayfarers, seekers, in pursuit of completeness. And it is in this pursuit of completeness, this hope-driven search that characterises the human condition that the necessity and necessarily political nature of education is to be found. For because we search, we are driven to explore, interrogate, question and learn, thus becoming *educable*.⁶ Hope is necessarily future orientated: detached from future it becomes an alienated and alienating abstraction...

Neo-liberalism deprived societies both of hope and future. Such was the case that in Argentina in the 1990s there were students who had difficulties to conjugate the future tense. The dominant culture had moulded an individualist “hope”, thus, only for a few. “Instead of humanisation as a utopian project, hope under the reign of neo-liberalism is directed toward self-improvement, striking it rich and ‘private notions of getting ahead’.⁷ The realization of humanisation is necessarily a collective task.

Since 2003 we are laboriously and molecularly building a different society that entails a counter hegemonic culture, being epic, social recouping of meaning and politics some of its main features; a culture that is constantly contesting the neoliberal value system. When our former president Néstor Kirchner died, during the three days of mourning, among the weeping crowds in Plaza de Mayo many banners thanked him for bringing back hope: the people again learned to believe, to dream and that together they

⁶ Darren Webb (2010) Paulo Freire and the need of a kind of education in hope, Cambridge Journal of Education.,pp. 329

⁷ Darren Webb (2010) Paulo Freire and the need of a kind of education in hope, Cambridge Journal of Education., pp 331

can. These are coordinates that, from my point of view, every pedagogic task should take into account

Science clubs are ambits of a major cultural, educational and even political potentiality: while enabling the scientific literacy, they are a fertile ground to foster meaningful learning, critical thinking, solidarity and conscientisation of the surrounding world. In short, they are exceptional channels for citizenship construction, social inclusion and political engagement.

Boaventura de Sousa Santos advises us of the necessity of exploring and analysing specific ways of socialisation, education and work that promote the generation of rebellious subjectivities, understood as the capacity to doubt and interrogate.

History will say if science clubs' experiences are in line with Santos' advice. But despite the tensions and contradictions of reality, and conceiving reality as a field of possibilities, they are certainly part of the path to build better societies

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