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Preparing Public Pedagogies with ICT: The Case of Pesticides and Popular Education in Brazil

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Abstract: This article analyzes the conditions through which it is possible to launch a project of public pedagogy with information and communications technologies (ICT) on environmental education and pesticides. This is a public pedagogy that is agreed between diverse actors (universities, environmental agencies, local authorities, schools, and farmers) and adapted to their needs and demands, based on the study of an ongoing project. The methodology is qualitative, with interviews with key informants and a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis developed with the contestants. In the development of the project, the conditions in which the theme of the project is lived and worked by the different actors who were included have been highlighted. The discussions that were held offered different points of view about the priorities of public health, environmental problems, and social and economic outputs. Among the conclusions, some difficulties came up about how to start public pedagogies that are managed by citizenship. The idea came from the community.

Keywords: public pedagogies; environmental education; Service-learning; political participation; information and communications technologies (ICT)

1. Introduction

There is a great worry about the use of agrochemical products in food production, including farmers' interactions with them, and the related dangers for human and community well-being, besides wildlife and ecosystem impact. This is particularly true in Brazil [1]. Thus, it is necessary to warn and show demonstrate it to the community and students of different levels of regular education. However, it is in discussion how that can be effectively applied to education, mainly for colleges [2].

"The problem of pesticides: Popular education for human health in diversified spaces" is a socio-educational project about the problem of the use and abuse of such products that are part of food chains. That project aims to bring awareness among different groups. The project is implemented in Goiás, Brazil, which is a strong agricultural producer.

An ongoing study carried out by one of the members of the research team shows that there are situations of risk to the lives of small rural producers. There are adults who have worked with pesticides for more than 30 years. There are young people who have worked in agriculture with their parents since childhood in many activities such as harvesting, land preparation for planting, land cleaning, agrochemicals appliance, and other activities. There are children who handle poisons with their parents. Another fact that brings impact is the presence of children at the planting sites: playing, harvesting, clearing the crop spaces, and handling containers of pesticides. Many of these children, on several occasions, were in the midst of spray fumes.

The use of eight to 12 different prohibited substances is regular. Another worrying aspect was the contact that people had with those products. As the predominant practice is crop rotation, the frequency to exposure is high. Most of farmers apply the chemicals at least four times a week to combat pests. They face risky situations that go from the preparation of poisons to their application. Farmers handle products without gloves, masks, or goggles. In addition, they prepare the blends at the application sites. There is a greater risk during the application of poisons, since the farmers predominantly use a back pump. In some occasions, it occurs with the use of a kind of hose cart and attached manifold motorcycles and tractors with spray. The choice of the equipment that is used is made according to the financial condition of each farmer. As most of them have low incomes, the use of the back pump prevails.

Despite the technical differences between the tools, all of them provide a high level of contact of the manipulator with the chemicals, which gets worse because of the destruction of personal protective equipment. Their clothes were soaked with poison, and it was in direct contact with their skin hair. Many farmers reported symptoms of intoxication, as itching, nausea, coryza, "yellowing", and burns and redness on the skin. Still, they continued to handle the products without proper protection and indiscriminately. As a result, there is a high level of cancer in that region.

Most of producers have never attended courses on the use of pesticides or their risks. The information they have is given by the agronomists of the agricultural houses, or it is that which appears in the package leaflets. The conventional production that is adopted implies the use of poisons, with a resulting discomfort that is related to the lack of safety information. The lack of knowledge about the products used and their handling was evident.

Different strategies could be developed. Formal education (a deliberated activity conducting to title) could be one of them. Vocational and continuous training and school actions with children could be some of them. However, some problems such as contents managed, time to participate, and trained professionals to share it with are limits. In the rural context, with family farms, it could be necessary to implement new strategies. This could be projects of non-formal education (educational programs with objectives but not conducting to titles) or informal education (less organized or structured, self-directed, family-directed, or social-directed, obtained by media or contact with trained people or cultural products as print materials or exhibitions). For this, popular education strategies will be implemented involving professionals and stakeholders from all sectors of society [3]. The project counts with information and communication technologies (ICT) to deliver it.

Popular education is a kind of informal education; it is a public pedagogy where citizens outside school gain spontaneous learning [4] through different agents: mass media, advertisements, posters, video channels on the network, etc., and they are engaged in the production and dissemination of messages.

In the sixties, Umberto Eco analyzed the role of media in modern societies [5]. The media have the purpose of training, informing, and entertaining the general population. Their programs must take this into account. Today, the consumption of audiovisual media is huge, thanks to social networks. Public spaces that distribute content thanks to networks are committed to respect the same principles as the public media, in our case particularly training the general population. In the first place, public media are public bodies with a social commitment. However, this commitment is also based on the idea that the effects of these media reach many people. It is possible to prepare the population to become the producers of ethically responsible content, thanks to the processes of media literacy that occur in schools. There are already ethically responsible production processes sustained by the general population in education projects based on arts [6]. There have been processes of empowerment for the population with ICT [7] to look for sensitive information for the community. Processes of audiovisual production are lacking for a social problem that is sensitive to society, as pesticides are. Citizens as witnesses using YouTube could be part of a new frontier of popular education through media [8].

Universities participating in the project share with other public stakeholders a marked interest in carrying out community service or extension activities, as a form of popular education, that link

universities and communities, with the help of environmental agencies, local authorities, and schools under the conviction that higher education can and must face the problem.

However, the implementation of the project is not a purely technical problem, but rather a rethinking of the role of higher education institutions and their relationship with educational and community entities. In addition, it gives a privileged role to the use of ICT as tools for the distribution of popular education content that is negotiated, authorized, and put into circulation by the recipients themselves.

Popular education is also a way to attract people out of schools to formal education. Brazil is now living the phenomenon of the "Institutos Federais de Educação, Ciência e Tecnologia" (Federal Colleges of Education, Science and Technology). There are 500 campi all over the country, and one million students located in very poor neighborhoods. The Instituto Federal de Goiás (IFG) is one of these campi in Goiás, Brazil, offering technical training to adults and thus helping them to become skilled workers and obtain professional university degrees.

This article discusses the conditions in which it is possible to launch a project of public pedagogy with ICT, which is agreed between diverse actors, and adapted to their needs and demands based on the study of an ongoing project. To situate the project, firstly there was an engagement between the universities and communities through service-learning. Then, we introduced the role of media as a tool to enhance this engagement.

Problematizing pesticides aroused as a concern of the university and higher education institutions about their consequences to the population in general.

As it was announced, the project was promoted particularly by evaluating the impact of pesticides on the diet and health of agricultural workers in Brazil by IFG. Then, the university considered how to diversify the project through different popular education strategies.

There are different theoretical perspectives of the university–community relationship. From a managerialist perspective, the task of university extension is a "corporate" or "educational" social responsibility. It focuses on organizational management and the transmission of attitudes of social commitment.

However, our theoretical framework is sited on a political level, in which the university is permeable to the problems of its international, national, and above all, local context; in the latter, its ultimate goal is to build knowledge to respond to the needs of society and culture. From this model of service from the university to the community, dialogue and communication between the university community and civil society actors is essential [9].

The goal of education "can hide the reality of domination and alienation or, on the contrary, denounce them, announce other ways, thus converting it into an emancipating tool" ([10], p. 74). To achieve this, the academy must generate projects of democratic participation with the objectives of awareness (as a first step) and transformation of reality, providing tools and resources to the population to build and produce knowledge. There is an awareness of reality, desire, exchange actions, commitment, and co-responsibility when people are involved from the beginning of a transformation project; they make it theirs. When all voices are heard and considered, it creates common spaces of thought, reflection, and decision-making ([11] p. 131). All this can help generate new realities.

This way, we believe that ICT could share knowledge, bring about new and different realities, favor new public and educational readings, and create networks and learning communities, but above all, create new habits that favorably affect the population. The community will use it by itself to investigate the problems that concern them.

This vision of the extended university also holds onto the advantages and benefits that it would have for the university itself. Service-learning is a pedagogical methodology that is based on a competency model that favors learning in educational institutions through participation in real experiences of local community improvement [12]. In addition, it supports the importance of the development of service-learning methodologies in educational institutions, differentiating them from community service activities. Service-learning requires an institutionalization by the school or the universities; actions must be planned where pedagogical goals and curricular contents are articulated.

The institution proposes developing solidarity action with a broad educational purpose (linked to education in values and attitudes), but does not formally plan the articulation between the community activity and the curricular contents that are developed in the classroom.

Environmental education is an area that can provide vast fields of collaborative projects between higher education and the problems of the communities.

However, in the field of environmental education, it is important to remember that a polysemy prevails in different ways of conceiving it, ranging from the transmission of information about the natural environment to the dialectic of human relations. From this polysemy, the heterogeneity of intentions emerges, which results in varied ideological perspectives [13–15].

In environmental education discourses, there is a strong tendency toward approaches of natural components, and pollution generally prevails. With this, emphasis is placed on the biological and physicochemical characteristics of environmental degradation, which are privileged to the detriment of the political, social, and economic dimensions of the environment.

Conceiving environmental education exclusively for the reduction of degradation is the same as reducing it to a space management instrument [16]. The limitations and risks of misunderstandings become greater when views based on these assumptions disregard other important socio-environmental dimensions. Thus, the predominance of a depoliticized vision and the absence of critical positions become common, contributing to the prevalence of hegemonic interests in social contexts.

According to that, concerns about natural aspects contribute more to "greening" the thinking of society than to reducing the interpretation of socio-environmental issues to the description of natural systems; this has been shown to be true [17]. This way, it still points out that perspectives that are focused primarily on this dimension promote the displacement of the vision onto the socio-environmental problem, referring to simplistic understandings and inserted in a "natural" order [18]. Thus, we emphasize that the critical perspective of environmental education guides the perspective of this study. We assume that only information about the natural components of space is insufficient and that, faced with so many adverse issues of the present time, it is necessary to critically train people to deal with adverse situations that endanger human survival.

The critical view of environmental education may be part of a process that is capable of providing subsidies for the challenges of contemporary life. We believe this referential, as it considers the human being inserted in the space of socio-environmental dimensions; the life in its complexity and the understanding of the environmental issues are not restricted only to the natural dimensions of the space [19].

The main purpose of critical environmental education is based on the formation of a person that is capable of identifying, questioning, proposing solutions, and acting in the face of adverse social situations. In addition, the development of these capacities is due to the very involvement of the people in their social, political, and economic contexts [20].

In this sense, the critical perspective of subsidiary environmental education, through the formation of contextualized knowledge, becomes a more complex and instrumented reading of the world for the intervention [16], with this knowledge being constituted by the interaction with the other and situated in the socio-environmental dimensions of agents' lives. However, it is important to emphasize that knowledge alone does not guarantee changes in adverse social conditions. They are given by the very intervention of the people whose collective action is fundamental, since it potentiates a greater involvement of the subjects and stimulates the formation of leaderships that invigorate the social group [21–23].

The formation of knowledge among farmers, contextualized in situations of risks experienced by the use of pesticides, would be an instrument of emancipation in this action research. In this area, information is considered to be one of the main means for the construction of this knowledge, since it allows the subjects to judge the situations experienced. The information increases the capacity of identifying, analyzing, exercising rights, and claiming service provisions, among other citizenship exercises [15,16,23].

Apparently, the university still does not fully take its transformation to be a partner of professionals and citizens for environmental education. The first obstacles are the poor applicability of policies, the difficultly of training of new professionals, and the lack of full knowledge about environmental pedagogy [24,25]. "There is a tendency to conceive environmental education within the complex perspective; while the position of conscience, care, and preservation has less support from the community. Likewise, the most attenuated tendency assumes that in the processes of environmental education, the subjects are related in a horizontal way, where the different knowledge and forms of knowledge are valid and contribute to collective learning and complex action" ([25], p. 530).

On the other hand, how can universities develop environmental educational materials from higher education through ICT? Since the 1990s, multimedia has changed the development of education. It allows the participation of multiple senses, detailed knowledge and even the handling of the contexts in which it is introduced [26]. In this sense, ICT allows students to engage in a new form of teaching in which they explore knowledge. In non-formal and popular education, auto-guided processes are important because students contribute to learning materials with their productions.

ICT are powerful pedagogical tools that raise awareness of key sustainability issues, such as human rights, peace and non-violence, global citizenship, multiculturalism, gender equity, etc. [27]; it also relates to the pedagogical treatment of curricular contents that are related to renewable energies, sustainable economic development, environmental education, etc. [28].

The pesticides project brings awareness and the production of knowledge through ICT through processes that have been promoted by educational institutions (high school and college) to the population in general, as well as in the process of dialogue with the community, which is a producer, and makes decisions about the materials and contents that are distributed. Higher education centers work as supporters. In regard to the development of the first contents and educational proposals, the challenge is to integrate different aspects (from ideation to production), with participatory planning.

Some authors point out the importance of adapting materials and facilitation mechanisms, as well as the promotion of key aspects such as trust, creativity, and transparency to generate full participatory and collaborative spaces [29]. The pedagogical proposal of the integration of materials in public pedagogy generates new channels for each partner, population, higher education institutions, and workers. This kind of project can integrate the social needs and concerns in their design and communication dynamics if, at the beginning of a co-creation process, it transparently fosters the confidence of the actors in the process mentioned. Opening the preliminary decision mechanisms to an investigation is valued by the participants as an important aspect for a successful integration ([29], p. 37). The population takes advantage of the channels to denunciate conflicting situations. These denunciations take place in spaces that have been generated as platforms [28–30], or used by the different actors. They become meeting places. This is possible because technological "low intensity" tools are used, in which a good part of the population has acquired competence such as taking a photo or recording a video and sharing it [28]. While new media technologies allow individuals to save unprecedented space for an alternative, similar to counter-hegemonic politics, they also face the risks of responding to established social constitutions in the tentacles of the dominant culture and ideology. Emancipatory, politically progressive, and socially transformative uses of the media and technology should thus be informed by a critical pedagogy to produce a viable counter-hegemonic cultural politics and pedagogy of the internet. This requires insight into the important role of narrative in pedagogy ([31], p. 6).

All actors, from schools to social entities and universities, participate by echoing and returning contents to the population as a whole. The traditionally unrepresented people can acquire their own voices in the politics of representations as the prerequisite of critical human agency for further social emancipation [31]. Schools generate their own materials through the result of research processes in the classroom. The project is based on the idea that environmental problems are a valuable resource for the generation of significant learning. This significant learning would allow the connection of different knowledge from different disciplines (research methodology, natural sciences, and technology),

the building of bridges between the knowledge and previous experiences lived by the students, and the possibility of transferring this knowledge to the community or local environment.

This way, ICT is thought of as a means that could foster the transformations of practices, knowledge, and social representations. For example, "posting and responding to videos in UT (YouTube) are fundamentally self-realizing activities of UTers because they invest their time and energy in thinking over topics, organizing ideas, and producing videos. Through the video production process, UTers practice a crucial pedagogy of critical human agency, becoming a subject in Freire's point of view. The oppressed traditionally are deprived of the means of expressing themselves, and self-expression on UT is consistent with the emphasis in Wollstonecraft, Toni Morrison, and Freire for [the] self-empowerment of the oppressed. Hence, in the society of multimediated and media culture, UT can provide individuals with significant opportunities to intervene in media cultural politics" ([28], p. 27).

Higher education institutions generate materials, such as micro-videos and infographics, which allow a quick overview of specific and social aspects of the pesticide problem. This way, problems addressed as curricular contents allow the use of authentic situations and articulation with students' interests. In this way, they become functional instruments in people's lives. Bringing the student closer to the birth of environmental problems links him even more to his immediate surroundings. It provides tools that allow them to build an environmental ethic to understand that nature, although limited, it is of inestimable value. It implies that man must think and rethink the quality of his relations with the environment [28].

Other participating groups are the workers. They receive synthetic information on safety standards at work. As it was said before, informal channels and massive online courses (MOOC) that are linked to professional training will be open.

The problem arose of how to implement a participatory design and find channels to connect stakeholders and share information. Conditions to launch a project of public pedagogy with ICT must appear.

2. Materials and Methods

The purpose of the study that has been undertaken was to analyze the viability of the participatory production processes of popular education on pesticides, with the participation of various agents (universities, farmers, schools, families, and environmental agencies). Some questions to answer include: how could it be possible to gain spontaneous knowledge about pesticide uses in Goiás? How can ordinary people be involved in this process? What channel must be implemented to undertake popular education? What agents take part in this? In this very difficult issue, are agents that are involved open to sharing knowledge about pesticides? How are agents interacting in this process? Could it be a participatory process? Are people ready to participate?

This is qualitative research. Popular education is possible with media. In this study, knowledge is linked to people who use the media and to the places where it was picked. Qualitative research works with texts. These texts could be part of a new theory to understand what happened in a singular place and time. Knowledge is built by the intersubjectivation of interviews and transcriptions. The triangulation of data and researchers [32,33] is needed in this study.

Questions of study are related, as said previously, to establish goals on the popular education initiative on pesticides, as well as establish criteria for materials, uses, and needs in a participatory way with ICT.

A previous study that is not included in this paper demonstrated the worrying uses of pesticides by the people of Goiás.

In our study, some interviews were conducted. Interviews were the main technique. People are disseminated in various places, and interviews were a way to connect with them in their own farms. On the other hand, in-depth interviews are necessary because not many people able to talk about pesticides. It is a controversial issue. In addition, it is necessary to connect with people with different

points of view, and are open to changing the conventional pro-pesticide wisdom. Ordinary people, farmers, local authorities, minorities, teachers . . . They were included in the process.

This study features five in-depth interviews with key people from the region. These include a counselor from an environmental research center in a national park in Goiás, a pesticide activist, a producer that lost her harvest, and a member of a "quilombo" or "kalunga" community. The pesticide activist works as a counselor in the district, a rural tourist agent, and a farmer. We also wanted to include a teacher, but it was not possible for the agenda. A mother informed us about what the teachers of local school were saying about pesticides.

Participants were chosen as key informants. Key information is related to the different audiences or consumers of information, the places where they are living, and the channels that they use. Selection was in a cascade process that started with the counselor. Selected quotes and an analysis of interviews are presented below.

The methodology is developed with a participatory research process [29]. It included a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis developed with the participants (http://www.redcimas.org/wordpress/wp-content/uploads/2012/09/manual_2010.pdf).

To promote participation, different meetings were held about what the participants knew about pesticides and the possibilities of promoting them as collective (university, secondary school, social entity) knowledge dissemination processes, and dialogue with both the community and the rest of the population.

An in-depth interview script was prepared for those who are responsible for the entities that were invited to be in this participatory design. The interviews were carried out in February 2018.

The script is adapted to different parts of popular education. It asks about the starting points of institutions: links with the community, materials produced, and projects carried out by the university in relation to diseases caused by contact with pesticides. Schools and teachers were interviewed about their relationship with the community, the environmental projects that had been carried out at schools, and their experience with pesticides. Finally, they were asked about the socio-demographic, occupational, and leisure characteristics of the workers' life, the possibilities of using ICT, and their experience with pesticides. With this structure, successive debates were established with different contestants.

In addition, it was useful to analyze interviews about the uses of pesticides in a current study promoted by a Brazilian network that was linked to one of the participants of this study. Thus, this study includes different Brazilian states that are strong producers of vegetables.

Our study generates a starting process of self-reflection and self-criticism. The interviews with the different actors generate trust, and open up genuine participation.

An analysis of transcriptions show some of the strengths, weaknesses, opportunities, and threats of solutions to starting popular education. In this way, it was labeled, and a report was built that shared with informants and the team.

The exhaustive description of the problem and many different participants should help to generate a conceptual transferability [33]. Nevertheless, the external validity of qualitative methodology is limited. At least four factors that limit the external validity are identified in this study. First, there are few interviews, although they are very relevant. Another way to develop the study could have been generating grounded theory. Second, the study occurs within a specific context. This problem could have been minimized by conducting studies in several agricultural regions of the country. Third, the study is developed for a limited time, although it is a constant in assessment and case studies to adapt to the conditions of what can be done, using resources, possibilities, and the time available with rigor. To finish, there may be a researcher over-implication problem. It has sought to compensate with a participatory process.

Information will be published in the following site, https://sites.google.com/site/agrotoxicossalud/ (in Spanish and Portuguese).

3. Results

The main results collected in the interviews are shown below in a SWOT analysis to decide how to start a participative process with ICT around pesticides and popular education. Institutions of higher education (an environmental counselor from a research center in the park, and the background of research of higher education institutions), farmers (a producer that lost her harvest and a pesticide activist), minority communities (a member of a "quilombo" or "kalunga" community), local authorities (a counselor), and educators (with the testimony of others) take different positions in the interviews that were conducted.

3.1. Strengths

All of the interviewed people agreed about the opportunity to talk about the problem of pesticides, because it affects people every day.

They also agreed about agribusiness as a reality in the center–east of Brazil. All of the involved parties wanted to think about solutions that lessen the effects of pesticides. One way could be getting into economic strategies. Then, the messages in a popular education strategy could promote the cut of expenses. They should offer directions to participatory strategy in order to convince them, and not collide.

Many people are concerned about pesticides. Higher education institutions have developed different actions over the last five years to promote environmental education. They have an environmental center that is maintained by a federal university, which performs different actions. They are involved in teaching undergraduate and master's subjects in this area, hold workshops, and participant in research in the territory.

In addition, higher education institutions explore the situations of farmers in various rural regions in Goiás in order to understand the effects of pesticides in their daily lives. They made contact with local agents and with the population to understand their feelings and problems. That offers a good network to try to propose solutions to start a participatory process.

Different activities that are linked to environmental education are undertaken from higher education institutions. These include popular education for the dissemination of science, oral histories about rural women, didactic materials (booklets), gymkhana waste collection activities, and more. These actions could attract people to other actions in ICT channels.

The didactic activities that were undertaken by the environmental counselor allowed generating alternative activities in the district, such as for example, the beginning of a market for organic farming products. There are small owners who hold weekly meetings in this market. This initiative allows, on the one hand, the existence of a collective connection, and on the other hand, people become open to new initiatives, such as the participatory process with ICT. It could be a space to share some of the materials, such as brochures and QR codes.

3.2. Weaknesses

The groups involved have different degrees of commitment to actions to raise awareness about the effects of pesticides. Some cannot have much commitment because they are isolated, either by political action or by marginality. For example, the environmental counselor informed us about the workers of big producers. They have a union, but it does not help them. They do not know if they have a health officer who protects the workers from handling pesticides. On the other hand, the "quilombo" or "kalunga" community is far from being linked to participatory process. It is necessary to engage some local supporters.

Another problem is the exhaustion of previous strategies that do not presage success for the new ones. The environmental counselor is desperate with the advance of the southern farmers and the disasters that they promote. He intends to stop them with political actions. The didactic activities

undertaken by the environmental counselor have been abandoned. He is not supportive to the implementation of popular education initiatives.

3.3. Opportunities

Media and places for sharing are important. As the population has smartphones, this is one way to start a participatory project. Environmental actions are being taken, and they have allowed a channel to be opened through *WhatsApp*, through which information circulates. This could be an initial way of sharing messages.

In the region of *Chapada dos Veadeiros* and around IFG-Anápolis, there are young community leaders who are part of the research processes. These leaders were willing to encourage people's participation in social media.

There are some social places where information is shared, such as a church of the main town of the district, on Sundays. Nevertheless, the goals to be shared are also important. The environmental counselor, the institutions of higher education, and the counselor are convinced that they must unite their strategies.

It involves all of the partners. The local school is concerned with environmental education, so they inform the environmental counselor. Colleagues from higher education institutions repeat the same about the past interviews held. Secondary schools undertake environmental projects; they make some videos and some podcasts, but then they do not continue. Now, in contrast, the school asks for larger workshops. A video workshop with young people is proposed; then, a video channel on the internet and a video and photography festival follow. This could be a way of engaging, analyzing, and denouncing the problems with ICT.

An Edutec Network—Water and Agrochemicals, with partnership with a member from the research team, includes a proposal to strengthen water research that involves topics of agriculture and the use of innovative technologies for the removal of pesticides and knowledge formation in communities, and aims to promote the well-being of the population and the protection of the environment. This network is important for linking universities and the representatives of the Secretariats of Environment and Health of the Federal District, in addition to other centers engaged in water research in the region. This network includes chemists, physicists, biologists, doctors, pharmacists, and other specialists, adding efforts to create a team with an interdisciplinary and multidisciplinary character.

The availability of information can be a key aspect. There are several federal, state, and local agents that collect information about the state of the park, although they do not share it. Higher education institutions have assembled a multidisciplinary team to get information in real time that can be given to farmers through ICT. Local studies could convince landowners. Pollution detectors in the waters and aerial photography can also be useful to the local authorities. In addition, micro-videos could be helpful. A local agreement exists to make the epidemiology of the district public. This information can be used to reduce the use of pesticides and make it necessary to disclose them. This way, it is possible to have a platform for the dissemination of data, and the applications of smartphones can be used in the dissemination of videos developed by young students from Spain and Brazil.

All of the partners of the project are open to share their materials. Materials from the environmental center could be used in new formats.

Actions in marginal communities need special developments. For example, the "quilombo" community is focused on the tourist exploitation of the territory. Its agriculture is for subsistence. They are worried about the progress of the big farmers. They are aware of their threat to both the territory and tourism. They can be a help of enormous interest for generating messages of environment conservation and of the rational use of pesticides.

3.4. Threats

The most fertile area of Brazil does not offer new spaces for agricultural exploitation. Farmers in the south buy land from the "Cerrado", which is a sub-tropical plateau in the center–east of the country,

with a regime of rains and rivers that make it suitable for cultivation. The soil is broken to introduce intensive soybean plantations. These plantations rotate with others, including corn. This movement of farmers generates various problems. For the environmental counselor, it threatens the life of the park. It is a process of transformation for the environment. For the local environmental activist, these farmers do not respect the permits obtained for cultivation, and destroy natural areas that protect aquifers. The problem of complaints of environmental crimes covers the size of the entire territory, as do the difficulties of the administration to enforce the law. New actions, as popular education, could be threatened by important interests in the area.

The aims of the project could be misunderstood by the target audiences. Interviews with higher education institutions show difficulties concerning the perception of the effects of pesticides on producers and workers in Goiás. Although the territory is near a national park and a biosphere reserve, intensive agriculture around the park destroys aquifers, as said before. There are incidents of water intoxication, but even small farmers do not associate the intensive use of pesticides with these situations.

The lack of information is a very common case. It could be possible to understand that not to use pesticides is the cause of pest suffering. For the farmer who lost her harvest, the bad use of pesticides in their neighborhood is not what caused the plague. It could be the result of mixing different pesticides, which subsequently disabled their effect against pests. They noticed similar situations in other states of Brazil.

The project depends on the strength of the partners. Important local supporters of a participatory strategy, as an environmental center, depend on external support. Its actions operate with some precariousness. They have a vehicle, but they depend on a project to pay for the fuel. They have a place, but they are not given permission to make it into an accommodation for other researchers.

4. Conclusions

A participatory process has been generated in which the different entities involved have different expectations, anxiety, fears, and misgivings. In any case, all of the participating entities have positively valued the participatory process that has been generated. It has been an opportunity for higher education institutions to participate in the construction of critical and empowered consciences.

In the development of the project, the conditions in which the theme of the project is lived and worked by the different actors that were called upon have been highlighted. In addition, it has been an occasion to highlight the difficulties that each actor has in order to reach other groups in the debate of ideas about how a social problem affects us.

Tensions have emerged between local languages and knowledge, citizen participation, and the preparations for the construction of contents and valuable resources for the collectives. There have also been tensions between the degree of freedom among the participants when making proposals, and the consensus with other agents to improve the products, as well as the interaction with the citizens.

Since the study was carried out on an ongoing and living project, only a few conclusions can be drawn. On the one hand, the difficulties with start a participatory process have been observed, and on the other hand, the possibilities for a public pedagogy that manages the citizenship and diverse agents arranged among themselves was also observed.

Among the difficulties, it is worth highlighting the socio-political context of Brazil, where the actions of protest are identified with leftist positions, at a time when politics has fractured the country. There are problems regarding the construction of knowledge by different agents, such as, for example, a certain distrust of schools about the role that the university wants to have.

Besides all of that, different conceptions of popular education appear to be handled by the different participating agents; with such an issue in discussion, the actions that could be started are paralyzed until some aspects are clarified. Even so, the possible actions to initiate are still on for the group work that begins between researchers and the students of the countries.

In advance, it could be possible to establish goals regarding the popular education initiative on pesticides. The popular education strategy should promote cutting the expenses of farmers and the importance of having local information to act as farm worker, more than the perils of pesticides. In addition, criteria for materials could be established. It could also be possible to use the material contents from the environmental center of the region. Brochures and QR codes could be shared in meeting places such as farmers' markets. However, more important, short films developed by teachers, parents, and students at schools could be shared in social networks. Overall, the dissemination of information regarding pesticides is a cheap, participatory, engaging, massive, local, optimistic, and sustainable product.

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