EduSol
Vol.20. Num.70
ISSN: 1729-8091
Published online: January of 2020 (http://edusol.cug.co.cu)

Componentes centrales de un programa de educación ambiental local desde la perspectiva de sus participantes Central components of a local environmental education program from the perspective of its participants

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Received: January 15 2018
Accepted: June 3 2019

Resumen: Existe desconfianza en la implementación de los programas de educación ambiental debido a que se desconocen aquellos elementos que incidirían en la consecución de los objetivos de estas intervenciones. Desde la perspectiva de los componentes centrales se indagó en aquellos elementos nucleares de un programa de educación ambiental local mediante la realización de grupos focales con 33 directivos y 37 docentes coordinadores de la temática ambiental en los establecimientos que son parte del programa. Se identificaron cuatro componentes de intervención: la ecociudadanía, el enverdecimiento de la escuela, la ambientalización institucional, y la sensibilización ambiental territorial.
Palabras clave: Evaluación de componentes; Educación ambiental; Evaluación de programas; Evaluación de implementación

Abstract: There is distrust in the implementation of environmental education programs because those elements that would influence the achievement of the objectives of these interventions are unknown. From the perspective of the central components, the nuclear elements of a local environmental education program were investigated by conducting focus groups with 33 managers and 37 teachers coordinating environmental issues in the establishments that are part of the program. Four intervention components were identified: eco-citizenship, school greening, institutional environmentalization, and territorial environmental awareness.
Keywords: Evaluation of components; Environmental education; Evaluation of programs; Evaluation of implementation

Introduction

The report of the annual Intergovernmental Climate Change (2018) and the most recent technical report issued by The World Economic Forum (2019), show that the magnitude of the socio-environmental crisis is devastating and that the objectives set so far are insufficient to stop the change climate produced by global warming, which makes it

necessary to increase the quantity and quality of socio-environmental interventions urgently (Gutiérrez, 2015).

One way to address these challenges is through the Environmental Education Programs (PEA). These encourage a transformative process in both the individual and collective relationship with the environment, seeking to promote a series of knowledge, attitudes and behaviors that safeguard this relationship with the ecosystem to be sustainable, and not predatory (González and Maldonado, 2017). They occur in both formal and informal media and are usually characterized by using various methodologies and techniques to generate instances of learning in environmental issues.

This type of program has had a proven effect on schools, impacting on academic performance, on the link between students and nature, on the attitude, knowledge and behavior of teachers, on pro-environmental behaviors, and on the ability to students to design and develop environmental projects (Borg, Gericke, Höglund & Bergman, 2014; Espejel & Flores, 2017; Olsson, Gericke, Boeve-de Pauw, Berglund & Chang, 2019).

In spite of this, in underdeveloped countries such as Chile, this kind of programs has not had the same effects, the evaluations carried out with teachers and students being extremely negative (Gädicke, Ibarra & Osses, 2017; Torres, Benavides, Latoja & Novoa, 2017). Even in many of the so-called developed countries, research has not followed rigorous methods that make it possible to state that its results are due exclusively to the direct effect of these programs (Chawla & Derr, 2012).

In this sense, in many cases, we do not know what really works, because research has not adequately reported how these results are mediated by the implementation of the operational models of these PEAs. What would be a fatal mistake if we consider that implementation is one of the most important variables in school programs (Dulark & DuPre, 2008).

Development

Science of implementation and environmental education programs

Countless systematic reviews and meta-analyzes have been published that demonstrate the benefits of using PEAs (Chawla & Derr, 2012; O 'Flaherty & Liddy, 2017), however, as

already noted, having programs that work is only one part of the equation, because the other corresponds to its implementation (Blase & Fixsen, 2013).

This has motivated the development of research with the implementation as an object of study (Durlak & DuPre, 2008; Eccles & Mittman, 2006), in order to understand the processes and components involved in the successful and sustainable incorporation of programs in schools (Forman, Shapiro, Codding, Gonzales, Reddy, Rosenfield, et al., 2013). The idea behind this research is that if a good program is not executed correctly, it will not have the desired effects.

Within this framework, some authors suggest a type III error in the development and implementation of the programs (Glasgow, Klesges, Dzewaltowski, Estabrooks, & Vogt, 2006). This would happen when the null hypothesis is rejected for the wrong reason, that is, when the results are explained as a product of the execution of a poor-quality program, when in truth it is a good program implemented in a bad way. Implementation errors, therefore, directly affect the internal validity and credibility of successful interventions, largely due to wasted resources and poor associated effects.

Implementation studies are increasingly conducted and valued in disciplines such as school psychology, school mental health (Durlak and Dupre, 2008) education (Forman et al., 2013), and others. This interest in understanding the importance of implementation in obtaining the results has also been transferred to environmental education (EA), it being important to understand how the implementation influences the achievement of environmental objectives.

To cite some examples, the classic study by Duvall and Zint (2007) pointed out that there are a number of contextual factors that influence the implementation of PEAs focused on intergenerational learning, pointing out, for example, the involvement of the community or practical learning Galvis, Perales and Ladino (2019), for their part, focused on pointing out the factors of classroom relationships such as institutional environmentalization or teacher motivation. Both studies highlight the lack of this type of research and the need to continue

investigating those factors that come from the operational models or from the implementations that impact the results of the programs.

In this context, one of the most researched interests in the science of implementation is the components that are central or nuclear for achievement (Abry, Hulleman & Rimm-Kaufman, 2015). Certain elements are sought that facilitate the conditions of the possibility of a successful experience or a good practice in implementation. This vision of the "components" means to think that, although there is no necessary presence of an element that we can call "nuclear", its appearance would be linked to the quality of the implementation and the improvement of the results obtained (Chorpita, Daleiden & Weisz, 2005).

The calculation is therefore simple; although we do not get “an unequivocal recipe” we do know the ingredients that allow us to make a better dish. This focus of the central elements or components is born wanting to answer the question what works in the interventions. Research and work with central elements are comparable to the efforts made in both systematic reviews and meta-analysis, as they seek to synthesize a set of precepts or elements that are important in a subject, backed by the scientific community or, at least, with the evidence in a particular territory or program.

Most implementation studies indicate that it is a primary step to understand the implementation of programs to be able to detect those central components of the intervention (Abry et al., 2015; Chorpita et al., 2005). This would facilitate the evaluation of the programs as well as the potential degree of knowledge that the executors and participants of the intervention have on them. It also helps to prioritize resources and efforts towards those things that are fundamental to the programs.

In this sense, authors such as Chen (2014) or Donaldson (2007) emphasize the importance of conducting evaluations that allow clarifying the operational models of the programs. A good way to do this, according to the literature, is to investigate the implementation from the perspective of those who experience it. This is because a good part of the executors has

their own theory implicit in the programs while they are permeated and trained in their guidelines (Peters, Adam, Alonge, Agyepong & Tran, 2013).

It is then possible to contribute to the literature, academic training with case studies oriented to the evaluation of environmental education projects, and programs from the perspective of the central components since it is understood the importance of starting to add more and more replicable and efficient environmental effective interventions. In a manner consistent with the aforementioned, it is expected that these studies will then focus on the understanding among the relationship of the operational models, the implementations, and the results of the PEAs, receiving feedback from those who participate in these programs (Peters et al., 2013).

Purpose of the present research

The purpose of this study was to identify the central components that make up the intervention model of the Pedagogical Innovation and Education for Sustainability Program (PIPES) executed in the Los Angeles commune, in southern Chile. This program was recently recognized as one of the most important in the country, both for the number of establishments that have an environmental certification of excellence and for the coverage that is estimated at more than 65,000 people.

The current Community Environmental Ordinance states that PIPES should promote "that students of municipal educational establishments participate and support local environmental management" (Los Angeles Municipality, 2016, p. 4). Thus, this has a series of actions carried out by a pair of professionals:

a) Year after year the certification level of the participating schools of the network is monitored;

b) Teachers, students and managers are trained in environmental issues and pedagogical innovation;

c) A pedagogical innovation fair and a recycling carnival are held every year in the center of the city;

d) The environment, earth and We Tripantu or Mapuche New Year days are held in schools annually;

e) It collaborates in the management of networks and obtaining public funds such as Environmental Protection Funds (FPA);

f) Technical visits are made for assistance in waste management, in the use of recyclable bags, in conducting environmental workshops for students and in the construction of one or more units of plant production;

g) A native arborization program is implemented in rural schools called "Mano Verde".

PIPES is a bottom-up program that, according to the latest Annual Plan for the Development of Municipal Education in Los Angeles (Alonso, 2018), seeks:

"Integrate into your curriculum and transmit in your educational culture, knowledge and current concepts of care and protection of the environment, strengthen respect, and preservation of everything that makes up the heritage of origins, natural and ecological, of the commune of Los Angeles "(P.1).Although its objective is clearly expressed, it does not establish specific actions to be carried out by the schools nor does it provide an explanatory framework regarding how the change in the pro-environmental attitudes and environmental culture of the school communities would be generated. For this reason, this study asked what components and activities make up the operational model of PIPES?

Methodology

We conducted a naturalistic evaluation focused on building the operational model of a particular program based on the opinion of its participants (Chen, 2014; Donaldson, 2007). 33 executives and 37 teaching coordinators of the environmental theme of the municipal education establishments in which the PIPES program is implemented were part of the research. 67.14% of those who participated are women. All have participated at least once in an instance of the CES Network, with an average participation in this over the three years (table 1).

Gender		Position		Years of experience	
F	M	Executives	Teachers	μ	σ
47	23	33	37	3,23	1,67

Table 1: study participants

Source: Self elaboration

The research had the approval and collaboration of the local authorities, since it was an interest of the Municipality to clarify what was being executed to be able to delineate what PIPES is in its implementation. Participants were asked for consent and a series of ethical guidelines were followed from research in community psychology (Winkler, Alvear, Olivares & Pasmanik, 2014).

As an information production technique, open-question questionnaires were used that investigated the activities carried out regarding the program and the objectives they pursued (e.g., the realization of the Environmental Workshop for the development of proenvironmental skills in students). In the second instance, this was discussed in seven focus groups with managers, and in six with teachers to clarify their relevance and importance.

The answers to the questionnaires and the focus group discussion were analyzed through a thematic content analysis (Vaismoradi, Turunen & Bondas, 2013). Consensus was used as a control technique for the validity of coding (Okuda & Gómez, 2005), so all the analyzes were accepted by the four authors.

Results

The directors and teachers' coordinators participating in the evaluation report that schools perform about a total of 19 actions that are related to the program, these being distinguishable from each other with respect to their objective and content. From the thematic analysis carried out, it is possible to understand that the intervention has four central components at the base that consider the 19 activities distributed as presented in table 2.

Components	Activities
C1. Eco-citizenship	Environmental workshop Talks and trainings Healthy and Outdoor Living Activities Environmental Forgers Club
C2. School Greening	Recycling Vegetable Production Unit Light and water care Clean spot Cleaning and space improvement Native tree Solar panel installation
C3. Institutional Environmentalization	Environmental certification Inclusion of EA in the curriculum Hiring a professional Application for environmental funds
C4. Territorial environmental awareness	Massive community activities Dissemination activities Exchanges between schools Exhibitions

Table 1: program components and activities

Source: Self elaboration

The first component identified is eco-citizenship (C1), which is related to the training of the different actors of the school communities in order to develop their abilities in order to be leaders of change in both their school and territory. Here are mentioned actions such as the environmental workshop, talks and training, those activities of healthy living and the program of environmental forgers.

The presumption behind the formation of ecological citizens is that collectively they will be able to build a sustainable way of life and society that is based on the use of environmental capacities and knowledge that they have. The development of proenvironmental

competences is understood as a path of personal change that has a strong impact on collective and social transformation.

In the second instance, the greening component of the school (C2) was detected, which refers to the environmental care and protection activities carried out by the various members of the school institution, and which have a visible physical impact on it. It is composed of activities such as recycling, the development of a plant production unit, the care of water and light, the cleaning and improvement of spaces, native tree planting, the implementation of solar panels, and the management of clean spots.

These activities are carried out in order to make the school a greener environment, making the environmental approach of schools visible both within and outside its surroundings. With this it is intended that all members of the school community can have a greater environmental awareness, knowing and having practical and direct forms of environmental protection and care at hand.

The third component that was identified is institutional environmentalization (C3), refers to those actions of the school aimed at managing administrative and bureaucratic issues that allow the implementation of the PEA in the establishment. This includes environmental certification actions, the hiring of a coordinator, the application for funds, and the inclusion of the EA in the school curriculum.

The institutional environmentalization is the point where the degree of penetration of the PIPES in the school is reflected and, therefore, the immersion of this in the environmental theme. It is understood that the greater the development of the environment in aspects such as the curriculum, the teaching staff, the certification of the school, etc., the greater the degree of sustainability that the intervention will have in the school and that it will be better delivered by the institution that executes it.

Finally, the territorial environmental sensitization component (C4) was detected, which includes those actions that raise awareness of the environmental issues of the communities surrounding the schools, and which aims to develop a greater environmental behavior by all

citizens of the commune. Dissemination activities, exhibitions, exchanges among schools and mass community activities such as fairs or carnivals are included here.

With these awareness actions, we want to ensure that communities close to the establishments have knowledge and a certain level of participation in the work that is carried out from the schools, and that with this they learn to care for the environment. In addition, this has a scope especially at the communal level, having an articulated work by the educational establishments in the communal activities that are developed as part of the program.

As it was seen, the components just described and the activities that conform them are carried out at different levels of the intervention. In the first place, it can be seen that the eco-citizenship component is the one that covers the individual level, especially of students, but also of teachers, managers and attorneys. It is understood that this would be an important focus of the program studied since it is possible to notice that it is articulated with the other components in different ways.

In a sense, the components of greening of the school and institutional environmentalization are those that give feasibility and practicality to the field of eco-citizenship since on the one hand they allow the environmental theme to be developed within the establishments and, on the other, they are the exercise concrete care and environmental awareness. The first is achieved by providing the structures and conditions for the development of the program, while the second is the visible materialization of the transformations experienced by the establishments. Both components, following a socio-ecological model, are at the school level.

All this ecological countenance that schools acquire thanks to these components together with the articulation among the different establishments participating in the program allows and encourages the dissemination of environmental issues in communities near schools, which are another important focus of this intervention.

In this sense, the territorial environmental awareness component becomes the channel through which the program and schools reach the neighborhood and community level

generating large-scale events that are the result of the joint effort that arises from the components described above. To get a clearer idea of how these components are structured in a socio-ecological way, figure 1 is presented.

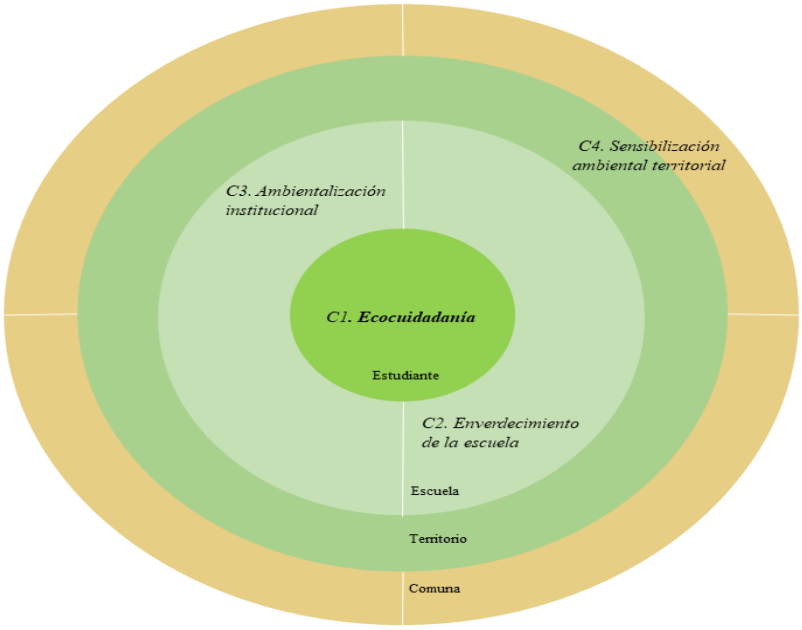

Figure 1: program intervention model

Source: Self elaboration

Conclusions

From the thematic analysis carried out, it was possible to detect a total of 19 activities described by teachers and managers, which were organized in a total of four intervention components: 1) eco-citizenship, 2) greening of the school, 3) institutional environmentalization, and 4) territorial environmental awareness.

First, it should be noted that the training of citizens in environmental issues is one of the original and classic objectives of the PEA. In this sense, most participants understand the importance of educating people in a way that is capable of building a more sustainable society. When referring to formal PEA, it is also possible to identify what this type of intervention generates, in turn, both internal and external environmentalization, observing

the first in the curriculum, calendars and academic programs, while the second, in the physical and visible space of educational establishments.

Another particular aspect of this program is its interest in developing towards what is known as community environmental education (EAC). Within this framework, the PEAs are increasingly interested in including communities in a double sense: on the one hand, that local and community problems flood the programs and, on the other, that the communities near the schools where formal PEAs are developed get involved. (Azahares-Curbeira, 2013; Espejel-Rodríguez & Flores-Hernández, 2012).

This vision of the PEAs is a great challenge, since an intervention that seeks to have local relevance and consider its surroundings, not only must promote activities that bring together the community, but must be in tune with the needs, knowledge and interests of the territories where they develop (Aparicio-Cid and González-Gaudiano, 2018). In this sense, all environmental intervention must know how to balance those adjustments required by the context and implementation, while developing its core components.

In this framework, being able to clarify the central components of the PEAs enables political operators to optimize and prioritize resources in pursuit of those elements that are essential to the intervention. Thus, it is possible to point out that, as in other studies, the present research allowed to identify the importance of certain aspects of the PEAs such as the EAC, the one that the EA permeate the educational establishments, the importance of generating instances of learning for eco-citizens that promote sustainability and that this has a visible impact on the environment (Duvall & Zint, 2007; Galvis, Perales and Ladino, 2019).

After this, the work of the political operators, managers of establishments and executors is key, since in them rests the capacity that the objectives and nuclear elements of the PEA align synchronously with the objectives of the schools and high schools. This coordination could influence the sustainability of the intervention in local contexts and the optimization of local memories.

As has been said, this study points out the importance of considering participants in multiple phases of the interventions, since their impressions will be required to combine objectives

and enhance the quality of the implementation of environmental programs. Once again, the necessary balance between the contextualization of interventions and their ability to respond to their core components in conjunction with local communities.

Another benefit that can be adduced to the detection of nuclear elements is the ability to replicate the programs or their central components in other contexts, these having to be skilled, in adapting the components that are not central to the intervention (eg. in this case, the formation of eco-citizens is promoted, but the ways in which it is carried out can be diverse.) The four components detected here are not the recipe, but rather potential ingredients for a project that is developed in other territories. In saying this, it also becomes necessary to train those executing these PEAs both in the core components of the programs and in skills that contribute to the contextualization and relevance of the interventions.

It will be possible for future research to investigate other aspects related to implementation, such as the Fidelity of Implementation (FI). This means asking the question about the relationship between the executors implementing the central components in an appropriate manner, and the intervention obtaining the desired results.

Also, it is worth mentioning the need for new research to use qualitative methodologies that facilitate a greater depth and specificity in the identification of the central components, in order to develop a greater verbatim and a deeper analysis in the relation of the central components, the implementation and results of environmental interventions. Finally, it would be possible to investigate whether these four intervention components obtain good results in other realities and if they can serve as a basis for the formulation of other PEAs.

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