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## Empathy and critical thinking: primary students solving local environmental problems through outdoor learning

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The present study explores the outcomes of teaching empathy and critical thinking to solve environmental problems. This investigation was done throughout the duration of an environmental education course within a primary school located in central Chile. A community-based research methodology was used to understand the formation of empathy and critical thinking. The findings reveal a significant benefit in using empathy strategies to engage students regarding the thinking processes involved with solving environmental problems. Using these elements as teaching techniques for environmental education courses can be very helpful in reaching the aims of creating a sustainable citizenry.

**Keywords:** education; environment and sustainability; qualitative research methodology; critical thinking; empathy

### 1. Introduction

Among the educational demands that the current social context names as meaningful and necessary are those relating to the development of students' ability to think and empathize (Cotton & Hackett, 2003; Lloyd & Bahr, 2010; Moon, 2008; Moore, 2004; Santrock, 2006). In South America, educational reforms such as the International Covenant on Economic, Social and Cultural Rights are tied to programmes and laws favouring environmental heritage preservation (United Nations, 1976). These aim at citizen involvement in making these complex environmental decisions. For example, political changes within the school curriculum were demanded following the creation of dams and hydropower plants. Active and critical educational communities were incorporated into the design, implementation and evaluation of such changes. In the case of Chile, the debate has focused on the role of schools for environmental awareness training and the development of critical, but currently scarce, studies on the aggregate value of such programmes in the development of critical thinking. This applies to the school community in general, and to students in particular.

The teaching of critical thinking and empathy has been present since the beginnings of education; nevertheless, at a global level the results obtained by different educational systems show a generalized norm, characterized by the superficiality of learning obtained in school (Little, 2004). Students seem to have learned pieces of information and

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sometimes are able to repeat ideas or memorize concepts. However, their intellectual abilities to establish relationships or to transfer and use information so as to solve problems, as a result of regular schooling, are definitely not being achieved to an acceptable level (Elliot & Dweck, 2007; Miranda, Zambrano, & Jelvez, 2010; Santrock, 2006). Some researchers have associated this problem with the teaching strategies used, which have typically tended to emphasize the acquisition of content by rote, at the expense of developing and learning skills that facilitate understanding (Groundwater-Smith & Dadds, 2004). Thus, the performance of graduates is far below their real potential. The cause for this behaviour, according to the results of Langer (2000), is unwillingness rather than a real lack of capabilities.

The epistemological anchor of the present work is found in the philosophy of Bertrand Russell. This philosophy states that the development of thought is the link between philosophy, science, liberalism and rationality. Thus the concept is enriched theoretically, to involve interplay between skills, dispositions and attitudes, which together delineate this competence that has moral and intellectual dimensions (Hare, 2001; Russell, 1973). Considering such theoretical anchoring, the perspective upon which this work has been built is that of *problem-solving*, which defines the student as a reflexive being capable of developing higher cognitive and affective processes. The cognitive domain includes knowledge and the development of mental skills, and the affective domain refers to the emotional responses to tasks. These processes can, in turn, be observed as skills for inquiring, information analysis and communication to solve environmental problems (Allen, 1975; Ernst & Monroe, 2004; Singh, 2011). The importance of the problem-solving approach in the field of education has increased considerably in recent years. For example, Borup (2001) analysed the 215 submissions for the Seventh International Conference on Critical Thinking and Educational Reform; the author concluded that more than 166 of them relate to this approach. However, according to the results of the recent XXXII International Conference on Critical Thinking (The Critical Thinking Community, 2012), the approaches focusing only on developing students' thinking skills, to allow them to solve socially relevant problems, have failed. In fact, Hungerford and Volk (1990) show that one of the insufficiencies of environmental education programmes is the focus of such programmes, where a greater emphasis is given to the cognitive domain over the affective domain (Gurevitz, 2000). This partiality towards the development of cognitive processes definitively impacts upon the efforts for creating students with the capacity to solve problems. In fact, the affective processes should be given the same emphasis in environmental programmes since studies have shown that the affective domain may conduct thinking processes (Hofreiter, Monroe, & Taylor, 2007). When students are not trained in dealing with their affective processes during the decision-making process, they tend to ignore their affective reactions, refuse to apply critical thinking and/or let affectivity regulate their thinking process (Fox, 2002; Martin, 1992; Wang & Ku, 2010).

Very little is known about the relations between the cognitive and affective domains. However, as mentioned before, it is known that they should be given the same attention when designing environmental education programmes, that the affective domain may conduct thinking processes and that problem-solving can be efficaciously developed as both domains are stimulated in students (Hofreiter et al., 2007).

In 2010 the Department of Education in the San Esteban Region of Chile requested the creation and application, in one of its 12 schools, of a new concept that could stimulate the development of the cognitive and affective realm using an environmental education programme. The department sought to develop the students' capacities to solve

local environmental problems in the San Esteban Region. Recent studies in environmental education reported that students' understanding of environmental problems and their decisions to participate in solutions are not stimulated simply by the cognitive realm, such as using knowledge to reason and think about rules for ethical conduct (Santrock, 2006), but also by affective forms. These include giving more attention to concern and empathy when solving environmental problems (Yeung, 2002). With this foundation, a teaching concept was invented that delivers capacities in problem-solving using critical thinking from the cognitive domain and empathy from the affective domain (Little dyke, 2004; Reniers et al., 2012; Tuncay, Yılmaz-Tüzün, & Teksoz, 2012; Yeung, 2002). More detail of this teaching concept is mentioned in the next section. We report the impact of the integrated teaching of critical thinking and empathy on primary students and its benefits to confront and solve personal and environmental local problems. Critical thinking is a specific socio-cognitive competence that questions any truth or knowledge that without previous critical judgement aims to set itself up as sole, as final and absolute. On the other hand, empathy refers to a moral sensitivity to others' views and feelings, and the ability to make personal judgements (Allen, 1975). People can develop many ways of understanding others. However, empathizing is more than just understanding or expectations, but is vicariously feeling the emotions of others, promoting communication and motivation to pro-social behaviours (Decety, 2011).

## **2. Methodology**

The research was conducted through an environmental education course applied to the entire student community of a primary school, located in the province of Los Andes, central Chile. The school has two different classes in each of its eight grades, a total of 16 classes from first to eighth grade. Children are aged from 5 to 14 years. Students were mainly from rural families with parents working in the agricultural industry and mining, belonging to the middle and lower economic sectors.

### **2.1. A description of the environmental education course**

The environmental education course constituted two parts—building theoretical foundations and the work at the Life Lab—that are described in detail below. The community was informed that the aim of the course was to use outdoor environment lessons to develop the critical thinking and empathy domains of learning.

#### **2.1.1. Building theoretical foundations**

In this part of the course the knowledge of critical thinking and empathy was delivered using a new teaching concept. We follow the recommendation of Facione (1998), who emphasizes the importance of innovative teaching to understand and encourage the learning of thinking and affectivity. To make it attractive for the school community, the teaching concept created was named 'environmental love'.

The theoretical foundations of 'environmental love' are based on both the skills proposed in a study by 30 experts of the American Psychological Association (1990), and the components of empathy mentioned below. Investigations suggest that there are three components to empathy: empathic concern, personal distress and perspective-taking (Davis, 1983; Hall, Davis, & Connelly, 2000; Zechmeister, Garcia, Romero, & Vas,

THE SIX CRITICAL THINKING SKILLS DEFINED BY THE APA DELPHI STUDY (1990)	ENVIRONMENTAL LOVE: Teaching Instrument to conduct critical thinking with empathy
<b>Self-Regulation:</b> The ability to monitor our own thinking and correct flaws in logic.	<b>Emotional self-examination:</b> To cope with emotional reactions during the monitoring of our own thinking, retaining positive emotions and gently correcting logic flows.
<b>Interpretation:</b> The ability to understand information.	<b>Emotional Prudence:</b> To understand and control the information fairly, avoiding envy, boasts, to act unfairly, or to favour one's interests.
<b>Analysis:</b> The ability to identify the main arguments given.	<b>Emotional self-control:</b> To analyse without annoyance, grudge or enjoying injustice, but in order to take pleasure in the truth and to evaluate and draw conclusions justly (based on the truth).
<b>Evaluation:</b> The ability to judge whether the argument is credible and valid according to the logic and evidence given.	
<b>Inference:</b> The ability to decide what to believe or do based on solid logic, and to understand the consequences of this decision.	
<b>Explanation:</b> The ability to communicate the reasoning process to others.	<b>Emotional courage:</b> To explain the thought process and being willing to suffer, have patience for and bear all consequences of this action.
<b>Dimensionless emotion:</b> The use of positive emotions to conduct reasoning processes should not be subject to specific times or places.	

Figure 1. The environmental love concept to conduct critical thinking with empathy. Note: APA, American Psychological Association.

2004). Empathic concern is the trend of experiencing feelings of sympathy, compassion and concern for others. Personal distress alludes to feelings of personal uneasiness when exposed to the distress of others, and perspective-taking is the capacity to stand on the psychological viewpoint of others and to view the world through their eyes (Davis, Luce, & Kraus, 1994). The Delphi study of the American Psychological Association determined that critical thinking is a process divided into six different skills, and we defined how each of these skills should be conducted when considering the components of empathy. From this idea a concept with five sub-skills was created (Figure 1). This concept aimed to positively support the critical thinking process by conducting it with empathy. The sub-skills of the concept were taught explicitly and individually each week, using storytelling from real-world examples identified from environmental problems in the school (Wang & Ku, 2010). Using real examples allows students to grapple with current problems and decide what they should do or believe. For example, when we wanted to convey the concept of emotional self-examination, we took a story from local social news or a teacher's anecdote to cause catharsis in the students, enabling them to reflect and compare experiences (Brand & Donato, 2001).

### 2.1.2. *Life Lab*

The major practical part of the course was the construction, by the students, of a Life Lab. In the school setting, the internationally known Community Gardens or Organized Garden Projects have taken the form of Life Labs, which are at the forefront in the development of practical scientific curricula focused on the environment (Pudup, 2008). These places encourage behavioural change, environmental equity and sustainable development (Holland, 2004). In the present study, the principal of the school allowed the professor (researcher) of the course to build a Life Lab together with the students, which was located at an old abandoned playground of 300 square metres at the back of the school.

Students named the Life Lab ‘the Garden’. The activities also involved outings in the park, the forest, the vegetable market, the adjacent plaza and nursing homes. At the beginning, the Life Lab was dry and untidy; hence leaves and organic material were obtained to produce compost and restore hard and infertile garden soil. Small trees from the outskirts of the city were used to afforest while scraps from the vegetable garden were acquired for composting. Advantage was taken of voluntary collections of vegetables from the nursing home visits. The socialization with the elderly was an important component of the class. Finally, sports and leisure activities were conducted in the green areas of the main square of the city. These were the main scenarios in which classes were held throughout the course.

The primary teaching method utilized to implement and encourage the use of thinking skills during the construction work at the Life Lab was the ‘Teachable Moments’. This is an unplanned and unexpected event inside or outside the classroom that teachers use to provide the opportunity to extend the child’s learning (Bentley, 1995). The instructor also discusses his own thought processes on the real-life problems and issues. This discussion included critical reviews of the information presented to the class, commenting on its prejudices and faults in logic (Hofreiter et al., 2007).

## **2.2. Methods of data collection**

The study used a community-based research (CBR) methodology (Strauss & Corbin, 1990) to understand the formation of critical thinking and empathy. This methodology was utilized during the two parts of the environmental course. CBR requires a substantial level of community participation, helping researchers gain and not omitting local knowledge. The methodology uses three main techniques: participant observation, focus groups and in-depth interviews.

Field notes, photographs and video/audio recordings were used to collect data on participant observations during course lessons. Data were utilized to check against participants’ subjective reporting of what they believe and do. The main author designed and implemented the course and was therefore involved in its central activities. These included gaining an understanding of the physical, social, cultural and economic contexts in which the students live; the relationships among and between them, ideas, norms and events; and behaviours and activities—what they do, how frequently and with whom. Great emphasis was placed on observing the disposition of students when using critical thinking skills and empathy in the educational context according to the delivered new concepts of environmental love.

A focus group is a, ‘carefully planned discussion designed to obtain perceptions in a definite area of interest conducted in a permissive, non-threatening environment’ (Krueger, 1998, p. 18). Two focus groups per class that lasted 1–1.5 hours were held during the course. Discussions were structured around a set of questions that related to the role that critical thinking and emotion play in students’ lives.

In-depth interviews facilitated the expression of gained experiences by participants and their perceptions of critical thinking skills and empathy (Baxter & Eyles, 1997). The in-depth interviews were conducted with 60 students and 30 staff, each lasting between 30 and 100 minutes. During the study, the researcher (first author) participated as a professor of the educational establishment, so field notes and recordings were also taken in the breaks and at other events that occurred during the school day, throughout the educational year (March–December). Researchers were also granted access to student writings, papers and documents. The classes, focus groups and interviews were recorded and transcribed,



and formed the heart of data analysis, supplemented by field notes from participant observations. The focus group transcripts were analysed by thematic codes, which involved reading through each transcript to identify important themes or points (Strauss & Corbin, 1990). The criteria for the selection of topics were the frequency, extent, intensity and specificity of responses (Krueger, 1998). A coherent master list of themes was developed to guide the organization and interpretation of the results, and such results were supplemented with data from the interviews and participant observations. These preliminary results were communicated to research participants to help assess the credibility of the researcher's interpretations of participants' experiences. We found that the results that emerged from the data analysis can be grouped into three main contexts, so we categorized and presented them as follows: the school and town level, the classroom level and the student-life level. These results are illustrated with direct quotes from the interviews, focus groups and the observations during the programme.

### 3. Findings

#### 3.1. *The school and the town*

The interdisciplinary nature of the course and its theoretical and practical components provided opportunities to coordinate thematic areas and to explore the connections between natural and social systems. The environmental context of the workshop blurs the line between learning in the classroom and real-life applications. This provides opportunities for students to develop and use critical thinking through the normal interactions between natural and social systems, and the real issues that emerge from these interactions. The CBR triangulation shows a progressive and collective shift towards a student community more aware of personal welfare and the environment. Among the changes, we found a decrease in violence seen during breaks and a significant reduction in damage to school facilities. The following quotation illustrates this:

What I did note were general changes, there was less violence when they met at recess, the lunch break from one to two o'clock. While it would have been preferable to completely eradicate the violence, there were changes in that aspect ... the children began not to run [aggressively] so much, their game became more normal, not so brusque. I could perceive this because I can compare with the 33 years of observing students at this school ... I noted that the children were becoming more responsible. (Female teacher)

Students were also increasingly concerned with keeping the school cleaner and caring for green areas (Figure 2). At the beginning of the year, children had been throwing large amounts of trash on the ground, including lunch or snacks (provided by the government) they did not like; however, this situation was reversing as the year progressed:

From what I've seen and what I hear from the girls [female assistants] this year the kids have been much cleaner than other years. Before we used to have to, after recess, gather up all the things the kids [children] had thrown away throughout the school, but now almost nothing is dirty. (Assistant maintenance man)

The triangulation of the CBR information showed that a shift in consciousness was evident to a much greater extent in the juniors from first to fourth grade. For example, these students showed an important degree of participation during the lessons, which often



Figure 2. Students helping to maintain the school's surrounding green areas.

developed into small sustainable actions. In one of the latest frameworks of environmental education, Monroe, Andrews, and Biedenweg describe a sustainable action as:

more than activities that promote understanding or skill building, these strategies are building capacity for effective citizenship in a complex world. More than previous strategies that could conceivably be limited to environmental information, these strategies tend to include economic and equity concerns. (2007, p. 213)

This is an example of how sustainable actions were enabling students within the school:

In the gardens they [students] made sure that nothing would get damaged or if it did they would come and fetch me, even, when a twig was broken off a tree they came looking for me straight away [immediately], so they learned to value the gardens, green areas. It was the first time that the trees and flowers remained unbroken right up to the end of the year; the children even went to water the plants. In these parts I realized that the children learned to think, reflect ... Before the school was disgusting, but now they worry about cleaning up the wrappers. (Female teacher)

During the monthly parents' meetings with teachers, many parents reported greater environmental awareness and positive behavioural changes of the child outside school as a result of the new teachings at the environmental education course. These observations were evident in all of the students' interviews.

### 3.2. *The classroom*

The students in the first and second grades quickly understood and identified empathy, which they used to positively drive their thinking. Occasionally children became very emotional, as they pondered and shared their experiences and feelings during the lessons and interviews. In one of the field notes it was written:

Today I found Gonzalo from the first grade crying during the story, and I asked him why he was crying, and he told me that he could feel the sorrow of the character in the story. I have noted that the majority of students from first and second grade deeply empathise with the characters of the real life histories, many times I have found some of them even crying or in the contrary extremely happy depending on the character's feelings.

In third-grade and fourth-grade courses the role of empathy in guiding the processes of thought was not so obvious. However, these children were still open to critically analysing and sharing personal problems with the class without being affected by emerging emotions. In fact, the majority of students from the first to fourth grades were pleased to learn about empathy, recognizing it as a positive way to establish moral rules and solve problems affecting them individually and/or people close to them:

I am happy, because learning about emotion and thinking has helped me to correct my negative behaviours towards my friends and family, even nature. Now I am also using these things to advise my friends in the neighbourhood, it makes me very happy. (Male student, nine years old)

Finally, the majority of students from the fifth to eighth grades received the information conveyed during the course and became aware of and interested in developing critical thinking skills. However, only a small number showed a high disposition to think critically regarding the defining of goals and/or methods of intervention to solve problems. On the other hand, self-reports within the students' interviews showed that the course concepts foster the development of the disposition to maintain an open mind, self-confidence and the pursuit of truth (truth-seeking) in children from the first to fourth grades, facilitating the progressive development of critical thought processes. At the end of the school year most of these students responded to questions more truthfully, accurately, relevantly and clearly. These results were especially achieved in those grades where teachers from other subjects voluntarily reinforced the concepts taught in the environmental class throughout the week. For example, in April the following observation was recorded:

The teacher of the third grade made creative and pretty wall charts about the concepts of environmental love and the topics discussed in the lesson, and put them within the classroom. I can observe that she has reinforced and encouraged the practice of what is taught in the environmental course.

This initiative also fostered the development of self-discipline, and the ability to listen and to participate as a team of critical thinkers. The following quotation illustrates some of the teacher's observations:

I saw respect, order . . . we mostly deliver content through a guide because there are children who cannot write fast or read, we explain what we do, work and review, it is always somewhat monotonous. In contrast, in the course [environmental education] it was not about developing the traditional class work, but about listening; normally they get distracted even by a piece of paper, but they paid attention and applied the things they were taught, there was no need to call them to attention as much . . . Benjamin was very similar to Paolo [severe case of misbehaviour], but he began to think about his actions, returned and apologized. That was the most obvious case. He ended up being a gentleman; a small gentleman . . . In general there was a willingness to think critically. (Female teacher)

On the other hand, the presence of small groups of students with a high level of thoughtlessness tended to interrupt the programme's effects with their egocentric behaviours. For example, they thought of themselves during the talks and Life Lab activities, seeking to only benefit themselves. They sought gratification through passive or active distracting behaviours, regardless of whether this impeached upon the rights of peers or the teacher. In the moments when critical thinking and empathy challenged the students' way of thinking, especially during practical work at the Life Lab, self-centred actions were clearly visible and intelligible. However, throughout the course these uncritical behaviours were observed less. A field note stated:

At the beginning of the year [March] the student of the eight grade did not want to participate in anything and was restless. However, throughout the course the student became more willing to participate in outdoor activities, listen to the environmental love talks, and discuss problems that affected them. Today I have become impressed because even the most egocentric students are starting to participate, thoughtfully listening during the lessons, even the principal came to me and confirmed my observations about this important progress.

As the students' critical thinking abilities grew, which occurred for some more self-centred students, they slowly realized the value of using critical thinking and its dissimilarity to the actions or comments that seem to be a failure to engage the mind. They began to gradually leave their egocentricity behind and started to defend the rights and needs of the rest of their classmates and the teacher, identifying and refuting the self-centred and socio-centric behaviours of their peers in class, often leading to a real and tense debate.

### **3.3. Students**

Interviews revealed that students clearly recognized that their critical thinking was improving and that they felt a greater tendency to use their thinking skills when given the opportunity. This occurred mostly in environments different from the classroom. Students understood that the process of critical thinking begins with a problem or an issue. They learned to pay more attention to thinking using self-regulation. In other words, keeping an open mind and judging their own moral and emotional reactions to the topic, especially when the topic involved students' parents, friends or other loved ones:

This workshop helped me to think ... all this time [her life] there was like a box in my mind, full of things and issues that I did not understand [tears]. But now with what I have learned, the box opened, now I can see everything that was there. (Female student, nine years old)

The use of real-world environmental problems within the local community, the school community and the family gave students a context in which to immediately practice the course concepts. After the lesson the students could immediately start practicing with others at school and then outside the school. Students learned how to recognize their own bias and to consider new information. This information was often already at hand but their egocentricity and impulsiveness had not allowed them to recognize it, and to judge it according to its credibility. This shows the achievement of teaching empathy and critical thinking. The students, personally, came to judge based on the analysis of information and its implications for others:

It [the course] helped me to examine everything ... helped me solve the problem with my sister [older] in terms of not fighting so much, talking more, helping each other more ... it

helped me to think positively about all aspects of Francisca [sister] ... I feel happy now with Fran [Francisca] and we get along better, we can go to all different places together ... before the relationship was quite bad, whatever she said was wrong, I told on her, I answered back and I yelled. (Female student, 13 years old)

For the interviewed students this was the first course that requested them to understand and interrogate their own views on an issue. The ability to infer and the willingness to think critically improved significantly, especially with issues impacting the student's family and friends or topics that directly affected their own identity. Although teaching critical thinking is shaped by the instructors, the use of examples from the student's own life enhanced the development of their analytical skills. Besides, the same students constantly considered the responsibility of decision-making as a key factor in their development of thought processes, particularly in terms of the student's willingness to think critically:

It interested me when they talked about love; the boys [classmates] also enjoyed it. I don't hit the children anymore. I was thinking of the children when they had been scared of me ... when my aunty spoke to me I would act silly and wouldn't listen, not now ... and I don't swear at my mom anymore, or my aunt, because now I don't want to anymore ... now [when I think] I start talking quietly ... I can understand and observe more, I can also feel fear the same as the other boys, those who have been beaten, and I can also really appreciate the flowers [nature]. I noticed that before my family hardly noticed me but now they do ... my mom never wanted me to hit other children. I hit them and she was always angry, I spoke to her and she wouldn't say anything ... and now ... now I listen to my classmates, I have decided not to hit the other kids anymore, not to disrespect my aunt, and not to swear at my mom. Where I live, the other kids encourage me to be bad, but now I know that I should think and I say no ... I like to think, before I didn't know but then I realized, I'm not sure how. (Male student, seven years old)

Through discussions students were encouraged to carefully consider what they have done and learned. In any case, the programme involved reflection beyond anything verbal or written, encouraging students to communicate the significance of their discoveries, through their actions, to classmates and other people within the school community, family and general community (Figure 3). The dispositions for seeking truth, self-confidence in critical thinking and an open mind were developed especially in environments such as the home and the community. This was important because many students emphasized the key role that these activities played in stimulating thinking and, ultimately, learning.

It has been broadly discussed that the adverse socio-economic environment that children deal with and the national educational system that does not provide a curriculum allowing teachers to think critically both reduce the students' self-concept and their opportunities to abandon natural self-centredness behaviours (Miranda et al., 2010; Stanley, 1991). However, the results show that the adoption of an adequate educational approach for the development of both cognitive and affective skills may cause students to positively develop sustainable behaviours towards both people and the environment; seeing the last as an internal part instead of an external part of them. The effect of the programme was more important on students between the first and fourth grades than the older grades. Although the latter showed abilities to develop empathy and critical thinking, a one-year programme may not be long enough for them to utilize what they have learned. Perhaps multiple years of this programme would be necessary to obtain important developments both in affective and in cognitive skills (Ernst & Monroe, 2004).



Figure 3. Students working at the Life Lab.

When children use the given concept to conduct critical thinking with empathy, or as many of them mentioned ‘thinking with love’, in their own social, ecological and economical life, it transforms both them and the issue through the process of addressing problems. Thus, after one year of the programme, students already use these learned skills as practical tools for solving the problems they have been exposed to, helping them preserve and improve the school environment. These findings confirm the ideas of Wang and Ku (2010), who infer that if the teacher instructs children on affective education by making them think about the multiple facets of an issue, they would be able to develop critical thinking, minimizing the negative impact of their family environment. Indeed, students were able to face and solve serious problems such as family violence, co-existence, school bullying, vandalism and environmental awareness, to mention a few. These suggest that the strategies used can help to create a citizenry that is more informed and better able to bear complex world problems (Hofreiter et al., 2007; Singh, 2011).

Empathy helped to guide the thinking process and the development of character in harsh environments. For the children, love was the most interesting and valuable topic. They highlighted this by applying the concept of environmental love to the thinking process and how it drove them to endure and continue to grow as thinkers and keep fighting to solve the various problems in their lives. Applying positive psychology in a course of affective education in Taiwan, Wang and Ku (2010) found that teaching explicitly about positive emotions produces positive behavioural changes in children. We conclude that by integrating empathy with the teaching of critical thinking, and at the same time practicing them throughout activities in the local environment, children apply what they learn to solve problems not only in the classroom, but also in family and community life (Ackerson, 1992; Oswald, 2010; Santrock, 2006; Yeung, 2002).

Nevertheless, it should be noted that even when the size of the school community studied was important, it does not allow us to make generalizations about all schools in Chile. Similarly, there were many interactions during the outdoor activities that we did not see. So the purpose of the present study, as we mentioned at the beginning of this paper, is



not to be able to say what Chilean students think or feel, but it is intended as a window into the experiences of a particular student community that we spoke with and observed. Besides, students of the present study did explain the effect of the programme on their lives, but not all of them were able to clearly explain and differentiate which specific skills were improving the most. It should be noted that the present research focuses only on the effect of the programme on the student community. Because of the financial limitations, the programme focused mostly on the work with students, but more work and support could actively include other members of the school community. In this way we hope that in the near future we will see highly effective and articulated sustainability programmes that will seek to transform traditional schools into sustainable schools. We also hope this work will serve as a catalyst for further discussion and research on the formation of cognitive and affective capacities to cope with the present and future environmental problems, whether they are social, ecological or economical.

Seligman, Ernst, Gilham, Reivich, and Linkings (2009) used positive psychology interventions within an educational programme to allow students to develop strength of character that allowed them to conduct positive critical thinking in order to solve problems. In 2011 we used validated tests to measure happiness in all the schools of the San Esteban Region, and some of the statistical results show a direct positive relationship between the disposition to think critically and the level of happiness. These findings are being prepared for publication. Results from this could help to improve the impact and evaluation of environmental education programmes, such as those related to the outdoor learning experience, that seek to create citizens capable of solving local environmental problems (Carleton-Hug & Hug, 2010).

#### 4. Summary

This study highlighted the benefits of the development of critical thinking and empathy at a primary school level, giving consistency to previous empirical results within the educational field at both a national level (Miranda et al., 2010) and an international level (Ernst & Monroe, 2004; Hofreiter et al., 2007; Tuncay et al., 2012; Wang & Ku, 2010). Presented are new ideas for improvements to curriculum programmes in terms of education for sustainable development. The originality of this research is in showing that social knowledge contributes to the international debate on the role of critical thinking and emotion as well as the effectiveness of schools in solving environmental problems that plague today's society (e.g. environmental pollution, social well-being). In a world of environmental crisis where global sustainable development is critical, the present research has shown that critical thinking and empathy could help to improve the disposition towards sustainable behaviours in young citizens at a primary school level. However, future research should focus on understanding how critical thinking and empathy can help to balance the individual with a collective well-being. This includes conducting oneself in a way that is good for all. Furthermore, studies should also focus on the value different people place on living things and why. Importantly, how can critical thinking and empathy applied together help people to appreciate the environment, especially environments that are threatened? This is a complex area of study, but we conclude that the outcomes obtained from the teaching of critical thinking and empathy are very rich in diversity of scope and impact. When developing the affective domain, the student is comforted and willing to learn how to guide the thinking process. This involves an in-depth level of understanding of what is happening. The student is able to problem solve with more

clarity and security, while trying many different solutions. This is clearly part of the true essence of sustainable development (Monroe et al., 2007; Yang, Lam, & Wong, 2010).

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