ISSN: 2175-7275

DOI: 10.18605/2175-7275/cereus.v8n1p17-32.

SOCIO-ENVIRONMENTAL EXPERIENCES AND PERCEPTIONS OF ELEMENTARY STUDENTS FROM PATOS, PARAÍBA, ON ASPECTS RELATED TO SOLID WASTE

SANTOS, Larrissa Araújo[1]
MEDEIROS, Jamylle[1]
TAVARES, André Higor dos Santos[1]
OLIVEIRA, Habyhabanne Maia[2]
SILVA, Edevaldo[3]

ABSTRACT

The inclusion of environmental issues in schools is essential for students to become social actors aware of the current environmental problems. The objective of this research was to have a didactic experience and assess the knowledge about solid waste with students (N = 72) of two public elementary school in Patos, Paraíba. The research had two distinct phases: a didactic experience on solid waste and; assessment of the students' perception about Environmental Education and solid waste through interviews with a questionnaire. The didactic experience provided a dialogic and participatory moment with students, encouraging a

[1] Graduandos em Ciências Biológicas pela Universidade Federal de Campina Grande (UFCG).
[2] Engenheiro Florestal pela Universidade Federal de Campina Grande (UFCG).
[3] Professor Adjunto da Universidade Federal de Campina Grande (UFCG), Doutor em Química. E-mail para correspondência: edevaldo@cstr.ufcg.edu.br.

reflective discussion and presenting the basic knowledge on the subject. The students said they knew more about the selective waste collection (63.8%) and the 4 R's (48.6%). However, 43.1% had little or no knowledge about dry "trash", which can hinder proper selective collection. Among the environmental problems related to solid waste, they highlighted diseases (32.4%) and pollution in general (19.9%) and tended to confuse the concept of "trash" with the usefulness of the object (31.9%) and the reuse of recyclable materials (19.4%). The knowledge of the students reported the need to include Environmental Education in school, in a continuous, conceptual way and that provides the students more criticality and reflection on solid waste management. Their interest during the didactic experience confirms their interest in the area, which facilitates the approach and the teaching-learning process.

Key Words: Selective Collection, Environmental Education, Sustainability.

VIVÊNCIA E PERCEPÇÕES SOCIOAMBIENTAIS DOS ALUNOS DO ENSINO FUNDAMENTAL DE PATOS, PARAÍBA, SOBRE ASPECTOS RELACIONADOS AOS RESÍDUOS SÓLIDOS

RESUMO

A inclusão de temas ambientais nas escolas é fundamental para que os alunos se tornem atores sociais conscientes dos problemas ambientais atuais. O objetivo desse trabalho foi experienciar uma vivência didática e avaliar os conhecimentos em Educação Ambiental, particularmente, sobre os resíduos sólidos com alunos (*N* = 72) de duas escolas do ensino fundamental público do município de Patos, Paraíba. A pesquisa teve dois momentos distintos: uma vivência didática sobre resíduos sólidos e; a avaliação da percepção dos alunos sobre Educação Ambiental e

resíduos sólidos por meio de entrevista, com aplicação de um questionário. A vivência didática proporcionou um momento dialógico e participativo com os alunos, fomentando uma discussão reflexiva e apresentando os conhecimentos básicos sobre a temática. Os alunos entrevistados afirmaram que sabiam mais sobre a coleta seletiva (63,8%) e os 4R's (48,6%). Entretanto, 43,1% tiveram pouco ou nenhum conhecimento sobre o "lixo" seco, o que pode dificultar uma coleta seletiva correta. Dentre os problemas ambientais relacionados aos resíduos sólidos, eles destacaram as doenças (32,4%) e a poluição em geral (19,9%) e tenderam a confundir o conceito de 'lixo" com a utilidade do objeto (31,9%) e com a de reutilização de materiais recicláveis (19,4%). Os conhecimentos dos alunos reportam a necessidade da inclusão da Educação Ambiental na escola, de forma contínua, conceitual e que proporcione nos alunos mais criticidade e a reflexão quanto à gestão dos resíduos sólidos. O interesse deles durante a vivência didática confirma o seu interesse pela temática, facilitando a abordagem e o ensino aprendizagem.

Palavras-chave: Coleta Seletiva, Educação Ambiental, Sustentabilidade.

1. INTRODUCTION

Environmental Education in Brazil has been much discussed since the second half of the 90s, when there was the creation and implementation of guidelines and public policies in order to develop and promote Environmental Education in various educational settings such as schools, public agencies, social movement, and community (LOUREIRO, 2010), which can provide a more durable Environmental Educational knowledge (TOTH; MAKIUCHI, 2012).

Environmental Education is a transformative tool and its integration into the teaching-learning process is essential to civic education of students concerning social and environmental issues (LOUREIRO et al., 2012).

In this educational process, the school has a primary role (POLLI; SIGNORINI, 2012), involving the whole school community. However, the teacher plays an important part in mediating this knowledge and including Environmental Education in the school setting (PRADA; FREITAS; FREITAS, 2010; LAMOSA; LOUREIRO, 2011; SILVA et al., 2015a).

Among the main factors contributing to the development of initiatives in the environmental area are the increase of urban population and the growth of industries, once they are responsible for the excessive consumption of products and the inadequate disposal of waste (SOUZA; FARIAS; CANTO, 2014).

Solid waste are materials produced by various human activities and covers residential, industrial, commercial, hospital, construction, agricultural and urban cleaning wastes; separating them properly is the first step to establish a proper management plan (JULIATTO; CALVO; CARDOSO, 2011).

The selective collection is a simple process consisting of the separation of waste that can be recycled, being one of the ways to start new habits to reduce environmental impacts. With this knowledge, students can start sorting recyclable materials at school and multiplying this knowledge in their various social spaces. It is a way to impart in the students that small actions and gestures can contribute to improve the environment and that the school is also a place of awareness and learning (TRINDADE, 2011).

Besides the selective collection, there are several important concepts related to solid waste management that a continued and pedagogical Environmental Education would address effectively and contribute to a more profound knowledge on this subject, that would also sensitize students to be participatory social actors.

It is essential to educate students for a perception of more respect for the environment (VALE; VIANA, 2014), rescuing the valorization of nature (SILVA et al, 2015b), providing more harmonious interactions between man and nature (VASCONCELOS; SILVA, 2015) and strengthening ethical and socio-environmental values (VALENTIM; SANTANA, 2010).

The objective of this research was to have a didactic experience and assess the knowledge about solid waste with students of two public elementary schools in Patos, Paraíba.

2. MATERIAL AND METHODS

The research was conducted between May and September 2015, in two state elementary schools: Coriolano de Medeiros (ECM) and Rio Branco (ERB), both located in the town of Patos, Paraíba (Figure 1). Patos is located in the Caatinga Biome (coordinates: 07º 01' 28" S, 37º 16' 48" W), has approximately 100,000 inhabitants and covers an area of 473 km² (IBGE, 2014).

Figure 1: Map with the location of the municipality of schools surveyed.

The sample population was defined according to Rocha (1997), considering the total number of students enrolled in the final year of high school and a standard error of 10%. Thus, they interviewed 72 students in total (ECM: 29 students and ERB: 43 students). The students were between 11 and 15 years-old and were randomly selected (raffled) by the presence of the teacher list for the questionnaire.

The research had two distinct phases, namely:

Phase 1: Didactic Experience on Solid Waste: in which a didactic workshop was held with the theme "Waste: a serious problem in the modern world", that covered the main concepts on solid waste, their causes, consequences and possible solutions of its environmental management. In addition, there was a debate among researchers, teachers and students and an exhibition of materials (toys and decorative objects) made from recyclable materials by the Program of Action for Environmental Sustainability - PASS team.

Phase 2: Evaluation of students' perception about Environmental Education and issues related to solid waste: this phase was performed with the application of a questionnaire of eight questions, with five questions structured on the model of Likert scale with five levels of answers, ranging from "no knowledge" (level 1) to "much knowledge" (level 5). The questions were about issues or concepts related to Environmental Education and solid waste, namely: the 4 R's (Rethink, Reduce, Reuse, Recycle); organic and dry waste, selective collection (Table 1).

The teaching-learning materials used in both phases of research were developed carefully to cover all types of students and their ability to attention and learning. For this, the material was enriched with the inclusion of audio and visual training aids (videos, images and oral presentation in Power Point), in the first stage and; in the second stage, kinesthetic elements, with the exhibition of objects made from recyclable materials by PASS team. At that time, the students were able to touch the objects, analyze them how they were created and also do some objects manually. Thus, the teaching materials of the two research stages tried to involve students from their various senses and perceptions for greater educational success.

The evaluation of the didactic experience was done in a qualitative way, assessing aspects related to the involvement and attention of students during the approach of the subject, motivation and participation. Quantitative data were analyzed using descriptive statistics, using Microsoft Excel 2016 software.

This survey was conducted by the Extension Program entitled “Actions for Socio-Environmental Sustainability” (PASS, in Portuguese) from the Federal University of Campina Grande, campus of Patos, Paraíba and complied with the actual rules for research involving human beings, Resolution Number 466/2012 of the National Health Council / Ministry of Health, approved by the Ethics Committee on Research of the Alcides Carneiro University Hospital of the Federal University of Campina Grande (CEP HUAC/UFCG).

Table 1: Questionnaire applied to interviewed students.

Select the alternative that best reflects their understanding of the following issues: Consider: 1 - None; 2 - Little; 3 - Reasonable; 4 - Much; 5 – Very much.	
1. 4 R's: rethink, reduce, reuse, recycle	( ) 1 ( )2 ( )3 ( )4 ( ) 5
2. "Trash" Organic	( ) 1 ( )2 ( )3 ( )4 ( ) 5
3. "Trash" Dry	( ) 1 ( )2 ( )3 ( )4 ( ) 5
4. Knowing how selective collection	( ) 1 ( )2 ( )3 ( )4 ( ) 5
5. What is trash for you?	
6. Indicate what type of recyclable material should be placed in each collector color (blue, green, yellow, red, brown) in a separate collection.	
7. What problems or damage which you believe that the "waste" can cause?	
8. In your opinion what level of knowledge about environmental issues each group below gives you? Consider: 1 - None; 2 - Little; 3 - Reasonable; 4 - Much; 5 – Very much.	
Parents ( ) 1 ( )2 ( )3 ( )4 ( ) 5	Internet ( ) 1 ( )2 ( )3 ( )4 ( ) 5
School ( ) 1 ( )2 ( )3 ( )4 ( ) 5	PASS Program ( ) 1 ( )2 ( )3 ( )4 ( ) 5
TV ( ) 1 ( )2 ( )3 ( )4 ( ) 5	Friends ( ) 1 ( )2 ( )3 ( )4 ( ) 5

3. RESULTS AND DISCUSSION

3.1 TEACHING EXPERIENCE ON SOLID WASTE

Among the surveyed students, 30.5% (n = 22) were male and 69.5% (n = 50) were female. During the didactic experience, students were attentive, interested and participative. The lecture fostered a good discussion between students and lecturers. The didactic material presented an objective and illustrative content for better understanding (Figure 2).

In a similar survey by Vale e Viana (2014), in a state school in Piauí, where they transmitted knowledge through exposure of lectures and videos, they reported that this practice encourages reflection and conveys the importance of education on selective collection to educate a population with better quality of life and a cleaner environment.

Figure 2: Moment of the didactic experience in the schools Rio Branco (A) and Coriolano de Medeiros (B).

Classes involving Environmental Education within the school setting contributes to a better understanding and connection among students, educators and the environment (MORAIS, 2009). Thus, the inclusion of methods and pedagogical practices in the classroom, provide teaching on sustainability and Environmental Education (SILVA et al., 2016; ARAÚJO; PEDROSA, 2014).

3.2 ENVIRONMENTAL PERCEPTION OF STUDENTS ON SOLID WASTE

Students had a good understanding of the various subjects related to solid waste (Table 2), in which 48.6% (n = 35) said they knew a lot or much about the 4 R's, and only 25% (n = 18) had little or no knowledge about this concept. A similar percentage of students claimed to know between a lot and much about organic "trash" (40.2%, n = 39) and dry "trash" (43.1% n = 31 students).

Table 2: Frequency (%) of the students' answers about their knowledge of solid waste.

Issues related to solid waste	None	Little	Reasonable	Good part	Much
4 R's: rethink, reduce, reuse, recycle	4.2	20.8	26.4	26.4	22.2
"Trash" Organic	11.1	22.2	26.4	29.2	11.1
"Trash" Dry	13.9	29.2	29.2	16.8	11.1
Knowing how selective collection	12.5	16.8	6.9	19.4	44.4

Among them, 54.2% (n= 39) could correctly match the residue with its respective collector (Blue: papers; Green: Glasses, Red: Plastics; Yellow: Metals and Brown: Organics).

However, for one-third (35.0%, n = 25) of the students, that knowledge is partial, where they do not know at least, what waste to put into one or two collectors. Other 11.1% (n = 8), do not know the practice of waste separation of a selective collection (Figure 3).

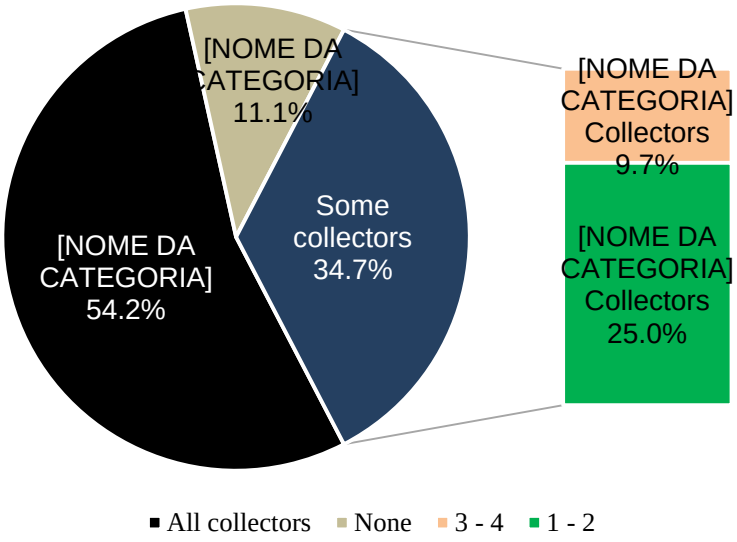

Figure 3: Percentage Analysis about the students' knowledge about the use of 5 selective collectors (blue, yellow, green, red and brown) for selective collection (N = 72 students).

The knowledge of students to carry out the selective collection is one of the easiest and simple actions to start new habits related to management of the solid waste they produce. In this regard, the selective collection has an interdisciplinary dimension that goes beyond the action of separating recyclable waste. Thus, education for the selective collection is a way to awaken small actions and gestures in students that can contribute to improving the environment (TRINDADE, 2011).

Besides the selective collection, there are concepts necessary for student learning, such as knowing that waste is not "trash", because "trash" is also defined as reject. Reject is considered all the material exhausted of all possibilities for reuse and/or recycling and have no other means than the final disposal in a proper location (BRASIL, 2010), being devoid of value. While the solid waste is material that can be reused and recycled, that is, can be reused with added value.

Students also confused the concept of "trash" with other concepts such as "reuse" and "recycle". Reusing is to use that material again by creating objects that become useful again, preventing that waste to be thrown away; recycling is to transform the product into a new raw material (BRASIL, 2009). The distinction between these concepts was not clear to 11.1% of the respondents.

Among the environmental problems related to solid waste perceived by students, disease transmissions (32.4% n = 44) and pollution (19.9% n = 27) were the most cited (Figure 4), followed by floods (13.2% n = 18) and sewage (12.5% n = 17).

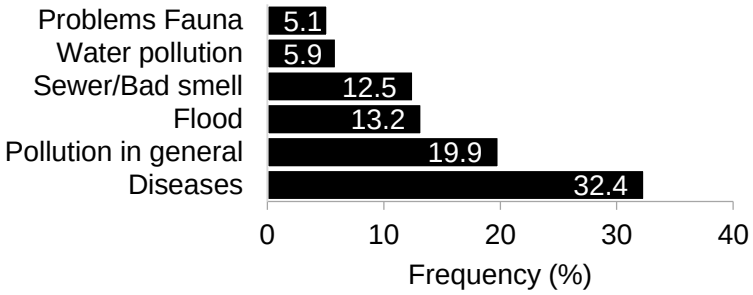

Figure 4: Percentage of the students' citations for environmental damages that may arise by poor solid waste management (N = 72 students; 136 citations).

For most students, the main responsible for transmitting between little and much knowledge on solid waste is the school (88.9%, n = 64) and the PASS program (69.4%, n = 50). Conversely, this information is little shared between their friends and them (59.4%, n = 42; Figure 5).

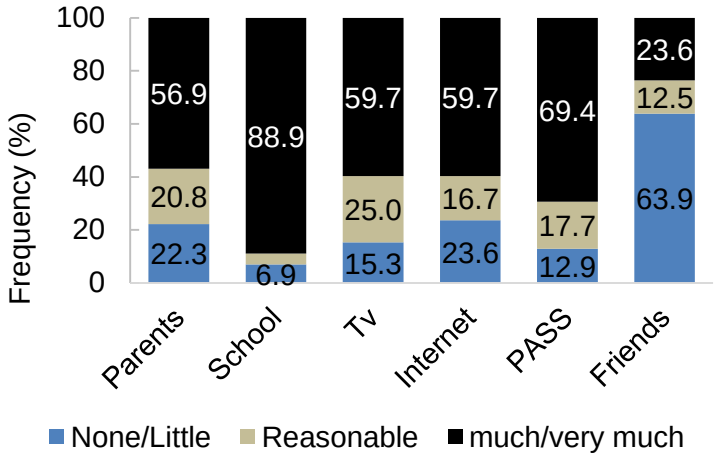

Figure 5: Frequency (%) with which people and social media contribute to the students' knowledge on solid waste (N = 72).

Thus, school, educators and institutional programs, such as the PASS Program, are fundamental and work to sensitize students about the various environmental issues, such as solid waste.

About 9.7% (n = 07) were unable to conceptualize what is "trash" (Table 3). Most students tended to perceive it as something useless that needs to be thrown away (31.9%, n =

23) or confused it with the meaning of reuse (19.4%, n = 14).

Table 3: Percentage (fr) and absolute (fa) frequency of the students' answers to the concept of "trash".

Concept	fa	fr
Things that can be reused	14	19.4
Thait it does not needed no more and throw away	23	31.9
Thing that harms the ecosystem and pollutes the environment	10	13.9
Rest of food/Objects	09	12.5
Things that can not be recycled/ reused	09	12.5
No answer	07	9.7

Thus, most students do not understand well what is "trash" and other terms related to solid waste. This suggests that there is a lack of inclusion of environmental education in the context of lessons or she is being applied inefficiently as it relates to matters on solid waste.

The inclusion of Environmental Education in the classroom is essential to involve and sensitize students to this environmental problem and there are several studies that examine the efficiency of such inclusion. Among them is the Projeto Escola Ação (School Action Project), developed in a state school in Maceió, Alagoas, created to propose Environmental Education through the encouragement of selective collection and, with this, to form a socio-sustainable, supportive, humane environment that works in training the student as a knowledge multiplier (PALMEIRAb MORAIS, 2015).

Marchy; Ferreira (2014) included, in an Organization of Civil Society of Public Interest, in São Leopoldo - Rio Grande do Sul, practical actions directed to workshops, visits to degraded environments and, in the community, these actions have enabled the students to observe the degradation caused by human activities, and through those actions, to promote awareness, educational readjustment and improvement in the quality of life.

Thus, Environmental Education can help students to face the man-nature relationship, based on a new ethic, working moral values and a

better way of seeing the world (VALENTIM; SANTANA, 2010; VASCONCELOS; SILVA, 2015).

According to Alcócer et al. (2015), a limiting factor for the inclusion of Environmental Education in the school is the lack of commitment of schools to develop projects in this area. In their research, more than 50% (n = 50) of the 99 students understand that discussing about Sustainability was a rare activity, which impairs the conscious development and interaction between the school and the community. The data reported here confirm the importance of the school, since 88.9% (n = 64) of students from both schools said that the school contributed significantly to their environmental knowledge.

In order to strengthen Environmental Education in the school, it needs to be recommended in the Pedagogical Project of the school and considered in its various projects throughout the school year, in an inter- and transdisciplinary way.

For this, it is clear that beyond the interest of the school in introducing Environmental Education in the school curriculum, there must be teacher training so that they can work the various issues and the environmental knowledge in a safe and transdisciplinary manner. Some surveys confirm the deficiency of educators to address Environmental Education in the classroom (SILVA et al., 2015a).

4. CONCLUSIONS

The students' interest during the didactic experience shows that the issue of solid waste is attractive to them, making the approach and the teaching-learning process easier. The respondents have little knowledge about environmental issues related to solid waste, suggesting the imminent need to include Environmental Education continuously and systematically in these schools so that the diverse knowledge about environmental issues, such as solid waste, are discussed and reflected upon.

The teaching on solid waste management is essential for students to acquire adequate knowledge on this topic and become citizens aware of this problem and, above all, become

mediators of this knowledge so that their community has more sustainable attitudes.

5. ACKNOWLEDGMENT

The Extension Scholarship Program (PROBEX) of the Federal University of Campina Grande for the financial support of scholarships for the PASS Program.

REFERENCES

ALCOCER, J. C. A.; RODRIGUES A. M.; PINTO, A. L. A.; SILVA, C. H. F.; BARROSO, H. O.; OLIVEIRA, M. M.; MARTINS, V.; FONSECA, A. M.; SOUZA, D. F.; COELHO, F. **Tecnologias sustentáveis, sustentabilidade e práticas pedagógicas no ensino médio.** *Linkania Revista Cientifica,* v. 5, n. 1, 2015, p.149-169.

ARAÚJO, F. F. M.; PEDROSA A. M. **Desenvolvimento sustentável e concepções de professores de biologia em formação inicial.** *Revista Ensaio*, v.16, n. 2, 2014, p. 71-83.

BRASIL, ***Agenda Ambiental Na Administração Pública (A3P).*** Ministério do Meio Ambiente. Brasília. 5ª edição. 2009. Disponível em <http://www.mma.gov.br/estruturas/a3p/_arquivos/cartilha_a3p_36.pdf> Acesso em: 18 abr. 2016.

BRASIL, Lei n. 12.305, de 2 de agosto de 2010. ***Política nacional de resíduos sólidos*****.** 2. ed. Brasília, DF: Edições Câmara, 2010. Disponível em: <http://fld.com.br/catadores/pdf/politica_residuos_ solidos.pdf>. Acesso em: 18 abr. 2016.

IBGE - INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICAS. ***Cidades@: Infográficos*****: Dados gerais do município de Patos, Paraíba. 2014.** Disponível em: <http://cidades.ibge.gov.br/painel/painel.php?codmun=251080>. Acesso em: 23 ago. 2015.

JULIATTO, L. D.; CALVO, J. M.; CARDOSO, E. T. **Gestão integrada de resíduos sólidos para instituições públicas de ensino superior.** *Revista Gestão Universitária na América Latina,* v. 4, n. 3, 2011, p.170-193.

LAMOSA, C. A. R.; LOUREIRO, B. F. C. **A Educação Ambiental e as políticas educacionais: um estudo nas escolas públicas de Teresópolis (RJ).** *Educação e Pesquisa,* v. 37, n. 2, 2011, p. 279-292.

LOUREIRO, C. F. B. **Educação Ambiental no licenciamento: uma análise crítica de suas contradições e potencialidades.** *Revista Sinais Sociais*, v. 5, n. 14, 2010, p. 10-35.

LOUREIRO, C. F. B. ***Trajetória e fundamentos da educação ambiental*.** 4ed. São Paulo: Cortez, 2012.

MACHRY, T. A.; FERREIRA, L. R. **Práticas de Educação Ambiental nas cidades de são Leopoldo e Porto Alegre.** *Caderno Meio Ambiente e Sustentabilidade*, v. 4, n. 3, 2014, p. 156-170.

MORAIS, M. F. ***A utilização de métodos participativos no ensino de engenharia de produção*: o caso do curso de engenharia de produção agroindustrial da FECILCAM.** In: IV Encontro de Produção Científica e Tecnológica, v. 1, 2009, p. 1-12.

PALMEIRA, O. H.; MORAES, S. J. ***A Educação Ambiental como ferramenta de conscientização e mudança de atitude social na escola estadual doutor José Maria correia das neves*.** In: 8º Encontro Internacional de Formação de Professores, v. 8, n. 1, 2015, p. 1-14.

POLLI A, SIGNORINI T. **A inserção da educação ambiental na prática pedagógica.** *Ambiente & Educação*, v. 17, n. 2, 2012, p. 93-101.

PRADA, L. E. A.; FREITAS, T. C.; FREITAS, C. A. **Formação Continuada de professores: alguns conceitos, interesses, necessidades e propostas.** *Revista Diálogo Educacional*, v. 10, n. 30, 2010, p. 367-387.

ROCHA J. S. M. ***Manual de Projetos Ambientais*. Santa Maria: UFSM**; 1997.

SILVA, E., OLIVEIRA, H. M., NASCIMENTO, A. L. R. **Environmental Education in Biology in public schools Pombal, Paraíba, Brazil.** *Revista Brasileira de Educação Ambiental*, v. 11, n. 1, p. 12-24, 2016.

SILVA, E., SILVA, F. G., SILVA, R. F. L., SILVA, R. H., OLIVEIRA, H. M. **Avaliação do saber ambiental de professores do ensino público do município de São Bento, Paraíba.** *Scientia plena*, v. 11, n. 9, 2015a, p. 1-11.

SILVA, R. H.; MARINHO, M. G. V.; SILVA, E.; SILVA, F. G. **Etnobotânica como subsídio para conservação das espécies vegetais utilizadas pela população ribeirinha do Rio Piranhas, São Bento, Paraíba.** *Scientia plena*, v. 11, 2015b, p. 1-12.

SOUZA, B. A.; FARIAS, E. S.; CANTO, R. V. **Gestão integrada de resíduos sólidos no município de Santana do Livramento: Uma análise à luz da Lei 12.305/2010.** In: 3º Forum Internacional Ecoinovar: Inovação sem fronteiras: conectando ideias e soluções sustentáveis", Santa Maria – RS, 2014. Disponível em: < http://ecoinovar.com.br/cd2014/arquivos/artigos/ECO469.pdf>. Acesso em 18 de abril de 2016.

TOTH, M.; MERTENS F.; MAKIUCHI, R. F. M. **Novos espaços de participação social no contexto do desenvolvimento sustentável - as contribuições da Educomunicação.** *Ambiente e Sociedade*, v. 15 n. 2, 2012, p. 113-132.

TRINDADE, N. A. D. **Consciência ambiental: coleta seletiva e reciclagem no ambiente escolar.** *Enciclopédia Biosfera*, v. 7, n.12, 2011, p. 1-15.

VALE, M. W.; VIANA, S. A. B. **Projeto coleta seletiva, um desafio escolar. *Revista do Plano Nacional de Formação de Professores da Educação Básica***, v. 2, n. 2, 2014, p.100-114.

VALENTIN, L.; SANTANA, L. C. **Concepções e práticas de Educação Ambiental de professores de uma escola pública.** *Ciência & Educação (Bauru)*, v.16, n. 2, 2010, p. 387-399.

VASCONCELOS, H. D. L., SILVA, E. **Research in environmental education in the state of Paraíba, Brazil: analysis of its insertion and professors' commitment in post-graduate courses.** *Revista Brasileira de Educação Ambiental*, v. 10, n. 2, 2015, p. 113-125.

Recebido em: 23/01/2016
Aprovado em: 26/04/2016