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The understanding of solid wastes from healthcare services in academic education: a contribution to environmental education*

Corrêa, L.B.[1]; Lunardi, V.L.[2]; De Conto, S.M.[3]; Galiazzi, M.C.[4]

[1]Graduated in Home Economics. Master's Program in Environmental Education/FURG - Fundação Universidade Federal do Rio Grande.

[2]Nurse. Doctor in Nursing. Professor of the Nursing Department/FURG – Fundação Universidade Federal do Rio Grande.

[3]Chemical Engineer. Doctor in Education. Professor at the Centro de Ciências Exatas e Tecnologia and Researcher of the Instituto de Saneamento Ambiental/UCS – Universidade de Caxias do Sul.

[4]Chemist. Doctor in Education. Professor at the Chemistry Department/FURG – Fundação Universidade Federal do Rio Grande.

ABSTRACT

This article shows solid wastes of health services have been approached in the process of formation of undergratuation courses of the field of health. Data were collected from coordinators, teachers and students of the courses of Dentistry, Veterinary Medicine, Nursery-Obstetrics and Medicine of a Public Institution of higher education in the southern region of Brazil. A reform of teaching is taken as necessary, in order to include in the pedagogic processes new understandings: of integrality, articulation, dialogue, problematização, so that to prepare future professionals for facing the problem of solid wastes of health services, with responsibility and commitment.

Key words: Formative process; university learning; solid wastes of health services; environmental education; social commitment.

INTRODUCTION

We have faced serious challenges these days, such as the complexity and the diversity of the environmental issues. Considering the sources of environmental degradation, the solid residues generated in health services show an important peculiarity: when they are inadequately managed, they pose potential risk to the environment. This issue has increasingly worried health and environmental

institutions, city halls, technicians and researchers in this field. It can be observed in the amount of current legislation and the constant references made to this issue; they suggest that rules for the management of residues should be applied to places where health services are provided (COELHO, 2000).

The need to implement management policies on solid residues in health services (SRHS) in all institutions that provide medical care is unquestionable. It is not only important to invest in the organization and the systematization of the sources, but also to awaken awareness, individually and collectively, of the responsibility for the human life and the environment. In this sense, professionals must worry about the residues generated by their activities and aim at minimizing risks to the environment, to the workers' health and to people in general. Deficiencies may happen in graduation courses if they do not emphasize the study of this theme nor invest in researches on this issue. Solutions depend on several decisions taken in different levels of the system, such as professionals who have not graduated in the compartmentalized way proposed by some universities **(**(FORMAGGIA, 1995; STÉDILE, et al., 2000; SCHNEIDER, et al., 2002; COELHO, 2003).

Not including the approach to SRHS in the education process of future professionals may be one of the factors to explain what happens nowadays regarding these residues, both in the health services and in the environment.

Constructing this knowledge is fundamental to the education process in health courses, so that students learn about the different phases of the residue management process, i. e., classification, separation, packaging and so on. However, we believe that this knowledge is not enough since the exercise of citizenship and the sense of duty towards this issue are also required.

Therefore, problematizing this issue seems relevant in the context of environmental education. We understand that, in order to implement techniques to manage residues in the different sources in health services, it is necessary to invest in all health professionals so as to prepare and empower them to deal with this issue.

This study aims at: a) learning about the education process of health professionals regarding the SRHS phenomenon; b) learning about how the SRHS content has been worked on in curriculum activities; and c) learning how students have understood the approach adopted to SRHS during their education process.

METHODOLOGY

This study is a qualitative research (MINAYO, 1999) carried out at Instituição Federal de Ensino Superior – IFES, a federal university located in the south of Brazil. The focus was the following graduation courses in health: Veterinary Science (VS), Medicine (M), Nursing/Obstetrics (N/O), and Dentistry (D).

The subjects of the research were four graduation course coordinators, three professors – two of them teach specific disciplines which aim at developing this knowledge - and fourteen college

students in the following graduation courses: four of them study (D), three of them study (VS), three of them study (M), and four of them study (N/O).

Semi-structured interviews and the documentary analysis were carried out in order to collect data. The interviews focused mainly on the phases of residue management; experiences in theoretical and practical activities; weaknesses and/or strengths regarding how SRHS was approached in the education process; the course, the syllabus and the political-pedagogical project; the development of the content and the methodology concerning SRHS in the discipline; and the references and sources used to teach the SRHS content.

Firstly, we carried out the documentary analysis of the political-pedagogical plans of the courses under investigation, their syllabus, and the teaching plans of disciplines which would approach SRHS, according to the course coordinators. The documentary analysis also helped in designing the interviews since it allowed that the SRHS approach adopted by graduation courses be known.

Concerning ethical aspects, this research project was approved by the Ethics Commission of the Santa Casa de Misericórdia, a hospital located in Pelotas, RS.

Based on the content analysis proposed by Moraes (2003), the following two categories were constructed:

THE APPROACH GIVEN TO SOLID RESIDUES IN HEALTH SERVICES DURING THEORETICAL AND PRACTICAL EXPERIENCES IN THE EDUCATION PROCESS

"Education for the SRHS approach in a theoretical perspective" focuses on learning experienced in the disciplines that deal with this content, either in their teaching plans or implicitly while developing other content in different disciplines.

Regarding the SRHS approach which is described in teaching plans, we have pointed out the discipline called Environmental Health in N/O; and the one called Sanitation in VS. Despite the relevance of these findings to the education process developed by these courses, the interviewees mentioned some weaknesses - and some strengths - these disciplines present.

The subjects in N/O seem to have a broader SRHS approach than subjects in VS, even though they do not have a good comprehension of the process as a whole: *…For me, in this case, it would be: What is it? Why? What is the advantage? What is the disadvantage for the future? Why do they (professors) say: you have to it, separate the contaminated material from the uncontaminated one; but they do not explain why it must be done, why we must contribute, the benefits it will bring. What is the advantage? How is it collected? How much does it cost to the institution? These things pass. Where is it taken to? How is it done? If it were so, I think it would raise our awareness; so, when you do it, you think it over, it is not only a mechanical act… (Student 2/NO).*

It seems that what the students point out – the lack of deepness regarding this content – is their lack of understanding of the phases of residue management, as well as the implications of an

inadequate management for people's health and the environmental preservation. Hence, the need for a systemic view in the teaching process, so that it can favor students' relational, interconnected thinking in an interdisciplinary view which shows that everything that exists, in fact, co-exists, and that nothing exists outside its connections and relations (MORIN, 2002; MORAES, 2004).

In VS, the SRHS approach is developed as content about solid residues; but the students mentioned that emphasis was given to the treatment and the disposal of residues. Even though this focus is relevant, the other phases and the health professionals' responsibility for residue generation must be taken into consideration: minimization, recycling, separation, management, packaging, collection, and storage. At this point, we have posed questions about how this knowledge is developed with the students. Is their education process problematized, consonant with the real world of their professional practice?

Pertinent knowledge can locate any information in its context, in a globalized and articulated way. Therefore, besides the SRHS content taught in Environmental Health and Sanitation, we think that this content cannot be accumulated, imposed, piled up, but it should be problematized and articulated with the other disciplines so that the knowledge can be integrated and can make sense in the education process. After all, intelligence that cannot perceive the context gets blind, unconscious, and irresponsible (MORIN, 2002, p. 15).

The broken knowledge regarding SRHS, mentioned by the students, may happen due to its (dis)articulation with the other phases of the education process and with the content of other disciplines. It prevents students from making a connection between what they learn and the rest of the process and their professional life: *…because there are disciplines we only study once, and never again (...) we talk, but, after that, other professors do not connect this knowledge to their disciplines; this one about residues, as far as I remember, only in Environmental Health…(Student 1/NO).*

The gap that exists among disciplines makes it impossible to grasp what is "woven together", i. e., the complexity. Thus, besides reforming the fragmentation in teaching, it is necessary and urgent to reform thinking so that we can rescue our own human condition. In other words, it is important to understand that our actions have relations with the different dimensions of reality, that everything is interconnected, and that the human being is part of this broader context. Rather than isolating objects from their contexts, we must unite, and awaken curiosity, critical spirit, doubt, and the everlasting ability to question: "we live constant uncertainty", and, because of it, the teaching system must prepare people to face the challenges of a global and complex life, in social, political, national, world, and everyday dimensions (MORIN, 2002).

Pimenta and Anastasiou (2002, p. 28) present "the paradigm of complexity as a possibility to base news forms of curriculum organization on. Disciplines would be more integrated and teaching methods would favor the construction of more meaningful knowledge to the students' human and professional education". Separated, fragmented, and compartmentalized knowledge which is usually presented and developed in disciplines in higher education becomes increasingly inadequate because

we need to think of reality as problems that are multidisciplinary, global, and planetary. Approaching contents as a whole in an education process may contribute to develop different thinking, in an integral perspective.

Another weakness pointed out by the professors and the students refers to the number of hours of the NO disciplines because only one hour per week is used for the students' presentation on the topic; in VS, three hours per week are used to study residues – a little is reserved for SRHS: … *when I attended Environmental Health, it was very superficial. When she taught it (residues), in fact, she didn't (...) because we presented the topics. So, we researched on it. I wanted to present a work on residues; that's why I know more, but we only talked about the topic when we presented our research. Our classmates didn't question us and the professor didn't seem to know the subject, so…(Student 1/NO).*

The number of hours assigned to develop certain content in a discipline may be associated with many elements, such as its importance in professional education, the importance of the other contents in that discipline, how important it is to develop following contents, references that are available, and even the professor's mastery of this knowledge.

However, if teaching provided opportunities for relation and interaction among disciplines and the articulation of knowledge and context, time would probably not be a limitation on content development. According to MORIN (1999), separated thoughts must be replaced by others which establish connections. Therefore, "the primary mission of teaching and an educator's challenge means learning how to re-connect, and how to problematize knowledge, at the same time".

We could notice that the students' presentation did not trigger reflection and discussion about the SRHS approach, such as: daily generation of residues in a health institution and in the universities; different material used in these institutions and its destination; occupational accidents which happened due to the management of this material; and social commitment and ethical questions regarding this issue.

According to Abreu and Masseto (1985 apud GODOY and CUNHA, 1997, p. 88), students' presentations used as a teaching strategy "… are about a theme that is studied by the students taking into consideration different points of view; then, students collect the results of partial studies and synthesize them to arrive at a conclusion". Thus, it demands that the professor should have organizational skills, ability to synthesize, and be able to keep good relationship with the group; this means that discussion must be allowed, every student must be able to give his/her opinion, wait-time must be increased, and group interaction must be favored among students.

Sanitation was the discipline in which the professor gave speeches about the topic; it was centered on the professor while students listened, rather than discussed. Once again, it seems that discussion about SRHS was not encouraged, which agrees with Godoy (1997, p. 76): in this kind of class, students may even a chance to ask and to take part in little discussions, but they listen and take notes most of the time.

Taking into account the multiples dimensions in which this approach can be focused on, several questions can be posed, mainly in terms of ethics. Integral ethics reveals the responsibility a human being has towards him/herself, others, and nature, associated with solidarity feelings which connect him/her to living and dead beings and to the world as a whole. It means bigger responsibility towards life, the human body, and all established order. It is responsibility towards the whole - every student and professor takes on his/her part (MORAES, 2004, p. 229). Thus, it is important to point out the pertinence of the theme under investigation to environmental education, since the SRHS phenomenon, or any kind of residue, is related to the social commitment of people who generate it, possibilities and difficulties in minimizing it, re-use, separation, and other phases, besides ecological implications of our actions and omissions. This commitment means a new way to relate to the world. We have to do complex thinking, i. e., we need broader thinking so as to better understand society, nature, and life. In doing so, we will understand that everything is interconnected, that we are part of a whole and that the whole is also part of us; that everything we do relates to a totality that is bigger than us and our acts (MORIN, 2002).

A generalist, humanistic, critical, and reflexive education is proposed in the National Curriculum Norms; it is necessary to review how methodologies are adopted by professors in the teaching process. We have to be open to the challenges brought by uncertainty to our everyday activities and to question our actions constantly so that pedagogical processes do not accommodate at any moment, and are followed by questioning and doubt looks.

It may be possible that in an education process which does not provoke criticism – problematization – students do not perceive the generation of residues and their destination both in the university and in other places. They will not learn the implications this fact has for the environment. Hence, the importance of the relation this study establishes with environmental education towards critical and reflexive sense in a holistic approach, since everything is interconnected (BERNA, 2001, p. 101).

Loureiro (2004, p. 24) also emphasizes that “environmental education is committed to social transformation, the subject’s emancipation in order to develop citizenship, as we educate ourselves, have a dialogue with ourselves, the community, humanity, other living beings, and the world and act as a social and planetary being”.

We also observed that professors who teach Environmental Health had planned to visit places where students could see how residues were treated, such as recycling sites, companies that collect and treat residues in health services, and the city’s landfill sites in order to get a better understanding of the knowledge, but, due to the lack of funds in the public institutions, they could not pay for the transportation of the students. However, it is important to mention that the professors of these disciplines noticed that it not fundamental to leave the institution to visualize the SRHS approach, since NO is developed in the same area of the Medicine Ambulatory, where people are assisted and

residues are generated. VS is also developed near the Veterinary Hospital where animals undergo different procedures; therefore, residues are generated.

In the same environment in which disciplines are developed, the SRHS approach can be observed,, analyzed, and problematized by students, favoring the development of their critical awareness, reflection on this theme related to their professions, and awakening their responsibility and social commitment to this issue. However, to make it happen, professors must articulate theoretical content and these practical situations in the institution, considering its common features, divergences, and possibilities of approaching them. The National Curriculum Norms regarding Graduation Courses – CNE/CES no. 3, 4, and no. 3, 105 (BRASIL, 2001a, 2001b, 2002a, 2002b) emphasize that the articulation of theoretical and practical activities is fundamental since the beginning of the course in an integrated and interdisciplinary way.

"Education for the SRHS approach coping with the practice" shows how SRHS have been approached through practical situations that the subjects have experienced in their education process; these experiences happen mostly in health institutions, so, closer to the real world, where students will perform their future occupations.

Data in this category were organized according to the phases of the SRHS management process, i. e., generation, separation, packaging, storage, collection, treatment, and final disposal. We also tried to articulate the management phases that were not mentioned in the interviews such as minimization and recycling.

It seems to be evident that the subjects/students have some idea about some of the management phases, their importance and implications, but they are fragmented and isolated notions. At the same time, students express the need and the wish to articulate the SRHS process as a whole. However, thoughts based on totality capture the relations, mutual interrelations and implications, multidimensional phenomena, realities which are sympathetic, conflictive, and respect diversity whereas the unit, an organizing thought, generates the reciprocal relation of all parts (MORIN, 1999, p. 14).

Regarding the phase of residue generation, students in NO and M reported some experience in a practical class: …*in the Anatomy class in the first semester, we generated a lot of gloves (...) at the end of each class we used to throw them into plastic bins…(Student 3/NO). ... I even thought about where this pile of gloves would go. What happens afterwards, I never asked the professor about it, never, really… (Student 1/M).*

If this issue had been problematized since the beginning of the education process by showing the implications and the importance of the different management phases, and by articulating it and the other situations the students would face in their practice, better understanding and preparation would probably have happened. Facing this issue would have been easier for the students during their education process and professional life.

When they started practical activities in three courses – NO, D, and VS – the students mentioned that they had experienced an orientation process about SRHS separation and packaging but they questioned their lack of understanding of the whole process; this fact shows that, even though they understood the process, they feel very insecure as future professionals who have to deal with it in real practice.

Separation and packaging are extremely important for the continuity of an adequate management process – it requires the collaboration and commitment of all people involved, since separation has the following benefits: a) to minimize residue generation; b) to allow adequate management, treatment, and final disposal, according to each category; c) to minimize the costs of its treatment and final disposal; d) to avoid contamination of a large number of residues by a small dangerous number of them; e) to separate sharp to avoid accidents during management; and f) commercialize recyclable residues (TAKAYANAGUI, 1993; SCHNEIDER, et al. 2004).

VS students also mentioned their professor's orientation, however, they identified and experienced problems to deal with residue segregation because of the lack of adequate material for packaging: … *while being a monitor in the veterinary hospital, I noticed that, sometimes, there was no material, no bags, no boxes for needles. The old box is overflowing with material; it's hard, we end up throwing everything in the same trash bin… (Student 3/VS).*

Another question can also be posed: is anyone making this future professional think about his/her work, based on ethical awareness, responsibility, and commitment to the quality of life in his/her environment? Taking into account the political-pedagogical project and the national curriculum norms for the courses under investigation in this study – CNE/CES no. 3, 4 and no. 3, 105 (Brasil, 2001a, 2001b, 2002a, 2002b), we can notice that they suppose the development of a general professional, with a sound technical-scientific, humanistic, and ethical education; with knowledge, skills and behavior that allow him/her to decide and act safely and wisely to promote health and prevent illnesses, so that social demands can be met in a sustainable way to promote quality of life.

For the people involved, the apparent lack of commitment to the environment and its safety does not mean any penalty for their actions. However, the SRHS issue is something larger; it goes beyond an individual act, and requires ethical awareness, responsibility towards the environment we belong to, citizenship, and respect for others. Therefore, environmental education is very important, since it aims at educating citizens who are aware of their rights and duties and who show local and planetary awareness, based on critical and innovative spirit which promotes transformation and the construction of a society in a holistic perspective (GADOTTI, 2000, p. 68).

D, NO, and M students and a VS professor mentioned difficulties regarding residue storage: … *here in college, the garbage is taken out, and locked in a kind of cage, but it is visible from the sidewalk. Sometimes, there are gloves hanging from the cage. On weekends, beggars break the lock to get plastics and spread everything on the ground… (Student 1/D).*

In fact, no places are kept for the storage of residues generated in health services; this fact was also verified by Mandelli (1997) when he carried out a study about solid residue management in urban houses. Probably, SRHS are not only a concern of professionals in health services, but also a preoccupation of other areas such as engineering, architecture, etc.

Back to the political-pedagogical projects of the courses, it is possible to observe that they suggest an education process based on the principles of ethics, respect, and social responsibility, from the perspective of integrality, so that the professional should be able to work collectively in his/her profession and everyday life, to fight for the improvement of the quality of life, to defend and preserve life, to establish relations with the social context. S/he must recognize the structure and the forms of organization, their transformations and expressions in citizenship construction. They must also be reflective, participative, and critical of reality. So, this behavior towards inadequate storage, according to student 1/D – exposing residues to people who may not know their dangers and implications for the environment – is linked to ethics, respect, social responsibility, and citizenship, besides preservation and promotion of quality of life. The issues that were mentioned need to be analyzed in the education process in order to review its contribution to develop a subject that is able to transform everyday problems.

Therefore, we understand the relevance of environmental education in the sense of a discussion, and re-appropriation of certain values, such as the ones concerning ethics, citizenship, respect, responsibility, and social commitment; usually, they are not in the most immediate level of awareness, but have been repressed throughout a long historical process (GRÜN, 1996, p. 22).

Regarding the collection of solid residues in health services, NO students mentioned the risks of occupational hazards associated with this phase. In places where there is generation of residues, their internal collection is usually carried out by the hygiene staff: …*there was an accident with the janitor in the health center where we were apprentices. She tried to arrange the syringes and needles that were in the box. It was full, overflowing. She ended up having an accident with the needles, which has traces of blood. Well, the box had been badly assembled by the staff in this health center. You know, it has many parts to avoid accidents but they neglected some, threw them away… (Student 2/NO).*

We noticed that, in general, accidents connected to residues, mainly associated with cutting materials, are neither mentioned nor discussed in practice. This carelessness towards reality is an ethical issue related to an individual's responsibility for him/herself and the others, based on values of solidarity and responsibility for life, the human body, and the environment. Responsibility towards the whole; everyone has to take on his/her part. Talking about ethics means talking about values, parameters that lead relations among individuals and society, among means and goals. Values, rather than being taught, in fact, need to be experienced in everyday life, in our different activities; ethics would need to be present in the essence of the educating act (MORAES, 2004).

Regarding the treatment of residues, one of the subjects mentioned this step: …*here we have an oven; we know that it does not meet the specifications, but it is what we have now. Every contaminated residue generated in the veterinary hospital is burned there, but the oven has broken now. So, we can't treat the residues now; they accumulate outside, far from the hospital… (Professor 1/VS)*.

It seems that the treatment available for the residues generated in health services is incineration; however, since the equipment usually has problems, the subject mentions inadequate disposal in a different place. Another subject mentions the final disposal of liquid residue generated in practical classes: ... *the disposal of the chemical element used for development. I know that now there are laws about it but I couldn't read them yet. Do you know where it goes to? There is a tube but I don't know where it goes to, but I know it is some dangerous residue. It escapes us. So, we neither see it, nor worry about it… (Professor 2/VS)*.

This report shows that, even though the professor has identified the problem regarding inadequate disposal of residues in his/her discipline, it seems that there is no real preoccupation with getting involved in this problem and looking for solutions. It must be emphasized that chemical products used for development are considered chemical residues, and are classified as dangerous residues because they contain heavy metals, according to the Brazilian Technical Norm – NBR 10.004 (ABNT, 2004). Rather than being disposed of, this residue should be packed up and sent to the manufacturer so that the silver could be recovered.

Commitment to residues generated by different activities is part of exercising citizenship and social responsibility. If we act in an inadequate way, it may not affect us. But residue management is much more than a matter of ethical awareness. That is why the study of environmental management is relevant: it is committed to thinking about totality, and contributes to awareness-raising of our relations with life, nature, the others, the cosmos.

It is important to emphasize that there are no policies aiming at the management of all kinds of residues generated by different activities; there are isolated actions in some departments, but they do not comprise all phases in an adequate management process. Besides, the discussion about residue management in Brazilian health services is recent.

FINAL REMARKS

The SRHS issue, as any other one that has proved to be aggressive to the environment, seems to call our attention to the need for another ethical behavior, which renews values, citizenship, and social commitment. It means that everything is part of a large web, and requires new awareness, responsibility, and commitment to our actions, our cats, our ways of living in this environment which we constitute and which constitutes us.

Therefore, among other aspects, education must prepare the student to perceive the real sense of things, evolve, and learn to make more conscious and responsible choices in their work. Thus,

education needs to consider that individuals and the environment form a totality, that our actions have implications for the environment. It must awaken awareness regarding a common destination, a unity sense and mutual belonging which unite us to the earth and to the cosmos.

In the places where health services are delivered, students experienced situations which showed inadequate residue management. This fact evidenced that residue generation has not yet been understood as a practice that can threaten the quality of life. However, the problem is not only the inadequate residue management but also the methods, instruments, and thoughts, which seem limited and problematic. Thinking based on totality leads to a more conscious action, allows the dialogue between thought and reality, adversity, nature, and the other person, thus decreasing the damage brought by mutilating and reducing views not only to the intellectual and scientific world but also to our lives.

To end this study, the need to look at the SRHS approach in the education process in graduation courses in health becomes clear. This knowledge cannot only be about how to do it: there must moments for reflection, problematization, critics, and articulation; it must be committed to the construction of subjects who take on ethical behavior towards solidarity, citizenship awareness, social commitment, and responsibility towards the environment.

We believe that, by including environmental education in higher education, transformation may be possible, if interdisciplinarity, complexity, ethics, solidarity, cooperation, and citizenship are valued. The aim is to let the subjects become critical transformers of the reality we have to face, i. e., environmental degradation which affects the whole society.

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Translated by Ligia Beskow de Freitas
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