

THE RELATIONSHIP WITH SCIENTIFIC KNOWLEDGE IN BASIC EDUCATION: THE PERSPECTIVE OF STUDENTS

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Abstract

This article reports the work carried out with a group of six students in two public schools in the State of São Paulo, within a project Pre-Iniciação Científica (Scientific Research Initiation) conducted at Faculty of Education, University of São Paulo, along the year 2011. These students conducted a survey in their schools in order to identify the relationship which their colleagues setting out with knowledge on the scientific disciplines. Thus it is assumed as objective for this study to drive a reflection concerning the views of students who complete basic education in public schools about the basic scientific knowledge who have had access throughout their school trajectories and drive some directions for police makers about natural science education policies.

Key words: *educational policies, natural science education, student's view.*

Introduction

Reflect on the relevance of school knowledge for the education of students can generate many questions such as how young people relate currently with the knowledge that is transmitted by school or what importance they attribute to this knowledge into their education. But, whatever the issue, it remains assured that the older generations receive indications of what has been made in terms of knowledge is an inalienable right of children and youth. And also that the school fits forward a selection of this knowledge should enable the use, understanding and questioning of the information and tools available in society. Ceases to accomplish this social function, the school empties its larger sense, as indicated by Sampaio (1998), referring to public school, "*the public school makes sense as they can perform their specific job, for knowledge and expansion of horizons, understanding of the world*"(p. 22).

Many studies indicate that young people point to the belief in the power of school education as a tool for positive transformation of their living conditions (Giovinazzo JR., 1999, 2003; Meconi, 2004; Oliveira, 2001; Souza, 2003). But, apart from possible conviction of these young people in relation to schooling, what the students say they have learned by being subjected to this process?

In the scientific literature on the relationship established between the school and its students, from the standpoint of these agents - light crop when related to other themes developed in research in education - it can be seen, beyond this utilitarian conception of knowledge, the recurrence of issues that point to the inadequacy of knowledge conveyed by the institution for facing everyday problems. But even that does not give immediate relevance to the knowledge disseminated by school; students seem to believe that the acquisition is associated with better circumstances to compete in the world of work.



Young people identify school as the institution responsible for the transmission of what they consider "the basics" - reading and writing skills. This knowledge is for them the basis for new learning which occur outside of school (Souza, 2003, p. 140). Given the above, the author concludes that *"these conditions, in which school knowledge has no value in itself and that the fruits of education can only be gathered later in the labor market, it is difficult for these young people bring together energy and motivation to study"* (p. 143). The role of the school, so for young listen in her research is to issue certificates and transmit knowledge they consider basic (reading and writing skills), by allowing movement in society and conduct, outside the school, the real learning, the practice one.

Giovinazzo Jr. (2003), investigating the relationship of young high school students with schooling, indicating that it is possible to state that the school remains an expectation of students and their families, that is, that the school is assigned some responsibility the formation of new generations (p. 35-36). The author points out those students *"attribute an instrumental character to education, which is seen as a mean to an end that is always distant in time"* (p. 133). Further indicates that:

Students recognize the need to receive a good education, but this is associated with the concept that training, learning contents and learning should focus on preparing for the future and life in society, understood as a professional - the school should provide support for students be able to achieve a professional qualification - the world of work (learning in the social reality is to learn to be a worker or pursue a productive activity or not) (Giovinazzo JR., 2003, p. 155).

Furthermore, also indicates Souza (2003), the author emphasizes the importance attributed by young people to sociability and personal relationships that are established in school, as a fundamental dimension of education (Giovinazzo JR., 2003, p. 126).

This seems to be another common aspect of the research dealing with the students' view on the school: the importance they attribute to social relations that are established in this institution. In this sense, the students clearly indicate the relevance of moral learning that the school favors: how to behave, the correct way of acting and speaking, the notions of right and wrong, time to be spent to fulfill the activities set by the teacher.

Regard to the content of teaching, it is known that there is a gap between what the official proposed policies about the curriculum and what is really effective in the classroom, as the teacher's practice. Not much is known, however, about what is for students as knowledge acquired.

Giovinazzo Jr. (2003), by focusing on the relevance of research revealing how the school legitimizes, produces and reproduces a particular social structure, argued that despite the widespread notion that the school experience marks a considerable part of the life of anyone who spends by the school, producing meanings and representations, that statement is no more than a hypothesis *"can not verify if, continuously and systematically, what school do or the type of training that offers passers by it"* (Giovinazzo JR., 2003, p. 52-53).

Besides considering the expectations of young people about the school and the knowledge provided by it, it is necessary to gather information that drive reflections on what is available to students as knowledge necessary for questioning the reality in which they live, in order to overcome the instrumental character associated with the acquisition of school knowledge as a strategy to ensure adequate conditions of this unequal and unjust society.

You should also be aware of the discursive resources that allow people to understand the world in a certain way. The characterization of identities formed in our educational

systems can allow the identification of these discursive resources that shape reality as something given, not questionable.

It is of utmost importance to reflect on the meaning of learning available at the school for the training process of the citizens. In this regard, Charlot (2000) indicates that *"acquiring knowledge allows ensure a certain area of the world in which we live, communicate with other beings and share the world with them, live certain experiences and thus become larger, more confident, more independent"* (p. 60). Accordingly, accepting the importance of working with the knowledge held by the school, and, according to Sampaio (1998, p. 22), believing that *"what is justified and what it has to contribute to the strengthening of its clientele"*, it is necessary to question, in order to infer how much school work approaches or moves away from that goal, the students say they have learned in school throughout the elementary school.

It is within this issue that fits the present study, focusing on the point of view of the education of subjects related to Natural Science. Thus, in this investigation it is assumed that knowledge of natural science must ensure student mastery of the tools, concepts and thinking skills that allow to know the world around you - in their natural features and the multiple human interventions on it - to understand, question and mark its position before the discourse of power embedded in social practices in which it appears, moving toward a fairer society.

The relevance of the research to be described here is the focus on the vision of the students about the process of teaching and learning about knowledge in the natural sciences, as well as the fact that they are also students of basic schooling to conduct, under the guidance of the authors of this article the research procedures that gave voice to the subjects of the school. Thus, it is not discussing the results achieved by pupils of public schools in big ratings nor it comes to assessing the impact of certain actions of continuing education on teachers' practice. It was attempted, this time, the students who report on the content and manner in which they gave up their learning science in school, with the intention to bring some elements to discuss factors that may be hindering or facilitating the relationship with this field of knowledge in Brazilian schools.

The Teaching of Natural Science in Schools: the Scientific Literacy

Official documents on the national school curriculum link the twin goals of basic education: the formation of the citizen and his general preparation for work. With regard to the sciences that are taught in school, we can consider that the approach of the themes in the classroom should be related to the possibility of students investigate situations contextualized to their reality. This should make use of their own strategies of scientific and analyze their impact on different spheres, as society and the environment, for example.

In this sense, the possibility of thinking about natural science education with the goal of achieving Scientific Literacy. And there are many studies that have shown us the Scientific Literacy as a guiding element in the development of curricula to account for promoting education can lead students to investigate natural science topics and discuss their interrelation with society and the environment (Fourez, 1994; Hurd, 1998; Lorenzetti and Delizoicov, 2001; Yore, Bisanz and Hand, 2003; Laugsch, 2000; Bybee and De Boer, 1994). The first ideas and preliminary work on what is and what you need to consider achieving scientific literacy in schools are not all recent studies on Science Education (Hurd, 1998; Fourez, 1994; Laugsch, 2000).



Taken these ideas, scientific literacy portrays more than school goals and objectives set in the experiences that individuals already have or will have with scientific knowledge, his advents and the impacts that they may bring us.

It is, therefore, relate to the sciences and pragmatically, while epistemological because it means using scientific knowledge to investigate new situations related to natural science, theoretical knowledge, practical and relationship with both society and the environment.

Method and Results

Taking into account relationships that students develop with the school and with the knowledge presented to them by the school and the ideas of Scientific Literacy previously exposed to the work presented here intend to analyze how students express their relationship to scientific knowledge: if pragmatically, epistemologically and / or affectively.

By pragmatic, it is understood the extent of the relationship to knowledge that is closely related to a purpose or practical utility. By epistemological, it is the relationship with knowledge that reflects an understanding of the scientific work and how it can be present in everyday situations. On the affective dimension, it takes the relationship to knowledge related to emotional factors.

To conduct this study, the group of Pre-Scientific Initiation consisted of six students, three girls and three boys, from two state schools in São Paulo, hereinafter referred to as School 1 and School 2. Since the beginning of the project, students were taking with the theoretical knowledge and the survey instrument used in other studies on relations with the knowledge so that, together with them, we were able to build a balance of knowledge appropriate to the aims of our research.

The balance of knowledge is a research tool developed by Charlot (2000) and constitutes a solicitation production of text from a header that varies according to the objectives of each investigation. In the case of this research, the text should be written from the following proposal:

Which grade you are doing: () 2^o () 3^o

Boy() Girl () age: ____ - years old

- Since you entered school, must have had contact with classes of subjects related to Science (Science in Elementary Education and Chemistry, Physics and Biology in High School). What do you remember having studied these subjects in the classroom during all this time? These skills were or are important in your life? Why? What issues of Sciences you would like to know more? Why? Try to write a text in which all these questions are answered: you do not need to answer each of them separately, as if it were a proof.

The application balance of knowledge occurred for a group of 72 (seventy-two) students, composing the sample according to the characteristics presented in Table 1:

Table 1. Sample Composition.

	Boys	Girls	Total	2 ^o year EM	3 ^o year EM
School 1	18	21	39	19	20
School 2	12	21	33	24	9

EM (Ensino Médio – High School)

An initial analysis of the balance of knowledge was performed by the students of the pre-IC: using information contained in the records obtained, the balance of knowledge were classified into three groups according to the interest shown by students in relation to knowledge and scientific themes: long, medium and short interest.

For this work, we aim to analyze which dimensions (affective, epistemological and pragmatic) are mentioned by these students in relation to knowledge and scientific topics dealt with them in their school life.

Results

The analysis allows us a quantitative explanation considering the affective dimensions, epistemological and pragmatic expressed by students in their balance of knowledge. Among the 72 records obtained, 55 (or 76.4%) of them express the pragmatic dimension, 29 (or 40.3%) explain the epistemological dimension and 25 (or 35.2%), the affective.

The pragmatic dimension appears with the highest percentage and this fact seems to be closely associated with the students' perception that the school is the end of schooling and, so being; content addressed there should be sufficient and useful in your life after school. Examples of this pragmatic dimension phrases like these, written by students in their balance of knowledge:

[...] Very important to my life because they are used in colleges, tests, admission exams (M-2).

Still have not been and are not [useful], but I believe it will be, only to admission exams (EA-31).

[...] In the near future will need to either pass some test, vestibular, a college, a good job [...] (M-10).

The above examples highlight the temporary and practical usefulness of knowledge learned in school: will be useful to obtain a place at university or a job. The epistemological dimension appears in less than half the balance of knowledge and, when it appears, is closely associated with the way scientific knowledge (and the characteristics of natural science) may be taken for the day to day. Some examples:

[...] Some phenomena we experience and has explanations (EA-10).

[...] More knowledge we can bring to life. (N-11).

Knowledge is always important because we acquire wisdom. (M-12).

The three examples above illustrate the importance given by students to the knowledge learned at school: though they may not have immediate utility, have you learned help you understand and/or make decisions in everyday situations. The affective dimension appears in a small number of swings of knowledge and often is linked to a specific thematic content. Examples of this dimension, as the excerpts below:

One subject I love from passion that I love to learn, what interests me is pretty sure is and always will be the solar system because I love learning new things about the planets if I could be an astronomer (sic) (M-14).



I would like to take classes in our laboratory, practical classes always give that incentive is lacking in young people. Much theory and practice just a little discouraging the student. (M-18).

The idea expressed by M-14 clearly shows an affectionate relationship with the content of Astronomy, this content that, in official documents, should be addressed in both: Elementary and Secondary Education.

Since the review from M-18 specifies a relationship of affection by making clear its view that lessons more practical favor student learning.

Considering the previous analysis by students from pre-IC as the interest shown by the students arrive at the following information:

- Little interest: 18 students fall into this classification. Among them, 2 (or 11.1%) explain the epistemological dimension, 13 (or 72.2%) explain the pragmatic dimension and 4 (or 22.2%), the affective dimension.
- Average interest: 43 students are part of this group. Among them, 20 (or 46.5%) mention the epistemological dimension, 32 (or 74.4%) explain the pragmatic dimension and 16 (or 37.2%), the affective dimension.
- Very interest: group of 11 students. Among them, 7 (or 63.6%) explain the epistemological dimension, 10 (or 90.9%), the pragmatic dimension and 5 (or 45.5%) mention the affective dimension.

Consideration

It should be mentioned that this is a snip of analysis; however, other considerations may come from studies of the same data focusing on other research questions. This is a great advantage with respect to study we have developed, as presented here these considerations suggest the possibility of cross variables we have now established.

In more related to the information we already have, it is important to note that all three groups showed the same distribution in relation to the dimensions revealed by students: the pragmatic dimension is always the one that appears most, followed by the epistemological dimension and the affective dimension, respectively. What is striking is that among the students who make up the group with supposed "great interest", the percentages are all higher, and even proportionately, the epistemological dimension is much more present than in the other two groups. This factor seems to be great evidence those students interested in the scientific subjects not only to the content presented to them, but also by the characteristics of scientific work. Notably, in this sense, this says Charlot (2000) about the students for whom knowledge has meaning and value as such:

If the relationship is to know the value and meaning of knowledge born of relations and induced for their alleged ownership. In other words, knowledge only has meaning and value by reference to relationships presupposes and produces the world, with themselves, with others (p. 64).

The strong mention of this pragmatic dimension in the three groups reinforces the ideas already explained by Souza (2003) and Giovinazzo Jr. (2003) in relation to the character of utilitarianism given to students for school knowledge.

For Charlot (2000), the school plays a crucial role in creating the conditions for

students to establish a relationship with knowledge with the world, able to introduce them in the symbolic universe in which they live: "*If you know the relationship is, the process it takes to take a relationship to the world is to be the object of an education and intellectual, not the accumulation of intellectual content.*" Thus, the problem of education is:

how can be updated which is given to man only potentially ", ie " to understand what kind of relationship with the world and with knowledge that the child must build with the help of the school, to gain access to the full use of the potentialities hidden in the human mind (p. 64).

Judging by the statements of the students speak at school, with regard to the relationship with scientific knowledge, of intellectual education is far referred Charlot and even the "*accumulation of intellectual content.*"

The low incidence of claims related to affective and epistemological dimensions of knowledge suggests a low level of construction of meaning for knowledge on science, which is confirmed in research conducted by the Centre Ibero-American Science, Technology and Society, entitled "*Los estudiantes y la science*". This research, developed in Spain and Latin America, heard high school students 15 to 19 years old between 2008 and 2010, about 9.000 schools, private and public. About the natural science taught in school, the researchers also point to aspects highlighted by the students studied in this study related to the methodology used in the classes, the shortage of activities and interesting materials and, in our case, as a complicating factor to the lack of teachers in some disciplines, especially in physics:

[...] It is essential to observe what happens in the classroom in the teacher-student interaction. The sample of students Iberoamerican analyzed in this book also offers some signs that allow asserting that a significant proportion of adolescents in scientific disciplines are very tiring and as difficult to understand. They make special reference to mathematics, but also to physics, chemistry and biology. Students also say that this difficulty and discouragement has to do largely with the way they teach. Teens also indicate that the teaching resources used in science classes are limited. Half of teens believe that neither scientific disciplines have increased their appreciation for nature, or which source solution to their problems of daily life, although they recognize that they had a greater impact on their own health care. (p. 17).

There remains the question: what relation with the world and with knowledge may be established before under these conditions reported by students? To what extent the school has been able to enter their students in specific form of relationship with the world of scientific activity itself? Judging by the prevalence of the pragmatic dimension the statements that students were more interested in subjects related to science, we can assume that the school helps to keep science in a huge gap in relation to new generations.

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