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CHEMISTRY AS A NATURAL SCIENCE AND THE UNIVERSE AROUND US

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Abstract: Natural Sciences, today called Earth Sciences and its Technologies, have always been treated by the student community as an almost insurmountable challenge, only geniuses managed to fight hard battles and win them. Going back a little in time, cartoons or television series whenever they showed a character who was perhaps a scientist, this one was usually disheveled and invariably was trying to blow something up or doing some kind of evil. The child entering school is like a rough stone and needs to be polished. Mathematics and the so-called Physical and Biological Sciences are part of the child's knowledge, however, in terms of mathematics, doing math is considered very difficult, in addition to the fact that in a system of continued progression, knowing or not knowing seems to matter little, PISA data confirm this phenomenon. Associated with this addicted social system, media/school, and with a series of irrelevant information, the child grows up, becoming an adolescent, without having the perception that his day to day is surrounded by Science, which has long ceased to be simply natural sciences and also became technology. With regard to Chemistry, which has its own language, with symbols, formulas, equations of reactions and mathematical tools, this teenager is immersed in the installation of chaos, because, based on the teaching/learning process he experienced, he was not prepared for this complexity. In order to show that Earth Sciences, in particular, that Chemistry is not something impossible, Students in the 1st year of the Technical Course in Chemistry Integrated into High School were led to give lectures and workshops with children from Kindergarten and Early Years of Elementary School. The results were surprising, the students were able to get to know different realities, in addition to being dazzled by the curiosity aroused by those children.

Keywords: Earth Sciences, Chemistry, community, workshops and lectures, media information.

INTRODUCTION

Much is said about traditional teaching, in which the student is a mere listener and the teacher is the holder of knowledge. Since this is an active-passive action, the information that the educator brings does not always relate to the prior knowledge that the students have built throughout their lives. As there is no relationship between what the student knows and what he is taught, learning is not significant (GUIMARÃES, 2009).

Debates about the importance of practical laboratory classes for the teaching of natural sciences have been going on for a long time, both in academia and by those responsible for disciplines related to the area. Even though there is a consensus among these educators, a lack of this type of class is observed and evidenced, especially in public schools. The lack of infrastructure, one of the main reasons for not carrying out practical classes in science teaching, the teacher's insecurity in teaching these classes and the lack of control over a large number of students within a challenging space such as the laboratory is notorious (ANDRADE and COSTA, 2016).

In the initial version of the National Curriculum Parameters for Secondary Education (PCNEM) the item "meaning of learning in the area" was highlighted. By signaling the area as not only Science and Mathematics, but also its Technologies, it is clear that in each of its disciplines, it is claimed to promote skills and competences that direct the exercise of interventions and practical judgments. This implies, for example, understanding equipment and technical procedures, obtaining and analyzing information, assessing risks and benefits in technological processes, broad recognition for citizenship, and likewise, for professional life (SANTOS, 2007).

The separation between Science and common sense was essential to constitute Modern Science, but progressively and unnecessarily, other knowledge was launched for the citizen to discredit and subjugate science. Decreasing this distance between scientific knowledge and common sense is a necessity to inhibit monoculture and provide a plurality of knowledge. In science teaching, pedagogical mediation has been very problematic, little has been done to facilitate the construction of knowledge. Today, in a world profoundly transformed by science and technology, this produced technoscience has become the object of social conflict and political debate. A pedagogical mediation and a parameterization attentive to the values and limits of this knowledge becomes crucial, so that the citizen, as a transforming being,

In 2016, the Ministry of Science, Technology and Higher Education of Portugal, in its Open Science Plan, takes Citizen Science as one of the decisive pillars for its materialization. Recognizes that trust, transparency and relevance of science increase when performed in relation to society and, above all, by the ability to encourage involvement as a way of bringing communities together, creating environments conducive to social, scientific, economic and cultural innovation. In 2017, it organizes the 1st National Meeting of Citizen Science – Open Science. In this panorama, the challenges posed by Citizen Science are discussed and are fundamental for the formative and methodological renovation in terms of teaching and research, introducing new methods and new learning based on a model of collaboration, creation, multidirectional knowledge transfer and voluntary work. In 2019, it proposed the holding of the 2nd National Meeting of Citizen Science – Open Science, with the aim of bringing together protagonists in this area again and discussing, promoting and disseminating ongoing projects and reflection on the practices, challenges and future of Citizen Science, in Portugal.

The errandsocial has become a device for attracting and retaining talent, voluntary work, spontaneous, works as a lever, social action is an opportunity to develop new skills and improve existing skills. Volunteer jobs are well regarded by corporations in terms of hiring and promotions. In this sense, corporations that use this concept are also well regarded by society. (OHL, 2012).

The citizen is an individual and social being. Their cultural identity is built from their social relationships with the environment in which they live. In this sense, the project tries not to separate the construction of concepts on a given theme in a continuous and dialogic way, ways of knowing/valuing/deliberating/thinking/acting. Citizenship culture is based on a great hope: to help citizens learn to build themselves and the society of the future, by building knowledge, considers it very important, but not enough, to build citizenship around the affirmation and consecration of human rights (SANTOS, 2007).

The objective of this work isto develop general and professional training skills and competences in students of technical education integrated to high school, encourage a voluntary spirit and, through lectures and workshops on Chemical Sciences, bring this area of knowledge to children in the early years of Elementary School. Stimulating curiosity about the phenomena presented and instigating the core of investigation and experimentation are essential steps to explore this environment without fear.

OBJECTIVES

To demystify Chemistry as something difficult and inaccessible, to show that

Chemistry is in everyday life both in the form of science and in the form of technology. Take this area of knowledge to children in the early years of Elementary School, through lectures and workshops on Chemical Sciences and Technology, presented by students from1st year of the Technical Course in Chemistry Integrated to High School (ETIM Química) and stimulate curiosity and experimentation.

METHODOLOGY

In 2019, during the second semester, the 1st year students of ETIM Química, from Etec Trajano Camargo, in the city of Limeira, were led, thinking of an attitude of citizen integration, to present Chemistry as Science and as Technology to students of the early years of elementary school at EMEIEF Prada, also located in the center of the city of Limeira.

Through the negative experiences that these students had when they studied in Elementary School, such as, for example, memorizing the information contained in the Periodic Table of Chemical Elements, they reported that entering an ETIM Chemistry course was often to meet a request from their parents, since mastering this area of knowledge could improve performance in a future entrance exam, which was not at all comfortable.

Using the knowledge acquired during the first semester of the course and with positive stimuli for overcoming difficulties, the class was divided into groups, and at first they took the form of small lectures and low-risk tests, Chemistry activities to students in the Early Years of Elementary Education of a city school. In a second moment, these same students were received at Etec's own Chemistry Laboratories.

In figure 1, Etec students lecture and demonstrate the paper production process, using the concepts of reverse logistics and Green Chemistry, producing paper in the form of papyrus, through recycling.

Figure 1: Students from Etec Trajano Camargo demonstrating the paper manufacturing process.

Source: The author, 2019.

In the sequence, through figure 2, the presentation of General Chemistry concepts can be observed. On the table you can examine the Periodic Table of Chemical Elements, a support with test tubes where low-risk chemical reactions were carried out. These chemical reactions cannot present risks, since the work is carried out for young children with a lot of curiosity.

Figure 2: Students from Etec Trajano Camargo presenting General Chemistry concepts.

Source: The author, 2019.

In a second moment, EMEIEF Prada students visited the laboratories of Etec Trajano Camargo, where they had contact with the glass artifacts used in chemical analysis processes, as well as having visual contact with some instruments used in analytical processes. In figure 3, we can observe a volume measurement by pipetting being performed by an Etec student.

Figure 2: Etec student Trajano Camargo demonstrating, in the Chemistry Laboratory, the pipetting technique used to measure the volume of liquids.

Source: The author, 2019.

In the image shown in figure 4, there is the interaction of students from the Early Years of Elementary School with students from the ETIM Chemistry course, where a procedure for measuring volumes by pipetting is performed.

Figure 4: Interaction between EMEIEF Prada students and ETIM Química students at the Etec Trajano Camargo Chemistry Laboratory.

Source: The author, 2019.

RESULTS AND DISCUSSION

Science is one of the pillars of society and consequently influences its evolution and culture. Being a former colony of Portugal, Brazil is poor in Science and Chemical Technology, a legacy left by the colonizers. Effectively, the country entered this area of knowledge just over 100 years ago, within this scenario, the ideal is to change this reality.

The ETIM student, in his first year of the course, is a fresh out of elementary school, he is also full of doubts, he entered a technical course, but he has many questions and uncertainties about his professional future. On the other hand, elementary school students are starting to take the initial steps of what will be their life path. His universe is restricted to living with his family, at most he has some experiences of living with children and teachers of Maternal Education and Early Childhood Education. In this age group, the child has no addictions, is open and receptive to whatever is presented, good and bad. There are two aspects, two realities, students already with an expressive content of knowledge and students open to the acquisition and expansion of knowledge. With the proposed work it was possible to successfully connect these two realities. Students on the ETIM Chemistry course were encouraged to study and carry out tests with confidence and consolidated wisdom. They were compelled to present themselves in public, expose ideas and concepts of chemistry in a convincing way, they were able to feel intelligent, capable and useful, they stimulated the curiosity of children, elementary school students. These, in turn, with heightened curiosity, got involved with the experiments presented, interacted with students of Technical Education, were curious about the profession of chemist, with what this professional does, where he works, in general, they are concerned with issues involving the environment, green chemistry issues. Students on the ETIM Chemistry course were encouraged to study and carry out tests with confidence and consolidated wisdom. They were compelled to present themselves in public, expose ideas and concepts of chemistry in a convincing way, they were able to feel intelligent, capable and useful, they stimulated the curiosity of children, elementary school students. These, in turn, with heightened curiosity, got involved with the experiments presented, interacted with students of Technical Education, were curious about the profession of chemist, with what this professional does, where he works, in general, they are concerned with issues involving the environment, green chemistry issues. Students on the ETIM Chemistry course were encouraged to study and carry out tests with confidence and consolidated wisdom. They were compelled to present themselves in public, expose ideas and concepts of chemistry in a convincing way, they were able to feel intelligent, capable and useful, they stimulated the curiosity of children, elementary school students. These, in turn, with heightened curiosity, got involved with the experiments presented, interacted with students of Technical Education, were curious about the profession of chemist, with what this professional does, where he works, in general, they are concerned with issues involving the environment, green chemistry issues. capable and useful, stimulated the curiosity of children, elementary school students. These, in turn, with heightened curiosity, got involved with the experiments presented, interacted with students of Technical Education, were curious about the profession of chemist, with what this professional does, where he works, in general, they are concerned with issues involving the environment, green chemistry issues. capable and useful, stimulated the curiosity of children, elementary school students. These, in turn, with heightened curiosity, got involved with the experiments presented, interacted with students of Technical Education, were curious about the profession of chemist, with what this professional does, where he works, in general, they are concerned with issues involving the environment, green chemistry issues.

The results achieved were positive, the ETIM Química students felt confident in the face of the embraced objectives, questioning and proposing to perform new presentations of the event. As for Elementary School students, curiosity can be seen on their faces, they also questioned when there would be new events for them to participate in. They expressed curiosity about when they would be old enough to enroll in the ETIM Chemistry course.

CONCLUSIONS

Chemical Science, which long ago ceased to be a simple science and today is one of the great areas of technology worldwide, is still seen with considerable discredit in Brazil. Great environmental problems are attributed to chemistry, everything that happens badly in environmental terms, in its great amount, is said to be the fault of chemistry, but it is not said to be the fault of greed and the great excesses at the level of public administration, each increasingly wide open, as in the case of Brumadinho, for example.

The chemical industry is the second largest industry worldwide, second only to the food industry. It must also be remembered that around eighty percent of the transformation processes used in the food industry are chemical processes. What people don't connect is that chemistry is in everyday life, a soap, a soap, a shampoo, products for daily use, dignified survival through the use of healthy water, which is only possible through proper treatment, with the use of suitable chemical products, in a water treatment plant (WTP). Thinking about the environment, the physical-chemical and microbiological treatment of industrial, hospital and domestic effluents from the "sewers" in a sewage treatment plant (ETE).

With the above exposed, a small explanation of the great reality that surrounds us is made, considering that the time for this reality to be observed and treated with more attention has passed. Unfortunately, it is common within the school environment for kindergarten and elementary school educators to make veiled criticisms of Chemistry Science, this fact can be proven when this student arrives at High School with completely wrong concepts, not to mention wrong ones. Fortunately, in some publishers here in Brazil, it is already possible to find literature on science teaching in general, using materials for daily use, without the need for large expenses. Examples include The Great Book of Sciences from Manual do Mundo (FULFARO & THENÓRIO, 2019) and The Periodic Table – Play and Learn (JAMES, 2019). This type of literature is very common in Europe and the United States, as an example we can mention "Scienza Rap – Quaranta Esperimenti Troppo Divertenti" (BIANCHI, 2017) and "Help Your Kids With Science" (JACKSON, 2012). The difficulties that students have when they reach High School in relation to Chemistry, and the other two sciences, Physics and Biology, can be solved in Elementary School, with a little willpower, vision and low cost. The lectures and workshops given by Technical Education students to Elementary School students prove this possibility. Physics and Biology can be solved in Elementary School, with a little willpower, vision and low cost. The lectures and workshops given by Technical Education students to Elementary School students prove this possibility. Physics and Biology can be solved in Elementary School, with a little willpower, vision and low cost. The lectures and workshops given by Technical Education students to Elementary School students prove this possibility.

Education promotes cultural, social and technological evolution in a people. With this tripod, this society will certainly have a respectful, healthy and sustainable coexistence. Much is said about the student being considered as a simple listener, about the teacher being the holder of knowledge and directing his class according to his convictions. However, in fact, this teacher is not always the holder of knowledge, since, having no content, having little experience in his area of training and, still, deficient in general knowledge, he cannot stimulate the student.

In many cases, apparently the system is careless, and the professor is not even a specialist in the area. It is a big mistake to think that to do chemistry you need very sophisticated laboratories, chemistry is done in a kitchen, in a simple cooking, just explore the content being studied. Louis Pasteur, whose higher studies were carried out at the Royal College of Besançon, received the title of Bachelor of Letters in 1840, and, in 1842, the diploma of Bachelor of Science, which included a mediocre qualification in

Chemistry. In 1843, he entered the École Normale Supérieure in Paris, taking classes with Jean Baptiste André Dumas, he is one of the founders of Modern Atomic Theory, and felt motivated to deepen his studies in Chemistry. It is seen here that good teachers are essential to stimulate the potential of capable students. As a legacy,

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