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More Trends in Modern Science Teachers Training

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Abstract: - During the natural update of teachers training design, there are many subjects like green chemistry, green energy and constructal theory that simultaneously with the proper use of internet interactive websites and educational software, optimising the change of information into knowledge, are advantageous for the educational purposes if made available. Also, the efforts in many locations for getting "hands on" with the implementation of sustainable energy production and environmental solutions can provide practical examples and motivation for cultural heritage and sustainable development.

Key Words: Constructal Theory, Education, Green Energy, Green Chemistry, Information Era,

1. Introduction

Before, when we arrived to beautiful touristy city of Sabugal - Portugal, owe vision would be attracted to its main attraction: the Castle of Sabugal, but now, it is not only the castle that captures the attention, but also the wind park with its wind towers, generating green energy, close to the Malcata Natural Reserve which is aimed to protect the few iberic lynx that are threaten on extinction.

Included in the *Hidroagricultural plan for Cova da Beira* [39], the Dam of Sabugal, a small hydro for power generation; when we drive in a city we can observe some street signs powered with solar panels, the same in highways and at some rural properties in Alentejo (in the south of Portugal), electrified fences are powered with solar panels too, the list of practical examples goes on.

The conscience for sustainable development makes us look for responses that will respect the environment; the green chemistry; green energy and the constructal theory are part of those efforts.

Since computers and the Internet technologies are increasingly more available in schools, a challenge (or perhaps the bigger challenge) is to change information in to knowledge and vice versa more efficiently [6].

Following the new Portuguese national curriculum and the STS goals in it [14], emerging science, society and Environmental subjects powered by the use of interactive computational simulations that can be found at the Internet, adequate modern training courses are generated, and that can lead to better judgments and performance.

This paper outlines more trends in science teachers training and is in line with my previous papers in this current year.

2. The (Green) Science, Technology and Society path

Has mankind makes goes forward, the energy demand grows, with consequences that are triggering our concerns about the environmental impact of human activities in the planet [25-26-27-28].

So we need teachers training courses that provide knowledge on the emerging technologies and modern procedures to promote sustainable development and, using the web support, it helps us to attract students and provides tools to better explanations and explorations of science concepts and skills present in the national education curriculum's [1-10-11-14].

3. The Teachers Training Courses

3.1 Introduction to Green Energy

The energy, the atmosphere, the sustainable development are subjects of increasing importance, as the energy consumption increases and the indirect and direct consequences of that consumption give impact in the environment [5].

The quest for renewable energies, alternatives to the fossil fuels is of vital importance to modern societies [11].

In Portugal, practical examples exist like wind parks, dams, small-hydro, biomass central, solar panels among others [37]. As the renewable technologies come forward [2-25], the landscape (urban, Industrial or rural) shows changes, where we see now the wind towers, solar panels, bio mass centrals.
The "friendly" production of energy to Earth's atmosphere and the preservation of the cultural inheritance appear as two approaches which can take students towards STS-E (Science, Technology Society - Environmental) [14], motivation, exploration; understanding; the development of interpretation skills of new scientific and everyday situations [10-11]. The Teachers acquire competences that allow them to motivate more students for the study of the discipline that they lecture and it allows using the web resources more efficiently and in an original and creative way. The Physical sciences will especially benefit, because it will help to fight the down tendency verified in their search by the students [7].
The course is structured in a workshop (Oficina de Formação) and is intended to Teachers from all Education levels, and specially recommended to Biology; Chemistry; Natural Sciences and Informatics Teachers.

3.2 Introduction to Green Chemistry, Security and Organization of Laboratories in Chem Education

The liberation of chemical substances into the Earth's atmosphere can do negative environmental impact that urges to evaluate and to predict [8-29-30-31]. These teachers teaching is aimed to give opportunities to better judgments and comprehension about mechanisms of potential environmental impact inherent to the teachers' choices, by being introduced to the Green Chemistry subjects. The second part intends to equip Teachers with more tools [3-13] about the drawing, installation and organization of Chemistry laboratories in schools (that have to guarantee safety conditions, appropriate to students, teachers, employees, etc), also is close to the (top) training I had in that subject while studding at School of Sciences University of Lisbon.
This Teachers training course in workshop (*Oficina de Formação*) format also aims to give teachers tools that will allow them being increasingly more effective in the Information Era.
While being for all Teachers, it is highly recommended for Chemistry and Biology Teachers.

3.3 Constructal Theory 4 Kids

A new theory appears. The constructal theory [32], the thought that the objective and constrains principle used in engineering is also the mechanism from which the geometry emerges in natural flow systems [4] impelled by Professor Adrian Bejan, and has been progressing much.
A great number of flows exists in tree form: lungs, blood circulation; beds and deltas of rivers; lightning's; hoist botanies (cups, roots, leaves); dendritic crystals; nervous systems; patterns of urban streets and urban growth, bacteria colonies, transports, communications and economical nets, etc [4].
Through this new theory, we can take the students to S.T.S subjects [14], to the motivation, to the exploration; to the understanding; to the interpretation skills of new scientific and everyday situations. The Physical sciences will especially benefit, because it will help to combat the down tendency observed in students' choices [7].
This training course is intended to Teachers of all Education levels

3.4Astrochemistry and Exobiology in the Web

Astrochemistry and Exobiology include Biology, Chemistry, Engineering, Physics, Planetary Sciences; Space Exploration [12-; supplying themes S.T.S. (Science, Technology and Society), that will provide new pedagogic approaches of the contents in the disciplines as they allow students attribute value to competences through the perception of practical applications. Teachers acquire competences to motivate students more efficiently for the study of their discipline. It allows Teachers to use web resources more effectively and in an original way (with their own creativity) in the present Information Era [9-10-11-17-33-34-35].
This training course is meant to Teachers of all Education levels

3.5 Interactive Internet in Sciences and Languages Education

The interactivity of the web resources that we can find is very attractive and motivating. In fact, Java, Shockwave and quick time applications and quizzes, are examples of we can find in the net that if made available with good teachers orientation from teachers, can lead students to understanding and motivation.
Due to the great success reported by the teachers to me about their classes planed within the teachers training courses *Internet Java Applets and Educational Software in Science* and *Electronics Education* and *Internet Java Applets and Educational Software in Social Science and Languages Education* at Castelo

Branco city [10-11-12] lead to this training course for all Teachers of all Education levels (the previous where not for all the teachers).
Still, while the general objectives are kept similar, the extension for early levels is also an advantage because it accompanies the introduction of English in the Primary School, and it is known that many of the good java applets and simulations are in English, as recourses on language training.

4. Conclusions

Following the instructions present in the national Education curriculum's related to the Science, Technology and Society -Environmental approach, many adequate modern teachers training courses that are needed can be generated like those presented above and through an Internet search we can see that more adequate training courses are in need.
Again, I reinforce that adequate training taken by a Teacher can lead to better judgments and performance as the absence of adequate modern training can lead to poor judgments and poor performance.
Local examples like those mentioned in the City of Sabugal area (very attractive with castles and remains of past civilizations) with green energy choices can contribute to student's success, while helping to reflect about (their) cultural heritage and landscape transformations.
Both training courses *Internet Java Applets and Educational Software in Science and Electronics Education* and *Internet Java Applets and Educational Software in Social Science and Languages* where very successful in Teacher's practice and their teaching methodologies had high success also in motivating students to the disciplines, improving the images of the discipline that they lectured and of the Teachers themselves.
Pursuing the national's curricula objectives, we can design teachers training courses that contemplate other cultural contexts like the baroque music, the renaissance Venice work (ex. Antonio and Bartolomeo Vivarini, Giovanni Belline, Antonello da Messina) by applying physics and chemistry concepts leading students to understand their work and how to validate authenticity, and then recognising the importance of physical sciences by their appliance in the concrete situations.
I believe that the Portuguese Science Education quality, the Economy and sustainable development can also have a great contribution from these modern teachers training courses.

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