Active Methodologies

ENGLISH FOR ENVIRONMENTAL SCIENCE

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Doce Calles

To my mother

Índice

Introduction

Active Methodologies: English for Environmental Science is designed for students who plan to take an environmental science course entirely in English. The principal aim of this book is to teach students to use and apply active methodologies throughout their learning process, for instance: when solving problems, studying case studies or collaborating in teamwork projects related to the Environmental Science.

In this book, I have drawn on many different didactic sources which I will be discussing throughout its pages, so that students learn to discuss and analyse methodological sources. All the authors whose works are used and commented for this purpose are referenced in each case. In most cases, I have used fragments of the authors' works to provide a theoretical background and then I have contributed my own designed exercises. So, this is a compilation of didactic sources, which I use to help my students develop active methodologies. I will further provide a brief analysis of the textbooks I have used, to explain my own experience using these didactic materials. I will do so by adding a commented literature to highlight their relevance.

The syllabus focuses on key vocabulary for Environmental Science and on words and phrases commonly used in scientific English. It covers key facts and concepts from the discipline, providing students with a broad framework where they can find worthy strategies for their future professional settings.

The book has 4 units. In each unit, I have developed from 1 to 4 lessons depending on the aspects to deal with. All lessons are based on the theoretical and practical aspects of active methodologies. Each unit provides between 2

and 4 hours of classroom activity, with the possibility of a further 4 hours on the suggested projects.

> It is assumed that prior to using this book students will already have completed a B1-level of English (Intermediate), based on the European framework of languages, which states that at this level students: "can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc.; can deal with most situations likely to arise while travelling in an area where the language is spoken; can produce simple connected text on topics that are familiar or of personal interest; and can describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans." [On line: https://en.wikipedia.org/wiki/Common_European_Framework_of_Reference_for_Languages#Common_reference_levels] [Date: November 14th 2020]

Parting from that background, this book will provide an ESP material that is aimed at helping students to understand and develop topics related to the third academic year of the Environmental Science Degree.

UNIT 1-PROBLEM BASED LEARNING

Lesson 1-*Introduction*

For this introduction I have extracted the following fragments from Ceker, E. & Ozdamli, F. (2016). "Features and characteristics of problem based learning". *Cypriot Journal of Educational Science*. 11 (4), 195-202. This is a way to get my students read their article and an opportunity to have it discussed in our class.

Problem Based Learning (PBL) is a learning method through which the learners gain and develop upper level skills such as problem solving and critical thinking while eliciting information from personal real life experiences and acquiring determinate knowledge about their own learning (Wadani, 2014). It is a method utilizing a constructivist approach, with which students strive to solve daily issues in collaborative environments.

Problem Based Learning (PBL) is designed to help students:

1. Construct and extensive and flexible knowledge base;
2. Develop effective problem-solving skills;
3. Develop self-directed, lifelong learning skills;
4. Become effective collaborators; and
5. Become intrinsically motivated to learn. (Cindy & Hmelo-Silver, 2014)

ADVANTAGES OF PBL

The advantages of PBL for teachers and learners can be listed as follows:

- PBL allows learners to take the responsibility of their own learning
- Group projects allow learners to develop their adequacy in teamwork
- Individual homework allows advanced students to display their highest performance, leadership attempts, and creativity. (Kumar & Rafaei, 2007; Utecht, 2003; Cheong, 2007; Hung, 2013; Seng, 2012; Guzelis, 2006; Klegeris & Hurren, 2011).

Students' role

Once students have read and understood the problem, they should be able to achieve some new goals such as looking for the necessary information, organizing and structuring that information.

Secondly, they should critically think on the why and how to explain what they have observed in the problem. Using hypothetical explanations and identifying learning needs (including knowledge and skills), students will achieve the main goal of PBL.

Finally, after studying the problem in groups, students will provide solutions or justified proposals. When arriving to conclusions in small separate groups, the next step will be to report the results obtained to the whole class.

Exercise A

1 For every problem, there may or may not be a solution. Discuss the following problems with another student and see how many solutions you can find.

Example: Traffic congestion

1 Increase road tax
2 Encourage people to car-share
3 Improve public transport

a) Global warming
b) Inflation
c) Overcrowding in cities
d) HIV / AIDS

2 Discussion

Think of a problem your country is facing at the moment. Can you think of any solutions to this problem? Discuss with another student and see if you can offer them advice on their problem.

2.1 Rank the following tasks from 1 to 8 (1=most problematic, 8=least problematic) with another student. You may disagree!

a) _____ remembering a chemical formula
b) _____ controlling inflation
c) _____ noisy neighbours
d) _____ writing an essay
e) _____ proving a theorem in geometry
f) _____ finding the best route from your house to the British Museum in London.
g) _____ finding your keys
h) _____ data analysis

2.2 What strategies would you need to solve the above problems?

Exercise B- *Steps to solving a problem*

1 When you are faced with a problem, what is the first thing you do? Put the following steps into a logical problem-solving sequence with another student.

a) ___ Develop alternatives for each major solution. Take the time to think of different options available to you.
b) _____ Choose the best solution for the problem.
c) _____ Weigh up alternatives: evaluate each option carefully. Consider the advantages and disadvantages.
d) _____ Define the problem clearly. What exactly do you need to do? State your goal. Use practical verbs such as *find out about…*
e) _____ Find major solutions: brainstorm as many possible solutions as you can for solving the problem.

Exercise C- *A logical approach to problem-solving*

The following pattern of organization is commonly used in writing when analyzing problems:

Situation→ Problem→ Solution→ Evaluation

A situation is given.

- The problem of the situation is identified.
- A solution to the problem is presented.
- An evaluation of the solution is given.

The following text discusses the problem of rising sea levels. It follows a logical sequence like the one mentioned above. It illustrates how this pattern of organization is commonly used in writing.

1 Read the text and identify and underline the parts of the text that:

- Describe the situation;
- Identify the problem;
- Suggest a solution or solutions;
- Evaluate the solution(s).

Recent evidence confirms that global warming is melting the ice in Antarctica faster than had been previously thought. Scientists say the rise in sea levels around the world caused by the melting may have been underestimated. It is thought that over 13,000 square kilometers of sea ice in the Antarctic Peninsula have been lost over the last 50 years. This poses a major problem because its effects will be felt across the globe.

A rise in sea levels increases the level of wave attack and tides, causing changes in the stability of shorelines as well as flooding of lowlands. In many places, a 50-centimetre rise would see entire beaches washed away by erosion, together with a significant chunk of the coastline. Many island nations will have their supplies of drinking water reduced because seawater will invade their freshwater aquifers. While some islands have sizeable populations, they are insignificant compared with the tens of millions of people living in the low-level coastal areas of Southern Asia. These include the coastlines of Pakistan, India, Sri Lanka, Bangladesh and Burma.

Since more than 75 percent of the human population live within 60 kilometers of a coast, finding a solution is imperative. While implementation of flood prevention measures on a local level is helpful in the short term, there is no physical capacity that humans have to protect against long-term sea level rise hazards for given points in time. In this way, humans can act decisively and appropriately to minimize loss of life and economic and ecological impacts. Education is the only long-term, far-reaching solution to sea level rise.

2 Now complete the flow chart below with notes based on the text.

Situation

↓

Problem

↓

Solution

↓

Active Methodologies: English for Environmental Science is designed for students who plan to take an Environmental Science Degree, which includes in the syllabus English as L2. The book is prepared for Non-native students of English, and particularly for a B2-level.

In this book, I have drawn on many different didactic sources, which have been discussed throughout these pages, so that students learn to discuss and analyse methodological sources. This is a compilation of didactic sources, which I have used to help my students develop active methodologies. In most cases, I have used fragments of other authors' works to provide a theoretical background and then I have contributed my own designed exercises.

ISBN-13: 978-84-9744-339-5