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DEFORESTATION: ACTIVE LEARNING APPROACHES

1. Introduction

Deforestation is the process of clearing forests, usually by burning or cutting down trees. Perhaps no other human activity has had such a global impact on land cover. About 40% of the world's forests have been removed or replaced either by smaller and less diverse vegetation or by artificial, impervious surfaces. Deforestation increases soil erosion and the threat of floods, because roots no longer exist to bind the soil and the forest canopy no longer intercepts the rainfall. Soil fertility declines due to erosion and the lack of trees, which return nutrients to the soil via fallen leaves. As a result deforestation may lead to desertification. The loss of forests leads to the loss of habitats for wildlife, as well as the loss of homes and the traditional way of life of local people. On a global scale, deforestation contributes to global warming, as less carbon dioxide is being absorbed by plants and converted into oxygen.

The predisposing conditions that favor deforestation include poverty, greed, quests for power, population growth and illiteracy. The indirect causes of deforestation include inappropriate government policies, hunger for land, national and global market forces, the under-valuation of natural forests, weak government institutions and social factors. The more visible direct causes of deforestation include land use that competes with natural forests (*e.g.* agriculture, ranching, infrastructure development, as well as mining and petroleum exploration). Logging, use of wood as a fuel and tree plantations also have a role in the phenomenon of deforestation [Botkin and Keller, 2004; Enger and Smith, 2006].

The creation of an environmentally literate citizenry is arguably among the most urgent needs in the class of challenges that are now rising to center stage. Today's students, and probably those of tomorrow, will inherit the Earth's environmental problems and be faced with addressing them, as they

are problems which cannot be solved in the foreseeable future [Blumstein and Saylan, 2007]. As deforestation is one of these problems it behooves us, as educators, to find ways to help students become aware of the problem and understand the complexity and subtlety of the issues involved. It is also our responsibility to provide them with some tools to address such a complex and multifaceted issue.

Such a task requires the use of active, rather than passive, learning approaches. Active learning engages the learner with the material being learned. In active, as opposed to passive learning, students are involved directly and actively in the learning process. This means that instead of simply receiving information verbally and visually, students receive information, participate and do [Bonwell and Eison, 1991; Meyers and Jones, 1993; Silberman, 1996; Leal Filho, 1996; Frederick, 2000; Leal Filho and Manolas, 2005]. The active learning techniques discussed in this paper are grouped into three categories: a) interactive lectures; b) discussions using visual and audiovisual aids and c) debates, student presentations and press conferences. Each of the active learning strategies used is accompanied by concrete examples regarding the issue of deforestation.

2. Interactive lectures

Feedback lectures are one form of interactive lecture. In a feedback lecture, the instructor allows time for students to address intellectual problems related to the material to be covered that particular day. At appropriate times in the lecture, the instructor poses a question to students and provides space for them to write their responses. For example, "why are the tropics a. so productive and b. so diverse?" or "what arguments could you offer for and against the statement "the cutting of clearings is natural and necessary for forest management?" Once the students have finished writing, the instructor can ask one or two students to read what they have written or collect their responses and read a random sample after class. These responses create a dialog between the students and the teacher, while offering insight into the students' thought processes as well. Aside from providing valuable feedback for the instructor, this exercise also serves as a transitional period for the students. The break from the lecture to write will help students refocus their attention and can help increase their level of attention for the remainder of the class [Bean, 1996].

As part of an interactive lecture one could ask students at the beginning of the class to mention one *concrete image / scene / event / moment* that stands out from a text, paper or chapter of a book that was given to them to study. No analysis is necessary, just recollection and a brief description. As each student

reports, the collective images are listed on the board, thus providing a visual record of selected content from the text as a backdrop to the resulting discussion. Usually, the recall of concrete ideas prompts further recollections and a flood of images flows from the students. After a few minutes the instructor asks the class: "What themes seem to emerge from these items?" "What connects these images?" "Is there a pattern to our recollections?" "What is missing?" In this inductive approach, facts precede analysis. But also, everyone gets to say something early in the class and every contribution is written down to aid collective memory and work [Frederick, 2002].

Another way to introduce a topic – or to check on learning halfway through one – is by using a *true or false questionnaire*. This game is particularly useful when students think they know a great deal about a topic but the accuracy of their knowledge demands examination. The following are some examples of such misinformation: "Destruction of tropical rain forests will cause the Earth's atmosphere to run out of oxygen," "cutting down only big trees leaves the younger trees room to become more valuable," "clearings are biological deserts with no potential of becoming a habitat for wildlife."

The instructor prepares a list of statements related to common misconceptions about the selected topic(s), half of which are true and the other half false. Photocopies of the list are distributed to the students, who are asked to decide whether each statement is true or false. When they have finished the task, the teacher reads the first statement aloud and asks the participants who think that the first statement is true to raise their hands. The teacher then explains why the statement is true or false, as appropriate, and provides the relevant evidence. The procedure is repeated for each statement [*Interactive Lectures: Summaries of 36 Formats*, 2004]. This exercise helps teachers discover what students know and do not know about the topic(s) and helps generate a list of questions and issues needing further examination.

3. Classroom discussions using visual and audio-visual aids

When using *visual lists*, students are asked to make a list – on paper or on the blackboard. This method is particularly effective when students are asked to compare views or to list pros and cons of a point of view. One technique which works well with such comparisons is to have students draw a "T" and to label the left- and right-hand sides of the cross bar with opposing points of view (or "Pro" and "Con"). They then list everything they can think of which supports these positions on the relevant side of the vertical line. Once they have generated as thorough a list as they can, the teacher can ask them to analyze the lists with questions appropriate to the exercise. For example, when discussing ways of stopping deforestation in their region, in their country or

even some other place of interest to them, students can use the "T" method to list all of the (potential) benefits and costs of an action and then discuss which side is more heavily "weighted". Often having the list in front of them helps to determine the ultimate utility of an action and the requirement to fill in the "T" generally results in a more thorough accounting of the consequences of the action in question [Paulson and Faust, 2002].

Photographs are important learning tools for at least four reasons: they are easy to find, they can cover a wide range of subjects, they enable the study of places and problems too remote for people to visit or experience and they can capture the "reality" of a situation. For the study of tropical deforestation, for instance, the instructor may select photographs depicting different aspects of the problem, *e.g.* slash and burn deforestation, deforestation for timber harvesting, deforestation as a result of clearing by burning. Although each photograph should be followed by a brief oral explanation in order to settle the audience, establish the topic for discussion and stimulate interest and willing-ness to participate, the projection of each photograph and oral explanation accompanying it should be followed by clear, brief, purposeful and thought provoking questions: What is the message of each photograph? What are the contents of each photograph? (A detailed description should be given.) In what ways can your personal experiences, knowledge and emotions influence the position you take with respect to each photograph? Is "each picture worth a thousand words?" Explain [Manolas, 1998].

The use of a *movie*, or parts of a movie, can constitute a powerful stimulus for discussion in the classroom. Movies have such power because they are capable of combining picture, movement, music and speech. Films, and in particular, colored three-dimensional films, also have the capacity of presenting not only physical reality, but even the functioning of physical and technical machinery and equipment. In addition, movies can give close ups of objects and phenom-ena, which means, that it can, in this way, contribute to the understanding of concepts, beliefs or even theoretical approaches [Giannoulis, 1980; Dervissis, 1982; Manolas, 2003].

Some examples of movies which address the issue of deforestation and could be used for educational purposes are: Medicine Man which is about a scientist who discovers a cure for cancer in the rain forest and loses it to unrelenting destruction and The Emerald Forest which addresses the theme of the destruction of the rain forest and the life of the indigenous people living in the area. The following are some questions which could be used in discuss-ing films: What emotions does the movie create? What is the message of each film? What particular values and beliefs does the movie represent? How was the film received by the public when it was first shown? What influence did the movie exercise on environmental movements and organizations and even governments? What questions were left unanswered by the motion picture?

What information did you gain from watching the film that could not be conveyed by a written source?

4. Forced debates, in class presentations and press conferences

Although obviously neither of two polarized viewpoints of an issue contains the truth, it is often desirable to force students to select one of two opposite sides and to defend their choice. "Which is more important, products or future generations?" "What is the best way to address deforestation: coercive action by the state, or allocation of resources through market transactions?" Once students have made their choice, which may be required prior to entering the room for class that day, the teacher asks them to sit on one side of the table or room according to their decision. Physical movement is important and sides need to face each other. Once the students have actually, as it were, put their bodies on the line, they are more receptive to answering the question: "Why have you chosen to sit where you are?" Inevitably, there may be a few students who absolutely refuse (quite rightly) to choose one side. If they persist, giving their reasons, create a space for a middle position. This adds a dimension to the debate and those in the middle find out what it is like to remain neutral or undecided on a heated, controversial issue. The instructor can also invite students to feel free to change their place during a debate if they are so persuaded, which, adds yet another real (and sometimes chaotic) aspect to the experience [Frederick, 2002].

Another part of the "real world" is the concept of making *presentations*. Every professional working adult will, at some point, be required to present some idea, concept or plan to a customer, potential customer, or to their boss, or if that individual chooses a teaching career to his/her students. This is why presentations are valuable as a learning tool. Although most university departments require some form of "speech class," nevertheless, it is important that individual instructors require their students to make presentations, so students can apply the techniques they learn in their speech class. The completion of a project is a good opportunity for making a presentation. If projects are team oriented, then all the team must be involved in the presentation [Mathews, 1999].

The following is an example: The class is divided into UNESCO regions (Africa, Europe, Asia, North America and South America). Each person in a group represents one country in their UNESCO region. Then, each student looks up key information and data regarding deforestation in their country. At the next step, students develop charts and maps of their findings. They can also download maps of their regions to be used in reporting their findings.

The group should then develop a report for presentation in class. The activity is culminated by having the class discuss and conclude by drawing parallels between regions according to the Earth's subsystems.

In a *press conference*, students are invited as investigative reporters, to ask questions to their teacher about the topic they have been studying. They may seek to clarify confusing material, find out new information or to press their professor's position to a point of contradiction or inadequate evidence. The teacher's responses might be crisp and short or might constitute mini-lectures. Professors can structure questioning sessions in any number of imaginative ways to facilitate and humanize the learning process. The press conference is particularly well suited to concluding a unit. The most appropriate time to be carried out is usually the end of the semester or year [Frederick, 2000].

5. Conclusions

Active, as opposed to passive learning, allows students to discover, process and apply information. It takes them beyond the role of being a passive listener and note taker and promotes activity and initiative. Students are given opportunities to recognize and accept their responsibility for life long learning.

In order for students to be taken out of a passive role and placed in an active, thinking mode, it is necessary for faculty to use the appropriate educational strategies. The active learning techniques discussed in this paper were feedback lectures, concrete images, true/false questionnaires, visual lists, discussions using photographs, discussions using movies, debates, student presentations and press conferences. Each of these strategies was illustrated by appropriate examples drawn from the issue of deforestation.

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