

Integrating Environmental Education with English Language Skills: A Multi-Channel Learning Approach

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ABSTRAK *Kertas ini mengemukakan hujah-hujah untuk menyokong penggunaan satu pendekatan pengajaran-pembelajaran pendidikan persekitaran dan kemahiran berkomunikasi dalam bahasa Inggeris. Pendekatan yang dicadangkan adalah gabungan pendekatan humanistik dan teknologikal. Kertas ini mencadangkan satu pendekatan pelbagai media untuk menyepadukan pendidikan persekitaran dengan kemahiran berbahasa dalam bahasa Inggeris. Rasional dan methodologi pelaksanaan dibincangkan dalam kertas ini.*

1. Introduction

The concern for developing environmentally responsible citizens who are aware of and concerned about environmental problems such as global warming, energy consumption, atmosphere pollution, land use degradation and water pollution ranks as an important item in the agenda of educators in Malaysia. Likewise the need for improving proficiency in the English language among Malaysians is viewed to be just as urgent as the country forges ahead to participate in economic globalization and technological advancement. It is in response to these two current national concerns that the writers of this paper advocate a multi-channel learning approach to integrate environmental education with English language skills.

This paper attempts to argue a case for the synthesis of humanistic-technological approaches in the educational process for competence in environmental education and communication skills in English. It will establish the rationale for such an approach and account for the methodology involved.

2. The Rationale

Classroom instruction in itself has often been found to be inadequate in providing optimal conditions for English language learning as well as the mastery of educational concepts and skills for various reasons such as the absence of a supportive learning environment. Though experiential learning and the process approach to teaching have gained much currency in Malaysia, largely through the efforts of curriculum developers, actual pedagogical procedures in the classroom are not seen to focus on the learning process nor do they promote self-empowerment which is central to classroom processes that provide for successful learning. It is against this background of the classroom's inability to tap into the learners' natural inquisitiveness and to captivate them in a process of confidence building and ego-enhancing quest for competence in some domain of knowledge or skill that the idea of the camp approach was mooted.

The education camp is fundamentally designed to allow participants to be intrinsically involved in the process of learning which emphasizes the importance of self-investment and self-determination of learners in their own educational destinies.

The Education Camp provides for the integration of content learning derived from environmental studies with English teaching aims. The main motivation for this integration is that it provides a more stimulating and meaningful environment for second language acquisition. It is believed that if English is used to teach a programme of study such as environmental studies, the language input will provide a genuine communicative purpose and context while at the same time offer learners opportunities to use English for authentic reasons. The language component is designed to provide practice in using English as a tool for learning the subject content.

Teaching-learning strategies incorporated in the subject content and language component draw upon both humanistic and technological methodologies to fulfill the following objectives:

- i) To develop environmentally responsible citizens who are aware of and concerned about environmental problems.
- ii) To provide hands-on environmental experience and activities to enrich vocabulary, increase verbal fluency, enhance the ability to think logically and present thoughts in writing creatively and coherently.
- iii) To develop environmental literacy for understanding and discussing developments in environmental issues as they are communicated via newspapers, magazines and other public media.
- iv) To promote the practice of decision-making and self-formulation of a code of behaviour about issues concerning environmental quality.

3. The Features of a Humanistic Approach

Humanistic approaches start with relationships, experiences and feelings between teachers and learners rather than starting with hard and software to engineer behavioural skills and competencies. Humanistic approaches operate within a framework of cultural, social and personal expression by which feelings, ideas, needs and curiosities are communicated. The features of a humanistic approach are represented by the concern for the following:

- i) organisational aspect of a learning experience
- ii) empowerment of the learner
- iii) integration of affective and cognitive factors
- iv) improvisation and variation
- v) heuristics

(Fox, J. et. al, 1992)

Humanistic approaches take as their elemental units 'lived relationships' in which situations or events are experienced as an organized developmental and holistic process of learning in a social context.

Empowerment is characterised by being able to act within continually changing and often unpredictable contexts to meet one's needs which leads to successful action in complex and dynamic situations.

Situation language use provides opportunities for the incorporation of both cognitive and affective factors in learning. It allows individuals to experience the range of human emotions: strangeness, nervousness, unpredictability in first encounters together with the joy, the curiosity, the anticipation of new adventures.

Humanistic approaches also provide for improvisation and variation on typical themes through social interaction. Furthermore, repertoires of situations previously experienced act as heuristics for current similar situations rather than formulae for reproduction.

3.1 The Camp Approach

In keeping with the main objectives of a humanistic approach, an education camp has to be organized to provide the relevant social context for exploring environmental issues. The focus of the camp is upon experiential learning where processes, events and environment i.e. social arrangements of participants and resources are brought together to promote the achievement of educational ends, in this case using English creatively to address environmental issues. It is believed that the camp approach can provide an "immersion environment" which appear to come closest to creating holistic educational experiences. Because learners are engaged in a developmental and holistic process of learning in a social context there is an increase in intrinsic motivation and empowerment as learners are pointed beyond transient extrinsic factors like grades and tests to their own competence and autonomy as individuals capable of actually doing something with their new language. The camp approach also allows for the integration of subject content, language and learning strategies which cover both cognitive and affective domains. An example of a cognitive strategy is when learners have to relate new information to prior knowledge or making personal associations with new information as they explore the environment around them. On the other hand, when learners get together with peers to check information, to obtain feedback and to solve problems they need to exploit the social-affective strategy of co-operation. Also, their involvement in field work which requires them to discover for themselves the extent to which the ecosystem has been threatened act as heuristics for current similar situations rather than formulae for reproduction.

Perhaps, the most important feature of the camp approach is the focus on the self and interpersonal relations. The needs of the self for friendship, self-esteem, self-confidence, enjoyment, the satisfaction of curiosities and the need to act are the motivation. Because the social content provided by the camp and the personal dynamics of situational interaction generated in group activities such as project work, discussions, role play, problem solving activities, etc. involve doing things together, the personal dynamics of the situation are intrinsically motivating. And motivation is the key for successful learning.

Apart from being intrinsically motivating, the "immersion environment" of the camp and the situations, events and tasks experienced by the learners serve to provide the necessary input in terms of both the subject content of environmental education and communication skills in English for further development through information technology.

4. Information Technology and the Integration of Environmental Education with English Language Skills

Operating within the framework of a humanistic approach, the Education Camp provides for the

integration of content learning derived from environmental studies with English language teaching aims. The language component is designed to provide practice in using English as a tool for analysing and investigating the subject content.

First-hand knowledge derived from field work and interpersonal group activities which take issue of environmental problems is seen as not only creating conceptual awareness, but preparing the learners for a mastery of the discourse of environmental education. This is supported by schemata-theory models (see Rumelhart & Ortony, 1977; Rumelhart, 1980; Anderson & Pearson, 1984). A schema is an abstract structure representing concepts stored in memory. Recent advances derived from the field of artificial intelligence has found that it is impossible to programme computers to understand natural language without equipping them with extensive knowledge of the world (Schank & Abelson, 1977; Wallace, 1988). Schemata relating to text content for the form or structure of texts have also been posited to be essential for understanding a particular subject area (see Carrell, 1983). Research into second language reading has drawn both on schema theory and on first language research to stress the importance of the reader's prior knowledge. Carrell (1983), in particular, has investigated the role of background knowledge in second language learning. She distinguishes between content schemata which refer to knowledge of a particular topic, and formal schemata which are concerned with knowledge of the rhetorical organisation of a particular discipline or subject area. Recent findings of the schemata theory have supported the importance of engaging learners in pre-reading activities which help them cope with semantic and discourse constraints of texts. Tomlinson and Ellis 1988, suggest elaborate activities involving group work, discussion or writing. Others suggest discussion of statements or relevant personal experiences (e.g. Taylor, Ahern, Shepherd & Rossner, 1986; Greenall & Swan, 1986).

A second, and potentially complementary response to schema theory findings is to provide learners with texts that consistently develop a given topic area (cf Williams, 1983; Eskey & Grabe, 1988), so that they achieve a 'critical mass' (Grabe, 1986) of information in that area.

It is upon these theoretical assumptions that the camp approach endeavors to provide hands-on environmental, experience and activities to help create and sustain the learners interest in environmental issues and at the same time enrich his background knowledge of environmental problems. While hands-on environmental experience serves to inject the necessary interest in environmental issues, group activities which focus on conceptual awareness are specifically aimed at enlarging the participants' world view of environmental issues and familiarizing them with the vocabulary and discourse of environmental education. Thus environmental literacy workshops need to be organized with the objective of developing the participants environmental literacy for understanding and discussing developments in environmental issues as they are communicated via newspapers, magazines and other public media. A 'critical mass' of information in environmental education is presented to the participants via various texts from the media which consistently developed topics on environmental issues to enrich their vocabulary and increase their verbal fluency when dealing with environmental issues.

4.1 Exploiting Computer Assisted Learning (CAL) for Developing Environmental Awareness and Environmental Literacy

Environmental awareness and environmental literacy can be further developed through Computer Assisted Learning (CAL) once the learners have acquired the "critical mass" of information as discussed above.

Interactive learning based on a computer system can be a small, yet significant realization of that ideal of learning whereby students participate actively in the acquisition of knowledge by interacting or communicating with the source (traditionally the teacher) thus giving an understanding of the subject and assuring it a place in their long term memory. They enrich it also with their own observations and experience which are shared with fellow learners.

There is already a considerable range of simple to highly sophisticated software available. Though traditionally the computer is used as a self-access resource by the individual learner it is increasingly integrated into normal classroom work where there is a mixed presentation involving the synthesis of human-computer interfaces. The possibilities of integrating machine and human face-to-face interaction involving group work for communication are many. The purpose of this paper is to show some of these possibilities. The examples we shall give cover a range of activities and programs related to environmental education and English language skills.

4.1.1 Text Manipulation: STORYBOARD

STORYBOARD is a program that is already widely used in language learning, both in class and for self-access purposes (Jones C. and Fortescue, S., 1986).

The program originally devised by John Higgins is a total cloze operation on a short text. It deletes every word, replacing each letter with a 'blob', and invites the users to restore the text by guessing words they think might be in it. Each time a word is guessed, the programme prints it in every place that it occurs in the text. This program is particularly useful for schema-related work which requires the learner to apply knowledge of the subject, vocabulary, grammar and discourse by guessing what a certain length word in a certain context might be.

STORYBOARD is an authoring package. It comes equipped with a special 'writer program' which enables teachers to write their own texts for their students to solve. For example, one could create texts on topics concerning environmental issues which earlier have been dealt with through other camp activities. The learners can then draw upon their prior knowledge of a topic to restore a text.

Group activity involving brainstorming could also be used where group members work together to produce guesses of content words like "emissions", "pollution", "carbon monoxide", "atmosphere", "vehicles", "health", "safety", "effects", etc. to complete a text on "Air Pollution". As the text builds up, guessing becomes less of a brainstorming exercise, and more of a cloze activity. The program has a variety of help options: users can "cheat" up any letter or any word, guess prefixes and suffixes, or even call up the whole text at any time they want. It thus caters for a variety of learning styles and preferences.

With its authoring facility, **STORYBOARD** can also be linked with listening comprehension, summary writing, or as a stimulus for group composition.

i) Listening Comprehension

One way of linking the spoken language and listening comprehension to **STORYBOARD** is to provide recordings of talks, discussions or other oral presentations of topics on environmental issues, as listening

comprehension material to learners. The learners then reconstruct a well-formed written version of the oral presentation with **STORYBOARD** preferably working in small groups. They are thus not working on the text cold since they actually know the content of the text. Their attention will be therefore more focused on discovering the more formal and more concise form of the written version. Teachers can create their own materials of this kind with the **STORYBOARD WRITER** program and a suitable cassette.

ii) **Summary Writing**

The **STORYBOARD WRITER** program can also, be used by the teacher to teach summary writing. The teacher produces carefully written model summaries and provides them as **STORYBOARD** texts. Firstly learners read a complete text. Then they try to write a summary of the text by using a total cloze operation. Each time a word is guessed correctly it is printed in every place that it occurs in the text. As learners become more involved in the task of completing the summary they become more aware of the techniques the teacher is trying to put across. A paper copy of the summary is made available at the end of the lesson.

iii) **Group Composition**

Group composition can also be facilitated with the use of **STORYBOARD**. The class is divided into groups of about 4 students, and each sets about writing a report or description of observations made during their field trip. When their reports are completed, learners go to the computer and use the **WRITER** program to save their work on disk which will become available to other groups. They then have the satisfaction of seeing how other groups of students solve their own compositions with the **STORYBOARD** program. This technique is very motivating because not only do learners feel that there is a real purpose in writing their reports (since others are going to use), but there is also a real incentive to find and correct errors, and to write something worth reading. The sense of ownership of the text and pride in displaying their writing ability to peers provide immense motivation.

4.1.2 **Computer Simulations: Educational Materials and Equipment Corporation (E.M.E.) Air Pollution and Water Pollution**

“Simulation” involves any learning activity which seeks to model some aspect of “real life” target behaviour in some way. Simulation games can be used to familiarise learners to some of the terms and concepts of a particular subject. They are now being used more often because of their potential both for motivating students and providing an active play-related means by which learners can understand the complexities of reality. What computers have brought to the technique of simulation are firstly, their ability to model complex systems in real time and secondly, their consequent capacity to give instant feedback.

It is found that computer simulations on specific environmental topics such as air pollution and water pollution can further provide an in-depth knowledge of the respective issues, while at the same time help develop skills of issue analysis and investigation. The following examples illustrate the use of computer simulation for two environmental topics.

4.1.2.1 The E.M.E. Air Pollution Program

i) Overview

The E.M.E. Air Pollution Program places the student in the role of an environmental planner whose job is to control air pollution, specifically carbon monoxide (CO) in "Pollution City". In the Introduction the program reviews the effects of CO on humans, U.S. CO Standards, the factors that affect atmospheric CO levels and the causes and effects of a thermal inversion.

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special section, DEVELOPING A COMPUTER MODEL, clarifies the assumptions, advantages and limits of computer models and emphasizes the use of safety margins. In the EXPERIMENTAL MODE the computer simulates CO levels under various conditions in a large city. The student uses the computer model to develop a plan to reduce CO pollution to acceptable levels. This is done by testing the effect of changing the factors that influence city CO levels including number of vehicles, average traffic speed, amount of pollution produced by each vehicle, availability of mass transit and wind speed. The program concludes with a review quiz.

ii) Objectives

The E.M.E. Air Pollution Program will help students to:

1. understand the factors which affect atmospheric CO pollution
2. manipulate a computer model and interpret results
3. evaluate hypotheses in light of experimental results
4. analyze data and improve problem-solving skills
5. design experiments and plan a research project

iii) Rationale

The direct study of air pollution is difficult and often impossible. However, with the use of a computer model that simulates the pollution conditions of an urban area, students become actively involved in the causes, effects and control of this complex problem. A high level of interest is maintained as students develop the ability to make informed, practical decisions to improve the environment. The program also illustrates how a computer model is used to solve specific problems, a subject basic to computer literacy. Since computer models are increasingly used to make public and corporate decisions, students are also made aware of how models can be misused. Discussion and practice in examining the assumptions of a computer model are provided to enhance concept understanding. This program focuses on carbon monoxide pollution produced by cars, since this source of air pollution is more affected by the actions of individuals than any other.

iv) Activities

Pollution Control Plan

Using program Air Pollution, each student will develop a plan for controlling atmospheric CO levels in "Pollution City". Evaluation criteria include: realistic assumptions-clearly stated in

writing and carefully explained; testing methods and results shown; safety margin (CO levels at least 10% less than U.S. Standards); plans for getting everyone to work. Side effects should also be evaluated as they are a major source of errors in a computer model. For example, using buses will help to reduce CO pollution, but also produces large amounts of particulate matter which may cause safety, cost and environmental problems.

The Public Hearing

A simulated public hearing is held to select an air pollution control plan that meets the community's needs. Prior to the public hearing, all students should have run Program Air Pollution and prepared a pollution control plan. There should be a moderator to make sure that each presentation is not too long, and to keep discussions to the point. A 5-student Board of City Affairs is also selected. Each student on the Board will represent one of the following community concerns: (1) business, (2) environment, (3) health and safety, (4) taxpayers, (5) area residents. The Board will vote on which city pollution control plan to accept. The other students are separated into groups to combine their pollution control plans and present them to the Board.

4.1.2.2 The E.M.E. Water Pollution Program

i) Overview

The E.M.E. Water Pollution Program is an interactive computer simulation consisting of two parts:

a) THE INTRODUCTION

Introduction reviews the basics of water-pollution including physical properties of water, factors affecting dissolved oxygen levels, types of water pollution, fish-kills, bio-chemical oxygen demand, primary and secondary water treatment.

b) THE EXPERIMENT MODE

The EXPERIMENT MODE provides clear and specific instructions for setting up and running the water pollution experiments. In the Experiment Mode, students manipulate the variables which influence water quality. Results are displayed in tables and graphs. A student lab book provides basic activities to acquaint all students with various aspects of water pollution, as well as advanced activities to challenge brighter students.

ii) Objectives

The **WATER POLLUTION** Program will help students to:

- a) understand the variables that improve and degrade water quality
- b) determine the impact of water pollution on aquatic populations
- c) predict the effects of manipulating one or more variables

- d) improve data interpretation, problem-solving skills graphing skills
- e) evaluate hypotheses in the light of experimental results
- f) design experiments and plan a research project

iii) Activities

1. *The WATER POLLUTION* Program calculates dissolved oxygen and waste concentration levels under a variety of conditions. The model displays results by means of a data table and a graph that plots both dissolved oxygen levels and waste concentration against time. Students can work out levels of pollution and present their results in a data table and graph by manipulating the following variables:

- a) Body of water (Pond, Lake, Slow or Fast Rivers)
- b) Water temperature (1 - 32 degrees Celsius)
- c) Type of Waste (Industrial, Sewage)
- d) Dumping rate (0-14 ppm/day)
- e) Type of treatment (None, Primary, Secondary)
- f) Number of days (2 - 30)

2. *Testing Water Samples for Dissolved Oxygen Levels*

Students are required to collect a small bottle of mid-depth water from several local waterways. They then pour 10ml of each water sample into separate test tubes and mix well with 2ml of methylene blue. Methylene blue is an indicator which changes water colour from a deep blue in oxygen free environment to colourless in an oxygen-poor environment. A stopwatch is used to record the length of time required to produce a colour change. Results for each site are then compared.

3. *Project Work: Local Investigations*

Students are to locate sources of industrial, agricultural or sewage water pollution in their area; find out how much of each type of waste must be dealt with daily and the problems it presents; determine how local authorities regulate water pollution and how they enforce these regulations.

Conclusion

This paper sets out the possibilities of interfacing human interactional learning strategies with computer applications. The context provided is an Education Camp which involves participants in an enjoyable experience of confidence building and ego-enhancing quest for competence in Environmental Education and communication skills in English. The entire learning experience is based on a humanistic approach which takes into account the dynamics of the process of learning. The dynamics of process involve an integration of both affective and cognitive factors which work together to motivate and empower the learner to do things with newly acquired knowledge and skills, and discover new experiences for himself through improvisation and variation. The joy of establishing friendships in the camp context where participants are thrown together to engage in genuine communication in their attempt to discover more

of each other and the environment is definitely supportive of a humanistic approach to learning. What is more important is that applications of information technology are seen to be integral to this approach, thus diminishing the existing chasm between traditional and technological approaches to teaching and learning.

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