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APPROACHES TO THE TEACHING OF CONTROLLING THE ENVIRONMENT

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EMPLOYING MULTIPLE INSTRUCTIONAL STRATEGIES TO TEACH CONTROLLING THE ENVIRONMENT

BY

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Introduction

The immediate natural environment of man is the component the planet earth. The need for survival among them necessitates daily interactions of all the elements in the environment. The interactions commonly takes the form of agricultural activities, domestic activities, transportation, mineral exploration and exploitation, construction works, game hunting, space exploration, etc. Most often, these daily interactions resulted into release of contaminants into the environment in such high quantity that adversely affects the natural delicate balance in the environment. Global warming, climate change, environmental disaster and reduction in biodiversity are some of the major consequences of this situation according to Global Ecology (2006); Goudie (1993); and Microsoft (2003). This has resulted into significant threat to human health, quality of life, the well being of other species as well as affecting the functioning of abiotic elements of the environment. According to Microsoft (2003), there is no organ in the body that cannot be affected by environmentally caused diseases.

There are many Teacher-centered (traditional) and Student-centered (modern) teaching approaches/techniques that can be used to facilitate meaningful learning of Controlling the Environment. However, according to Randall (2000), findings from research studies has indicated that students learn just "10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they hear and see, 70% of what they say and 90% of what they say as they do a thing". Randall (2000) also cautioned that to be an effective teacher you should not focus on any one method to the exclusion or minimization of the others. According to the National Board for Professional Teaching Standards (2003) accomplished teachers know that students learn in a variety of ways, hence they develop and provide a variety of resources and employ variety of learning experiences. They equally present multiple paths to learning to enable learners confront important subjects from several angles using a variety of lenses. It is therefore essential to frequently use verities and combinations of teaching approaches and instructional strategies to provide optimum opportunities for students to be active participant in teaching and learning process.

This paper attempted to provide a useful insight into how teachers can successfully use multiple instructional strategies to teach and enhance meaningful learning of Controlling the Environment. Specifically, the paper provides useful insight into how a combination of Resource Person, Project and Field Trip can be used as instructional strategies to facilitate meaningful learning of Controlling the Environment by students.

Field Trip Instructional Strategy

The field Trip instructional strategy is well known students-centered teaching approach/technique. According to the Saskatoon Public School (2006), it is a structured

activity that occurs outside the classroom, which can be a brief observational activity or a longer more sustained investigation or project. In the view of Randall (2000) field trip provides avenue for learners to be exposed to real life situations that are not normally available in the classroom set up. Application of modern Information and Communication Technology (ICT) in teaching and learning has now make it possible to embark upon Virtual Field trip, which is an online virtual visit as an alternative to real-life field trips. Saskatoon Public School (2006), noted that, "Virtual Field Trips allows both students and teachers the opportunity to travel to areas of the world that would otherwise be out of reach. Teachers can take their students on a field trip right in their own classroom. Students can gather information about areas in the world that would have been impossible for most of them to see." Important guidelines for effective use of real-life field trip are outline below."

- * Teachers must make a preliminary trip to obtain relevant first hand information
- * Students must be involved in the planning and execution of the trip
- * Students must be adequately informed about the detail activities during the trip, what to look for and what they must not do.
- * The trip must be directly related to the topic under study
- * First-aid box must be taken along on the trip and appropriate medical personnel
- * Teacher must debrief the class after the trip
- * Students must be made to write report on the trip
- * Teacher and students must jointly evaluate the trip
- * Focus must be on hands on experience such as observing, touching, identifying, measuring, comparing and other process skills.
- * The trip should be used as integration with a particular unit (Bello, 2005; Orien, and Hofstein, 1993)

Resource Person/Guest Teacher Instruction Strategy

In the field of education both human and material resources are important elements in the preparation of effective instructional strategies. Resource persons refer to individual craftsman, professional or expert non-professional from the community who possess certain specialized skills and knowledge relevant to items in the school science curriculum (Bello, 2000). Hence, science teachers can use such individuals as part of instructional strategy to enhance effective teaching and consequently facilitate meaningful learning by the students. Craftsmen, Technicians, Nurses, Scientists, Medical doctors and other professionals are elements of human resources. An individual craftsman or professional used by the teacher as part of instructional strategies for effective teaching and meaningful learning is referred to as a Resource Person or Guest Teacher. Although guest teachers are wonderful resource for enriching a lesson they are not substitute teachers as rightly observed by Baron (2006). They enhance meaningful learning by students by;

- * bringing diverse points of view to the students;
 - * bringing 'real world' applications to complement theory; and
 - * adding a different dimension to the dynamics of the course (Baron, 2006)
- Teachers should consider the following guidelines as part of measures for effective use of Guest Teachers in their lesson.

Pre-presentation

- * Sought for permission to make use of resource person in your lesson from the school authority.

- * Visit 2-3 individual technicians, or professionals whose field of specialization is closely related to the concept/theory to be taught. During this preliminary visit, establish a friendly relationship, humbly ask the individual to explain the theory and practical aspects of his/her profession. Use this occasion to quickly assess the under-listed qualities in the individual
 1. Knowledge of the subject matter
 2. Communication skills including voice projection
 3. Level of formal education and training
 4. Emotional stability
 5. Physical appearance such as neatness and smart dressing
- If you judged the individual to be suitable a Guest Teacher then inform him/her that you may likely nominate him/her as a Guest Teacher.
- * Use the above criteria to select the most credible individual among those visited. You may consider the distance of the individual's residence/workshop to the school as another criterion if the need arises.
- * Re-visit the selected individual to be used with an official letter of invitation to the school as a Guest Teacher. The letter should indicate the topic, date, time and venue of presentation of the topic. The school authority and the Head of Science Teachers should sign the letter.
- * Discuss the topic and the objectives of the presentation in addition to detail activities expected to be carried out by the Guest Teacher and the students during the presentation.
- * Clarify misconceptions and alternative conceptions related to the topic held by the Guest Teacher or you. Anticipated students' questions and their responses should be examined together.
- * Send an outline of the key points you would like covered, and if possible discuss this in detail and have the Guest Teacher send you his own outline, so there will be no surprises.
- * Suggest appropriate sub-topics and the sequence of their presentation to the Guest Teacher in order to simplify his/her task and enhance meaningful learning by the students. This will equally keep the Guest Teacher strictly within the scope of the topic.
- * Arrange for the Guest Teacher to visit the school before the presentation date. Provide the Guest Teacher useful background information about the students and the school during the visit.
- * Allow the Guest Teacher to check facilities in the proposed venue of the presentation and determine the suitability of the venue. You may reschedule the presentation to another venue, time and date if the need arises.
- * Inform the students about your plan to use a Guest Teacher. The information should include the topic, date, venue and time. Counsel the students on the necessity for good conduct during the presentation by the Guest Teacher.
- * Select members of the class that will give vote of thanks to the Guest Teacher. The selected students should be trained for this assignment if the need arises. Ask the students to get ready relevant questions on the topic for the attention of the Guest Teacher.
- * Explore potential for hands-on and interactive opportunities in lieu of a straight lecture.
- * Discuss the possibility of using supportive lecture material and be willing to help prepare them.

Presentation

- * Ensure that you are present for the entire section
- * Ensure that all the students and required facilities are in place before you usher in the Guest Teacher into the class.
- * Introduce the resource person in a very colorful manner, stating the name, status, professional achievements among other relevant information. This is to stimulate students' interest in both the resource person and the topic to be presented.
- * Briefly introduce the topics and sub-topics. Let the students know that the Guest Teacher shall welcome questions only after the presentation.
- * Now let the Guest Teacher present the lecture using the scheduled sub-topics. At the end of each sub-topic, briefly summarize the salient points.
- * Provide assistance to the Guest Teacher as needed such as distributing or collecting apparatus, circulating.
- * Welcome relevant questions and allow the Guest Teacher to respond to each question. Do not hesitate to rescue the resource person when faced with a difficult question.
- * At the end of the question session, ask the representative of the class to give vote of thanks to the resource person.
- * Before you escort the Guest Teacher to the door/school gate, express your personal appreciation to the resource person and ask the students to remain on their sets in readiness for a test on the topic.

Post-Presentation

- * Debrief students about the guest's lesson by pointing out appropriate connections to material previously taught.
- * Ensure that you refer to the information and activities covered during the Guest Teachers' lesson.
- * Administer a follow up test and give follow up assignment
- * Send an official letter of appreciation to the Guest Teacher
- * Critically examine the entire exercise to determine its success and failure as well as obstacles encountered in planning and carrying out the exercise.
- * Advance plausible reasons for its failure and suggest ways to improve such exercise in the future (Baron, 2006; Bello, 2000; Mullins, 2001).

Project Instructional Strategy

In this instructional strategy students are required to carry out specific assignments over a given period of time which ranges from few hours to months. The project can be conducted within or outside the class and it can be initiated by the students or teacher. It can be carried out in groups or individually and can be planned or unplanned. Reports can be written or verbally presented. In the view of Apple Learning Interchanges (2003) Project-based learning activities provide opportunities for students to work on problems in a real-life set up. It develops students' abilities to set personal goals and standards of excellence, and encourages students to widen and explore their personal interests as they acquire the knowledge needed in a discipline. Fajemidgba (2001) stated that a project can be used to

expose students to in-depth knowledge of some concepts and topics. This strategy has a strong potential to develop leadership qualities, spirit of cooperation and organizational skills in students. It is essential to observe the following guidelines when using project instructional strategy.

- Objectives of projects must be made clear to the students.
- Ensure regular progress report to avoid errors and time wasting
- Make the projects relevant to the world outside the classroom, and help the students to see and understand the connections between classroom activities and the world of work
- Verify the amount of students' input into the project
- Do not accept commercially produced material as a project from students.
- Ensure that materials needed for the project are available in the immediate environment of the students (Bello, 2005; Fajemidgba, 2001).

ILLUSTRATIVE LESSON

Topic: Water treatment and Disease Vectors

Class: JSS 1

Objectives: By the end of the lesson student should be able to

1. Describe water treatment
2. Describe insect vectors

Materials: Insect net, beakers/suitable small containers to collect water and refuse samples, hand glove, nose guards and basic writing materials

Pre-instructional Teacher's Activities:

- Take a preliminary field trip around the school environment/town to locate areas with stagnant and flowing water bodies, water treatment plant, water drainage system, refuse and sewage dump sites, and public health centers.
- Complete all necessary arrangement for a day field trip with the students and school authority.
- Complete all necessary arrangement to make use of resource persons/guest teachers
- Set aside a day as the environmental day for the class.

Instructional Activities

Teacher's Activities	Student's Activities
Briefly introduce the topics to class and your plan to make use of field trip, project and guest teachers to facilitate meaningful learning of the topics by the students. Engage students on discussion on your plan.	Students to discuss the plan and make necessary preparations to achieve the plan, and even suggest possible modifications to the plan.
Lead the class on a field trip to the following locations: stagnant and flowing water bodies, water treatment plant, water drainage system, refuse and sewage dump sites and public health centers. Guide the class to observe and collect relevant specimens in the various locations.	Students to carefully observe all stages of water treatment in a municipal water treatment plant, and pay special attention to victims of water and insect vector born infections.
Instruct the class to pay special attention to stages of water treatment process at the site of municipal water treatment plant, and to equally pay special attention to victims of water and insect vector born infections in the health center visited.	Students to collect samples of the following insect vectors: housefly, tsetse fly mosquito black fly. The collection should include eggs and larva of the insects. Very few samples of biodegradable and non-biodegradable refuse as well as water sample from water bodies should equally be carefully collected.
Embark on debriefing exercise at the end of the field trip. Emphasize the interconnection between the topics under study. And ask students to draw the various insect specimens collected during the field trip.	Students to actively participate in the debriefing exercise and draw samples of specimens collected from the field trip.
Make use of Resource Persons/Guest Teachers to handle the topics under study. (one or two credible professional in the field of health services, or an environmental scientist can service as Resource Persons/Guest Teachers for the topics under study). Declare the presentation day as Environmental Day.	Students to participate actively during the Guest Teachers' presentations and raise relevant questions to clarify their misconceptions.
Engage students in practical environmental sanitation exercise in the school as part of the Environmental Day programme.	Students to embark on environmental sanitation exercise within the school compound.
Embark on debriefing exercise at the end of the presentations by the Guest Teachers.	Students to actively participate in the debriefing exercise.

Assign the following projects to students; (let the students work in six groups)	Students are to embark on the following project works:
- Insect Breeding: (a) breed housefly, preserve and draw all the stages of the life-cycle of the insect. Compare their observations with textbook presentation of the life cycle of the housefly. - Insect Breeding: (b) breed mosquito, - cycle of the insect. Compare their observations with textbook presentation of the life cycle of the housefly. - Convert biodegradable refuse and sewages into organic fertilizer (Making a compose heap). - Analyse the health records in two or more health centers in the community and compare the relative prevalence of water born infections in the community. - Design an environmentally friendly waste management for the school and community. - Design a public enlightenment programme to improve environmental sanitation and community participation in immunization exercise.	- Breeding of housefly - Breeding of mosquito - Making a compose heap - Analyse health records of a community with focus on water and insect vector born infections. - Design environmental friendly waste management programme. - Design a public enlightenment programme on environmental sanitation and immunization.
Monitor the progress of the student's project works and provide relevant guides when necessary. Assess the student s' project works when completed.	Students to complete their project and submit written reports for class discussion and assessment by the teacher.
Lead the class on discussion on the projects and then summarize the major points of the topics under study. And administer a comprehensive assessment test on the topics.	Students are to write a compressive test on the topics after class discussions.
Set up Environmental Friendly club in your school as part of measure to sustain students' interest in environmental education and activities.	Students to form/join Environmental Friendly Club.

Conclusion

This paper placed emphases on the use of students' centres instructional strategies; it however does not in any way attempted to demean teacher-centre strategies such as the direct instructional strategy. The focus is to sensitize science teachers to the need to always consider the use of multiple instructional strategies to enhance meaningful learning by students. This will help to take care of individual differences in learning style and provide multiple pathways to learn.

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