Integrating ICT in Teaching Mathematics

By

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Abstract

Computer technology is an increasingly popular method for delivering instruction in an effort to increase learning and improve performance of students. In the midst of technological advances, the INTEL Teach to the Future provides training programs that would help teachers in improving instruction to promote a more active and student-centered learning scenario.

The INTEL Teach Unit Plan entitled Mathematics Power/Fuel Patrol was used in carrying out the activity following the Essential and Unit Questions such as: How do we Conserve Energy? What mathematical concepts are applied in energy?

This plan is focused on the use of Power Patrol Report Cards and Journal in Fuel Consumption in teaching/learning concepts on Ratio, Proportion and Percent in Mathematics. It began with monitoring the electricity and fuel consumption (those with motor vehicle) in the households of the First year –Guijo students. The data gathered were used in discussing the mathematical concepts. The students made use of the spreadsheets program to synthesize the information gathered from the power patrol report card and journal in fuel consumption. Part of the plan was the integration in the Araling Panlipunan subject where the teacher introduced the topic on "Napapatunayang may mga likas na yaman at likas na kagandahan ang bansa na nangangailangan ng wastong paggamit at pangangalaga". Collaboratively in a group of six, the students created a Multimedia Presentation from the concepts learned. All the student outputs were evaluated using rubrics.

The plan achieved its goal of connecting mathematical concepts used in computing their electricity /fuel consumption and how these values relate to their daily life activities specifically on knowing the cost of electricity and fuel used per day of their motor vehicle.

This plan concludes that mathematics can be taught using computer technology as a tool to captivate students' participation and propel them towards greater learning. The students indicated that using technology helped them to understand concepts on Ratio, Proportion and Percent including the complexity behind Mathematics

as a subject. Learning was further enhanced by creating an opportunity for them to think more critically in connecting mathematics concepts to real life situations. These situations mold and guide them to become responsible students and prepare them to tackle the role of being good citizen in the community.

Introduction

When this plan was initially conceptualized, the objective of using the power patrol report card and journal in fuel consumption was to have it as a project, a basic component in computing Mathematics grade with the following expected learning outcomes:

1. performs basic mathematical operations;
2. reads an electric meter and fuel gauge of a motor vehicle;
3. records and tabulates data;
4. computes electricity and fuel consumption at home;
5. identifies some household tips of saving electricity and fuel, and;
6. develops awareness on the country's energy crisis.

With this, learning was not confined on the four walls of the classroom but it goes out to the basic unit of the community… the household. With the participation of the members of the family, students' learning was more meaningful and fulfilling. Parents of students were required to sign the power patrol report card of their children. The central idea was to connect the students' learning to real life situations. Is the recent increase of transportation cost fair? Is the electricity cost this month justifiable? Doing this project build a community of learners that responded to the call of President Gloria Macapagal Arroyo to help save energy at the height of our present energy crisis. As a result, at the end of the 8th week (June 28 to August 16,

2004), the 1st year Guijo students were able to save a total of 346 KWH (Kilo Watt Hour).

However, as we become more involved with the monitoring activity, the very nature of our experience became an interesting situation to look into. How about using the power patrol report cards and journal in fuel consumption in the concept of Ratio, Proportion and Percent in Mathematics and heightened it with the use of technology… **the computers?**

Undeniably, computers have exerted a fantastic attraction on the students who use them in class. This technology allows the student to manipulate the world according to their desires and interest. Supporters believed that computers are a much more powerful learning medium than the innovative instructional devices. (Mayer, 1998). Learning tasks become more individualized enabling each student to receive immediate feedback. Experts say that having students work collaboratively on computers leads to greater initiative and more autonomous learning.(Encyclopedia of Knowledge, 2000).

It is on this light that the INTEL Teach to the Future Unit Plan entitled Mathematics Power and Fuel Patrol was developed. The plan gives emphasis on integrating Information and Communication Technology (ICT) in teaching Mathematics. However, the proponent strongly believe that computers are not substitute for teachers but teachers can make use of computers to give magic to the teaching-learning process… an educational environment that many computer classrooms can provide.

The plan was anchored by the following essential and unit questions:

Project Overview	
Project Plan Title:	***Mathematics Power/Fuel Patrol***
Curriculum-Framing Questions	
Essential Question	- How do we Conserve Energy?
Unit Questions	1. Is there Mathematics in energy? 2. How do we relate mathematics to energy? 3. What mathematical concepts are applied in energy? 4. In what way can these mathematical concepts be used in energy?

and the following student objectives/learning outcomes/learning competencies:

Student Objectives/Learning Outcomes/Learning Competencies:

At the end of this activity a First year student in mathematics:

1. reads an electric meter and fuel gauge of a motor vehicle ;
2. records and tabulates data and observation;
5. analyzes and computes data gathered;
6. expresses relationship between two quantities using ratios;
7. uses the concept of proportion and percent in solving two quantities;
8. gives situations illustrating problems that involve percentage;
9. synthesizes concepts in ratio, proportion and percent using spreadsheets; and.
10. expresses concepts learned using Power Point Presentation .

Instruments:

The unit plan is focused on the use of the following instruments.

1. Power Patrol Report Card

   A Power Patrol Report Card is an instrument used in monitoring the electricity consumption of the households of the 1st year- Guijo students of Iligan City East High School-Hinaplanon. It is given as an individual project and checked every week. The authenticity of the data presented in the card is determined by requiring the students to submit their monthly electricity bills.

2. Journal on Fuel Consumption

   The journal contains important information on the fuel consumption of the 1st year-Guijo students with motor vehicles. This is given as a group project considering that there are students who do not own motor vehicles.

Procedure

The INTEL Teach to the Future Unit Plan is first developed/designed. The objective is to reflect some aspects of the power patrol report card and journal in fuel consumption that can be considered in discussing Ratio, Proportion and Percent (Chapter 2: Lessons 2.1.1 to Lesson 2.5 of the BEC Curriculum)) in teaching Mathematics and integration of computer technology. Part of this is the consultation with the Araling Panlipunan teacher for possible team teaching. Time is spent on discussing the objective of the Araling Panlipunan Learning Competencies that will be integrated. It is decided that to reinforce the objectives of giving the power patrol report card and journal in fuel consumption, Learning Competency Chapter II. Lesson 1.5, ("*Napapatunayang may mga likas na yaman at likas na kagandahan ang bansa na nangangailangan ng wastong paggamit at pangangalaga*") should be given

emphasis. To make the learning process more active and meaningful, a Multimedia Presentation on the Household Tips in Saving Energy is required from them.

In the process of examining the data in the power patrol report card and journal in fuel consumption for the concept on Ratio, Proportion and Percent, the following activities are performed:

1. Compute the average KWH/fuel used per week/day.
2. Compute the average electricity/fuel cost per week/day.
3. Compute the average KWH savings per week/day.
4. Compute the average cost per kilometer/ average fuel consumption per kilometer.
5. Compute the percentage electricity/fuel expenses or cost per month.

The result of their computation provides a good springboard for the integration of computer technology. To expound and give a meaningful analysis on the data, the students are asked to graph/chart the result using the MS EXCEL Program.

During the computer orientation, it is very interesting to note that students are very much eager to learn the computer. The activity creates an opportunity for them to manage computer operation especially the beginners. The orientation takes one session (1 hour) for MS EXCEL and another session for MS Power Point. And it yields a fruitful result. Students absorb more information and learn the basic operation in a shorter time. Learning is so fast. In the creation of Multimedia Presentation, they are first taught how to search information using the ENCARTA. They are given the chance to explore the interactive section of the encyclopedia and

are given tips on how to search information about their topic. Since it is their first time, everyone is amazed with what the encyclopedia can offer them. In the Multimedia session, these are some of the students' comments:

> *"Wow very beautiful. This is very good. We can also give sounds and effects!"(Gwapoha ani uy? Nindot man kaayo. Pwede pa butangan ug sounds ug effects")*
> *It's very easy for us to learn here because of the pictures/illustrations. We can even get pictures from Encarta. This is what we are looking for. Learning becomes dynamic." ("Dali ra ta katuon ani kay naa man picture. Pwede pa gyud ta mokuha ug pictures sa Encarta. Mao ni among gipangita mam. Malingaw mi ani.")*

The students' comments on multimedia are consistent with Mayer's (1998) fundamental premise underlying the use of multimedia that learners understand explanations better when they receive words and corresponding pictures rather than words alone.

In the MS EXCEL session, students comment:

> *Fantastic! In a split of seconds, the graph is done."("Grabe wala may pila ka minutes graph man dayon!").*
> *"This is good". "We can even give color to our graph.".(" Mao ni gwapo. Pwede pa coloran daritso").*
> *No one would dare to buy an ordinary graphing paper now."("Dili na mahalin graphing paper ani"!.*

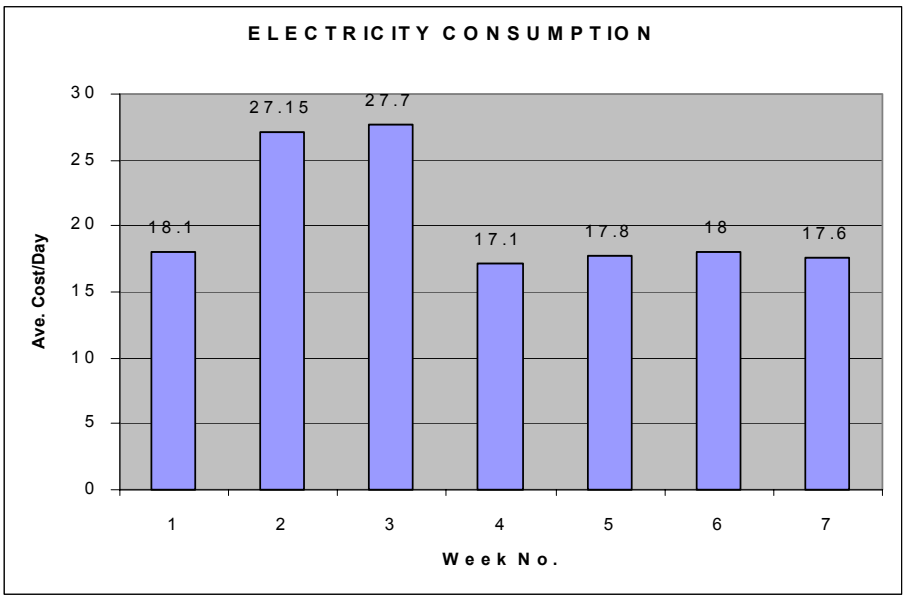
When students are asked to produce a hard copy of their outputs, they are very happy and satisfied on what they have done. Since then, they have been lobbying at the computer room for possible time in which they can be accommodated even during noon breaks.

Students' Outputs

Samples of students' outputs and reactions are included as evidence of students' learning. It is interesting to note that several comments and reactions have emerged.

A. Electricity Consumption:

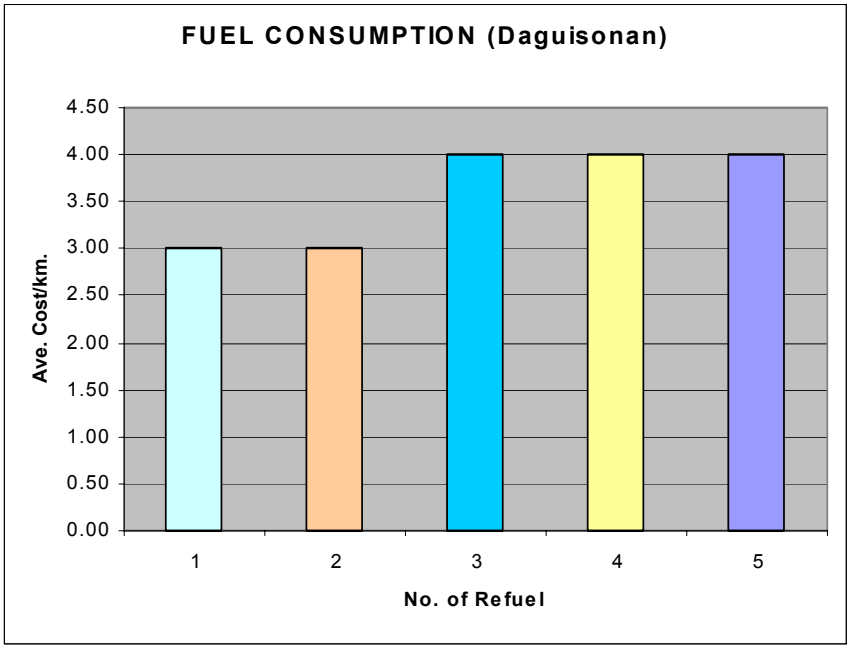
"*The 1st week of our electricity use was low. This was the start of the project. The 2nd and 3rd weeks were the highest because we used air conditioner every night. The more appliances were used the greater was the electricity increase and the greater electricity is used the*



higher was the bill increase so our budget was not enough. On the 4th to 7th weeks, we did not waste electricity. We did not watch TV for a long period and we turned off the lights when not in use. We used aircon from 9 to 12:00 midnight only."(Dayto, Kristian P.)

B. Fuel Consumption (Group activity):

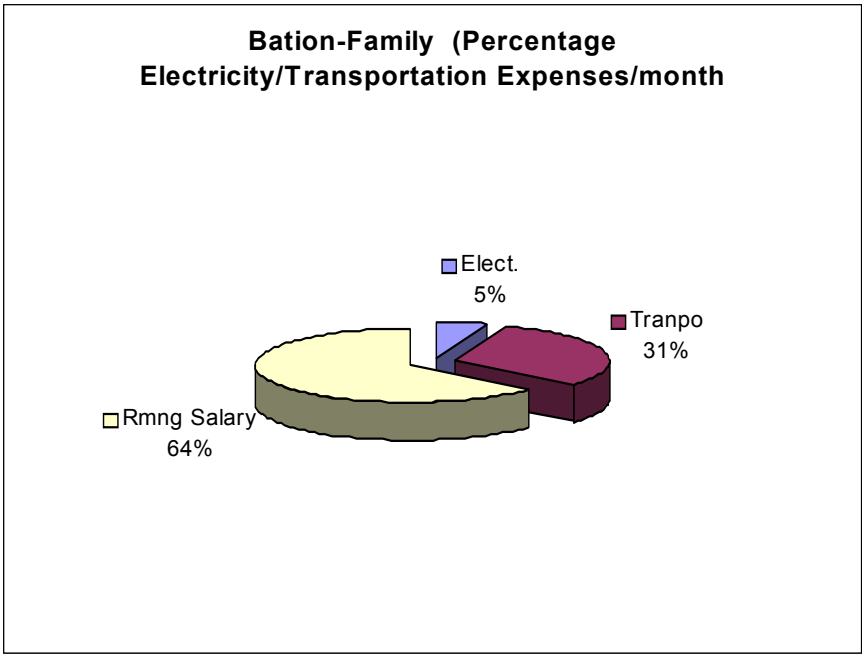
"As seen from the graph, a*t the first two refueling it was the same and the cost per kilometer was not high.. Maybe because the*



price did not increase yet. The next three refuels were higher, and it cost more than the first two because the price of gasoline that time has increased. Because of the increase, in fuel cost, the group decided on the following tips: turn off the engine when not in use or waiting for somebody for quite a time; avoid traffic area; walk for short destination instead of using the car." (Group 6)

C. Percentage Electricity and Transportation Expenses:

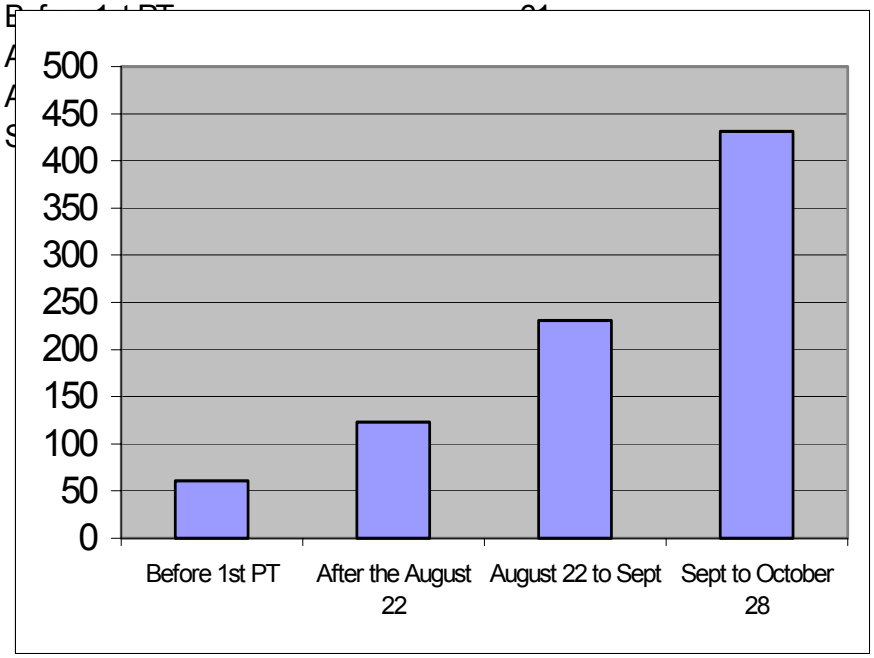
"The graph shows how the salary of my father is spent in terms of



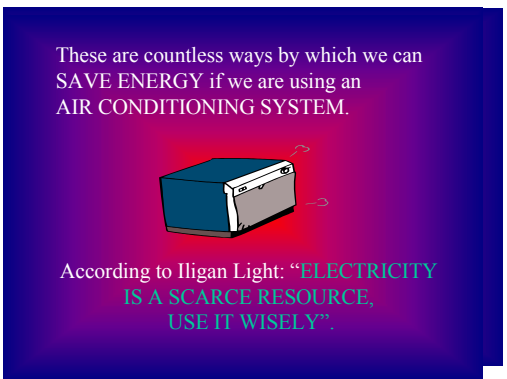
electricity and our transportation expenses for the month. According to my mother,, before the increase in fare, the salary is enough to shoulder everything, but today, the transportation expenses in going to school with my brothers and sisters become bigger. It's no longer enough. The 64% remaining salary is intended mainly for food because prices of food also increased due to increase in fuel prices. Our school allowance is sometimes not enough."(Michael Bation).

Impact to Other Student's

The idea of energy conservation creates a wave in the lives of some students in the school campus. Some science teachers consider it already as a project in science. Before the 2nd quarter examination (November 4-5, 2004) started, the number of students who adopted the project on power patrol rose from 61 to 437 (or a total of 437 families/households) with a total of 2,871 kilo watt hour or P14,268.87 (at P4.97/KWH) savings.



Some slides on multimedia presentation created by the 1st Year-Guijo students revealed simple but important tips in energy savings that sparked the interest to other students in adopting the "project".



Conclusion

This plan concludes that mathematics can be taught using computer technology as a tool that attracts student participation and moves them towards greater learning. The students indicated that using technology helped them to understand concepts on Ratio, Proportion and Percent including the complexity behind Mathematics as a subject. Their learning was further enhanced and created an opportunity for them to think more critically in connecting mathematics concepts to real life situations which mold and guide them to become responsible students and prepare them to tackle the role of being good citizens in the community.

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