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ABSTRACT

Much of the innovation in the use of microcomputers in education has come from classroom teachers who are using computers with students. In October, 1987, forums were held for secondary school science teachers who were using computers in their science classes. Within this document are some of the lesson plans that the participating teachers brought to the sessions. The lessons outlined in the booklet include computer applications for: (1) physical science laboratories; (2) stratigraphy; (3) teaching about significant digits; (4) weather forecasting; (5) chemical reaction synthesis; (6) creating a database about tides; (7) science laboratory tools which measure heat, light, and temperature; and (8) a teacher-made program dealing with laboratory calculations. The descriptions contain the name and address of the contributor, the target audience of the lesson, the hardware and software needed, and a brief statement about the purpose and objectives of the lesson. Some of the lessons also include a listing of the computer courseware and some sample student worksheets. (TW)

THE Northwest Regional Educational Laboratory

TECHNOLOGY PROGRAM

IDEAS FOR INTEGRATING THE MICROCOMPUTER INTO SCIENCE INSTRUCTION

November 1987

Edited
by
Jim Pollard

Northwest Regional Educational Laboratory
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INTRODUCTION

Much of the innovation in the use of microcomputers in education has core from the classroom teachers who are using the computers with kids. Unfortunately, much of this innovation stays in the classroom. The teachers do not often have the time or the opportunity to teach other teachers how to do the things that they do so well.

Some of this isolation of good ideas is solved through regional and local conferences where teachers are encouraged to make formal presentations during concurrent sessions. Unfortunately, this solution is inadequate for those teachers who are successful with what they do in the classroom but do not feel that what they are doing warrants an entire session at a conference. They are willing to share ideas but are unwilling to do so in such a formal atmosphere. In fact, teachers often report that they get more out of informal talks in the hallways between conference sessions than they do from the formal sessions. It is in those informal sessions that they can compare notes and share tips.

With this situation in mind, the Technology Program of the Northwest Regional Educational Laboratory has conducted a series of forums for computer-using teachers. The forums offer an environment where these educators can share ideas among themselves. Teachers are invited to report to each other on what they were doing that had proven useful within a particular subject area. Each teacher is asked to present an idea informally and to chat with the other teachers there about which software works, how students respond, what is the best value, etc. There is no strict agenda and an abundance of informal time was planned. The teachers were given access to the Laboratory's Technology Center where they could use the computers to try the software described or to sample from the Center library of over 2,000 educational software titles.

In October of 1987 forums were scheduled for science teachers from middle schools and high schools. The participants discussed a variety of projects and exchanged some valuable ideas. They taught in virtually all science education topics including general science, physical science, chemistry, physics and biology.

Within this document are the lesson plans which the teachers brought to the sessions. In some cases there are also some supporting materials. I have tried to complete the descriptions by reporting some of the exchanges which took place around each idea. The forums are a continuing activity of the Laboratory. If you have an idea to share, please watch for the announcement of a future session.

Physical Science Lab

Roger Stephen of Albany, Oregon uses the *Science Toolkit* software and probes to teach his junior high school students about speed and mass. The toolkit contains a photo switch which he places at the end of a 25-foot length of 4-inch diameter PVC pipe. (He borrows the pipe from the district's maintenance department and returns it each year after the unit is over.) The pipe is taped to the wall of the classroom and is at an angle.

One of the tools in the *Science Toolkit* is a stopwatch which can be activated through the keyboard or through the switches supplied in the kit. The switches attach through the game port so there is little danger of damage to the computer. To start the demonstration, a student presses a key on the computer at the same time that Roger starts a ball rolling through the pipe. When the ball exits the pipe, it triggers the photo switch turning off the timer. He rolls balls of different sizes and weights to demonstrate that the speed is always the same.

Some of the participants suggested that Roger build a second photo switch with kits available from *Feelies* or *Vernier*. These kits are inexpensive and can be as good as the ones in the toolkit. With a second switch, the ball could trigger the start of the clock as well as the stopping of it, eliminating the factor of the human reaction time in comparing the speeds.

The participants compared the temperature probes available in various science packages and agreed that the one in the *Science Toolkit* was a weak point. It has a narrow range which doesn't include many of the temperatures used in classroom experiments.

What Works for You?
Using Computers in the Classroom

SUBMITTED BY

Name: Roger Stephen

School Address: N. Albany Mid High, 1205 N.W. Albany Rd., Albany, OR 97321

Phone: 503/967-4541 **Best time to call:** 10:30-11:00 am

TARGET AUDIENCE

Grade: 7 **Ability level:** 5-12

Comments: Decimal division involved

HARDWARE

Number: 1 **Type:** Apple IIe **Peripherals:** Game port/joystick port

Arrangement: Computer on wheeled cart for ease

SOFTWARE

Title(s): Science Toolkit master module **Publisher(s)** Broderbund

Number of copies: 1 per station

PROJECT DESCRIPTION

Title or brief description: Speed and mass lab

Instructional Purpose: To determine the speed of spheres of different mass

Objectives: (1) calculate speed; (2) graph speed results; (3) compare mass of various spheres and how it affects speed.

Stratigraphy

Fred Wickholm teaches in Selah, Washington. In his physical science unit on stratigraphy, Fred uses an Apple IIe with a program called *Stratigraphy*. Using a large screen monitor (the software requires color) Fred demonstrates how strata are formed. The screen starts with bands of color representing different minerals and sedimentation. He can select the depth of any stratum and assign each a color. With the neat bands of color on the screen, he begins to disrupt the strata as the earth might.

The software will fold the rock layers, introduce normal reverse and thrust faults, show magmatic intrusions and simulate erosion and subsequent filling. The students have a chance to introduce any of these factors during some exploration time. He then asks the students to try to recreate the strata shown in a picture of road cuts.

Fred has found that teaching with *Stratigraphy* allows the students to do some problem-solving, deciding what events occurred in what order to cause the earth to look as it does.

What Works for You?
Using Computers in the Classroom

SUBMITTED BY

Name: Fred Wickholm

School Address: Selah High School, 300 W. Naches Ave., Selah, WA 98942

Phone: 509/697-0770 **Best time to call:** 9:30-10:30 am

TARGET AUDIENCE

Grade: 9-12 **Ability level:** Average

Comments:

HARDWARE

Number: **Type:** Apple **Peripherals:** Large color monitor

Arrangement:

SOFTWARE

Title(s): Stratigraphy **Publisher(s)** Sugar Pine Software

Number of copies: 1

PROJECT DESCRIPTION

Title or brief description: To study the process and concepts of stratigraphy.

Instructional Purpose: To help earth science students understand the concept of stratigraphy as well as the abstractions of chronological order over long periods of geological time.

Objectives: To observe how sediments are laid down; to observe the Law of Superposition and to explain the idea of superposition; to observe the process of folding of rock layers; to observe the faulting process in rock layers; to observe normal, reverse, and thrust faults; to observe the process of magmatic intrusions in rock layers; and to observe the erosional processes on rock layers

"STRATIGRAPHY MENU"

N)ORMAL FAULT

R)EVERSE FAULT

F)OLD

S)EDIMENT FILL

E)ROSION

B)EGIN AGAIN

I)NTRUSION

D)UPLICATE FAULTS

K)EEP THIS SCREEN

Q)UIT THE PROGRAM

1) SHOW HI-RES SCREEN 1

PRESS <RETURN> TO DISPLAY THE MENU

OPTIONS:N.R.F.S.E.B.I.D.K.Q.1.<RETURN>

YOUR CHOICE:

Significant Digits

Don Schmidt of Elmira, Oregon uses a program from the Mole Company, *Science Skills and Measurement*, to help in teaching the concepts of significant digits. He demonstrated his lesson to the participants which starts with an explanation of the rules of determining the number of significant digits in a number. After going through the mnemonic devices he uses, Don had the participants complete a quiz on the concept (which is attached).

Once he was sure that we all knew about significant digits, we raced. The software presents a number and times the students in their answers. The students get a score based on the speed and accuracy of their responses, with the ten highest scores recorded on the disk "honor roll."

What Works for You?
Using Computers in the Classroom

SUBMITTED BY

Name: Don Schmidt

School Address: Elmira High School, 24936 Fir Grove Lane, Elmira, OR 97437

Phone: 503/935-8200 **Best time to call:** 2:30-3:00 pm

TARGET AUDIENCE

Grade: 10-12 **Ability level:** Average and above average

Comments:

HARDWARE

Number: 1 **Type:** Apple IIe **Peripherals:** Large screen monitor

Arrangement: Students within 15-20 feet of large monitor

SOFTWARE

Title(s): Science Skills Uncertainties & Measurements **Publisher(s)** The Mole Company 1012 Fair Oaks Ave. #356 South Pasadena, CA 91030

Number of copies: Two disks required

PROJECT DESCRIPTION

Title or brief description: Significant Figures (Module 4 of 5)

Instructional Purpose: Provide a stimulating situation for students to apply the rules for determining significant figures in measurement.

Objectives: The student will be able to: (1) state the rules used to deal with zeroes and significant figures in measurements; (2) state the number of significant figures in a given measurement made by someone else; (3) round off a number (from a calculator, for instance) to a specified number of significant figures.

Significant Figures and Rounding:

Name:_____

Date:_____Period ___

A. For each of the following numbers, indicate how many significant figures there are. Then round each of them to the number of significant figures indicated. For example:

1.234 has 4 significant figures and, rounded to 2 significant figures, is 1.2

1. 0.6034 has _____ significant figures and, rounded to 2 significant figures, is _____
2. 12,700 has _____ significant figures and, rounded to 1 significant figure, is _____
3. 12,700.0 has _____ significant figures and, rounded to 2 significant figures, is _____
4. 0.000933 has _____ significant figures and, rounded to 2 significant figures, is _____
5. 123542.9 has _____ significant figures and, rounded to 5 significant figures, is _____
6. 6.023×10^{23} has _____ significant figures and, rounded to 2 significant figures, is _____
7. .005600 has _____ significant figures and, rounded to 1 significant figures, is _____
8. 10000.5006 has _____ significant figures and, rounded to 5 significant figures, is _____
9. 2.0×10^{-3} has _____ significant figures and, rounded to 1 significant figure, is _____
10. 3.456110 has _____ significant figures and, rounded to 3 significant figures, is _____

B. The following number sequences represent calculations done on a calculator with the answer given as the calculator would show it. Write the answers in the appropriate notation and with the appropriate number of significant figures for the figures put into the calculation. Example:

6.00 x 3.00 = 18 The answer should be 18.0

1. 23 + 46 = 69 The answer should be _____
2. 23.0 + 46.0 = 69 The answer should be _____
3. 253 + 345.8 = 598.8 The answer should be _____
4. 56 - 35 = 21 The answer should be _____
5. 56.00 - 35.0 = 21 The answer should be _____
6. 16 x 12 = 552 The answer should be _____
7. 3.24 x 5.63 = 18.2412 The answer should be _____
8. (2.355+2.645) x 10.00 = 50 The answer should be _____
9. 654 ÷ 32 = 20.4375 The answer should be _____
10. .024 x .063 = 1.512 E-03 The answer should be _____

Weather Forecasting

In Clark Poole's junior high school science class in Albany, Oregon, weather forecasting is a big part of the day. The students gather the daily atmospheric measurements both directly and through calls to the National Weather Service. The data are entered into the program, *Forecast*, and the program provides a prediction for the short- and long-range. A shortcoming of the program, that it doesn't explain how it makes the prediction, is actually a benefit for Clark since it allows him to lead the students in a discussion of what the computer might be doing.

The data are stored by the program and can be printed out. The participants in the forum suggested using that data to study trends in weather. For example, the students could graph the changes in barometric pressure then overlay a graph of wind velocity to see how they correlate.

The program is written in BASIC, so if there are features which a teacher doesn't like, it can be modified if there is a teacher or student around with the skills to make the changes. Because the program is operated by selecting from menu choices, it is somewhat slow to use. The graphics representing the meteorological instruments are good but also tend to slow the program.

What Works for You?
Using Computers in the Classroom

SUBMITTED BY

Name: Clark Poole

School Address: Calapooia Middle School, 824 24th St. S.E., Albany, OR 97321

Phone: 503/967-4555 **Best time to call:** 7:30-8:00 am, 2:40-3:15 pm

TARGET AUDIENCE

Grade: 7-10 **Ability level:** All

Comments:

HARDWARE

Number: 1 **Type:** Apple II Laser128 **Peripherals:** Printer

Arrangement:

SOFTWARE

Title(s): Forecast **Publisher(s)** CBS Software

Number of copies: 1

PROJECT DESCRIPTION

Title or brief description: At-home or school weather station

Instructional Purpose: Measurement, predicting

Objectives:

Chemical Reaction Synthesis

Bret Loucks teaches chemistry at Hudson's Bay High School in Vancouver, Washington. Since he was interested in using computers with his students and his school could not provide enough resources for what he wanted to do, he has assembled his own collection of equipment. He shops at garage sales and takes the computers that other people have decided aren't worth keeping around. The basis of his system is a Radio Shack Color Computer which has a time share mode. Each of the three other systems in his network can work off of the Color Computer's program.

Most of the software which Bret uses he writes himself. The program he described to the participants is a simulation of the Haber Ammonia Synthesis Reaction. The students select the pressure, temperature and catalyst for the reaction and the computer calculates the reaction rate and the percent yield for that combination.

After the students have experimented with the program for a while, they are challenged to find the conditions for the optimal reaction time, the optimal percent yield and the optimal compromise. When students use extreme temperatures or pressures, Bret uses that as an opportunity to discuss the cost of production versus the yield.

Bret has included his lesson plan, his student worksheet, and a listing of the program which he has put into the public domain.

What Works for You?
Using Computers in the Classroom

SUBMITTED BY

Name: Bret Loucks

School Address: Hudson's Bay High School, 1206 E. Reserve St., Vancouver, WA 98661

Phone: 206/696-7221 **Best time to call:** 2:00 pm

TARGET AUDIENCE

Grade: 10-12 **Ability level:** Chemistry students

Comments: Open-ended, problem-solving activity

HARDWARE

Number: 5-6 **Type:** Apple IIe **Peripherals:** None

Arrangement: Best in room, okay to use Media Center, etc.

SOFTWARE

Title(s): Haber Synthesis **Publisher(s)** developed personally

Number of copies: 1 for each computer (or loaded in each and removed)

PROJECT DESCRIPTION

Title or brief description: Students get results of time to equilibium and % yield in Haber Ammonia Synthesis Reaction. Students select pressure and temperature and catalyst operating conditions.

Instructional Purpose: Students will experiment to determine how competing variables affect the ammonia synthesis reaction.

Objectives: (1) Determine relationship of pressure and temperature to reaction rate and percent yield; (2) Determine effect of catalyst on reaction rate and percent yield; (3) Use competing variables to arrive at a compromise for operating conditions.

Name_____
date_____
Per_____

ASSIGNMENT: HABER SYNTHESIS SIMULATION

Use the simulation for the equilibrium reaction of the production of ammonia from the elements. Run Haber

1. What is the equation for the reaction?

2. Change the pressure on the system (try temp 100, pressure 100, and catalyst of tungsten to start):

(a) how does pressure change affect % yield?

(b) how does pressure change affect time of equilibrium

(c) WHY?

3. change temprature on system (pick a good pressure)
(a) how does temp affect % yield?

(b)how does temp change affect time of equilibrium?

(c) WHY?

4. Try no catalyst,Iron and Tungsten
(use good temp and pressure)
(a) Which gives greatest % yield in shortest time?

(b) How does a catalyst affect % yield?

(c) How does a catalyst affect time to equilibrium?

(d) WHY?

5. Is the reaction endothermic, or exothermic?

6. What conditions would you select for operating your Ammonia Synthesis plant?

```
]LIST

1     REM  HABER SYNTHESIS SIMULATION
2     REM  PROGRAM BY W. SCHWEIKERT, DEERFIELD ACADEMY
3     HOME
30    PRINT "THE HABER SYNTHESIS REACTION"
40    PRINT "SIMULATING THE INDUSTRIAL PRODUCTION"
45    PRINT "       OF AMMONIA"
100   PRINT : PRINT : PRINT "WHAT IS THE PRESSURE OF YOUR SYSTEM
      (ATM)?"
110   INPUT P
300   P9 = INT  (RND (1)  *  300 + 1000)
331   IF P < P9 THEN 360
340   PRINT P: "ATM IS TOO MUCH PRESSION - AN EXPLOSION MAY
      OCCUR!!"
341   PRINT: PRINT : PRINT
345   GOTO 100
360   PRINT "WHAT IS THE OPERATING TEMPERATURE?": PRINT
      "(CELSIUS)"
363   INPUT T
365   T9 = INT ( RND (1) * 100 + 950)
370   IF T < T9 THEN 400
375   PRINT "THAT'S TOO HOT! - A MELTDOWN IS LIKELY"
380   GO TO 360
400   T = T + 273
410   PRINT "WANT TO USE A CATALYST (Y OR N)";: INPUT Z$
412   IF Z$ = "Y" THEN 430
415   E = 80000:Z$ = "NO CATALYST"
420   GOTO 550
430   PRINT "WHICH ONE - IRON OR TUNGSTEN";: INPUT Z$
440   IF Z$ = "T" THEN Z$ = "TUNGSTEN"
450   IF Z$ = "I" OR Z$ = "FE" THEN Z$ = "IRON"
460   IF Z$ = "IRON" THEN E = 50000: GOTO 550
470   IF Z$ = "TUNGSTEN" THEN E = 40000: GOTO 550
480   PRINT "PLEASE ANSWER IRON OR TUNGSTEN!": GOTO 430
550   K = EXP (((6460 + 1.1 * P) / T)-14)
560   B = (3.08 / K) + 2 * P
570   R = SQR (B * B - 4 * P * P)
580   P1 = (B - R) / 2
590   A = 100 * P1 / P
595   A = INT (A * 100 + .5) / 100
599   C = EXP (( - E / (2 * T)) + 30)
600   PRINT
605   IF C < 1E - 33 THEN PRINT "EQUILIBRIUM TAKES FOREVER!!":
      GOTO 730
607   GOSUB 1000
610   PRINT "% YIELD AMMONIA = ";A
611   S = P1 / C
612   S$ = STR$ (S) :FL = LEN (S$)
```

```
613  IF  PL < 5 THEN 620
614  IF MID$ (S$,PL - 3,1) = "E" THEN S$ = LEFT$ (S$,4) + RIGHT$ (S$,
     4):5 = VAL (S$)
615  GOTO 621
620  S = INT (S * 100) / 100
621  M = INT (S * 100 / 60) / 100
622  H = INT (M * 100 / 60) / 100
623  D = INT (H * 100 / 24) / 100
624  Y = INT (D * 100 / 365.25) / 100: IF Y < 1000 THEN 626
625  S$ = STR$ (Y): IF MID$ (S$, LEN (S$) - 3,1) = "E" THEN S$ = LEFT$
     (S$,3) + RIGHT$ (S$,4):Y = VAL (S$)
626  Q = Q + 1: PRINT "EQUILIBRIUM REACHED IN:"
627  IF Y < 1 THEN 629
628  PRINT Y; "YEARS USING ";Z$: GOTO 730
629  IF D < 2 THEN 631
630  PRINT D; " DAYS USING ";Z$; GOTO 730
631  IF H < 1 THEN 640
632  PRINT H; " HOURS, USING ";Z$; GOTO 730
640  IF M < 1 THEN 650
650  PRINT S;" SECONDS, USING ";Z$
655  GOTO 730
730  PRINT  :  PRINT
735  PRINT "DO YOU WANT ANOTHER RUN?";: INPUT A$
760  IF  LEFT$ (A$,1) = "Y" THEN GOTO 100
780  IF A$ = "CONTROL" THEN END
800  RUN
1000 HOME
1010 PRINT : PRINT : PRINT : PRINT
1020 PRINT "  PRESSURE  ";P;"ATM"
1023 PRINT
1024 T = T -273
1025 PRINT " TEMPERATURE ";T;" C "
1027 PRINT
1030 PRINT "  CATAYLIST  ";Z$
1040 PRINT : PRINT
1050 RETURN
```

Database of Tides

Ed Johnson teaches a general science course which he refers to as "non-science". In Seaside, Oregon, his class has ready access to the ocean and he spends some time each term teaching about tides. The students learn to read tide tables and duplicate them on the Apple IIe using the database portion of *Appleworks*. After the students understand something about tides, the go to the ocean to learn to measure the tide. After that they create a tidal graph for a 24-hour period.

Ed reported that the students are quick to learn the database but are not as conscientious about keeping up the database. Any of the tide tables that are kept have incomplete cells due to students forgetting to take the measurements. He uses these gaps to stress the importance of regular recordkeeping.

The participants suggested that Ed use the *MegaWorks* program to graph the data from his experiments. Since he is using Appleworks, the graphs could be generated automatically and the students would get one more experience in the science process as it is practiced today.

All of Ed's lesson plans, grades, letters, and data are maintained using Appleworks. His computer has become essential to how he operates his classroom.

What Works for You?
Using Computers in the Classroom

SUBMITTED BY

Name: Ed Johnson

School Address: Seaside High School, 1901 N. Holladay Dr., Seaside, OR 97138

Phone: 503/738-5586 **Best time to call:** 8:30 am-9:20 am

TARGET AUDIENCE

Grade: 9 **Ability level:** All

Comments:

HARDWARE

Number: 1 **Type:** Apple IIc **Peripherals:** Printer

Arrangement:

SOFTWARE

Title(s): AppleWorks **Publisher(s)** Apple Computer, Inc.

Number of copies: 1

PROJECT DESCRIPTION

Title or brief description: Using database to determine tidal heights vs. time for graphing purposes.

Instructional Purpose: (1) Database entry; (2) Daily observation of tidal change; (3) Use data to make predictions after constructing tidal graph for 24 hour period.

Objectives: (1) Teach selected science process skills including: (a) classifying; (b) measuring; (c) using numbers; and (d) data interpretation.

Science Lab

Bill Spurling from Everett, Washington uses the *Bank Street Laboratory* package from the *Voyage of the Mimi* materials in his middle school science classes. He reported that while the actual unit provided with the materials was good, he has found dozens of uses for each of the laboratory tools which is provided. The kit includes heat, light and temperature probes as well as a microphone and speaker. Each of the probes connects to a box which is connected to the Apple IIe through an interface card. The connections to the box are standard telephone plugs and jacks.

He has found all of the devices useful in his classrooms. The software which is included provides ways of recording experiments, analyzing the data then charting the results. He demonstrated each of the components.

What Works for You?
Using Computers in the Classroom

SUBMITTED BY

Name: William W. Spurling

School Address: Evergreen Middle School, 7621 Beverly Lane, Everett, WA 98203

Phone: 206/339-4550 **Best time to call:** 7:00-8:00 am or 2:00-3:00

TARGET AUDIENCE

Grade: 6,7,8 **Ability level:** Basic-Challenge/Gifted

Comments:

HARDWARE

Number: 4 **Type:** Apple IIe **Peripherals:** Heat, light and temperature probes, speakers, monitor patch cords

Arrangement: Placed on computer carts for flexible arrangement

SOFTWARE

Title(s): Bank Street Laboratory **Publisher(s)** Holt Rinehart & Winston
Boot disks and lab disks

Number of copies: 4

PROJECT DESCRIPTION

Title or brief description: The Bank Street Laboratory is a component of "The Voyage of the Mimi"

Instructional Purpose: "The Voyage of the Mimi" is a Video Print and computer based curriculum, using a scientific research expedition aboard the sailing vessel Mimi, as a basis for studying whales and their environment.

Objectives: Students learn to use the computer as a tool for collecting and analyzing data on sound, light and temperature.

Teacher-made Programs

Jim Martin from Portland, Oregon has programmed lessons and tools on his Apple IIe for his students. One of his programs, *OXY*, is available to his students to make the calculations necessary during a lab experiment. He makes sure that the students understand the formulas which is programmed into the computer before they use it. They use the computer as a scientist would in analyzing the data they gather.

His second program, *CNS-1* is used to present stimuli in a perception experiment for his life sciences students. Each student reads a series of letters or numbers from the screen in a variety of conditions while another student times the responses. From the data the students make inferences about the neural processing which has gone on in each condition.

Jim's third demonstration was of a program which fits a curve to the data which the students have collected. The program is called *Process* and it helps the students to learn about scaling, labeling, dependent variables, independent variables and the general characteristics of sigmoid curves.

Anyone who is interested in getting the programs should contact Jim.

What Works for You?
Using Computers in the Classroom

SUBMITTED BY

Name: Jim Martin CNS-1

School Address: Jesuit High School, 9000 Beaverton Hwy., Portland, OR 97225

Phone: 503/292-2663 **Best time to call:** 8:30-9:00 am

TARGET AUDIENCE

Grade: 10 **Ability level:** All

Comments: Students have to be able to read

HARDWARE

Number: 1 per student **Type:** Apple II **Peripherals:**

Arrangement: 2 students per computer

SOFTWARE

Title(s): CNS-1 **Publisher(s)**

Number of copies: 1 per computer

PROJECT DESCRIPTION

Title or brief description: CNS-1: A program which times students as they read a row of characters.

Instructional Purpose: Reinforce learning regarding central nervous system functions. Experience at measuring activity in a student's own central nervous system. Demonstrate differences in processing alpha and numeric data.

Objectives: Students can estimate the time it takes neurons in their central nervous systems to process letters or numbers. Students can estimate the time it takes an impluse to travel down one neuron. Students can appreciate differences in cerebrial hemispheric functions.

What Works for You?
Using Computers in the Classroom

SUBMITTED BY

Name: Jim Martin OXY

School Address: Jesuit High School, 9000 Beaverton Hwy., Portland, OR 97225

Phone: 503/292-2663 **Best time to call:** 8:30-9:00 am

TARGET AUDIENCE

Grade: 12 **Ability level:** Medium - high

Comments:

HARDWARE

Number: 1-6 **Type:** Apple II HP-85 **Peripherals:**

Arrangement: Near lab tables, students use as needed.

SOFTWARE

Title(s): OXY **Publisher(s)**

Number of copies: 1 per computer

PROJECT DESCRIPTION

Title or brief description: OXY--a program which calculates oxygen consumption per kg. hr.

Instructional Purpose: To calculate oxygen consumption data during the course of a lab on oxygen consumption. Supplements labs on gas consumption by living tissue.

Objectives: Students can use a computer to produce data during the course of an experiment. (Students know the formula). They learn to use the computer to: (1) save time, and (2) get immediate feedback on effect of experimental parameters.

What Works for You?
Using Computers in the Classroom

SUBMITTED BY

Name: Jim Martin PROCESS

School Address: Jesuit High School, 9000 S.W. Beaverton Hwy., Portland, OR 97225

Phone: 503/292-2663 **Best time to call:** 8:30-9:00 am

TARGET AUDIENCE

Grade: 10 **Ability level:** All

Comments: Students have to be able to read.

HARDWARE

Number: 1 per two students **Type:** Apple II **Peripherals:**

Arrangement: Seating for 2 students per computer

SOFTWARE

Title(s): Process **Publisher(s)**

Number of copies: 1 per computer

PROJECT DESCRIPTION

Title or brief description: Process--a program which reinforces table and graph constructing and interpreting skills.

Instructional Purpose: To reinforce learning about tables and graphs. to teach the analysis of sigmoid curves in processes.

Objectives: Students can make clear tables of data. Students can make clear graphs of data. Students can interpret portions of curves of data.

Products Mentioned in this Report

Appleworks
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

CNS-1
Jim Martin
Jesuit High School
9000 S.W. Beaverton Hwy.
Portland,Oregon 97225

Feelies
Consider It Dunn
Box 5362
Oregon City,Oregon 97045

Forecast
CBS Software
A Division of CBS Inc.
Greenwich, CT 06836

Haber Synthesis
Bret Loucks
Hudson's Bay High School
1206 E. Reserve St.
Vancouver,Washington 98661

MegaWorks
Megahaus
5703 Oberlin Dr.
San Diego, CA 92121

Oxy
Jim Martin
Jesuit High School
9000 S.W. Beaverton Hwy.
Portland,Oregon 97225

Process
Jim Martin
Jesuit High School
9000 S.W. Beaverton Hwy.
Portland,Oregon 97225

Science Skills and Measurement
Mole Company
1012 Fair Oaks Ave #356
So. Pasadena, CA 91030

Science Toolkit
Brøderbund Software
17 Paul Drive
San Rafael, CA 94903-2101

Stratigraphy
Aquarius Software
P.O. Box 128
Indian Rocks Beach, FL 33535

Vernier Software
2920 S.W. 89th Street
Portland,Oregon 97225

Voyage of the Mimi
The Bank Street Laboratory
Holt, Rinehart and Winston
CBS,.Inc.
383 Madison Avenue
New York, NY 10017

Northwest Regional Educational Laboratory

Dr. Robert R. Rath, Executive Director
Dr. Ethel Simon-McWilliams, Associate Director

The Northwest Regional Educational Laboratory (NWREL) is an independent, nonprofit research and development institution established in 1966 to assist education, government, community agencies, business and labor in improving quality and equality in educational programs and processes by:

- Developing and disseminating effective educational products and procedures
- Conducting research on educational products and procedures
- Providing technical assistance in educational products and procedures
- Evaluating effectiveness of educational programs and projects
- Providing training in educational planning, management, evaluation and instruction
- Serving as an information resource on effective educational programs and processes including networking among educational agencies, institutions and individuals in the region

Programs
Center for Advancement of Pacific Education
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Center for National Origin, Race, and Sex Equity
Ethel Simon-McWilliams, Director
Education and Work
Larry McClure, Director
Evaluation and Assessment
Gary Estes, Director
Literacy and Language
Stephen Reder, Director

R&D for Indian Education
Joe Coburn, Director
Rural Education
Steve Nelson, Director
School Improvement
Bob Blum, Director
Technology
Don Holznagel, Director
Western Center for Drug-Free Schools and Communities
Judith A. Johnson, Director

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