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Earth Science Education in Southern Mississippi

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EARTH SCIENCE EDUCATION IN SOUTHERN MISSISSIPPI

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An earth science teacher education program is described which was designed to compensate for a ninth grade course being taught at the seventh grade level and for years of neglect of this subject area. This program may also serve those areas where the conditions are more satisfactory.

The program meets the goals of both earth science and education due to its premise that teacher effectiveness equates with communicating each lesson to all students. The students plan and teach six earth science lessons based on the analogy that "a topic is to a meal as a lesson is to a bite in the course of that meal". The lessons are prepared and taught holistically to the specifications of teacher- and learner-objectives.

Evidence is that about 75 percent of preservice and inservice elementary school teachers have a visual hemispheric preference. For that reason, the program emphasizes visual preference activities that develop mathematical skills needed by earth science teachers.

The Mississippi State Department of Education recently changed earth science from an eighth grade course to a seventh grade course. This worsened the problem of poorly trained teachers having to teach a course that was designed for ninth graders to their seventh graders. The authors, earth science educators in the University of Southern Mississippi's Science Education Department, have created a course in response to the fact that seventy percent of the state's inservice earth science teachers are virtually untrained in this area.

We have adapted the current state curriculum and are using the state adopted seventh grade textbooks to prepare as quickly as possible a cadre of teachers that have a functional knowledge of the program (see Appendix A). Our assumption is that some will not only apply for earth science positions, but will continue their earth science education.

The ongoing earth science teacher education program that we describe was designed to meet and challenge some widely known, as well as some student-admitted, weaknesses of each class of students for which the course is offered. Because we are science educators, our prime objective is to fulfill equal needs in both, science and education. A premise that we hold is that teaching is synonymous not only with communicating a lesson, but communicating it to all of the students. We define *teacher effectiveness* as the degree to which it *equate with communicating the lesson at hand to all students.*

Holistic education is the teaching strategy that we use to do all of these things. The instructions are simple. There must be a teaching aid for each and every idea explained. And, when showing a teaching aid, it must be thoroughly and linear-logically explained. Holistic education is a strategy that any teacher can use, regardless of hemispheric preference or subsequent teaching style, to effectively reach and teach all students, visual and/or analytical

(Sonnier, 1982b, 1985, 1989).

Since most of the students in our earth science program are preservice elementary school teachers, we describe that version of the program. However, the fact of the matter is that inservice teachers have essentially the same needs. Therefore, the curriculum has but minor variations from class to class. The students are required to present six lessons covering a wide span of the curriculum. With the analogy that a topic is to a meal as a lesson is to a bite in the course of that meal, the lessons are prepared to the specification of teacher- and learner-objectives that are evaluated by the other members of the class (see Appendix B). Their subject matter accumulation in both science and mathematics and their teaching skills are evaluated after the second and fourth presentations. The fifth and sixth presentations are evaluated as a final examination activity (see Appendix C).

For some unknown reason, a vast majority of the elementary school teachers, both preservice and inservice, tend to be visually oriented. Very few have an analytical hemispheric preference, our experience indicates 75 percent visual and 25 percent analytical. Because of this, one of the course requirements is that any two of their lessons must be on mathematical topics such as the use of measurements, balancing chemical compounds, or any other activity to strengthen their weak science and mathematics backgrounds; as noted in the course requirements (Appendix A).

In order to strengthen both subject matter and education objectives, another one of the course requirements and continuing topic of discussion is the viewing of the 1988 Warner Brothers movie, *Stand and Deliver* in which a calculus teacher at Garfield High School in East Los Angeles is greatly effective in communicating his knowledge to his students. With neither collaboration nor corroborated verification of this, it is our observation that the teaching technique is *holistic education.*

The course was designed with our conviction that it should be a lifelong aim of education at all levels to help analytical persons toward skill development in visual thought-processing and to help visual persons to develop analytical thought-processing skills (Sonnier, 1985, 1989). Therefore, we are careful to implement all of these activities in a non-threatening manner with the belief that, unknowingly and to their disadvantage, visual students at all levels resist personal involvement with learning activities that require abstract thinking.

Unfortunately, our evidence indicates that visual learners are rather successful at not only avoiding, but getting away with neglect of personal skill development in abstract thinking. Therefore, we make it a point to bring them to this understanding and to the desire to deal with this weakness in a positive and effective manner.

In conclusion, we are encouraged that the program achieves the development of both subject area and teaching skills for the students' chosen careers by the feedback of past students' remarks. There is consensus that this earth science course makes positive and significant contributions towards improved National Teachers Examination scores. Therefore, we submit our program as a possible model for others who find themselves in need of an effective cadre of teachers to teach a science in which they have little or no training.

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Selected Bibliography

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APPENDIX A
Earth and Environmental Science
at the University of Southern Mississippi
based on the Mississippi Earth Science Curriculum

7.4.1 The Universe

7.4.2 The Solar System

7.4.3 The Earth-Moon System

7.4.4 Basic Chemistry and Mineralogy

7.4.5 Earth Structure and Composition

7.4.6 Continental Surface Processes

7.4.7 Topographic and Geologic Maps

7.4.8 The Earth's Interior

7.4.9 Geological Time

7.4.10 Factors of the Atmosphere

7.4.11 The Hydrosphere

7.4.12 The Environment

Course Requirements:

1.0 Six Lesson Presentations
- .1 Two required: mathematics/metric/measurement orientation
- .2 One required: test for level of educational management
- .3 Optional: enrichment: film/filmstrip/guest (10 min. max.)

2.0 Lesson Preparations
- .1 Objectives
- .2 Criterion Referenced Questions

3.0 Attendance and Participation
- .1 Each week of absences drops attendance one letter grade
- .2 Performance Oriented Grading
  - .1 Class participation is monitored and recorded as performance criteria
  - .2 Individual participation in performance evaluation

APPENDIX B

Date _____

PRESENTATION EVALUATION INVENTORY

PRESENTER

TOPIC

I. PRESENTATION					
A. Voice	1	2	3	4	5
B. Correct Speech	1	2	3	4	5
C. Visual Aids	1	2	3	4	5
D. Spoken/Not Read	1	2	3	4	5
E. Content	1	2	3	4	5
F. Student Involvement	1	2	3	4	5
G. On Time	1	2	3	4	5
TOTAL EFFORT	1	2	3	4	5

Suggestions _____

_____

_____

II. OBJECTIVES					
A. Clearly Stated	1	2	3	4	5
B. Parallels Presentation	1	2	3	4	5
C. Evaluation	1	2	3	4	5
D. Teacher-Proof	1	2	3	4	5
TOTAL EFFORT	1	2	3	4	5

Suggestions _____

_____

_____

TOTAL EVALUATION	1	2	3	4	5

Evaluator _____

RATING SCALE:

1 - Needs Improvement
3 - Adequate
5 - Excellent

APPENDIX C
COURSE PERFORMANCE EVALUATION

Personal Copy___/Instructor's Copy___ Eval. Date/Initial

_____/_____
_____/_____
_____/_____

Name_____

EARTH AND ENVIRONMENTAL SCIENCE IN MISSISSIPPI

1. PRESENTATION: Date/Topic

_____

1.1	_____	1	2	3	4	5
1.2	_____	1	2	3	4	5
1.3	_____	1	2	3	4	5
1.4	_____	1	2	3	4	5
1.5	_____	1	2	3	4	5
1.6	_____	1	2	3	4	5
1.7	Other considerations	1	2	3	4	5

(M) Identify one required math lesson
(EM) Identify one required educational management lesson
(E) Enrichment lesson: film strip/guest/10 min. max./Optional

Your Grade___

2. OBJECTIVES: Date/Topic

_____

2.1	_____	1	2	3	4	5
2.2	_____	1	2	3	4	5
2.3	_____	1	2	3	4	5
2.4	_____	1	2	3	4	5
2.5	_____	1	2	3	4	5
2.6	_____	1	2	3	4	5
2.7	Other considerations	1	2	3	4	5

Your Grade___

3. MATHEMATICS COMPETENCIES IN SCIENCE

3.1	Liquid Measurements					
	3.1.1 Volume	1	2	3	4	5
	3.1.2 Mass	1	2	3	4	5
	3.1.3 Density	1	2	3	4	5
3.2	Solid Measurements					
	3.2.1 Volume	1	2	3	4	5
	3.2.2 Mass	1	2	3	4	5

3.2.3 Density	1	2	3	4	5
3.3 Spheres					
3.3.1 Solving for diameter	1	2	3	4	5
3.3.2 Solving for Circumference	1	2	3	4	5
3.4 Setting up Ratio/Proportions (Cross Multiplying)	1	2	3	4	5
3.5 Exponents					
3.5.1 Adding/Subtracting	1	2	3	4	5
3.5.2 Multiplying/Dividing	1	2	3	4	5
3.6 Balancing chemical compounds	1	2	3	4	5
3.7 Other considerations _____	1	2	3	4	5

Your Grade___

4. SCIENCE COMPETENCIES

4.1 Degree of Science difficulty of lessons taught with relation to age level intended	1	2	3	4	5
4.2 Class notes/Notebook	1	2	3	4	5
4.3 Class comments/Questions/Discussion	1	2	3	4	5
4.4 Other considerations _____	1	2	3	4	5

Your Grade___

5. ACTIVITIES _____

5.1 _____	1	2	3	4	5
5.2 _____	1	2	3	4	5
5.3	1	2	3	4	5

Your Grade___

6. ATTENDANCE 1 2 3 4 5

Your Grade___

7. GRADE EQUIVALENCY

7.1 A = 5/B = 4/C = 3/D = 2/F = 1

7.2 A = 90%/B = 80%/C = 70%/D = 60%/F = 50%

8. YOUR EVALUATION

8.1	Presentation	___x___% = ___/___
8.2	Objectives	___x___% = ___/___
8.3	Math Competencies	___x___% = ___/___
8.4	Science Competencies	___x___% = ___/___
8.5	Activities	___x___% = ___/___
8.6	Attendance	___x___% = ___/___
8.7	YOUR COMPOSITE GRADE	___/___ = ___

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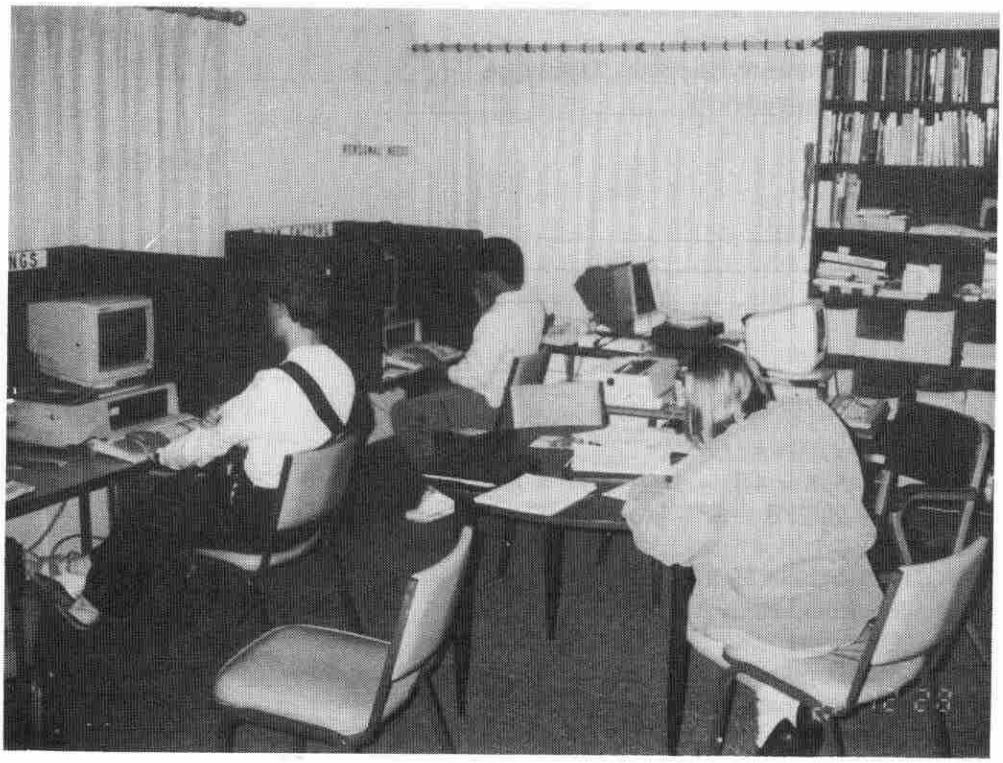

The California Masonic Youth High Risk Drug Abuse Peer Counseling Training (story page 436)