TEACHERS AND MARINE EDUCATION -- A SURVEY

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Introduction

"Man and the Gulf of Mexico" (MGM) is a marine education project sponsored by the Mississippi-Alabama Sea Grant Consortium. The broad objectives of the project relate to teacher education and curriculum implementation as a means of establishing viable marine education programs in Alabama and Mississippi. As an initial step in attaining these objectives, a survey of Mississippi and Alabama science teachers was conducted in the spring of 1979. The results of this survey have implications not only for the MGM project staff, but also for anyone engaging in marine education activities.

The Questionnaire

The questionnaire contains four major sections and calls for responses concerning: (1) descriptive information about the teachers and the schools in which they teach, (2) teachers' assessment of their knowledge of nineteen marine topics, (3) teachers' assessment of the educational priority of the same nineteen topics, and (4) teachers' preferences in types of materials and/or strategies which might be used in marine education materials.

The questionnaire was mailed to 177 teachers in Mississippi and 144 teachers in Alabama who were randomly selected from lists supplied by the respective State Departments of Education. Completed questionnaires were returned by 45 Mississippi teachers and 42 Alabama teachers.

Results

The descriptive data, as could be expected, revealed a wide range of annual science budgets, school sizes, textbook titles, and the number of science teachers in the school. Of special interest is the item asking the

teachers to list the courses they have had in marine science or related fields. Of the 87 teachers responding, 56 indicated no formal academic preparation in marine-related education, 16 had taken one course, five had taken two courses, five had taken three courses, two had taken four courses and two had taken five courses.

An item analysis was performed on the responses to the items in Parts 2, 3, and 4 of the survey and the mean and standard deviation for each item as well as the percentage of teachers responding to each choice were determined. The results related to each of the three sections will be discussed separately.

Teachers' Assessment of Their Knowledge

Teachers were asked to judge their competency in teaching nineteen marine topics by using the following scale:

1 Unaware of topic or its meaning

2 Aware of topic, but have little specific knowledge regarding topic

3 Have some knowledge of topic, but inadequate knowledge for teaching topic

4 Have adequate knowledge for the teaching of topic

5 Have above-average knowledge for teaching of topic

The nineteen topics as well as the mean and standard deviation for each topic are presented in Table 1. The topic for which the teachers rated their knowledge the highest was "the sea as a source of food" while the topic receiving the lowest rating was "plate tectonics." However, only five of the nineteen topics had a mean rating of 3.00 or greater and even the highest mean was only 3.29, indicating that a significant number of teachers feel they do not have adequate knowledge about marine education

in general.

In further examining the data, responses 4 and 5 were grouped into one category and the percentage of responses falling into this category for each topic was determined. These results are presented in Figure 1. It was found that even for the topic with the highest mean, the percentage of teachers rating their knowledge as adequate or above-average was only 37%. Approximately half (ten) of the topics had percentages between 20% and 37%, while nine of the topics had percentages below 20%. Even when one considers that teachers might tend to be modest or conservative in responding about their own capabilities, these results lead to the inevitable conclusion that teacher education must be a vital part of any marine curriculum endeavor.

Assessment of the Priority of the Marine Topics

Using the same nineteen topics, the teachers were asked to assess the priority each of the topics should be given in the development of marine education curriculum materials. The following scale was used:

1 Lowest priority (Should not be included)

2 Low priority

3 Inclusion is questionable

4 High priority

5 Highest priority (Most definitely include)

The means and standard deviations for the items are presented in the last two columns of Table 1. To provide more detailed information on how teachers perceived the importance of the topics, the percentage of teachers giving a rating of 4 or 5 to each of the topics is presented in Figure 2.

As can be seen from the table and the graph, those topics receiving the highest ratings were marine ecology, influences of the marine environment

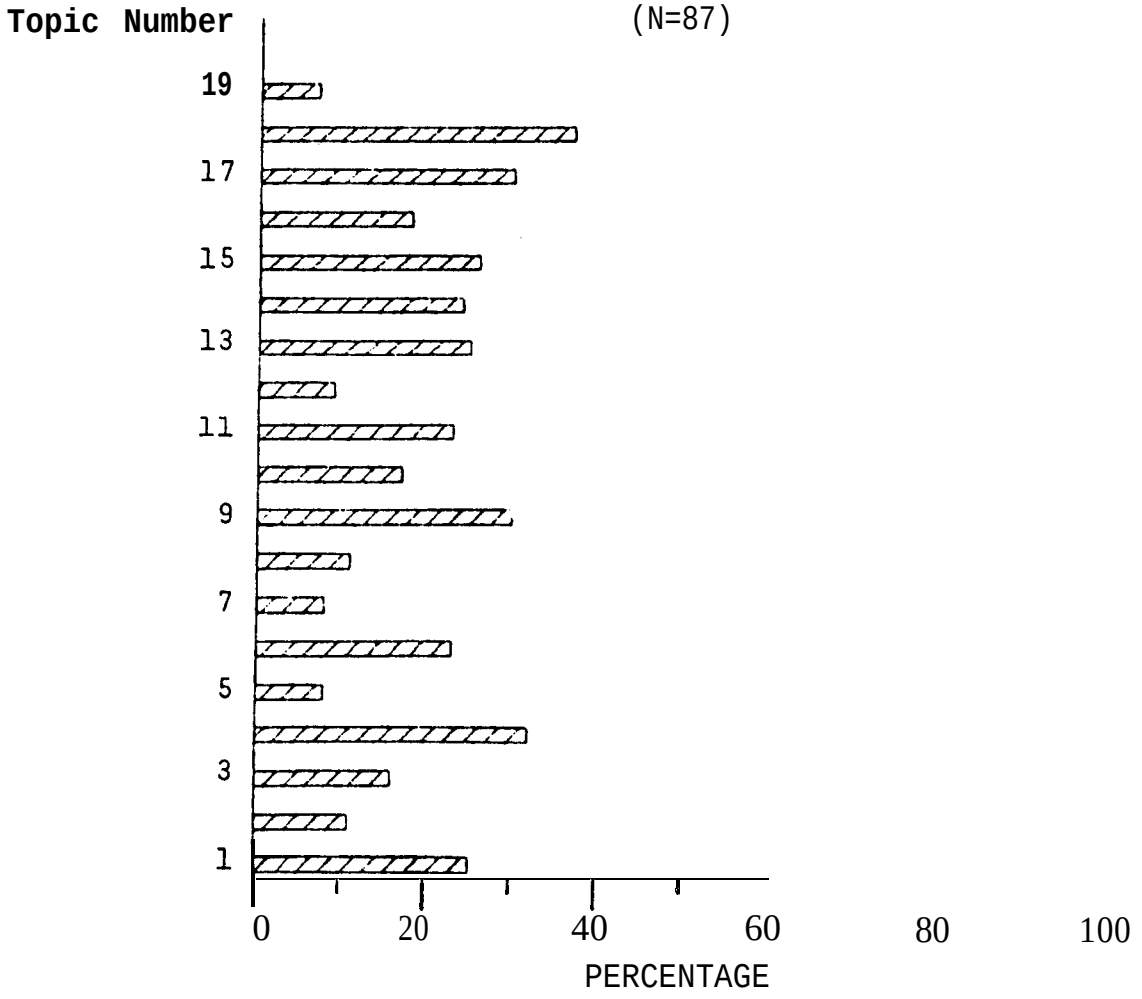
Table 1

Summary of Means and Standard Deviations for Parts 2 and 3 of the Survey

Topic	Assessment of Knowledge		Priority	
	Mean	S.D.	Mean	S.D.
1. Marine Ecology	2.99	.70	4.41	1.17
2. Estuarine ecology	2.46	.88	3.20	1.26
3. Marine habitats	2.97	.60	3.78	1.20
4. Marine food webs	3.07	.83	3.77	1.32
5. Coastal zonation	2.18	.94	2.38	1.18
6. Plate tectonics	2.10	1.31	1.95	1.22
7. Marine culture	2.24	.86	2.68	1.14
8. Diversity of marine plants	2.69	.72	3.74	1.27
9. Diversity of marine animals	3.07	.78	3.80	1.27
10. Marine related economics	2.60	.86	3.32	1.20
11. Pollution of the sea	2.93	.78	4.10	1.21
12. Legislation governing conservation of organisms	2.44	.81	2.99	1.36
13. Influences of the marine environment on man	3.01	.75	4.11	1.24
14. Aesthetic value of the marine environment	2.87	.93	2.71	1.21
15. Physical and chemical properties of sea water	2.87	.88	3.23	1.06
16. Minerals from the sea	2.83	.75	2.94	1.23
17. The atmosphere and ocean	3.14	.79	2.90	1.20
18. The sea as a source of food	3.29	.74	4.17	1.20
19. The Gulf of Mexico: Its history, geology and physical oceanography	2.44	.72	2.74	1.33

FIGURE 1

Percentage of Teachers Assessing Their
Knowledge as Adequate for
Teaching Selected Marine Topics



Topics:

1. Marine ecology
2. Estuarine ecology
3. Marine habitats
4. Marine food webs
5. Coastal zonation
6. Plate tectonics
7. Marine culture
8. Marine plant diversity
9. Marine animal diversity
10. Marine economics
11. Pollution
12. Conservation legislation
13. Influence on man
14. Aesthetic value
15. Sea water properties
16. Minerals in the sea
17. Atmosphere and ocean
18. Marine food sources
19. Gulf of Mexico

on man, pollution of the sea, the sea as a source of food, marine habitats, marine food webs, diversity of marine plants, and diversity of marine animals. The three topics with the lowest ratings were plate tectonics, coastal zonation and marine culture.

Teachers' Preferences in Types of Materials and/or Approaches

In Part 4 of the questionnaire, the teachers were asked to give a rating of 1 to 4 on the suitability of nine teaching formats or approaches by using the following scale:

1 Totally unsuitable

2 Suitability is questionable

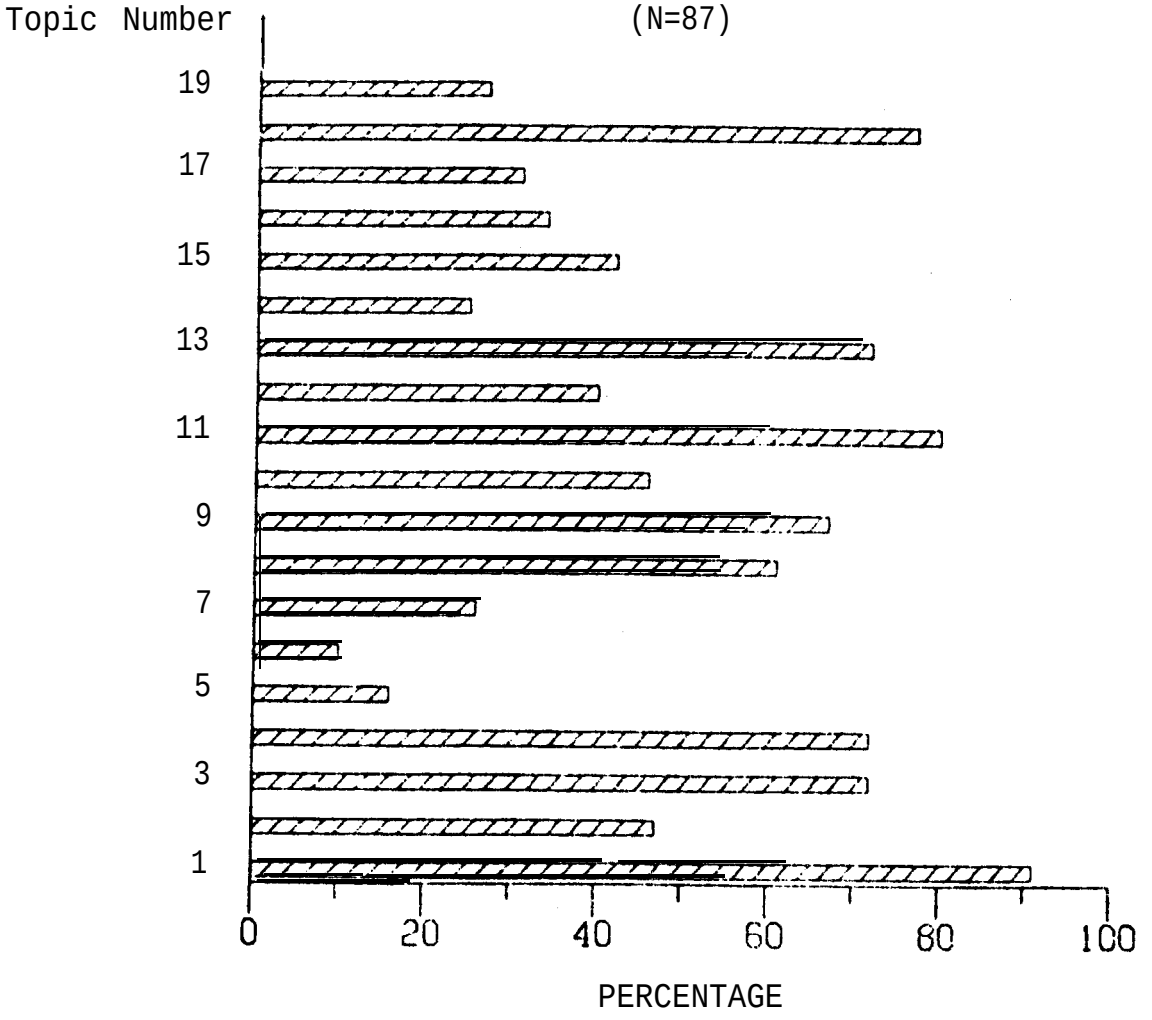
3 Suitable

4 Especially suitable

A list of the activities along with the mean and standard deviation for each are presented in Table 2. Of the nine activities, four had a mean of 3.00 or higher while five had a mean less than 3.00. However, even the activity with the lowest preference had a mean of 2.56, indicating that the activity was suitable for a substantial number of the teachers. The graph in Figure 3 depicts the percentage of teachers responding to a particular item with a rating of 4. Approximately 50% of the teachers found innovative approaches to be especially suitable while 20% found reading-type learning packets to be especially suitable, with all of the other activities falling between 20% and 50%. These results indicate that teachers do definitely differ in their opinions about appropriate teaching materials and procedures, and that no one approach will be satisfactory for all teachers.

FIGURE 2

Percentage of Teachers' Ranking Topics
as High or Highest Priority



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3. Marine habitats
4. Marine food webs
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9. Marine animal diversity
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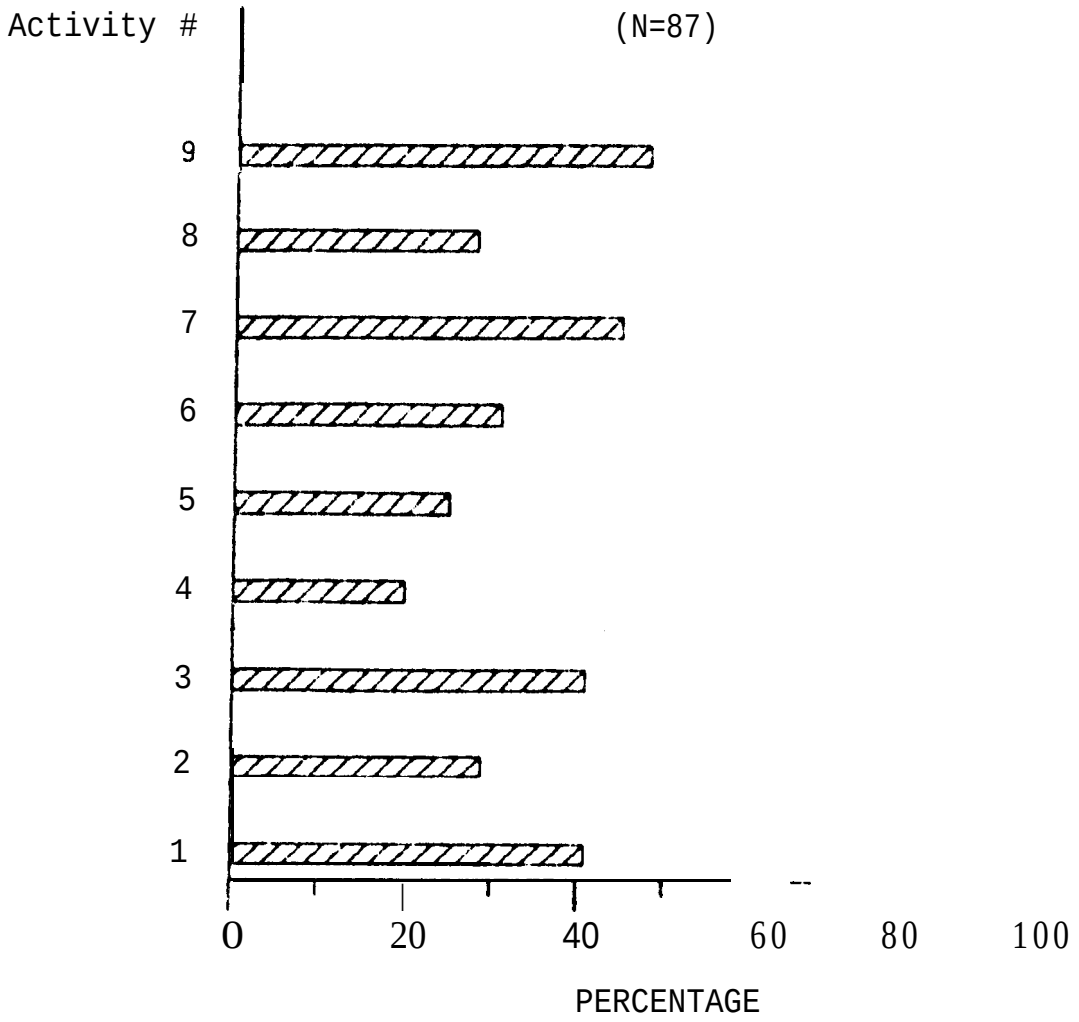
12. Conservation legislation
13. Influence on man
14. Aesthetic value
15. Sea water properties
16. Minerals in the sea
17. Atmosphere and ocean
18. Marine food sources
19. Gulf of Mexico

FIGURE 3

Percentage of Teachers' Rating
Materials and/or strategies as Especially Suitable



Activities:

1. Supplemental textbook chapters
2. Textbook-keyed reading passages
3. Teacher-centered resource guides
4. Reading-type learning packets
5. Inquiry-type learning packets
6. Teacher-centered learning packets
7. Textbook-related laboratory exercises
8. Non-textbook-related laboratory exercises
9. Innovative approaches

Table 2

Summary of Teachers' Rating of the Suitability

of Materials and/or Approaches for Marine Education

	Activity	Mean	Standard Deviation
1.	Supplemental chapters to your current textbook	3.06	1.05
2.	Reading passages keyed to selected topics in your textbook	2.69	1.15
3.	Teacher-centered resource guides	3.18	.80
4.	Student self-paced reading-type learning packets	2.56	1.06
5.	Student self-paced inquiry type learning packets	2.66	1.05
6.	Teacher-centered inquiry-oriented learning packets	2.97	.99
7.	Laboratory exercises keyed to content and topics in your textbook	3.14	1.03
8.	Laboratory exercises introducing topics not covered in your textbook	2.76	1.02
9.	Innovative approaches (simulations, games, hypothetical situations, etc.) integrating several aspects of marine science education	3.16	.99
10.	Other: (Please specify)		

Conclusions

The results of this survey have far-reaching implications for any individual, group or organization attempting to improve marine education at the pre-college and at the university level and the following conclusions appear warranted:

1. Most high school science teachers have had little or no academic preparation and formal coursework pertaining specifically to the marine sciences.
2. High school science teachers feel they do not have adequate knowledge for teaching most marine-related topics, with many teachers indicating little or no knowledge about many of the topics.
3. In rating the importance of marine topics, teachers tend to give the highest ratings to those topics with which they are most familiar.
4. Teachers are receptive to a variety of teaching strategies and approaches and marine education curriculum materials should employ a range of types of strategies to meet the needs and teaching styles of as many teachers as possible.