THE NEED FOR OCEANIC COURSES BY UNIVERSITY EXTENSION IN THE SAN DIEGO AREA

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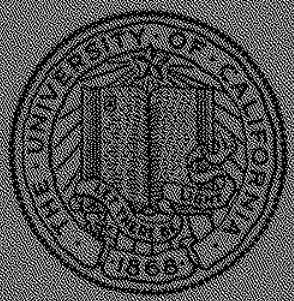

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TABLE OF CONTENTS

PREFACE

As part of the Sea Grant Institutional Program at the University of California, the University of California Extension Office at UCSD carried out a survey of the need for courses in ocean engineering and related fields to enable them to plan course sequences that would meet the needs of would-be extension students in the area. This survey was carried out during the Grant Year 1970-1971 and included surveys of both student interest and industrial needs for trained personnel. The following is a summary of the results of these surveys, sponsored by Grant #112 from the Office of Sea Grant, now a part of the National Oceanic and Atmospheric Administration, Department of Commerce. The U.S. Government is authorized to produce and distribute reprints for governmental purposes notwithstanding any copyright that may appear hereon.

G. G. Shor, Jr.

Sea Grant Program Manager

February, 1972

SUMMARY

As directed under the UCSD Sea Grant proposal for 1970, University Extension surveyed the needs of students presently enrolled in Extension courses in Oceanography and Ocean Engineering, and the personnel needs of local industry, in order to develop course sequence to fit.

The survey and information gathering phase of the study has been completed and the results are detailed on the following pages. Two separate surveys were conducted through the mails. In the first, present and past students of Extension courses in Oceanography and Ocean Engineering were polled; in the second, questionnaires were sent to representatives of local ocean-oriented industries. Follow-up interviews were conducted with four of the largest of the industries surveyed.

The student survey forms were mailed to approximately 250 students who had taken at least one course in oceanography within the last two years; 120 completed forms were returned. As anticipated, students indicated that their primary reason for taking Extension Oceanography courses is their general interest in the field. A desire to take ocean-related courses was indicated by 103 (86%) of those responding, and a general preference for courses of a biological nature was expressed. This information, together with specific course suggestions, has been forwarded to programmers at Extension. In addition, programmers have been urged, on the basis of the strength of continuing interest among UCSD students, to develop broad, survey-type sequences in the requested areas. Because of the somewhat biased nature of the reporting group, however, the question of need and feasibility of a Certificate Program still cannot be answered conclusively.

The industrial survey was sent to 96 ocean-oriented industries, selected from a San Diego Chamber of Commerce publication, "Ocean-Oriented Industries", and from a mailing list of the Oceanographic Development Committee of the Chamber of Commerce. Of these, 56 returned responses to the survey. An additional eight companies indicated cessation of oceanographic activity.

Among the important findings of the survey were:

1. Most businesses are not increasing their oceanographic involvement, but are apparently in a "holding pattern" and expect to remain there for several years.

2. There is a current need for BS and MS level electrical-mechanical engineers with oceanographic background and this need will apparently persist for at least the next three years. Much of this need, however, rests with a single organization.

3. Retraining programs to meet projected personnel needs apparently cannot be justified at this time.

4. Upgrading present employees was considered at least as important as primary education in the field of oceanography.

The last consideration seemed to warrant action by University Extension and interviews were set up with representatives of Bissett-Berman Corporation, General Dynamics, Lockheed, and the Naval Underseas Research and Development Center. They unanimously agreed on the importance of upgrading present employees to the extent that they were willing to consider helping support such a program. The support, however, would be an overhead expense that could only be justified by a very worthwhile program.

Each of the representatives seemed eager to participate in some kind of exploratory session with University Extension officials, to examine upgrading needs in detail. The purposes of such a session would be:

1. To confirm a more-than-passing interest in such a program, on the part of local industry;

2. To examine the needs of each individual firm, and to determine if there is any substantial over-lapping of "collective" needs;

3. To determine the economic feasibility of instituting such a program;

4. To determine whether or not there is sufficient local expertise to meet the needs of such a program.

University Extension has undertaken the planning of such a meeting, and further action will hinge upon determinations mentioned above. The need for upgrading programs in ocean engineering has been established. The economic feasibility of such a program requires thorough scrutiny.

SECTION ONE

SUMMARY OF INDUSTRIAL OCEAN ENGINEERING QUESTIONNAIRE AND RECOMMENDATIONS

SUMMARY OF INDUSTRIAL OCEAN ENGINEERING QUESTIONNAIRE AND RECOMMENDATIONS

The results of the Industrial Survey are summarized below. An annotated copy of the original questionnaire and summarized responses to it are attached as an Appendix. Of the 96 questionnaires sent to valid ocean-oriented companies, 56 were returned. These responses were transmitted to John Stark, UCSD Extension. An additional eight firms responded by letter or telephone indicating that they have ceased activity in oceanography.

Responses were obtained from all of the major oceanographic firms, as well as many of the smaller businesses, presently in the San Diego area. Also sampled and responding were representatives from most of the educational institutions with oceanographic interests. Hence, the results can be considered to have come from an adequate cross-section of the local interests.

About the Respondees

The activities of the responding firms were about evenly divided between Research, Design, and Manufacturing. Typical present size of the firms was rather evenly distributed. Well over half of the respondees projected only small growth in the next three years. Only five firms expected substantial growth during this period. Most of the firms were heavily committed (> 50% of their activity) to the ocean field and planned to continue this degree of involvement into the future. Four firms anticipated a reduced involvement. Only three firms anticipated an expanded interest in the field. Most businesses are in a "holding pattern", apparently, and expect to remain there for the next several years.

Thoughts on Education

There was virtually unanimous agreement that college level courses in ocean engineering and oceanography should be taught in San Diego County. San Diego State College and the University of California San Diego were leading nominees to carry out this training. The most often mentioned level of training was a B.S. followed by an M.S. degree.

Course Material

The courses mentioned in the questionnaire seemed to be generally adequate in extent. The basic data from the questionnaires should be helpful in defining future course sequences. A detailed evaluation of the data is not appropriate here.

Personnel Needs: Present and Future

The questionnaire indicates a large need for B.S. and M.S. level electrical-mechanical engineers with oceanographic backgrounds. The need will apparently persist over at least the next three years. In addition, the returns indicate a distinct need "across the board" for B.S. and M.S. degree people. By contrast, the need for PH.D. people is quite small. These survey results, when compared with local existing educational programs and capabilities, point to some obvious shortcomings.

Before formulating programs to remedy the apparent lack of B.S.-M.S. ocean engineers, it is wise to take a more critical look at the "need". Approximately 30-50% of the present and projected need for engineers is due to one organization. This same organization accounts for approximately 50% of the need for oceanographers. Hence, a large part of the apparent need is rather tenously based on the viability of but one organization.

Certificate or Re-training Program?

About one-third of the respondees indicated that some fraction of their present and projected personnel needs could be met by a Certificate or retraining program. Significantly, another one-third did not answer the question at all. A total of 13 per year retrained or certificated people are presently required. The number raises to 23 per year in three years. The largest potential employer of new hires indicated no interest in certificate personnel.

The questionnaires and the above figures do not appear to indicate a primary interest among employers in a Certificate-retraining program at this time.

Educational Emphasis: Educate, Retrain, or Upgrade?

Upgrading present employees was considered at least as important as primary education. This is one of the more important results of the survey, for there is apparently no organized "upgrade" educational program in San Diego County. Questionnaire results thus seem to indicate a genuine need not met by local educational institutions and do not support the requirement for an extensive "retraining" effort.

RECOMMENDATIONS RESULTING FROM INDUSTRIAL QUESTIONNAIRE

1. The personnel needs of local industry as determined from the questionnaire should be regarded with some caution. The major reason for this suggestion is that a rather large percent of the projected need is due to only one employer.

2. Extension should seriously pursue the offering of upgrading programs to local industry. This recommendation is supported not only by the questionnaires but by personal interviews with industry. It is strongly suggested that the industry and Scripps Institution of Oceanography be involved from the very start in program formulation. Industry, at least, should be involved on a continuing basis to ensure a "living", purposeful program.

3. There does not seem to be an abundance of enthusiasm for a Certificate-retraining program by itself. It is suggested that these items be included with upgrading programs, thus providing them with the academic rewards industry feels they should have.

RESPONDEES TO INDUSTRIAL QUESTIONNAIRE

1. Aeromarine Electronics
2. American Tunaboat Association
3. Ametek/Straza
4. Applied Oceanographics, Incorporated
5. Balboa Structural Industries, Inc.
6. Bissett-Berman Corp.
7. Burnett Electronics Laboratory, Inc.
8. Chemalloy Electronics Corporation
9. Consultec, Inc.
10. Cubic Corporation
11. Dillingham Corporation
12. Diversified Marine Corporation
13. Diving Locker
14. E.G. & G.
15. Environmental Engineering Laboratory
16. General Dynamics
17. Helle Engineering, Inc.
18. Howard Marine Engineering Services
19. Humphry, Inc.
20. Hydrospace Research Corporation
21. Institute of Geophysics and Planetary Physics
22. Innis-Tennebaum, Architects
23. Instrument, Inc.
24. Institute of Marine Resources
25. Jakus, Associates
26. Kahl Scientific Instrument Corporation
27. Kelco, Company
28. Kennecott Exploration, Incorporated
29. LaFond Oceanic Consultants
30. Lockheed Ocean Laboratory
31. Marine Advisers, Inc.
32. Marine Experimental Services, Inc.
33. Mer Optics Company
34. National Marine Fisheries Services
35. National Steel and Shipbuilding Company
36. Naval Undersea Research and Development Center
37. Ocean Applied Research Corporation
38. Ocean Education Consultants
39. Oceanic Products, Inc.
40. Ocean Engineering Information Service
41. Ocean Market Consultants Company
42. Ocean Resources, Inc.
43. Offshore Technology Corporation
44. Pacific Support Group
45. Robert Eberhardt, Consultant
46. Rohr Corporation
47. San Diego Aircraft
48. San Diego Community Colleges
49. San Diego State College
50. San Diego Unified Port District
51. Sea World
52. Submarine Technology Corporation
53. Submarine Development Group One
54. Systems Exploration, Inc.
55. Tracor, Inc.
56. Whittaker Corporation

OCEAN ENGINEERING EDUCATIONAL AND PERSONNEL NEEDS: A COMPARISON BETWEEN THE 1968 AND 1971 SURVEYS

The 1971 survey was purposely arranged to afford a partial comparison with the 1968 survey. However, correlations over three years' time, while tempting, must be made cautiously. The questionnaires are not detailed enough to allow anything more than the general sense of local feelings and needs.

The facts follow; the reader may draw his own conclusions.

	ITEM	1968 SURVEY	1971 SURVEY
1.	Number Questionnaires sent	70	96
2.	Number Questionnaires returned	35	56
3.	Should a college level course in ocean engineering be given locally	Yes, 30 No, 2	Yes, 50 No, 1
4.	Where?	UCSD, 20 SDSC, 17 Other 1	UCSD, 45 SDSC, 46 Other, 28
5.	Level?	B.S. 21 M.S. 22 Ph.D. 5	B.S. 43 M.S. 38 Ph.D. 31
6.	Detailed Course Content	Emphasis essentially identical between the two surveys.	
7.	New Hires per year <u>NOW</u> required	Engr. B.S. 38 M.S. 17 Ph.D 6 Oceanog. B.S. 14 M.S. 13 Ph.D.22	Engr. B.S. 109 M.S 30 Ph.D 7 Oceanog. B.S. 38 M.S. 29 Ph.D. 13

(Engineering area of most interest - Electrical-Mechanical, both surveys. Oceanographic area of most interest - 1. Physical and 2. Acoustics, both surveys.)

COMMENT: The 1971 survey appears to show a slightly greater need for B.S.-M.S. personnel, after adjustment for greater response. There is obviously a much smaller need for Ph.D. levels in 1971. The present view of the future seems more positive than that expressed in 1968. Also, the 1968 respondees apparently did a reasonable job of projecting their three year (1971) personnel needs (except at the B.S. level).

SUMMARY OF PERSONAL INTERVIEWS AND RECOMMENDATIONS

Among the four companies interviewed there was unanimous interest in an "upgrading" program. However, the cost to industry of supporting such a program is a major stumbling block in its implementation. The feeling was generally that any proposed upgrade sequence should be associated with academic accreditation and the possibility of a certificate or degree. In other words, the program should be well planned with some end-in-sight merit bestowed upon the participant. All persons interviewed agreed to help design an upgrading program that would meet their needs.

Recommendations are as follows:

1. Make formal inquiries within the Sea Grant structure as to the possibility of support for a (long term) upgrading program. Such a program seems to fit very well into the Sea Grant Charter. Sea Grant (or other) support would be strong inducement for industrial participation.

2. Arrange informal discussion with Scripps Institution of Oceanography persons interested in Ocean Engineering (e.g., Dr. John Mudie, Dr. F. N. Spiess) to determine the common grounds of interest and participation in an upgrade program. It has been made clear that SIO might well offer its wholehearted support to such a program. The word "support" is intended to include providing both teachers and students.

3. Invite one representative from each of the four companies (customers) to attend an informal planning session. This meeting should be chaired by an Extension (organizer) spokesman. Also included in the group should be one representative from the Scripps Ocean Engineering program, Dr. John Mudie having been suggested.

The purpose of such a half-day meeting would be to rough out a written outline of course content, financing, timing, etc. Particular emphasis should be placed on defining potential problem areas.

REFERENCE: UCSD EXTENSION INDUSTRIAL QUESTIONNAIRES

CONTACT: Paul Stahl, General Manager
Bissett-Berman Corporation
3939 Ruffin Road
San Diego, Calif. Phone: 378-6500

ITEM: Bissett-Berman has approximately 65 employees.

ITEM: They have a definite interest in an upgrading course sequence. The main constraints are money and designing courses to fit their "special" desires. The latter centers mainly in their electronics area.

ITEM: It will be hard for them to lose people during working hours. They are presently not rich enough to do more than reimburse employees for course expense (i.e., the people will have to do it on their own time). The situation may loosen up in one or two years.

ITEM: Stahl saw two interest groups involved in an upgrade program: The first are highly experienced people with little formal education desiring academic credits. The second are highly educated people keeping up to speed.

ITEM: Stahl wonders if the larger companies would push their people to take a course offering. Good question!

CONCLUSION: A positive interest exists in an upgrading program although monetary problems will limit Bissett-Berman participation. However, Stahl (or a representative) would be glad to attend an informal course-planning session.

ACTION: A letter inviting Stahl or a representative to participate in an informal course-planning session should be dispatched.

CONTACT: Pete Summers, Manager
Lockheed Corporation
3380 North Harbor Drive
San Diego, Calif. Phone: 298-8245

ITEM: Lockheed's Ocean group presently numbers 50 people.

ITEM: They have a definite, across-the-board interest in an upgrading program.

ITEM: Lockhheed, Sunnyvale presently has a cooperative educational program with San Jose State and the University of California Santa Clara.

ITEM: The people on his staff travel a great deal and, therefore, a good set of printed class notes would be a "must". A combination lecture-correspondence course might solve the problem here.

ITEM: The individuals would have to assume the responsibility for the courses, but company time might be available for them to attend classes.

ITEM: Summers indicated no interest in a retraining program.

ITEM: Outside funding support for an educational program would be most welcome.

ITEM: Lockheed's present financial position is not particularly conducive to instituting new, overhead-supported programs.

CONCLUSION: Interest in an upgrading program is quite definite. Monetary problems will be the main hang-up. Summers (or a representative) would be glad to participate in an informal course structuring session.

ACTION: Dispatch a letter inviting Summers (or appointee) to participate in an informal course-planning session.

CONTACT: Messrs. P. Branson, M. Folkert, D. Moxby, and K. Samples
Group Managers of the Oceanic Division
General Dynamics
Electro Dynamics Division
Phone: 279-7301

ITEM: Their projected personnel needs are almost certainly conservative. This observation is based on discussions plus additional information. They presently have approximately 60 people.

ITEM: They were not surprised to see strong need for upgrading.

ITEM: They generally favored the idea of an upgrading course sequence. They thought interest for such a sequence would be high within their groups.

ITEM: A two-level program would be attractive to them. One level could lead to a certificate; the other, to a degree of some sort B.S. or M.S.).

ITEM: An on-site course would be best for their people. They suggest that a course requiring matching time contributions from the Corporation and the student would probably be most attractive to their management.

ITEM: Their potential students do a reasonable amount of traveling. This poses a distinct threat to course interest and continuity. The problem could be largely overcome by providing a good set of class notes, perhaps in mimeographed form.

CONCLUSION: They were in favor of an on-site upgrading program. There seemed to be no obstacle to their participating in an informal planning session designed to rough out such a program.

ACTION: Transmit, via letter, the sense of the personal interviews to Mr. Vince Finley, Personnel Manager. Provided the interviews are positive, the letter could conclude with an invitation for an Electro Dynamics representative to participate.

CONTACT: Dr. Eugene Cooper
Consultant to the Director
NURDC
271 Catalina Blvd.
San Diego, California 92152 Phone: 222-6311

ITEM: The NURDC need for people is probably going up. Their only constraint is budget. They are extremely sensitive to the Navy (DOD) budget. It is felt that their manpower requirements are over-estimates. They employ well over 100 people at present.

ITEM: There is a favorable past history of educational programs within Navy labs. The expense of such a program would be carried as an overhead item at NURDC. While they appear to have liberal attitudes toward education programs, they are forced to manage overhead closely, and that is priority ONE.

ITEM: They would gladly accept retrained personnel as potential employees but offered no enthusiasm for a retraining program.

ITEM: Dr. Cooper offered the following suggestions with regard to an educational program at NURDC:

1. In order that students get more than just instruction from the course, he favors credit toward M.S. or even B.S. degree rather than a certificate.

2. Instruction should be on-site during working hours.

ITEM: Dr. Cooper offered to bring up the idea of a proposed "upgrading" educational program at the next staff meeting. Should the response be favorable, he felt NURDC would provide someone (probably Howard Talkington, Head of Ocean Technology Department) to participate in an informal session to rough out the outline of a proposed program.

ITEM: To implement a program, NURDC will require a formal proposal from the Extension. The proposal should cover course content, timing, length, site, staff, and cost.

ITEM: The suggestion that support for such an upgrading course might be obtained from Sea Grant and other sources was well-received.

ITEM: NURDC's staff of ocean engineers consists largely of transplants from other fields - strong in experience, yet lacking in formal education.

CONCLUSION: Cooper was generally in favor of an upgrading program but felt it should be linked ultimately to a degree. Most of the potential pitfalls to be expected, prior to the realization of the program, concern money.

ACTION: Transmit, via letter, the sense of the personal interviews to Cooper. Provided the interviews are positive, the letter could conclude with an invitation for a representative from NURDC to participate in an informal definition meeting.

APPENDIX TO SECTION ONE

INDUSTRIAL QUESTIONNAIRE RESULTS

A. What is the general nature of your marine activity?

1.	Education	8	4.	Manufacture	23
2.	Research	22	5.	Operations	12
3.	Design	21	6.	Other (specify) "Consulting"	2

B. Please indicate present and projected size of your organization:

	Present No. Employees	In 3 yrs.	No answer
Less than 5	14	10	4
5-15	13	12	
16-40	7	7	
41-100	8	8	
101 or more	10	15	

C. Please indicate the percentage of your organization's activity devoted to ocean-related work:

Percent	Present	In 3 yrs.
0-25	11	9
26-50	6	8
51-75	5	7
76-100	34	32

D. Specific Educational Information:

1. Should college level courses in ocean engineering and oceanography be taught in San Diego County?

   (a) Yes 50 (b) No 1 (c) No answer 5

2. (a) UCSD 45 / 7 (b) SDSC 46 / 6

   (c) Jr. Colleges 27 / 24 (d) UCSD Extension 28 / 24

   (e) No Answer 4

(NOTE: No check of the institution was taken as a NEGATIVE vote. The first number represents the positive response, while the latter is the negative response.)

3. What level(s) of training should be taught?

   (a) B.S. 43 / 8 (b) M.S. 38 / 13 (c) Ph.D. 31/ 20

   (d) Certificate 27 / 24 (e) Other 8 / 43 (f) No Ans. 5

4. Indicate which courses you feel should be included:

OCEAN ELECTRICAL-MECHANICAL ENGINEERING

35 Underwater acoustics
37 Engineering materials
33 Marine Hydrodynamics
30 Shock and vibration
27 Marine sediment properties
39 Corrosion and fouling
35 Underwater structures
43 Oceanographic instrumentation
26 Towed-body dynamics
18 Inelastic behavior of materials

Other
3 Electronic Instrumentation
Computer course
Semi-conductor electronics
Statistics
Thermodynamics

OCEAN CIVIL-STRUCTURAL ENGINEERING

31 Marine Survey Instruments
35 Wave motion and current studies
29 Sediment transport
25 Coring techniques
27 Marine mineralogy
29 Coastal structures
34 Waste disposal
31 Estuarine pollution
17 Surf vehicles
33 Engineering ecology

Other
Net design
Closed cycle life support

5. Indicate which courses you feel should be included:

PHYSICAL

43 Introduction to Physical Oceanography
38 Ocean waves
37 Ocean circulation
24 Numerical modeling

Other
Meteorology, air/sea interaction
Remote sensing

CHEMICAL

41 Introducation to Marine Chemistry
25 Nuclear Geochemistry
41 Physical chemistry of seawater
36 Major chemical cycles in the sea

Other
Gaseous environment control

BIOLOGICAL

39 Introduction to Marine Biology
31 Marine ecosystems
29 Marine botany
30 Marine biochemistry

Other
4 Marine fisheries
General taxonomy
Mariculture and aquaculture
High pressure physiology

GEOLOGICAL

41 Introduction to Marine Geology
33 Littoral processes
34 Geochemistry
27 Petrology

Other
Paleontology
Paleoecology
Properties of sediments
Mining
Sea floor ecology
Surveying

6. How many professional "new hires" do you expect in your company in the following specific categories?
(17 companies did not answer this question.)

Title	Academic Level 1971-1972 BS	MS	PhD	Certificate	1974-1975 BS	MS	PhD	Certificate
OCEAN ENGINEERS								
Electr-Mech. Eng.	66	18	3	8*	85	27	4	13*
Civ-Structl. Eng.	15	2	-	1*	18	3	-	2*
Other Engineers:								
Electr. Engineer	6	-	-	2*	6	-	-	5*
Naval Architect	2	-	-	-	-	-	1	-
Ocean Engineer	-	2	1	1*	-	2	2	1*
Sonar Technician	2							
OCEANOGRAPHERS								
Acoustical Ocng.	13	6	2		16	7	3	
Biological Ocng.	6	5	1		6	7	4	
Chemical Ocng.	2				4	2		
Geological Ocng.	2	4	1		5	6	3	
Physical Ocng.	6	8	2	1*	7	7	3	2*
Other (Specify)								
Fishery Biol.	1							
Population Dynam.			2					

* Companies expressing interest in Certificates:

1. Systems Exploration
2. Howard Marine
3. Jakus
4. Off-Shore Technology
5. National Steel
6. Kennecott
7. General Services
8. Amtek/Straza
9. San Diego Community College
10. Marine Equipment Company

NOTE: The company with largest projected increase expressed no interest in the Certificate.
The Certificate program has almost no importance in the field of "Oceanographers".

7. What percent of your present and projected professional oceanographic personnel needs could be supplied through a certificate or retraining program if such were available?

	Present %	Projected %	No answer	No %
Ocean Engineers	12 (50-100%)	10 (50-100%)	21	13
Oceanographers	4 (50-100%)	3 (50-100%)	21	20

(Missing totals represent percents less than 50.)

8. Please rank the following areas of educational emphasis in their importance to your projected personnel needs. (1 = Most, 2 = Secondary importance, 3 = Least importance.)

	EDUCATE	RETRAIN	UPGRADE
1	20	1	20
2	10	18	11
3	10	21	9

Note: 13 did not answer.

9. Significant comments:

a. "Don't overlook on-the-job training which is, in many cases, as valuable as formal education."
b. "Don't train people for jobs not available."
c. "...feel ocean engineering should not be a separate career field, but a specialty under classical fields of EE, ME, CE, etc."
d. "Avoid saturating the market."
e. "Need oceanographic and marine biology museum larger than Scripps.."
f. "State of budget market unlikely to make field of oceanography require new employees for next two years. Do not feel emphasis should be put on training oceanographers at this time."
g. "Should study 'man in the sea', life support systems, etc."

Note: Many of the companies needed people capable of on-the-job training which probably could not be gained from any course work now available.

SECTION TWO

SUMMARY OF STUDENT QUESTIONNAIRE RESULTS AND RECOMMENDATIONS

SUMMARY OF STUDENT QUESTIONNAIRE RESULTS AND RECOMMENDATIONS

The results of the student survey are summarized below. An annotated copy of the original questionnaire and summary responses to it are attached as an Appendix. The 120 (out of 250) individual questionnaires have been transmitted to John Stark under separate cover.

The reader will find totals exceeding 100% (or 120) in the following summary. This is a result of multiple answers by individuals. Each answer has been given equal weight. In cases of no answer, a 100% (or 120 total) is, of course, impossible.

Questionnaire vs. Respondee

The majority of the questionnaires were meaningful for the respondees. However, part of the questionnaire was designed for students pursuing a primary oceanographic education. Most of the respondees have already attained their basic education and had taken oceanography classes as, mainly, a sideline. The result was a partial (25%) mismatch between questionnaire and respondee.

The "Average" Oceanography Extension Student

The typical Extension oceanography student is under 30 years of age, has a college degree, and most likely is a teacher. The odds are just better than even that the student is a female. A great majority of the students took an oceanography course on their own initiative. Most of the students do not plan a career in marine science, although an interesting number (25%) are undecided. Most students are already employed full time.

Enrollment Problems

Approximately 25% of the students indicated some difficulty enrolling in Extension courses. About half of these students attributed the problem to "not enough oceanography courses offered".

Nature of Past Course Work

About 70% of the students had taken "general" oceanography courses. Biological and physical oceanography courses accounted for 45% and 15% of the courses taken, respectively.

Desire for Additional Ocean Courses

One hundred and three (103) of the respondees indicate a desire to take additional ocean-related courses. Documentation of this potential "market" represents a major result of this survey.

The courses desired were mostly of a biological nature, although there was a significant interest in geology and physical oceanography. The respondees were split regarding the academic level of these courses. No attempt was made to correlate academic level with the type of courses desired, although this will be possible from the questionnaires.

Most respondees wanted to take the courses via Extension (95) or UCSD (31). Considering the bias nature of the students sampled, this result was expected.

Certificate Program

Although a fair number of the respondees (51) seemed favorable to a Certificate program, the figures may be somewhat misleading. A number of commments were made to the effect that "am not interested in Certificate for myself but (it) may be helpful to others".

Available Job Opportunities

This section of the questionnaire had little significance for the students sampled.

Recommendations

1. It is suggested that Extension offer additional oceanographic courses. The substance and level of these courses should be determined from an analysis of the returned questionnaires.

2. It is suggested that all of the Extension offerings in oceanography be structured into a meaningful and cohesive pro-

gram. The goal of this co-ordinated program should be to provide a general background in the science of oceanography and, in addition, to give the potential oceanographic student a sound foundation for continuation. To achieve this end fully, it may be necessary to co-ordinate the Extension's course programs with other educational institutions in the area that are also offering study in this field.

3. The existence and course sequences of the oceanography program should be widely advertised throughout local industry, the teaching profession, past Extension students, and other areas. Also on-campus students (UCSD, San Diego State, and Junior Colleges) should be made aware of the courses offered through Extension.

4. The questionnaires pointed out great enthusiasm for "General Interest" courses (e.g., "Our California Coastline", "Tidepools", "Our Local Islands - with field trips"). Certainly, from the students' response, ANYTHING taught by Sam Hinton would be well-received, even if he were just to repeat the last course he taught.

5. More oceanographic courses for teachers, with an emphasis on education, should meet with success. A sure winner would be "Marine Biology for Teachers".

6. Extension should determine WHAT the competition with Sea World's courses is, in order to eliminate duplication.

APPENDIX TO SECTION TWO

STUDENT QUESTIONNAIRE RESULTS

120 Responses

Age Ranges:

Under 31	55	(including a 16 year old)
31-40	36	
41-50	18	
51 and over	11	(including a 72 year "young")

Education Levels:

(Education levels of responding students were generally high, with 98+ having a college degree or better.)

12th Grade	12th Grade +	A.B., B.S.	A.B., B.S.+
4	22	40	34

M.A., M.S.	Ph.D., M.D.
18	2

The most generally held occupation was that of "Teacher" which suggests that, since they work all day, members of this group will find the Extension their best means of "upgrading".

Teacher	Students	Other: Science	Other: General
46	16	22	36

(Of the 120, 52 were male and 68 were female.)

A. Educational History and Information:

1. Who provided educational guidance?
   a. Counselor 1 b. Person in Field 14
   c. Parent 3 d. No one 63 e. Other 39

2. Who helped you plan?
   a. Counselor 18 b. Person in Field 5
   c. Parent 5 d. No one 78 e. Other 14

3. Do you plan a career in Marine Science or Technology?

   a. Yes 17 b. No 72 c. Undecided 29

4. Do you seek Marine education for background in a basically non-marine career?

   a. Yes 63 b. No 53

5. Did you experience difficulties in enrolling in oceanographic courses?

   a. Yes 28 b. No 92 c. Describe:

   Some of the comments under "c" include:

   (1) "Not very many classes" - 12 others reiterated this.
   (2) "Most courses offered in graduate program" - 2 others expressed this also.
   (3) "Could not get in because of prerequisites" - Six others agreed.
   (4) "No courses offered as part of day program."
   (5) "Can only attend night Extension - not enough diversity in ocean science classes."
   (6) "..restricted (some classes) to male participants."
   (7) "..do not want people with undergraduate degrees in English Literature.."
   (8) "Classes closed out."
   (9) "Introduction to Chemistry of Oceanography not offered frequently enough.."

B. Nature of Oceanographic Courses Taken in Extension:

   1. General 83 2. Chemical 5 3. Biological 54

   4. Geological 2 5. Physical 18 6. Other: Scuba

C. Why did you take the courses?

   1. Job advancement 23 2. Changed professions 14

   3. Seek degree 14 4. General interest 103

   5. Other (generally included in categories above)

   Many of the teachers felt they were taking courses for "General interest" but could also have answered "Job advancement" since the pay scale increases with the number of additional accredited courses taken.

D. Would you take additional courses in Ocean-related subjects?

   1. Yes 103 2. No 14 3. Detailed course 42

   4. General course 52 5. Not sure 3

Notes: Sam Hinton's course was very popular with this group. Many would take the same course again; the group would certainly take any other courses offered by him.

Sea World apparently offers a course (courses? accredited?) in Marine Animals and some of the students had taken it. One expressed disapproval and one dropped after only one meeting. People taking the Sea World course would probably otherwise take a course through Extension.

Other courses requested:

Physical Oceanography (15) Marine Biology (43) Geology (16)

Chemical Oceanography (12) Pollution, Conservation, Ecology, and Preservation (9)

Other courses mentioned:

1. More teacher-related Oceanography courses (6 or more agreed)
2. Sam Hinton ("anything")
3. Tidal life
4. Marine law
5. Marine photography
6. Scuba diving
7. Embryology of Marine Organisms
8. Fisheries
9. Collection and preservation of marine life
10. Shell collecting
11. Man in the Sea
12. Nursing care related to "man in the sea", bends, etc.
13. Marine paleontology
14. Family courses with field trips
15. Biology was the most demanded course and broke down into:
    a. Comparative anatomy of marine life
    b. Marine Physiology
    c. Marine Vertebrates
    d. Marine Ecology

E. Where would you wish to take courses?

1. City Colleges 12 2. San Diego State 12

3. UCSD 31 4. Extension 95 5. Other (Scripps, and correspondence)

F. Certificate program interest:

a. Yes 51 b. No 64

(Note: While almost half responded "yes" to the above,

many were not interested themselves but felt that a certificate program might benefit someone else. In other words, they were not opposed to the idea. Since most of the respondees are already educated in another field, it is difficult for them to see that a certificate can be an advantage to them at this stage of their lives.)

G. View of Job Opportunities in Marine Science and Technology

1. Job opportunities far exceed supply	5
2. Job opportunities are in balance with supply	11
3. Job opportunities are scarce	39
4. No idea of job situation	70

H. Where do job opportunities exist in Marine Science and Technology?

1. U.S. Federal and State Government	33
2. U.S. Private Industry	11
3. U.S. Institutions of Higher Education	22
4. Foreign Industry or Government	3
5. No idea	54

It is interesting to note that, in spite of their education, respondees have little or no idea of employment opportunities or of where these lie in marine sciences and technology.

I. Will your planned education program require you to find full-time employment in some field other than oceanography?

1. Yes 69 2. No 27

Discrepancy in number here results from the fact that everyone did not answer the question. Once again, this question reflects the finding that most of the people polled already have established professions.