DEVELOPMENT OF RELEVANT TERTIARY FISHERY EDUCATION IN EASTERN VISAYAS

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APPROVAL SHEET

This dissertation entitled "DEVELOPMENT OF RELEVANT TERTIARY FISHERY EDUCATION IN EASTERN VISAYAS," has been prepared and submitted by LATIP S. ABDURAHMAN, who having passed the comprehensive examination is hereby recommended for oral examination.

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L.S.A.

DEDICATION

To all those who believe in the significance of curricular programs as the blood-life of higher institutions for the sustainable development of national industry and economy.

To my ever caring and supportive wife Melit, my parents, to our four children, Marisol, Alimar, Jheamil and Rheamil, and to the Almighty and Merciful God for their unending love, care and inspiration.

I dedicate this dissertation.

L.S.A.

ABSTRACT

This study attempted to determine the relevance of the training skills in subject areas, relevance of the training skills in subject areas for fisheries and marine science resource-based curricular programs for the development of relevant and responsive courses in fishery tertiary education in Eastern Visayas. Training skills in the subject areas for the twelve (12) fisheries and marine science courses are perceived "very much" and "much" relevant to the courses or curricular programs as perceived by the respondents. There is a significant difference in the perceptions of the respondents on the relevance of training skills on the subject areas for the twelve (12) fisheries and marine science courses. There are 49 identified fishery business/commercial/industrial or economic activities with two are illegal means of economic activities used in fishing. The most prominent and common forms or types of businesses are fishing, fish salting and drying. There are 20 identified fisheries and marine science courses or curricular programs. The first top ranks and second ranks of both non-ladderized and ladderized degree programs are relevant to the business/commercial/industrial or economic activities of the communities. The training skills in subject areas for the twelve (12) fisheries and marine science courses or curricular programs are "much" and "very much" relevant and therefore can be offered as major subjects. The perceptions of the respondents varies significantly with the relevance of training skills in subject areas as perceived by them.

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Introduction

The most ambitious stride undertaken by the Philippine Government in our aspiration to be globally competitive is by turning into a Newly Industrialized Country (NIC) in the year 2000. All government agencies and instrumentalities are confronted on how to accelerate human, community, and natural resources to enable the government to implement its economic plans into a realistic situation in order that human resources give their greatest share and contribution to socio-economic development of our country.

There are lots of strategies, goals or objectives, project or programs and other methods to make the Philippines a newly industrialized country. Fishery Education plays a very crucial role in the development of human resources through its educational program on manpower needs of the community and its natural and marine-based industries. Fishery science and technology of tertiary education programs should have offered payoff instruction to open opportunities of relatively between human and natural resources in meeting manpower needs to fit into fishery industrial demand.

Excellence in tertiary or higher education towards global competitiveness is a big challenge and opportunity for us to develop and be progressive towards the next millennium.

In the words of the great English Educator Sir John Newson, he states that "All education is, in a sense, vocational for living and education is not only building the individual but also building the community." It is high time for us to trace back and reckon the comprehensive presentation of accomplishment over a period of time where tertiary educational programs in fisheries had its beginning and pose where its position was to stand and support the socio-economic development in order to uplift the quality of life of the people and make the community a progressive one and enable the country to meet its fishery industrial position to complement its economic growth.

Let us again have a comprehensive outlook of the natural and human resources in our environment. Can it support a sustainable fishery educational program or project? It is only through relevant fishery science and technology aspects of education that we can have a sustainable fishery and marine resources to be tapped to complement and supplement the very basic component and elements of successful and progressive fisheries and marine sciences educational programs in tertiary education.

The need for quality tertiary education cannot limit or isolate itself within its system's internal plan and policies for development but there is a need for involvement of the community sector and environmental scanning in terms of curricular programs, organization, management, research and development, industry relations, instructions and manpower needs.

There has been no momentary effort to match tertiary education program with natural-community based resources to improve the socio-economic conditions of the community. Relative to socio-economic development of the community, the tertiary fishery education needs to evolve a concept of curricular program in fisheries and marine sciences where there will be a complementary and supplementary of courses needed in the community through training skills in formal education. The need for any relatively advance and progressive stage of development in tertiary education is indeed a very realistic and imperative in order to evolve a relevant and responsive education in the community and to promote a progressive education in the community and improve the quality of life of the people. Its economic programs should support the country to develop socially productive citizens.

The conditions of the rural sector indicates the necessity for a direction of our educational effort, a redirection and reorientation in our curricular practices to make education more sensitive to the needs and demand of the people who need to acquire science and technology skills. After all our national strength rests upon the people who must be educated, whose standards of living must be raised if our country is to be competitive with other countries.

A new relevant fishery and marine science educational program and system in the local autonomy of an institution must be aimed at elevating the common man. Tertiary educational program and instruction must be geared to the needs and problems of living in the rural areas where most of our people live. The potentialities of the people must be exploited to its fullest to improve their social and economic well being. The local school management must be given latitude and encouragement in developing tertiary programs that are adaptable to the conditions that will make the fullest use of community resources. This requires a sort of directional policies governing the school systems of our educational practices.

We are faced with challenging roles in our quest for relevant and quality tertiary education in the next millennium. The Philippines is known in the world to have vast fishery and marine resources that can support the fisheries sector economy. Though there is the existence of such vast resources, many of us are not aware of its economic importance because of the absence of information, knowledge, and trainings on their economic usefulness.

Development of relevant and appropriate educational training curricular programs on the needs of the community where these fishery and marine resources are available needs to be developed with proper training in order to have a pool of manpower in the wise utilization of the resources. It is the functions of tertiary institution as center of excellence, of community development, and as catalyst of manpower development, to operate a relevant tertiary fisheries and marine science courses with quality instruction and training.

The variety of economic usefulness of fishery and marine products aside from being utilized as food includes pharmaceutical, medical, fertilizer, and other industrial uses. The Philippine Council for Aquatic and Marine Research and Development Annual Report (PCAMRD 1996:1) expressed concern on modernization of the fisheries and aquatic resources especially in the comprehensive technology transfer and commercialization about seaweed processing and utilization of which the products were developed or formulated by the University of the Philippines - Marine Science Institute and University of the Philippines - College of Home Economics are now being patented at the Bureau of Patents, Trademarks and Technology Commercialization Office. These products are "seemoy" (a low-cost seaweed-based air freshener gel), "fruity-cubes" (fruit-flavored candy gels) and "lugentrol" (menthol and ginger-flavored pastilles from seaweed polysaccharides). Another is production of marritol from sargassum. The application of marritol in pharmaceuticals is already being studied while development and formulation of food and non-food applications are yet to be done. As reported by the Philippine Council for Aquatic and Marine Research and Development they are only a few of the varieties of the marine product development known to us. There are many others.

The Aqua Farm News, a publication of Aquaculture Department of the Southeast Asian Fisheries Development Center, discussed folk medicine and horticulture stating that, "marine organisms are used in folk medicine by coastal people of Northern Mindanao and the Visayas Islands of Bohol, Cebu and Negros in Central Philippines. Of particular interest are concoctions used to treat malaria, bleeding, fertility problems, worm malaria, and worm infection. These could be truly effective drugs from marine organisms. Sea urchins contain bioactive substances. Mangroves contain tannins, phenolic compounds that exhibit antimicrobial activity. Seaweeds contain phenols and terpeniodal compounds. In horticulture and agriculture, Filipino coastal dwellers have used brown seaweeds as soil ameliorant and growth whenever possible. Studies point out that seaweed extracts contain plant growth promoting these substances. These are now exploited commercially.

There are fishery and marine living resources reported by the two agencies which are of economic importance, and the problem is how can we disseminate and transform them into concrete products not only through the form of publication. We should have the vision in education and training so that our institution can transform them into a forceable and attainable curriculum not only in the year 2000 but also for the next millennium.

Fisheries has an important part, although more diffuse, impact on food security, the contribution it makes to economic well-being. Fisheries in the early ninetieth century was regarded of lesser importance simply because of the inadequate knowledge and few discoveries concerning the economic importance of marine resources.

We are now moving towards the next millennium where we must address our concern to the development of our people. It is themselves that develop the community. The Philippines was represented in the United Nations Conference on Environment and Development in Rio de Janerio in June 1992 and a program of action was adopted by UNCED which is known as Agenda 21. National and regional consultations were held to come up with a common concept of sustainable development and so the Philippine Council for Sustainable Development was created and lead to the creation of Fisheries and Aquatic Resources Management Councils (FARMCs). The councils were organized from barangay level up to the National Level with the primary function of implementing policies, rules and regulations concerning fisheries management.

Fisheries and marine science education is one of the educational sectors in tertiary education that can provide and sustain the Philippine economy in the next millennium. This is reflected in the Long-Term Higher Education Development Plan in the mission of higher education that "Higher Education shall be geared towards the pursuit of better quality of life for all Filipinos by emphasizing the acquisition of knowledge and formation of those skills necessary to make the individual a productive member of the society". It shall accelerate the development of high-level professionals who will search for new knowledge, and provide leadership in various disciplines required by a dynamic and self-sustaining economy. Higher education shall likewise be used to harness the productive capacity of the country's human resource-based towards international competitiveness and in its vision 2005 would have provided and expanded opportunities for the technologically useful knowledge and skills of Filipinos, and would have constructively advanced the capabilities of Filipinos in society. It would have produced in the Filipinos the ability to critically think, create, act positively and contribute to the full development of the family, community and the larger society. So, the Philippines in its vision 2005 would have fully emerged as a newly industrialized country and regained the stature as the Center of Education and Training in the Asia-Pacific region. Politically and socially, it would establish national unity. Its production, manufacturing and service sectors would have successfully penetrated the international markets. Domestically, these sectors would have generated gainful employment for the majority of Filipinos. The quality of life of the average Filipinos would have risen to the standards of modernizing economies. By the year 2005, the average Filipino would have asserted himself as empowered and globally competitive– one who has managed his future and won his destiny.

We all accept the statement that man is social by nature, that man develops and reaches his full stature as man in society in his interaction with others. Man's idea of what he wishes to be or what he ought to be is influenced by the society in which he lives. As Mortimer Adler says, "Education is filling man for living." Our world is a changing world. So, the best that a humanistic education should do would be: One, to give the student means to understand the present world. This end can be served by courses in mathematics and the natural sciences, geography, and familiarity with technique and its possibilities.

Republic Act No. 8550 otherwise known as "The Philippine Fisheries Code of 1998," which provide for the development, management and conservation of the fisheries and aquatic resources, integrating all laws pertinent thereto and in its declaration of policy states: (a) to achieve food security as the overriding consideration in the utilization, management, development, conservation and protection of fishery resources in order to provide the food needs of the population. A flexible policy towards the attain of food security shall be adapted in response to changes in demographic trends of fish, emerging trends in the trade of fish and other aquatic products in domestic and international markets, and the law of supply and demand; (b) to limit access to the fishery and aquatic resources of the Philippines for the exclusive use and enjoyment of Filipino citizens; (c) to ensure the rational and sustainable development, management and conservation of the fishery and aquatic resources in Philippine waters including the Exclusive Economic Zone (EEZ) and in the adjacent high seas, consistent with the primordial objective of maintaining a sound ecological balance, protecting and enhancing the quality of the environment; (d) to protect the rights of the fisherfolk, especially of the local communities with priority to municipal fisherfolk, in the preferential use of the municipal waters. Such preferential use, shall be based on, but not limited to Maximum Sustainable Yield (MYS) or Total Allowable Catch (TAC) or the basis of resources and ecological conditions, and shall be consistent with our commitments under international treaties and agreements; (e) to provide support to the fishery sector, primarily to the municipal fisherfolk, including women and youth sectors, through appropriate technology and research, adequate financial, production, construction of post-harvest facilities, marketing assistance, and other services. The protection of municipal fisherfolk against foreign intrusion shall extend to offshore fishing grounds. Fisherfolks shall receive a just share for their labor in the utilization of marine and fishery resources; (f) to manage fishery and aquatic resources, in a manner consistent with the concept of an integrated coastal area management in specific natural fishery management areas, appropriately supported by research, technical services and guidance provided by the State, and (g) to grant the private sector the privilege to utilize fishery resources under the basic concept that the grantee, licensee or permittee thereof shall not only be a privileged beneficiary of the state but also an active participant and partner of the government in the sustainable development, management, conservation and protection of the fishery and aquatic resources of the country. The State shall ensure the attainment of the following objectives of the fishery sector: (1) Conservation, protection and sustained management of the country's fishery and aquatic resources; (2) Poverty alleviation and the provision of supplementary livelihood among municipal fisherfolk; (3) Improvement of productivity of a aquaculture within ecological limits; (4) Optimal utilization of offshore and deep-sea resources; and (5) Upgrading of post-harvest technology.

In Section 116 of the Philippine Fisheries Code of 1998 on upgrading of the State Fisheries Schools / Colleges, the Department of Agriculture through the Bureau of Fisheries and Aquatic Resources, in coordination with the Commission on Higher Education (CHED), Department of Education, Culture and Sports (DECS), and Technical

Education and Skills Development Authority (TESDA), shall upgrade State Fisheries School / Colleges which provide both formal and non-formal education: Provided, however, that the CHED shall incorporate Approfishtech in the curricula of fisheries schools / colleges. The Department of the CHED shall formulate standards to upgrade all fisheries schools / colleges. Fisheries schools / colleges that do not meet minimum standards shall be closed.

Our concern for fisheries development is facing a tremendous effort for its sustainability in its implementation. There is a need for educational and informal campaign on sustainable development, fisheries conservation, management and development. But, how can we help campaign to realize the policies of the state and promote the principle of sustainable development, management, conservation and proper use of the marine environment when there is an absence of relevant curricular programs offered by the higher institutions that are responsive to the needs of the fishery sector. In the Philippine bureaucratic system of education, there is a need for rational curriculum planning among educational planners towards generating specific and identified direction and precise educational ends.

There is a need for redirection and reforms in the curricular programs of education and training. Organized curricular programs calls for concerted efforts in order to achieve the purpose to which direction of the curriculum is moving in terms of knowledge, skills and economic development. In other words, curriculum must suit with the state of the environment and time of development of the place and its constituents to be socially and economically progressive.

In developing a curricular program in pursuit of educational business and economy, the business and industry sector must be included to consider the needs of the curriculum in the desire to produce manpower needs of our economy. Varied and new technologies are introduced which are of great value and contribute to the new development stages of the fishery economy and society, hence a development in curriculum reforms and change to meet the demand of time.

Statement of the Problem

This study attempts to determine the relevance of training skills in subject areas for fisheries and marine science resource-based curricular programs in tertiary fishery education.

More specially, this research work will be undertaken to seek answer to the following questions:

1. What is the profile of available fishery and marine resources of the municipalities or communities where the fisheries schools are located?

2. What fisheries and marine-based business/ commercial/ industrial or economic activities are undertaken in the communities where the fisheries schools are located?

3. What fisheries and marine-based courses or curricular programs are relevant to the business/ commercial/ industrial or economic activities of the communities as perceived by the four groups of respondents.

4. What priority rank of fisheries and marine science courses or curricular programs can be offered and relevant to the communities as perceived by the four groups respondents?

5. What training skills in subject areas are relevant and help develop fisheries and marine science courses / or curricular programs as perceived by the four groups of respondents:

5.1 Fishery Educators and Supervisors.

5.2 Fishery Instructors and Students.

5.3 Local Government Officials.

5.4 Non-government Organizations, Business and Industry Organizations.

6. Is there a significant difference in the relevance of training skills in the subject areas for fisheries and marine science courses or curricular programs as perceived by the four groups of respondents?

Hypothesis

Based on the formulated questions, the null hypothesis is:

There is no significant difference in the perceptions among the four groups of respondents on the relevance of training skills in subject areas for the twelve (12) fisheries and marine science courses or curricular programs.

Theoretical and Conceptual Framework

Theoretical Framework

Primarily, this study revolves around the theory of Tomas Quintin D. Andres and Felizardo Y. Francisco (1989: 84-85).

The theory states that "the curricular offering must be made relevant to the economic demands of society if we are to achieve the goal of producing people who are to provide direction and guidance in the operation of commerce and industry. Technical skills, researchers for the discovery of new products, constant improvement of technological procedures, and needs managerial pool must be taken into consideration by curriculum developers in the Philippines." And secondly, it embraces the theory of Harbison and Mayers as cited by Helen (PASS Education digest, 1969:6). The theory states that, "if a country is unable to develop its human resources, it cannot develop much else, whatever it be a modern political and social structure or a sense of national unity or higher standards of material welfare. Also a country may have natural resources and physical capital but unless it also develop human talents, motivation, and organizations to make use of physical resources for human ends, it is not going to advance very far."

There is a need for redirection of our tertiary fishery education to the needs of the community for social and economic development because there can be no progress without development where the people are the prime mover towards community development. To meet the goals of human resource development in fishery education, there is a dire need for the institution to carry out the training skills with competence and of the necessity to harness and tap our fishery and marine resources. However, pressing problems on conservation and wise utilization of our fishery and marine resources is yet to be given the highest attention in the ideas of values and work ethics in community development from all sectors of classes of people as they are the beneficiaries of the social economic growth and development of the society.

Second paragraph, section two of R.A. 7722, otherwise known as The Higher Education Act of 1994, declared the policy that "state supported institutions of higher learning shall gear their programs to national, regional, or local development plans. Finally all institutions of higher learning shall exemplify through their physical and natural surroundings, dignity and beauty of, as well as their pride in, the intellectual and scholarly life."

In the schematic diagram of the conceptual framework of the study, the base frame defines the training skills in fisheries and marine sciences curricular programs which is the focus and concentration of the study, and the subject of assessment by the respondents, namely: the fishery educators, who are the head of fishery institutions, and supervisors, who are the supervising Agriculturists / Technologists / Biologists of BFAR; the fishery instructors and students, who are instructors and students of fisheries schools; the local government officials, who are the Sangguniang Bayan members; and the NGOs business and industry.

The researcher rationalizes the new and future fisheries and marine sciences educational programs and its concerns for keeping with the human community and natural resources for socio-economic programs of education in our strive for quality of life and better living.

Conceptual Framework

The conceptual framework shown in Figure 1 defines the fishery institutions or schools and communities where those

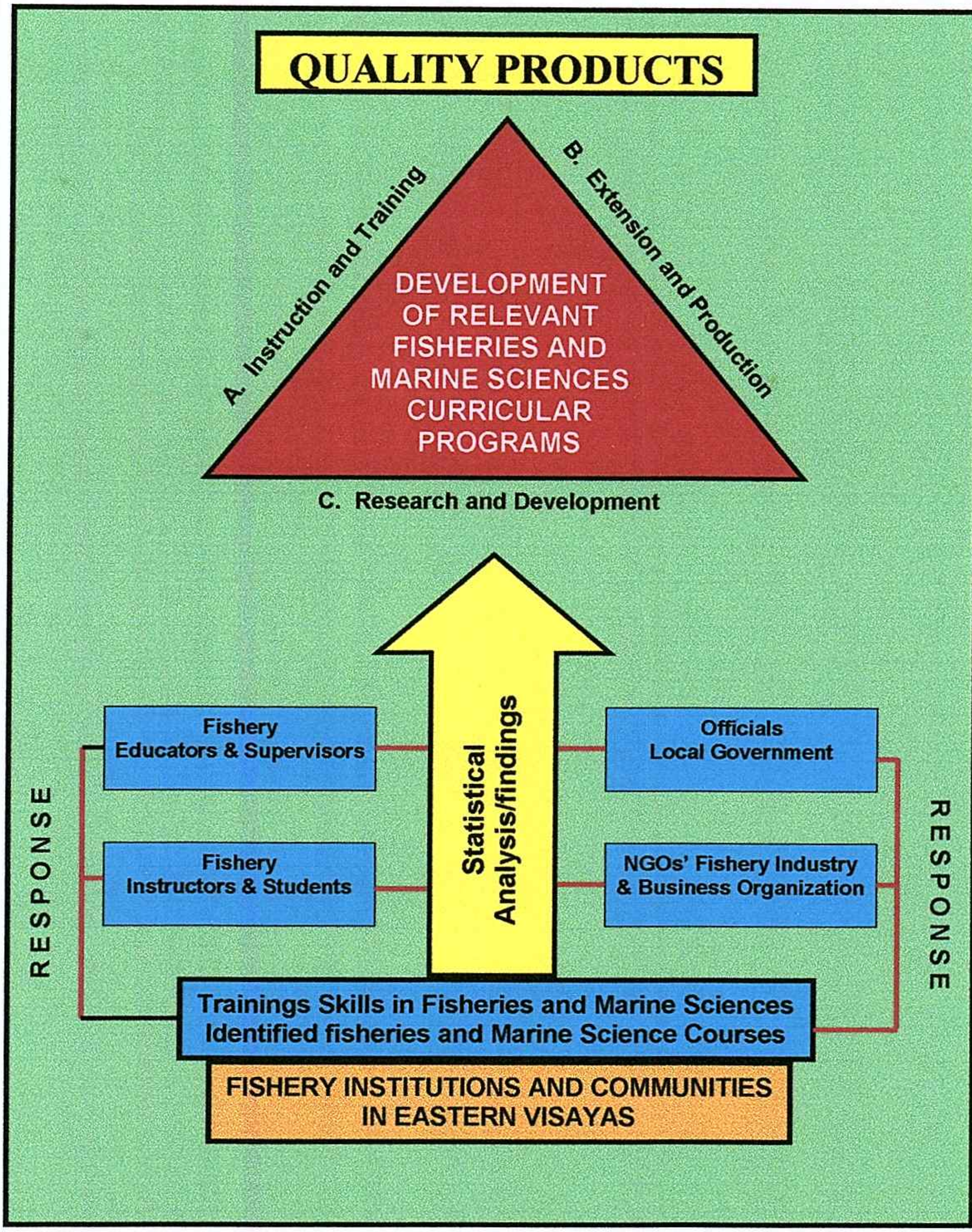


Figure 1. Schematic diagram of conceptual framework of the study illustrating the research environment and the problem, statistical analysis/findings towards a direction in the development of relevant fisheries and marine sciences curricular programs which ultimately produce quality products in tertiary fishery education and become the pool of manpower that shares and contributes directly or indirectly to community socio-economic development.

learning institutions are located as the sources of fishery information on available fishery and marine resources so that relevant courses could be identified to fit in the appropriate training skills in the fisheries and marine courses by statistical analysis and its implications on findings in developing relevant fisheries and marine science curricular programs.

The curricular program of an institution is the life-blood part of the institution as it reflects its educational philosophy, vision and mission of its existence. So, through the trilogy functions of tertiary fishery education in instruction and training, extension and production, and research and development the institution would produce quality graduates and become a pool of highly skilled manpower for community socio-economic development.

It is the researcher's belief that education is not complete without training and proper training with business enterprise develops better manpower skills when relevant and appropriate training curricula are offered to meet the needs of the community. Education is not only building the individual but it is also building the community.

The curriculum is the life of the learning institutions as it is that gives image to the school through its programs and products.

Importance of the Study

The study is conducted in response to the role of higher or tertiary education in the development of human resources enunciated in the development plans of the Philippines to become a newly industrialized country in the year 2000. However, it is doubtful to say that year 2000 is merely just a couple of years from the present status of economic growth of the Philippines which is so short a pace of time which requires a tremendous effort and material resources to assemble.

This study will provide vision and insights to all sectors of society who are concerned with fishery education, business, industry, and economic activities, and those engaged in the utilization of the open access of marine resources for recreational, scientific and technological pursuit for they are part of the socio-economic development for the improvement of better life of the people in the region.

The participation of the respondents will provide vital information to the people in the region in particular and to the other regions to develop potential fishery industries and will guide the establishments to adopt priority-based skills or preference which may open avenues for new employment opportunities. It also encourages and support priority occupational courses that will help develop the communities in their respective areas.

Finally, the results of this study will serve as basis in prioritizing curricular programs in education and training courses in fisheries and marine sciences relevant to the communities. Consequently, these identified and recommended curricular programs with matching training skills will be used as basic and fundamental foundations for evolving fisheries and marine sciences curricula in tertiary education that will enhance the development education of the region.

Scope and Delimitation

The study will cover the islands of Samar, Leyte, and Biliran. Only the towns or municipalities in the region are included in the study where the ten fishery schools are located which are CHED supervised and TESDA schools. For local government officials the respondents were the members of the Sangguniang Bayan of the town or municipality. The non-government, business, and industry organizations were those that were registered, and only the senior staffs and fishery staffs are the respondents. Fishery Supervisors of the Bureau of Fisheries and Aquatic Resources of the Department of Agriculture, and Fishery School Superintendents, Administrators and Principals of fisheries schools. Fishery instructors were those respondents handling fishery subjects, and fishery students were those enrolled in post-secondary and baccalaureate degree in fisheries for the school year 1997-1998.

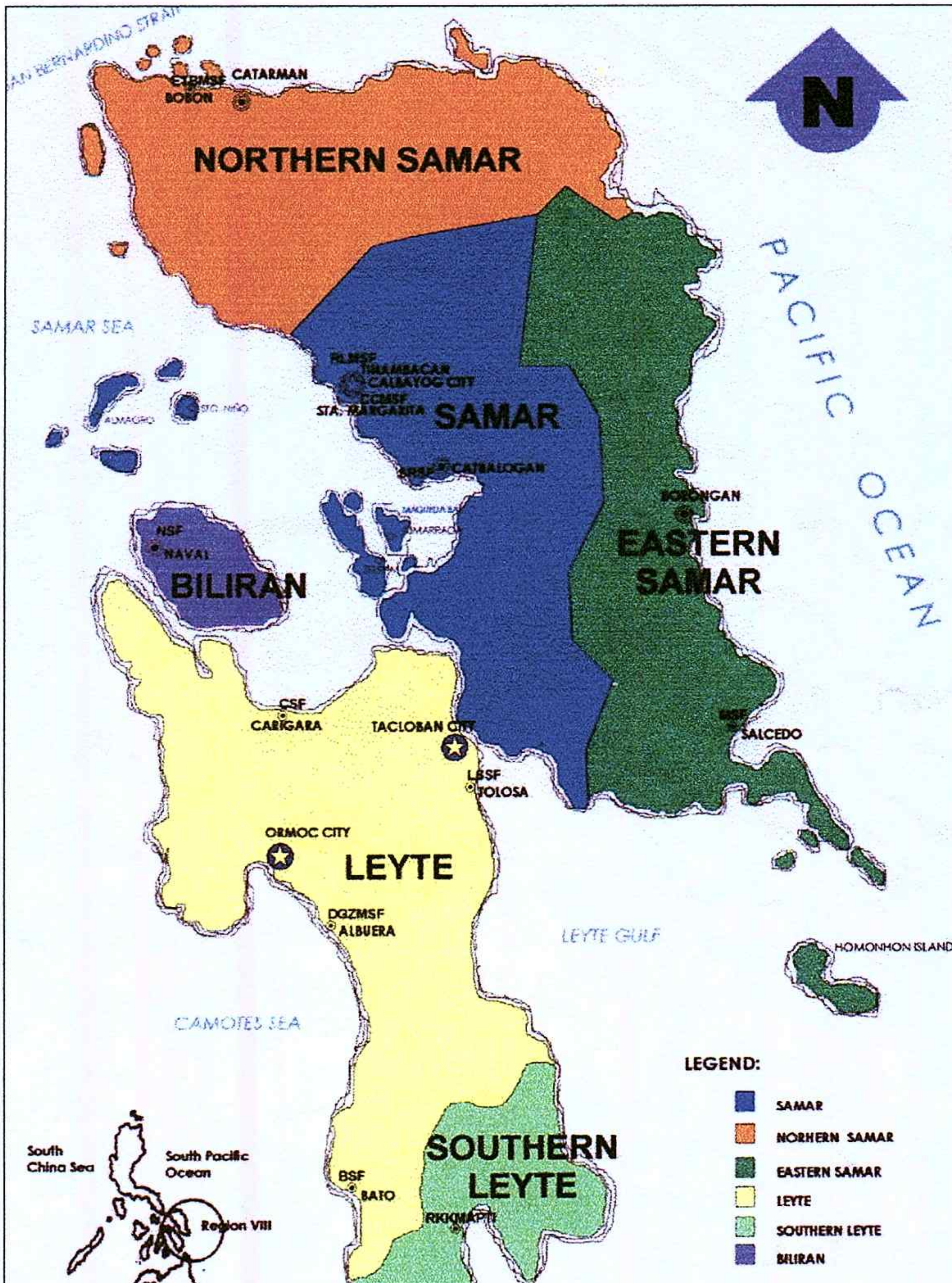
The study is focused on the investigation of the training skills in subject areas in fisheries and marine science courses on curricular programs for the development of a relevant tertiary fishery education in Eastern Visayas.

Listed below are the names and addresses of the ten (10) fishery institutions in the Eastern Visayas region:

1. Samar Regional School of Fisheries - Catbalogan, Samar

2. Clarencio Calagos Memorial School of Fisheries - Sta. Margarita

3. Rafael Lentejas Memorial School of Fisheries - Tinambacan, Calbayog City



CATARMAN
NORTHERN SAMAR
PACIFIC OCEAN
SAMAR SEA
CALBAYOG CITY
STA. MARGARITA
SAMAR
CATBALOGAN
BORONGAN
EASTERN SAMAR
NSF
NAVAL
BILIRAN
CSF
CARIGARA
TACLOBAN CITY
SALCEDO
LSSF
TOLOSA
ORMOC CITY
LEYTE
DGZMSF
ALBUERA
LEYTE GULF
HOMONHON ISLAND
CAMOTES SEA
LEGEND:
SAMAR
NORHERN SAMAR
EASTERN SAMAR
LEYTE
SOUTHERN LEYTE
BILIRAN
South China Sea
South Pacific Ocean
Region VIII
SOUTHERN LEYTE
BSF
BATO
MAASIN
Moro Gulf
MAP OF THE PHILIPPINES
SURIGAO STRAIT

4. Eladio T. Balite Memorial School of Fisheries - Bobon, Northern Samar

5. Matarinao School of Fisheries - Matarino, Eastern Samar

6. Naval School of Fisheries - Naval, Biliran

7. Leyte State School of Fisheries - Toloza, Leyte
8. Carigara School of Fisheries - Carigara, Leyte

9. Dr. Geronimo Zaldivar Memorial School of Fisheries - Albeura, Leyte

10. Bato School of Fisheries - Bato, Leyte

Definition of Terms

For purposes of clarity and common reference of the words used in this study, the following terms are hereby defined.

Course. This means the organized subject matter in which instruction is conducted within a given period of time for which credit is given.

Curriculum. This means the entire body of course offered in school's curricular programs.

Curricular program. This refers to the total program effort of the school to produce desired outcomes in school and out-of-school situations.

Curriculum planning. It is the process whereby these arrangements of curriculum plans or learning opportunities are created.

Curriculum plan. It is the advance arrangement of learning opportunities for a particular population of learners.

Curriculum development. It is the process of selecting, organizing, executing and evaluating learning experiences on the basis of needs, abilities and interest of learners and the nature of the society.

Curriculum improvement. It is a decision-making requiring values according to which judgment are made.

Extension. This refers to the outreach or community services undertaken by the institution.

Estuary/Estuaries. This refers to bodies of coastal water which have free connection with the area, like the mouth of the rivers, and coastal bays that serve as nursery grounds of juvenile fishes.

Fish. This means all fishes and other aquatic animals such as crustaceans and mollusks.

Fishery. Refers to the business of catching, taking handling, marketing, and preserving fish and other fishery products, the fishing grounds and the right to fish or take such products there from.

Fishery products. This means all other products of aquatic living resources in any form.

Fishing communities. They are villages along the coastline of the municipalities in which the people depend on fishing as the source of income.

Fishery Education. It is the processes of educating by formal schooling or training in fishery institutions.

Fishery Science. It is the scientific knowledge of the biologic, the state of fisheries, and the effects of exploitations of fishery resources.

Higher education. This refers to the education beyond the secondary level and requiring a secondary school certificate for entrance.

Instruction. This refers to the method of teaching and activities in the classroom.

Industrial activity. It is an employment needing specific skills in the service or production industry or in business occupation.

Marine Science. It is the scientific investigation of the environment as its biological, physical, chemical boundaries with the atmosphere.

Marine Resources. It is the marine ecosystem community which is totally protected from extractive activities of human kind, although some non-executive activities may be allowed.

Priority. It is a system of assessing needs from a set of alternatives.

Production. This refers to the process of producing goods.

Quality products. It is the outcome or graduates that have undergone the process through education and training in accordance with the standard of the curricular program.

Resource-Based Curriculum. It is a curriculum in which the center of learning is on the development of resources in land and water for human sustainable life.

Tertiary Education. It is an education, beyond the secondary level in universities, and offers technical training.

Training. This refers to the activities required in undergoing a course of instruction or direction.

Chapter 2

REVIEW OF RELATED LITERATURE AND STUDIES

Scientific procedures have become a part of an educator's tools in research for educational practices of finding solution to the problems of relevant curricular program. There are varied literatures and studies which are significant to the study undertaken and have bearing on the problems under consideration in order to give more meaning.

The most relevant of these are reviewed in this chapter to provide authenticity to the study.

Related Literature

The Philippines is rich in mineral, water and land resources. Its land resources include fishpond, swamps, and marshes. Water resources are abundant. There are seven major river basin and six major and 53 minor lakes covering an area of around 200,000 hectares. Mineral resources of the country are classified into metallic and no-metallics. The non-metallic included limestone, charcoal, clay, feldspars, etc. The mining industry has concentrated on gold, copper and iron (DAP Task Force on

Human Settlements, 1976:12). Agriculture and fishery, and forest products contribute the most to the Philippines net domestic product, followed by the industries, commerce and trade, and manufacturing. In 1978, 52.2 percent of the total work force of 16,668 was in agriculture and related sectors. 10.4 percent was in commerce, 11.15 in manufacturing, 0.4 percent in quarrying and mining, 25.1 percent in service industries, and the remaining percent in activities not adequately defined (NEDA, 1984:1458).

Fish is considered as one of the main sources of protein in the Philippines and there are more than two thousand species of fish inhabiting the coastal and offshore area of the marine environment. Shellfishes, sea urchins, sea cucumbers, and jellyfish are marine sources of food aside from having economic importance and export potential to the world markets. Many of the species like tuna, squids, and shrimps find their way to foreign markets in other countries and therefore contribute to the foreign exchange earnings of the Philippine economy.

To help in economy and social well-being of the country as a whole, the government has undertaken appropriate steps to hasten and promote the integrated development of the industry and to maintain the fishery resource through conservation and proper utilization of marine products. Gonzales' report in 1980 on Philippine Fisheries Progress Report (1981:3-11) states under the following topics or subjects.

Philippine Fishery Resources. The marine resources cover an area of 1,666,300 square kilometers. However, fishing industry is confined to coastal waters which account for 265,970 square kilometers are traditional fishing grounds. The inland resources consist of 562,000 hectares which include fresh and brackish water swamp lands and fishponds, and other inland resources such as lakes, rivers, reservoirs, and canals readily available for rich harvest or culture purposes. The river area of 31,000 hectares, reservoirs of 31,000 hectares and other water areas waiting further development into fishponds.

External Trade in Fisheries.. The fisheries industry directly and indirectly employs a big number of Filipinos, including those engaged in fish marketing, processing, net making, boat building, and other ancillary industries supporting trade. Foreign trade figures for 1980 indicate diminishing and increasing thrust towards boasting our economy. In terms of quantity of fish traded, we imported only 53,402 metric tons of fishery products valued at

274.08 million pesos and exported 76,179 metric tons of fishery products valued at 274.08 million pesos and exported 76,179 metric tons of fishery products valued at 939.3 million pesos.

Development Strategy. Various government plans/ programs for development of fishery industry have been operationalized such as: a) The Integrated Fishery Development Plan. It is designed to fill the recurring need for research, planning, and implementation efforts of various organizations engaged in fisheries development. b) The expanded Fish Production Program. This program identifies objectives, strategies, production targets, both private and public: funding requirements for better development of the fisheries industry.

Problems of the Industry. The following are the problems that beset industry: (1) additional research information on the resources potential of the country; (2) need for more fish marketing facilities such as terminal flash markets in various fish landing centers; (3) additional manpower needed to handle the various expansion aspects of the fisheries industry; (4) indiscriminate illegal fishing and continuous rampant pollution of rivers and bays; (5) increasing cost of fisheries inputs affect all sectors of the fisheries industry. Furthermore Gonzalez (1981 : 12), states in his report that in order to alleviate the status of the industry, the following are being undertaken by the government through the Ministry of Natural Resources and its agencies (MNR now Department of Environment and Natural Resources), also in coordination with another ministries (now departments): (1) the conduct of nationwide inventory of fishery units covering the three sectors of fisheries; (2) establishment of fishery infrastructure, ie., ice plants, cold storage, fish ports in strategic fishing areas; (3) establishment of training center in all regions to expand training of manpower for the industry; (4) promulgation and enforcement of fishery rules and regulations to ensure the wise utilization and conservation of fish and fishery resources; and (5) representation with the financing institutions for more credit to fishermen and relaxation of credit requirements to ease out difficulties in obtaining loans to accelerate fishery development.

Fish production has grown considerably since the seventies. From 1990 to 1992, quantity of fish posted in average annual growth of 4.82 percent and 19,32 percent in terms of value. Total fish production in 1992 reach 2.60

million metric tons valued at 65.44 million, posting an increase of 1.01 percent in quantity and 8.26 percent in value over the 1991 production. The country has three major sources of fish production, namely; commercial fisheries, aquaculture, and municipal sustenance fishing which are further subdivided into marine and inland. Municipal fisheries accounted for the biggest fish output in 1992 (41.50 percent), followed by commercial fisheries (30.65 percent) and the rest from aquaculture (28.05 percent). The Philippine coral reef area which is estimated at 27,000 square kilometers is the source of about 15 percent of the total finfish production of the country as reflected in the 1994 Yearbook of the Philippines National Statistics Office (1994:356). Course enrichment and development in curriculum planning must give also emphasis on the protection and sustainable use of our living marine resources. As empathetically elaborated by Soriano, Claudio, and Fansler (1995:131-132) that the sustainable use and conservation of marine living resources is of social, economic and nutritional importance as they can make significant contribution to national food security. As the world's population will increase to some 6.5 billion by the year 2000, it is necessary to maximize food production from all sources, especially in the light of existing pressure on agricultural land resources. On the Global Partnership for Environment and Development: A Guide to Agenda 21, the worlds marine environment is rich in life. Approximately 20,000 species of living resources both fresh and saltwater, have been identified and many more are to be discovered (UN 1992). About 9,000 of those identified species are harvested by human beings. Only 22 of those species, however, support significant fisheries. Some 80 to 90 million tons of fish and shellfishes are harvested from marine fisheries every year, with 95% of this catch taken from waters under national jurisdiction. The harvest from fisheries on the high seas accounts for 5% of the world's total catch (Agenda 21: 1992). About 5 Million metric tons are harvested from marine culture. The figure is expected to double by the year 2000. Artisanal fisheries on the other hand, generated 24 million metric tons annually, aside from contributing to fisheries employment (UN 1992).

Living marine resources does not only meet human nutritional needs. Through fisheries employment, they also serve as social and economic ends, particularly for countries which rely heavily on the harvest and processing of such resources, in the Philippines for instance, fisheries contributed P 46.59 billion pesos to the country's Gross National Product. Fisheries also employ a million fishermen and fish farmers, aside from providing indirect employment to those involved in the processing, marketing and distribution of marine harvests (DENR 1990). Considering the importance of fisheries to many economies, the depletion of living marine resources can mean the loss of jobs, the destruction of communities, and an end to a way of life (NRTEE 1991).

The Philippines is an archipelago surrounded by the China Sea to the West and North, the Pacific Ocean to the East and the Celebes Sea to the South. To the North are the Republic of Taiwan and China; to the Northeast is Japan and the Southwest are the other Southeast Asian nations, e.g., Thailand, Brunei, South Vietnam, Malaysia, Singapore and Indonesia. The archipelago consist of 7,100 islands extending north and south over 1,000 miles and approximately 660 miles east and west. Only 45 islands have area of 100 square kilometers or more each; these islands constitute about 98 percent of the total land area which is 115,600 sq. miles or 299,404 sq. kilometers. The three biggest islands are Luzon with the total area of

104,688 sq. km. followed by Mindanao 94,630 sq. km. and the Visayan islands 52,801 sq. km. (Cortez, 1987:12). Within the Philippine Islands are rivers and reservoirs, lakes, swamps and marshes which are the very important sources for inland fisheries or aquaculture projects.

Estuaries are nursery grounds of juvenile young fishes, the coastal waters within the limit of continental shelf of the marine environment where most of the marine flora and fauna are abundant to include coves, channels, bays, and the 200 meters deep seas are readily accessible for educational, scientific, economic, technological, business and industry, and many aspects of socio-economic development of the community. Extending from these coastal waters are the Gulfs and Deep Seas within the Philippine Territorial boundary of the 200 limit Exclusive Economic Zone where tuna and other marine resources are exploited.

The Philippine Archipelago with an irregular coastline that stretches for 17,640 kilometers, twice as long as that of United States, is so rich in fishery and marine resources that can be tapped for curricular program development. Though the Philippines is considered rich in natural resources, these resources will be limited in the future due to the population growth that will continue to create pressure on the country's resources and on the people's capacity to produce more. Cortes (1987:96) expressed her ideas that certainly, these conditions and the forces that sustain them have to be changed in order to improve the future of the Filipino people. The desired changes are clearly stated in the country's national development plans. 1983-1987 which are: 1) sustainable economic growth, 2) equitable distribution of the fruits of development, and 3) total human development. The concept of "total development" is anchored on the view that human development is an end in itself as well as the means toward economic programs.

Harbison and Myers as cited by Cortes (1987:52) in their study of 75 nations led them to conclude that educational development and economic development are positively correlated. On this basis, the underscored the importance for education in relation to national development in these words:

> Not capital, nor income, nor material resources constitute the ultimate basis for the wealth of nations. Capital and natural resources are passive factors of production: human beings are the active agents, who accumulate capital, exploit natural resources, build social, economic and political organization and carry forward national development. Clearly, a country which is unable to develop the skills and knowledge of

> its people and to utilize them effectively will be unable to develop anything else.

The heart of education is the curricular programs of an educational institution that carries forward the human and economic development of the nation. A country that utilizes the natural resources-based curricular program offer courses that contributes to the socio-economic development of the community. Natural environment education on the conservation and protection of fishery and marine resources, and other material resources must start from the primary to the tertiary educational ladder to instill in the mind of the individual the very vital importance of such resources in the development of one's life. These are resources that are passive which are imperative to curriculum development. Resource-based curricular programs offer many aspects of studies that can give educational, scientific and technological knowledge and skills necessary in industry and economic activities of the people in the community.

Development Education was primarily conceived by the social economist as a solution to lessen the poverty of the people in the community. It strives to offer equality of educational opportunities as well as social mobility which therefore the improvement of the standards of living of the people in the community, that is, the standards of living befitting a dignified human existence and enriches community constituents.

In development education, schools are dependent socially and economically on other community constituents like the government industry partners, business leaders and donors, civic organizations and parents. As in other development educational projects a common goal of improving the life of people in a specific locale is the starting point.

Education is a form of human and versatile capital. According to Cortes (1987:2-3) that functionalists and conflict theories offer two contrasting views on the relationships between education and national development. The functionalists argue that schools or formal education should provide the mechanism and the socialization process for role differentiation and social integration. Since social change and development generate new and norms, schools must assure that dysfunction knowledge, attitudes and skills are replaced by newer and functional ones. Many of the romantic and idealistic claims on what schools do for the individual and society arise from the functionalists view. Among these claims are: (1) Schooling is the great leveler or the great social and economic equalizer; (2) Schooling is the key to economic and social opportunities; (3) Schooling increase labor productivity by developing in the individual the requisite knowledge, attitudes and skills for social and economic roles; (4) Schooling makes people more enlightened and tolerant of cultural and racial differences and; (5) Schooling is humanizing. As cited by Cortes (1987:20-3), according to Collins (in Karabel and Kasley, 1977:199) are derived the basic propositions from the notion that education is process of human capital formation and therefore, a factor in economic growth and productivity with functionalism are: (1) the skill requirement of jobs in industrial societies constantly increase because of technological change; (2) formal education provides the training, either in specific skills or general capacities, necessary for more highly skilled jobs; and (3) therefore, educational requirements for employment constantly rise, and increasingly larger proportions of the population are required to spend longer periods in schools.

To improve the quality of lives in the community through development education remains to be an attractive challenge. The globalization challenge is a vital task and a vast undertaking and from our view points, we encounter difficult obstacles to hurdle but these should not daunt us. Development education is the master key to the future. It is a challenge to employ all the suitable aids which are within our capacity to enlighten the community. Guiang (1994:2) in her annual report 1993 of the Bureau of Technical and Vocational Education states that: "II. Challenges and Opportunities. As envisioned by the economic managers of our country in the year 2000, Filipinos will expect a more politically, economically and socially stable Philippines. It is also expected that by the time poverty would have been minimized and a per capita income raised to a desirable level with a sustainable economic growth of six to eight percent annually. The Philippines' vision of quality work force would be highly productive, flexible to changing labor market opportunities and adaptive to new and emerging technologies. The Medium-Term Philippine Development Plan (MPDP) for 1993-1998 emphasized that throughout the six year period, the industrial sectors share in the employment will increase from 16% in 1993 to 19% in 1998 with the manufacturing sub-sector having a decreasing share of 46% in 1993 to 39% in 1998. The service sector will remain the second largest employer of the economic sector. Unemployment rate will be down by 6.35% in 1998 from 9.00% as of 1993. The economic restructuring thrust of the government is expected to hasten the growth of employment in various industries. Some 1.7 million skilled production technicians will be produced by the combined output of the formal and non-formal education and training programs. Development education and training cannot just be dependent upon the restructuring thrust of the government on economic but have developed its own progressive programs and projects that is sustainable and community-oriented projects to help improve the quality of life of the people in the community.

According to Samonte as quoted by Aquino (1986:72), to be relevant and effective, innovations must be guided by a theory of education and related to an over-all strategy of educational development that take into account the socio-economic realities of a developing country (such as the Philippines) as well as our values and aspirations as a people. Curriculum development must embrace our surroundings, the things and material resources in the environment that give and contribute to the total effort of the school's curricular programs to produce individual that socially effective in the utilization of the economic resources for the benefit of mankind to develop at his own pace in life.

Education is the greatest resource and the most vital of all resources as profounded by Schumacher (1973:79). Education is vitally linked to human growth as he learns the experiences in the school and out-of-school environment. As E.F, Schumacher wrote in his book Small is Beautiful, "the task of education would be first and foremost, the transmission of ideas of values, of what to do with our lives. The modern way of life becoming ever more complex: This means that everybody must become more highly educated." Any curricular program offered by the school, its relevance to the socio economic conditions of the rural community must be coupled with school capabilities to provide the needed manpower development of the industry and its economic resources development.

As T.Q. Andres wrote in his book Curriculum Development in the Philippine setting (1989-85) that:

1. Curriculum developers must have in mind that the problems of society are the problems of education. Education cannot be divorced from the economic, political and social realities of a country. Any society in order to progress economically must progress educationally.

2. Education must enrich society, improve the living conditions of its people, and make possible its optimum development. Herein lies

the importance of the orientation, organization, enrichment, adaptation and development of the local curriculum.

3. The curricular offerings must be made relevant to the economic demands of society if we are to achieve the goal of producing people who are to provide direction and guidance in the operation of commerce and industry. Technical skills, researchers for the discovery of new products, constant improvement of technological procedures and needed managerial pool must be taken into consideration by curriculum developers in the Philippines.

To plan the curriculum development with program development will lead to environmental progress of what is to be conserved by the individual. The role of science in curriculum plays a vital pivoting point to scan its environment on economic resources development that must be given more concern. It is quite evidence that curriculum development in science should be continuous. Conner and Elena (1967:266) explained that, with science and its applications advancing at such a rapid rate with curriculum investigations and projects yielding new evidences regarding both content and organization of science courses, it becomes imperative that these be considered a curriculum revision. As this is the case education must therefore be science oriented. Emphasis on science education can bring new discoveries which move on to the innovations of process and technology that bring forward to creation of operative and manipulative mechanism for the utilization of the people in the pursuit of economic activity. This can only be realized in proper education, in school with curricular programs offering more of science courses leading to economic resources development coupled with science oriented professional educators. Oliver (1971:61) once said:

> As education has become more and more a "science" and the demands upon the school have become increasingly complex, the public has tended to leave school matters in the hands of the professional educators.

The study of environment is important. When the relation between the environment and the individual is fully understood, the inculcation of education for living can be achieved. It is the relationship that we fully have to make our environment sustain economic activities for living. This means that school curricular programs must offer experiences in life activities. School curriculum change, Skeel and Hagen asked this question, "how do we develop a school curriculum that is relevant for the times in which we live?" There must be a relevant program, a school relevant curricular programs that make a difference in the lives of the students, not only as they become adult members of the society but more important, on an immediate basis in and out of the classroom.

As viewed by Wolotkiewcz (1980:219) that curriculum should be viewed as the total range of influence upon the students from the academic to incidental, informal contacts with faculty. Cumbersome governance mechanism can be a major deterrent to curriculum improvement. The organization must provide an exciting and vital environment with a mechanism for responding quickly when the needs arises to reorganize program and structure.

Corson (1975:8) emphasizes that higher education can be acquired through scholarly processes of inquiry, that knowledge, once acquired can be expanded as it is organized and evolves as it is transmitted, and that knowledge acquired and transmitted attracts users and usage and thus benefits the society. The new educational orientation must therefore be aimed at elevating the common man. The new curriculum must geared towards the needs and conditions of living in the rural areas. Tupaz and Bernardino (1955:229) reflected this by saying that:

> The local school people must be given not only latitude but also encouragement in developing school programs and curricula that are adapted to local conditions, and which will make the fullest use of community resources.

By this saying we must share what we know and help those who need it most. This must be our concern as empathetically elaborated by E.F. Schumacher in his book Small is Beautiful that, "It is therefore important that everybody should produce something than that a few people should each produce a great deal, and this remains true even if in some exceptional cases that total output under the former arrangement should be smaller than it would be under the latter arrangement. It will not remain smaller, because this is dynamic situation capable of generating growth.

No education is ever complete without training. The school total effort curricular programs with specified course or subject need to be mastered with the right and proper skills, and to change the performance of doing the jobs. Ellis, Cogan, and Howay (1981:344) in their book on foundations of education writes that, "Content represents the matter, skills represent the crucial processes which learners must master in order to function and learn on their own. And values represent the attitude and feelings which we model and teach to the students.

Conner and Ellena (1967:250) wrote in their book on curriculum handbook that, "Vocational education represents an opportunity to attain through the orderly acquisition of marketable skills, knowledge, and attitudes. It is regarded as a means of acquiring broad training rather than a narrow set of skills to be used only by a single employer. Through vocational education, men and women can gain not only entry job skills but as a basis for growth in skills and knowledge which should give some assurance of lifetime employment. A vocational education program cannot and should not assume responsibility for the failure of schools to meet the needs of all students. Indeed, like other education, can be meaningful to the student only if there is motivation to learn and if the abilities, aspirations, and employment opportunities."

Education is the process, training is the procedure, and skills is the products. It is therefore the purpose of curriculum to have a point of focus of direction, for the students to prepare for a destination of self-employment or employment in various industries where their specific individual skills are appropriate. This could be attained through common training interest for the students in which the course of study must be based on common characteristics, needs, and the resources of community.

According to the Center for Development Management and Productivity and the Franco Institute, (1991: 183-184) that the four hierarchy of learning activities in training are: 1) LARK (Learn and Repeat Knowledge). This is the first step in learning-simply memorizing what symbols/or concepts mean. LARK activities are usually simple: class lectures, individual study sessions, demonstrations, or discussions initiated by the instructor; 2) SOAR (Search Out and Relate Information). It means the activity requires some level of knowledge about a concept before you can apply this knowledge to a problem. SOAR requires synthesis or bringing together of knowledge to answer a problem, often in a knowledge stimulated training season. SOAR activities can stimulated in a role play where the skills are practiced, in a case studies where independent research and tentative solutions are developed, and in demonstrations; 3) LIFE (Learning in Field Experience). The activities relate information and skills to on-the-job situation. It requires utilizations of what has been learned in real world situations. It means a test of the learners' ability by applying what is known to a problem is the job back home or the anticipated work environment. LIFE activities may call for creativity and development of new skills; 4)

DIADIA (Do It and Do It Again). Action and implementation lead to the best learning and relearning.

Training is the applications of principles taken from education and development and it is appropriate according to action and concept of Franco (1991:5) when: (1) there is a need for specific skill that does not exist in the present labor or work force; (2) there is a need for a specific skill not available in sufficient numbers in the present; (3) there is a need for specific standard of skill performance, but workers are not performing to that standard; (4) there is a change in the technology obsolete; and (5) economic conditions prevent sizable parts of a population from supporting themselves, such a serious problem in the agriculture, industry or the service sectors.

In order that fishery schools or institutions will realize the objectives of fishery educational program in the country, that of providing vocational and occupational competence of the students and the youth who are preparing themselves for work in fishing communities, industry or in any economic activities, training and preparation in any branch of fisheries must be adequate enough to support its operation.

By virtue of Executive Order No. 240 "Creating Fisheries and Aquatic Resources Management Councils (FARMCs) in Barangays, Cities and Municipalities, Their Composition and Functions," could help control in the exploitation and wise utilization and conservation of the fishery and marine resources. The principle in fisheries management is to protect the livelihood of the fisherfolks. In 1994, a social dislocation occurred in Canada following the collapse of the cod fishery industry which threw out of work thousands of fishermen. We should take care of our open access and avoid a similar occurrence in our community by taking positive approaches and steps to safeguard our fishery resources.

Based from research findings in central Philippines and those of other workers, the function of marine reserves include the following (Alcala in SYMBIOSIS. 1995:8-9): 1) a reserve allows the environment to recover sustainability from the previous damaged condition within a few to several years provided damaged interference. This means that if the reserve is a coral reef, the extent of the live coral cover is increased, making it a more favorable and attractive habitat for fish, mollusks and other marine organisms; 2) a reserve makes it possible for coral reef fish to exist in large numbers and in greater variety after a varying period of few to several years of protective management depending on the species; 3) a reserve allows fishermen to catch more fish in the adjacent non-reserve. Apparently, fish in the reserve move out to the non-reserve where they are caught by fishermen; 4) a reserve allows fish to grow to larger sizes which produce more eggs and larvae than smaller sized ones. These eggs and larvae which are pelagic are carried by ocean currents to areas several kilometers away.

According to Alcala (In SYMBIOSIS, 1995: 9-10) that there is the needs for networks of marine reserves to prevent fishery collapse. A marine reserve acts both as source of fish eggs and larvae for export to other areas and as recipient of larvae from up current sources. The recruits in this process metamorphose after a few several weeks of pelagic life into juveniles and later to adults which later contribute to the harvestable fish and spawning stock in the recipient reserve and adjacent areas.

To illustrate according to Alcala, the Tubbataha Reef National Marine Park and Reserve in the middle of Sulu Sea serves as source of fishery and marine propagules for southern and eastern Palawan, about 150 kilometers away, if the prevailing ocean currents move in the westward and southwest ward direction. Similarly, the Tubbataha reefs would receive fishery and marine propagules from up current source areas in Mindanao and Visayas.

Of all the coastal marine resources, the coral reefs is the most productive and supports marine living resources and from this point-on other fishery resources continue to build a community of organism which contribute to sustainable resources for a marine-based curricular program industry and the community.

The quality and relevance of curricular programs are indeed very vital aspect which to the large extent depend on the relevance of the subjects component of the course in education and training. Education is not complete without training and such training skills must be relevant and beneficial to the students and to the community. Curriculum is the whole life and program of the school hence the need for continuous development for class activities for education and training.

There are some characteristics that curriculum planners must possess and these are open-mindedness, conduct of research and use it as basis in curriculum making, and forward working characteristics. Curriculum development must be given high priority in the planning and implementing school program in fisheries and marine sciences and technology education, especially that the country is aspiring to become newly industrialized country by the year 2000.

According to Winston Churchill: "We shape our buildings and afterwards our buildings shape us." In these words of Churchill, if the word building is substituted with the word curriculum then the phrase would be "We shape our curriculum and afterwards our curriculum shapes us." A good curriculum must utilize the most effective learning experience and resources available at the time they are relevant and helpful. What is more in demand is for more rigorous and more scientifically oriented curriculums. Eleavazo (1979) pointed out:

> The need to modify the substance and direction of the curricula at the various level of such curricula are to become the means for infusing into the development of the new Filipino a combination of knowledge, skills, and attitude that will make him a productive, constructive, and dynamic member of his community and of the society at large.

Forecasting environmental problems that will significantly affect the capacity of our fishery and marine resources to produce the volume and type of food needed by the growing population in the next millennium is a difficult task. There is the need for education and training in fishery and marine sciences for a projected development and foreseeable skills needed for wise utilization and conservation, and also for marine-based industries. If a useful drugs from the sea turns up, researchers could quickly face a problem, that is demand may outstrip supply. Researchers try to prevent that by developing techniques for farming marine organisms. Let us not wait for this to occur, the condition and situation of the present socio-economic and industry must be a step ahead towards this point of development and therefore relevant education and training must be carried over and over to sustain the communities livelihood activities.

In the annual report 1995 foreword of the Secretary - General Dorangsowasdi that the Southeast Asian Fisheries Development Center (SEAFDEC) was established in 1968 as an intergovernmental organization with the mandate to promote the various field of fisheries development in the region. From its inauguration to the present time the activities of the center have encompassed all aspects of fisheries, especially marine capture fisheries, post-harvest technology, aquaculture and resources development and management. During the past few years, and particularly in

1995, SEAFDEC has broadened and strengthened its sphere of action by promoting collaboration among members and non member countries including other international organizations with a neutral interest in fisheries development. Research and training programs have been expenses and extended to cover all aspects of fisheries science and target groups.

Related Studies

Fishery and marine resources are vulnerable to human activities both in legal and illegal ways of livelihood of the people. There is a need to protect and conserve these open access fishery and marine resources; and this problem can only be rationalized in the educative process of the individual through curricular programs. The study of Oliva (1987) that in the conclusion of the study that affects the use of people as productive resources and the provision of necessary skills needed in the region's economy to enable people in the region to engage in productive activities and with the ultimate aim of uplifting the quality of life of the people. Part of his recommendations that appropriate technologies needed in Eastern Visayas and the use of local resources, both human and otherwise, must continuously be explored.

What we really need is to have the wise utilization of these resources so that economic activities can be pursued to develop the socio-economic development of the community. In the study of Marco (1993) on the assessment of Maqueda Bay area development program recommended that there is much need in equipping our project beneficiaries with the skills and competencies to mobilize their limited resources to their advantage. There is much more room for people to undergo trainings, those that are appropriate to their needs and aspirations, so that the transfer of technology can indeed push them to sustained and eventually bring them to self-reliance. She further recommends that massive appropriate technology transfer trainings must be undertaken to the resource mobilization competencies of the people in the area.

The recommendation stated in Marco's study on Maqueda Bay development program can only be achieved through both formal and informal education. In trilogy functions of tertiary education carried out by the tertiary fishery institutions which are instruction and training, extension and production, and research and development can address such massive technology transfer training. Development brings livelihood and peace, and there can be no progress without development. Babalcon (1992:128-129) recommended that (1) Trade-technical schools should maximize the use of resources available in the locality for effective technical-vocational education; (2) New industries with feasible business potential must be generated for productive commercial/industry activities; and (3) That development plan model should be piloted in one of the areas in each of the province of Samar.

Efficiency is generally taken as the proportion of achieved results to the resources used to achieve them. In this study, it is related to the relevance of the curricular offerings to the felt needs of the fisheries industry. Bardelas (1988) in his study that some of the courses offered by the different vocational-technical schools were not relevant as they do not meet the needs and demand of industrial establishment. The study of Cabanganan (1982) reveals that there is a need for a close cooperation with industry and the community to ensure up-to-date courses and curricular offerings. To make vocational-technical education relevant, Quitalig (1991) made the following recommendations: (1) by gearing it to the needs of the industry; (2) give incentives to the enrollees of the most in demand but less enrolled courses; (3) there must be a periodic inventory of occupational sills needed in the industry to establish congruency; and (4) conduct a study on the relevance of vocational-technical education courses to job experience in the island of Samar for a proposed model.

Abdurahman (1990:31) in his study states that the general objectives of fishery technician program are in line with occupational or industrial pursuit, socio-economic development and gainful employment. It is also geared towards utilization, exploitation, and conservation of the nation's fishery resources. A curricular program must provide sufficient coverage of the fundamentals in science and mathematics, as well as practical laboratory work techniques and operation so that students can readily prepare themselves to assume specific responsibilities in a variety of fishery jobs, and such programs should be reinforced or supplemented by basic knowledge in communication, community life, social psychology, and economics.

In development education there should be a program that can stimulate and enhance community development, and therefore a school must undertake a program in production and extension services, research and development, curriculum and development, faculty and institutional development, and linkages. It is in these area of educational programs that development education can be realized.

The study of Abawag (1990) on the employment status of technical-vocational graduates, concluded that the employment of said graduates of the eight techno-vocational schools in Samar from 1982 to 1987 was not associated with socio-economic status of the province. The reason was attributed to the fact that only few were employed in Samar at the time of the study. The greatest number of graduates have gone to other places to look for better employment opportunities that offer higher wages. Obsequio (1987) in his study recommended that there should be streamlining of the school's objectives to consider manpower goals and that updating of trade curriculum and improvement of facilities and instruction should be implemented and guided by the different manpower functions.

The findings of Suyom's (1984) study on higher education and manpower development in Region VIII are: (1) Generally, the college graduates in Region 8 who were able to find employment considered their college training adequate to some extent for meeting the needs of their jobs; and (2) on adequacy of college training, the following variations among the different groups of employment graduates surfaced: (a) More trade technical and agricultural employed graduates than graduates of academic colleges found their college training very adequate in terms of job requirements, (b) More of the graduates of private institutions when compared to those from government institutions rated job preparations provided in college.

Educational program must not only prepare the graduates for employment but also for entry into self-employment or entrepreneurship. Any curricular program offered by higher institution, its relevance to the socio-economic conditions of the region must be coupled with institutional capabilities to provide the manpower development of the industry, business and commerce. The institutional capabilities include leadership, competent personnel and staff, instructional and training facilities, extension and production, and research and development. On the other hand students who are to be admitted into the program must possess a deep concern and interest, and right attitude toward fisheries and marine-based industry for the progressive and sustainable development of fishery and marine resources to support the educational programs in higher education.

Relationship with the Present Study

The study of Cabanganan reflected the problems on vocational-technical education which focus on the in-plant training program. Such a program will harness and develop the vast natural resources of the provinces. In his study includes the three sectors of vocational schools in the region.

The study of Oliva (1987) in his conclusion that manpower development embraces a wide latitude of activities that affects the use of people as a productive resource and the provision of necessary skills needed by the region's economy to enable the people in the region to engage in productive activities, and with ultimate aim of uplifting the quality of life of the people. Part of his recommendations has includes the use of local resources, both human and otherwise, must continuously be explored.

In the conclusion of Bardelas (1988) in his study on curricular offering in trade technical schools that some of the courses offered by the different vocational-technical schools are not relevant as they do not meet the needs and demand of industrial establishments. The respondents in his study suggested to increase the number of hours in school to adequately train and prepare graduates.

Part of the recommendations of Quitalig (1991) in his study on the proposed model for the relevantizing technical-vocational curriculum that: make the technical-vocational education relevant by gearing it to the needs of the industry; courses that are not existing must offered to meet the demand of time; and conduct a study on the relevance of vocational-technical courses to job experiences in the island of Samar.

Similarly in the study of Babalcon (1992) on development plan for a model in traded technical school recommended that: trade-technical schools should maximize the use of resources available in the locality for effective technical-vocational instruction; the inclusion of trade technical-vocational courses not offered in the curricular programs of trade-technical schools but perceived relevant by the respondents need preferential attention to satisfy industry demand; and of course priorities and strategies in improve trade-technical schools in the island of Samar should be subjected to continuous research to determine future trends and projections.

In the findings of the study of Abawag (1990) that the greatest number of graduates have gone to other places to look for better employment opportunities that offer higher wages and that Obsequio (1987) in his study recommended that there should be streamlining of the school's objectives to consider manpower goals and that of updating of trade curriculum and improvement of facilities.

Suyom (1984) study on higher education revealed that more trade, technical and agricultural employed graduates than graduates of academic colleges found their college training very adequate in terms of job requirements.

The revelation of the studies herein reviewed is within the ambit and bearing of embracing the present study on the relevancy of fishery education. Its relationship is viewed from its problems of the study to be conducted specifically on the training skills, and relevant courses offerings. They only differ with the present study in the sense that their focus was more on trade courses and trade curriculum program, while the present study focuses on fishery and marine sciences curricular programs.

Eastern Visayas is surrounded by four prominent and well known seas and gulf: Leyte Gulf on the Southeastern part of Leyte; Samar Sea on the Western part of Samar; Philippine Sea on Eastern Samar Island; and Visayas Sea between the Northwestern side of Leyte and Northern part of Cebu. The coastal areas are rich in fishery and marine living resources that can be harnessed and tapped for educational, economic, scientific and technological purposes which the researcher attempt to be fit into its role in the community development education.

The three main islands comprising Region VIII represents the community group of respondents to identify, recommend, prioritize curricular programs, and assess the relevancy of training skills in the different subject areas of the identified courses in fishery and marine sciences. The study leads to the development of relevant fisheries and marine sciences courses that tertiary fishery institutions can offer in the pursuit of developing and improving the community in the context of rapid changes in world economy and to spare effort in integrating science and technology in the learning process of our students.

Chapter 3

METHODOLOGY

This chapter provides an overview of how the study was undertaken, the research design, the methods and procedures pf the research, the instrumentation used in gathering data, sampling procedure, and statistical treatment of data.

Research Design

The study employed the normative-descriptive design using questionnaire as the main instrument in gathering the data. Likewise, documentary analysis, unstructured interview and observations were availed of to verify the data needed for further clarification. The foregoing method was used because it is the most appropriate means of ascertaining facts under normal conditions that prevailed among the respondents involved. Kruskal-Wallis ANOVA was used in determining what among the training skills of the subject areas in fisheries and marine science courses or curricular program identified in the study. Purposive sampling was employed since the school population in these schools are few and also the number of NGOs, local government officials and industry sectors within the municipality or town. A dry-run was conducted for validation in Bontoc, Southern Leyte. The data gathered in this study were treated using the descriptive measures, and presented in tabular and textual presentation.

Instrumentation

The researcher used questionnaires, documentary analysis, and interviews and observations to verify data that need further verification.

Questionnaire. There were two parts of the questionnaire for the four groups of respondents. The questionnaire included checklist and open-ended questions where the respondents have to check and to fill-in other vital questions. The first part of the questionnaire is on community survey and curricular programs with item 1-4 and Part Two with item no. 5.1 - 5.12 on the relevance of training skills in the subject areas for the twelve (12) fisheries and marine science courses or curricular programs relevant to the community.

Validation of the Questionnaire. The validation of the questionnaire was done through a trial run in Ruperto K. Kanglaon Memorial Agro-Fisheries Technical Institute, in the Municipal Agricultural Office, and in Bontoc Community considering that the school as offering fisheries programs and the location of the communities and its resources. The fisheries schools in the region were all included as respondents. The researcher tried to put the questionnaires in proper order in consultation with the adviser and some supervisors who are not respondents, but have contributed to the final revision of the questionnaires.

Documentary Analysis. The researcher examined the documents from the Bureau of Fisheries and Aquatic Resources to authenticate the fishery and marine resources available in the community and the list of non-government organizations as well as the business and industry sector. Also examined was the list of students and instructors of the fishery schools who were considered as principal respondents in the study.

Interview. The researcher conducted an unstructured interviews to check the veracity of information that were obtained from the respondents.

Observations. Since the researcher personally distributed the questionnaire to the principal respondents in the schools, in coastal barangays or municipalities/cities or in office, it was the opportunity of the researcher to observe more factual information relative to the study.

Sampling Procedures. Purposive or deliberate sampling was used in the study based on the knowledge of the population of the samples as principal respondents and the specific aim of the research. A critical and careful judgment of the researcher, the heads of schools, instructors, students In the ten fishery schools in both post-secondary and baccalaureate degree for the school year 1997-1998 were considered. The Bureau of Fisheries and Aquatic Resources Supervisors, local government officials, non-government organization and business and industry sectors were another groups of respondents which represents the best share and contribution to the curriculum development in fisheries and marine sciences.

The "rule of thumb" is selecting samples as practices by researchers in normative-descriptive research is that 100% is taken as samples for a population of 100 or less, 50% for a population of 101 to 500, 25% for a population of 501 to 1,000, and 10% for a population of more than 1000. As reflected in Table 1, there were a total of 317 respondents composed of 30 fishery educators and supervisors, 197 fishery instructors and students, 52 local government officials, and 38 non-government organizations, business and industry organization. There were ten fishery

Table 1

Summary of the Four Groups of Respondents

Town/ Municipality	Educators & Supervisors	Instructors and Students	Local Gov't. Officials	NGO's, Bus. and Industry Organization	TOTAL
Albuera	2	9	4	5	20
Bato	3	9	4	5	20
Bobon	3	14	9	2	28
Calbayog	3	14	5	5	25
Carigara	3	45	6	3	57
Catbalogan	6	32	6	10	54
Naval	2	14	4	5	25
Sta.Margarita	2	15	4	2	23
Salcedo	5	12	5	1	23
Toloza	2	29	4	1	35
Total	30	197	52	38	317

schools as respondent schools and correspondingly also ten towns or municipalities as community respondents. These schools and communities are: (1) Samar Regional School pf Fisheries, Catbalogan, Samar; (2) Clarencio Calagos

Memorial School of Fisheries, Sta. Margarita, (3) Rafael Lentejas Memorial School of Fisheries, Tinambacan, Calbayog City; (4) Eladio T. Balite Memorial School of Fisheries, Bobon, Northern Samar; (5) Matarinao School of Fisheries; (6) Naval School of Fisheries, Naval, Biliran; (7) Leyte State School of Fisheries, Tolosa, Leyte; (8) Carigara School of Fisheries, Carigara, Leyte; (9) Dr. Geronimo Zaldivar Memorial School of Fisheries, Bato, Leyte. There were four groups of respondents involved in this study namely: the fishery educators and supervisors, the fishery instructors and students, the local government officials and, the non-government, business, and industry organizations.

Fishery Educators and Supervisors. Only the administrators, superintendents, and principals of fishery schools and aquaculturist/agriculturist, technologist/ biologist and chief of the fisheries section of the Bureau of Fisheries and Aquatic Resources under the Department of Agriculture were considered as respondents. There was a total population of 30 educators and supervisors in the ten schools and communities, broken down as follows: two (2) from DGZMSF, Albuera; two (2) from BSF; three (3) from ETBMSF, Bobon; three(3) from RLMSF, Tinambacan; three (3) from CSF, Carigara; six (6) from SRSF, Catbalogan; two (2) from NSF, Naval; two (2) from CCMSF, Sta. Margarita; five (5) from MSF, Matarinao; and, two (2) from LSSF, Toloza.

Fishery Instructors and Students. This group of respondents included only the instructors and teachers handling or teaching the fishery subjects in a fishery school. A total population of 197 were represented by this group of respondents of which nine (9) were from DGZMSF, 15 from BSF, 14 from ETBMSF, also 14 from RLMSF, 45 CSF, 32 from SRSF, 14 from NSF, 15 from CCMSF, 12 from MSF, and 29 from LSSF.

Local Government Officials. There was a total population of 52 local government officials from the communities who were members of the Sangguniang bayan. This does not mean that only 52 were members of the Sangguniang bayan in the ten communities but only 52 were within the research environment and the rest were not available. Since the perceptions of this group of respondents were needed in this study four (4) were from Albuera, five (5) from Bato, nine (9) from Bobon, five (5) from Calbayog, six (6) from Carigara, also six from Catbalogan, four (4) from Naval, and also four (4) from

Sta. Margarita, five(5) from Salcedo, and four (4) from Toloza.

Non-Government Organizations, Business and Industry. Only those with registered name of the organizations or business were included as respondents which were represented by the senior staffs and fishery staffs of the organizations from the communities. The establishments were selected so as to make and enable representation of different business engaged in fisheries and marine-based industry; hence the limited number of 38 respondents from NGOs, business and industry organizations.

Data Gathering. After reproducing the revised questionnaire, permission from the proper authorities was sought to distribute the questionnaire to the selected respondents. To facilitate the fast distribution of the research instrument, the researcher personally fielded the questionnaire to the selected respondents. The questionnaires were group by school and by community. The accomplished questionnaires were retrieved personally by the researcher and by very close friends, to insure assurance that the questions in the questionnaire were properly and accurately answered.

Treatment of Data

The data thus gathered through the various research techniques were tallied in a master sheet and collated for appropriate presentation in textual and tabular form. These data were analyzed quantitatively with appropriate computational applications, including the testing of hypothesis using the appropriate statistical measures. The results of every computation and hypothesis testing were interpreted and accompanied with implications.

Basically, statistical measures were used, especially for simple numerical facts which were the frequency count, percentage, ranking, and weighted mean.

The weighted mean, particularly, was applied in quantifying the descriptive or adjectival assessments of the relevance of training skills on the subject areas in fisheries and marine sciences by the four groups of respondents as follows:

4.51 - 5.00	Very Much (VM)
3.51 - 4.50	Much (M)
2.51 - 3.50	Moderately (Mo)
1.51 - 2.50	Not Much (NM)
1.00 - 1.50	Not at all (NAA)

In determining the significant differences in the perceptions of the four groups of respondents in the relevance of training skills of the subject areas in fisheries and marine sciences, Kruskal-Wallis ANOVA (Siegel, 1956: 184-185) was used using the formula:

$$H = \frac{12}{N(N+1)} \left[\Sigma \frac{Rj2}{Nj} \right] -3\ (N+1)$$

Where k = number of samples

Nj = number of cases in jth sample

N = ΣNj, the number of cases in all samples combined

Rj = sum of ranks in jth sample (column)

Σ = directs one to sum over the k samples (columns) is distributed approximately as chi square with df = k-1

T = t^3 - t (when t is the number of tied observations in a tied group of scores)

Corrections for ties were no longer applied as the obtained value of H is great enough without the correction for ties where the effect of correction for ties is negligible and may for all practical purposes be ignored.

The significance value of H is assess by reference to table of critical of critical values of chi square (Table

C) with df = k-1. If the probability associated with the observed value of H is equal or larger than the previously set level of significance, H_0 is rejected in favor of H_1.

CHAPTER 4

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter presents, analyzes and interprets the data gathered from the responses of the four groups of respondents through the survey questionnaire fielded to them, supplemented by interviews, documentary analyses and observations. The discussions were centered on the fishery and marine resources available in the municipalities or communities where the fishery institutions are located, on commercial/industrial or economic activities undertaken by the people on fisheries and marine sciences courses prioritization and on the relevancy of training skills of the different subjects areas in the different fisheries and marine science courses or curricular programs towards the development of relevant fishery education in Eastern Visayas. Collected data were based on the specific questions posed in Chapter 1 in this study which were correspondingly presented in tabular form and followed by textual explanations, statistical analyses and interpretations of data.

The participation of the sectoral community groups and the education groups of respondents were sought in identifying available fishery and marine resources in the community.

Table 2 shows the fishery and marine resources available in the communities or municipalities where the fishery institutions are located. These fishery and marine resources available in the communities or municipalities represent the kind, type, class of each resource ranging from open wide seas and ocean fishes, shells, crustaceans, seaweeds, coral reefs, mollusks, and coastal resources. However, not all of these resources are available in all the communities but could be introduced to help the fishery economics of the communities by aquamarine farming. As reflected in Table 2, those checked means that the resources are available.

Fishery Business/ Commercial/ Industrial or Economic Activities in the Communities

The fishery and marine resources available in the community usually become the basis in generating business/commercial/industrial or economic activities. Commercial and industrial business flourishes in a community where there is accessibility of available resources.

Table 2
Fishery And Marine Resources Available In The Community

Resources Available	Albuera	Bato	Bobon	Calbayog	Carigara	Catbalogan	Naval	Sta. Margarita	Salcedo	Tolosa
1. Abalone	/	/	/	X	X	/	/	X	/	X
2. Bay	X	X	X	X	/	/	X	X	/	X
3. Bivalves	/	/	/	/	/	/	/	/	/	/
4. Bangus Fry	/	/	/	/	/	X	/	X	/	X
5. Coral reef	/	/	/	/	/	/	/	X	/	X
6. Coves	/	X	X	X	X	/	/	X	X	X
7. Channel	X	X	X	X	X	X	X	X	X	X
8. Continental Shelf	/	/	X	/	/	/	/	/	X	X
9. Crabs	/	/	/	/	/	/	/	/	/	/
10.Clams	/	/	/	/	/	/	/	/	/	/
11.Commercial fishes	/	/	/	/	/	/	/	/	/	/
12.Clear coastal water	/	/	/	/	/	/	/	/	/	/
13.Demersal	/	/	/	/	/	/	/	/	/	/
14.Deep coast	X	X	/	X	X	X	X	X	/	X
15.Estuary(ies)	/	/	/	/	/	//	/	/	/	/
16.Fishing grounds	/	/	X	/	/	/	/	/	/	/
17.Grouper fry/ juvenile	/	X	X	/	X	/	/	/	/	/
18.Industrial fishes	/	/	/	/	/	/	/	/	/	/
19.Jelly fish	/	/	X	/	/	/	/	/	/	/
20.Lobster	/	X	/	/	X	X	/	X	/	X
21.Lakes	X	X	X	X	X	X	X	X	X	X
22.Mangrove swamps	/	/	/	/	/	/	/	/	/	/
23.Mud crab	/	X	/	/	/	X	/	/	/	X
24.Mussel	X	X	/	X	X	/	/	X	/	X
25.Open sea	/	/	/	/	/	/	/	/	/	/
26.Ocean	X	X	/	X	X	X	X	X	X	X
27.Octopus	/	/	/	/	/	/	/	/	/	/
28.Oyster	/	/	X	X	/	/	/	X	/	/
29.Pelagic	/	/	/	/	/	/	/	/	/	/
30.Kelp	X	X	X	X	X	X	X	X	X	X
31.Rivers	/	/	/	/	/	/	/	/	X	X
32.Rays	/	/	X	/	/	/	/	/	/	/
33.Swamplands	/	/	/	/	/	/	/	/	X	/
34.Sandy beach	/	/	/	/	/	/	/	/	/	/
35.Surf shells	/	/	X	X	X	/	/	X	X	X
36.Sea grass	/	/	/	/	/	X	X	X	/	/
37.Squids	/	/	/	/	/	/	/	/	/	/
38.Sharks	/	/	/	/	/	/	/	/	/	/
39.Sugpo fry	/	X	/	/	X	X	/	/	/	X
40.Sponges	/	X	/	X	X	X	X	X	/	X
41.Shrimps/prawn	/	X	/	/	/	/	/	/	/	X
42.Sea urchin	/	X	/	/	X	/	/	X	/	X
43.Seaweeds	/	/	/	X	X	X	X	X	/	X
44.Siganid fry/juvenile	/	X	/	X	X	/	/	X	/	X
45.Scallop	/	/	X	X	X	/	X	X	/	/
46.Sea cucumber	/	/	X	/	X	/	X	/	/	X
47.Strait	X	X	X	X	X	X	X	X	X	X
48.Sargassum	/	X	/	X	X	X	X	X	/	X
49.Univalves	/	/	/	/	/	/	/	/	/	/

LEGEND: X not available; / available

The fisheries resources is the key to the commercial or industrial development of a community, and to a large extent on degree or volume of commercial activities, undertaken by the people. But sad to note that only fishing, fish drying, fish trading, and fishpond operation are the most affluent and common compared to other business activities in fisheries. This is simply due to the absence or lack of knowledge on the economic importance and uses of the varieties of fishery and marine products aside from being used as food.

Fish together with rice, is the staple food of Asians, including Filipinos. It is well known that about 50% of the protein diet of the Filipinos is fish, mostly marine species. It is therefore important that availability of fishery products, which are relatively cheaper protein source is assured at all times not only to maintain food health but also to prevent social disruption according to Alcala in Symbiosis (1995:7).

Table 3 shows the fishery business/commercial/ industrial or economic activities undertaken in municipalities or communities where the fishery institutions are located.

Table 3
Fishery Business/Commercial/Industrial or Economic Activities in the Community

Economic Activities	Albuera	Bato	Bobon	Calbayog	Carigara	Catbalogan	Naval	Sta. Margarita	Salcedo	Tolosa
1. Aquamarine seaweed farming	X	/	X	X	X	X	X	X	X	X
2. Aquamarine Lapulapu grower	X	X	X	X	X	/	X	X	X	X
3. Aquamarine lobster grower	X	X	X	X	X	X	X	X	X	X
4. Aquamarine siganid grower	X	X	/	X	X	X	X	X	X	X
5. Aquamarine talakitok grower	X	X	X	X	X	X	X	X	X	X
6. Aquamarine fry/juvenile gatherer	X	X	/	X	X	X	/	/	X	X
7. Bangus fishpond operator	X	/	/	/	/	/	/	/	/	X
8. Bangus fry gatherer	X	/	X	/	X	X	/	/	X	X
9. Boat building/making	/	/	/	/	/	X	X	X	/	X
10. Coral gatherer	X	X	X	/	X	X	X	X	X	X
11. Dynamite fishing	/	/	/	/	/	/	X	/	/	X
12. Fish vendor/vending	/	/	/	/	/	/	/	/	/	/
13. Fish dealer/trading	/	/	/	/	/	/	/	/	X	/
14. Fish gear designer/making	/	X	/	/	/	/	/	X	/	X
15. Fishing with fine mesh	/	/	/	/	X	/	/	/	/	X
16. Fish drying	/	/	/	/	/	/	/	/	X	X
17. Fish salting	/	/	/	/	/	/	/	/	X	X
18. Fish smokings/bottling	/	X	/	/	X	/	X	X	X	X
19. Fishing with nets	/	/	/	/	/	/	/	/	/	X
20. Fishing boat operator	/	/	/	/	/	/	/	/	X	X
21. Fish corral fishing	X	X	X	/	X	X	X	X	/	X
22. Fish exporter/exporting	X	X	X	X	X	X	X	X	X	X
23. Fishing supplier retailer	X	/	X	/	/	/	/	X	X	X
24. Fishermen's cooperative	/	X	X	/	/	/	/	X	X	X
25. Fisheries researcher	/	/	/	/	/	/	X	X	/	X
26. Gulaman gatherer	X	/	/	X	X	X	/	X	X	/
27. Gulaman dealer	X	X	/	X	X	X	/	X	X	X
28. Gulaman making	X	X	/	X	X	/	/	X	X	X
29. Gulaman exporting	X	X	X	X	X	X	X	X	X	X
30. Hatchery operator	/	X	X	/	X	X	X	X	X	X
31. Hook and line fishing	/	/	/	/	/	/	/	/	/	X
32. Ice plant	X	X	X	X	X	X	/	X	X	/
33. Icing fish	/	/	/	/	/	/	X	/	X	X
34. Ice dealer	/	/	/	/	/	/	/	/	/	/
35. Middlemen (labasero)	/	/	/	/	/	/	/	/	/	/
36. Marine technician	/	X	X	/	X	/	/	X	X	X
37. Marine science researcher	X	X	X	X	X	X	X	X	X	X
38. Mussel farming	X	X	X	X	X	/	X	X	X	X
39. Marine product buyer/dealer	/	/	/	/	/	/	X	/	X	X
40. Oyster farming	X	X	X	X	X	X	X	X	X	X
41. Sponges gatherer	X	X	X	X	X	X	X	X	X	X
42. Pearl culture	X	X	X	X	X	X	X	X	X	X
43. SCUBA diver	X	X	X	X	X	X	X	X	X	X
44. Salt making	X	X	X	X	X	X	X	X	X	X
45. Shell craft making	X	X	X	X	X	/	X	X	X	X
46. Shellcraft dealer/exporter	X	X	X	X	X	X	X	X	X	X
47. Shrimp fry gatherer	X	X	X	/	X	X	X	/	X	X
48. Sugpo fry gatherer	X	X	X	/	X	X	/	/	X	X
49. Sugpo fishpond operator	/	X	X	/	/	X	X	X	X	X

LEGEND: X – without economic activity; / – with economic activity;

Fishery economic activities with check marks indicates that the community is with fishery economic activity. There is therefore a need to have relevant fishery education and training that offer courses on training curricula to develop the resources, to make use of its economic value and wise utilization of community resources. Education, training, resources and manpower has the main root and direction in the path of curriculum development.

Non-Ladderized Degree Fisheries and Marine Science Resource-Based Curricular Programs or Courses Relevant to the Fishery Business/Commercial/Industrial or Economic Activities of the Community

Table 4 shows the perceptions of the four groups of respondents on the non-ladderized fisheries and marine science resource-based courses relevant to the business/commercial/industrial or economic activities of the community. There are 20 courses identified in non-ladderized degree programs that are relevant to the community. The order of ranks of the 20 non-ladderized fisheries and marine science course are as follows: Marine Environmental Science ranked 1, followed by Food and Marine Products Technology and Aquamarine Technology which tied for rank 2.5.

Table 4

Non-Laddered Degree in Fishery and Marine Science Resource-Based Curricular Programs or Courses Relevant to the Fishery Business Economic Activities of the Community.

Courses/Curricular Program	Total	%	Rank
Food and Marine Product Technology	282	88.96	2.5
Aquamarine Technology	282	88.96	2.5
Marine Fisheries Technology	270	85.17	6.5
Fishery Business Management	270	85.17	6.5
Fisheries Biology	230	72.56	13
Fisheries Management	224	70.66	15
Fisheries Economics	220	64.40	16
Fishery Education	275	86.75	5
Fishery Extension Education	245	77.28	12
Fisheries Oceanography	265	83.6	8
Oceanography	206	64.98	17
Coastal Oceanography	251	79.18	10
Ocean Engineering	251	79.18	10
Coastal and Ocean Law/Marine Affairs	251	79.18	10
Marine Environmental Science	291	91.80	1
Marine Biology	229	72.24	14
Marine and Atmospheric Chemistry	33	10.41	19
Marine Geology and Physical	33	10.41	19
Oceanography	33	10.41	19
Meteorology and Physical Oceanography	281	88.64	4
Living Marine Resources			

Living Marine Resources ranked 4, Fishery Education ranked 5, Marine Fisheries Technology, and Fishery Business tied for rank 6.5, Fisheries Oceanography ranked 8, Coastal Oceanography, Ocean Engineering, and Coastal and Ocean Law tied for rank 10, Fishery Extension Education ranked 12, Fisheries Biology ranked 13, Marine Biology ranked 14, Fisheries Management ranked 15, Fisheries Economics ranked 16, Oceanography ranked 17, and tied for rank 19 are Marine and Atmospheric Chemistry, Marine Geology and Physical Oceanography and, Meteorology and Physical Oceanography courses.

Based on the fishery and marine resources in the community, non-ladderized degree fisheries and marine science courses are beneficial and relevant to the business/commercial or economic needs of their community. In the aforementioned text, the 10 top ranks are composition of five fisheries courses and five marine science courses which indicate that there is a need of non-ladderized degree courses not only for the development of fisheries components but also of the marine-based resources in order to improve their socio-economic life in their community.

<u>Ladderized Degree Fisheries and Marine Science Resource-Based Curricular Programs or Courses Relevant to the Fishery Business/Commercial/Industrial or Economic Activities of the Community</u>

The ladderized degree fisheries and marine science resource-based curriculum programs or courses beneficial and relevant to the business/commercial/industrial or economic activities of the community is shown in Table 5. A cursory view of the table indicates the unpopularity of ladderized degree courses as it reflects only 45.74% of the 317 respondents responses to this program. This is maybe due to its absence or only few tertiary institutions are offering ladderized programs and most of the respondents are unaware of such educational program. However this does not also mean that the respondents perceived the fisheries and marine science courses in ladderized form not beneficial and relevant to the community. This is manifested in their responses that the first 10 top ranks are: (1) Food and Marine Products Technology, (2) Aquamarine Technology, (3) Marine Fisheries Technology, (4) Fishery Extension Education, (5) Marine Environmental Science, (6) Coastal Oceanography, (7) Coastal and Ocean

Law/Marine Affairs, (8) Fisheries Oceanography, (9) Ocean Engineering, and (10) Marine Biology.

Table 5
Ladderized Degree in Fisheries and Marine Science
Resource-Based Curricular Programs or Courses
Relevant to the Fishery Business Economic
Activities of the Community

Courses/Curricular Program	**Total**	%	**Rank**
Food and Marine Product Technology	145	45.74	1
Aquamarine Technology	141	44.48	2
Marine Fisheries Technology	140	44.16	3
Fishery Business Management	83	26.18	16
Fisheries Biology	91	28.71	12
Fisheries Management	89	28.08	13
Fisheries Economics	86	27.13	14
Fishery Education	96	30.28	11
Fishery Extension Education	130	41.01	4.5
Fisheries Oceanography	102	32.18	8.5
Oceanography	84	26.5	15
Coastal Oceanography	125	39.43	6.5
Ocean Engineering	102	32.18	8.5
Coastal and Ocean Law/Marine Affairs	125	39.43	6.5
Marine Environmental Science	130	41.01	4.5
Marine Biology	101	31.86	10
Marine and Atmospheric Chemistry	35	11.04	18
Marine Geology and Physical	31	9.78	19.5
Oceanography	31	9.78	19.5
Meteorology and Physical Oceanography	52	16.4	17
Living Marine Resources			

Though the ladderized courses show lower percentage from the respondents, the courses are still needed in the improvement of their socio-economic life in their community. The less preference in ladderized courses is brought about by the absence of industries which are marine resource based. However they perceived that such ladderized degree in fisheries and marine science curricular programs are beneficial to the business/commercial/industrial or economic activities of the community as indicated in the ranks of the first 10 ladderized degrees in fishery and marine science resource-based courses.

Ladderized and non-degree courses can only attract customer or clientele when there is prosperity in the industry sector. Commercial, business or industry establishment enhanced the educational programs of an institution due to generation of more jobs and employment syndrome. Furthermore, students from rural areas are in demand for jobs and employment, but this should only be the conditions. We have to help the community to cope up with changing technology so that they may be able to develop and improve their socio-economic life in the community.

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By education and training on fisheries and marine science resource-based courses, students will acquire new knowledge, skills and technology that would contribute to the progress of the community in the very near future to come. There are still undiscovered economic potentials of the fishery and marine resources for fisheries development.

Priority of Offering Fisheries and Marine Science Resource-Based Curricular Programs or Courses Relevant to the Needs of the Community

Considering the needs of the community to its business/commercial/industrial or economic activities, offering of courses or curricular programs must be relevant. This will help the labor force and must address the manpower needs of the community in particular and to the country in general. The relevance of school curricular programs will be progressive through close linkage and coordination with the community sectors in terms of priority needs. Toward this end, the involvement of the group of respondents were solicited and partners to this study were requested to identify priority rank of courses relevant to the needs of the community.

The resources available in a community is the basis for economic activities. These resources are the key to the development of a community; however, these resources can only be tapped to its fullest when the constituents or the people have the potential of developing its resources. This could be the situation when the citizenry of the community possesses the proper education and training skills in resource development and it is to a large extent that resource-based curricular program which will help develop the community and therefore prioritization of the offering of these courses clearly directs the community and the institution of higher learning to chart its programs in development education. Table 6 manifested this prioritization by ranks of offering courses in fishery and marine science resource-based curricular programs as perceived by the group of respondents from the community as well as from the academe.

First Priority Rank. As perceived by the respondents, the following courses or curricular programs should be first offered: Food and Marine Products Technology, Marine Environmental Science, Aquamarine Technology, Fishery Business Management, Marine Fisheries Technology, and Fishery Education. The identified courses in the first priority rank are geared towards the need for the improvement of the community and address the socio-economic situation which would help alleviate the living conditions

Table 6

Perception of the Respondents in the Priority Rank of Offering Fisheries and Marine Science Courses Relevant to the Needs of the Community

First Priority Rank	Total	%
Food and Marine Products Technology	306	96.53
Marine Environmental Science	298	94.01
Aquamarine Technology	293	92.43
Fishery Business Management	291	91.8
Marine Fisheries Technology	291	91.8
Fishery Education	291	91.8
Second Priority Rank		
Fishery Extension Education	287	90.54
Coastal and Ocean Law/Marine Affairs	286	90.22
Fisheries Economics	277	87.78
Fisheries Management	275	86.75
Third Priority Rank		
Fisheries Biology	274	86.44
Coastal Oceanography	272	85.8
Marine Biology	270	85.17
Fisheries Oceanography	267	84.91
Oceanography	266	83.91
Fourth Priority Rank		
Ocean Engineering	257	81.07
Living Marine Resources	257	81.07
Fifth Priority Rank		
Marine and Atmospheric Chemistry	51	10.09
Marine Geology and Physical Oceanography	40	12.62
Meteorology and Physical Oceanography	39	12.3

of the people in the community. These courses are of importance in enhancing commercial and industrial or economic activities of the community with appropriate technology to maximize available resources and their concern for a well-managed marine environment which is the key to socio-economic prosperity.

Second Priority Rank. The second priority rank offering of courses are: Fishery Extension Education, Coastal and Ocean Law/Marine Affairs, Fisheries Economics, and Fisheries Management. These priority courses are considered next rank in offering the curricular programs in fishery and marine science educational program in its essential form of succession and carry with it the progress in education and training pattern. It deals more on management and conservation affairs of the fishery and marine resources. Sociologically an approach to this is very basic and essential once a technology has been discovered and practiced. The next step is to protect the resources and to sustain the socio-economic life of the community.

Third Priority Rank. This priority rank of courses are concentrated on the biological aspect and processes of the fisheries and marine resources which are composed of

Fisheries Biology, Marine Biology, Fisheries Oceanography, and Oceanography. The fishery industry is categorized into marine fisheries sub-sector, aqua-culture sub-sector and inland fisheries sub-sector, and the Philippines is the 12^{th} largest fish producer in the world. The focus is in marine fisheries sub-sector where major species groups contributed to the Philippines marine fisheries production as tuna fisheries, small pelagic fisheries, demersal fisheries, marine invertebrates (crustaceans and mollusks), seaweeds, and coral reef fisheries, which needs proper management because fishery and marine resources are valuable resources for marine-based industries; therefore, the need for biological education and training or studies to develop their potential and economic share to improve the socio-economic life of the people in the community.

Fourth Priority Rank. This is made up of two different marine science concerns which are distinctively opposite, engineering and the other one on biological aspects of the marine resources. Ocean engineering concentrates on problems associated with the interaction of the sea or the ocean and the works of man, while the living marine resources is concerned with the life biology, ecology, and the processes of living marine resources. The respondents prioritized these two courses, engineering and living marine resources, as third priority due to their quest for further advancement of knowledge and training to cope up with advance science and changing technology in order to make fully and tap, to its fullest, the economic use of marine resources available in the community.

Fifth Priority Rank. The least of the priority rank of courses are: Marine and Atmospheric Chemistry, Marine Geology and Physical Oceanography, Meteorology and Physical Oceanography. As gleaned from the table on the perceptions of the respondents in the priority ranks of offering fishery and marine science courses to the needs of the community, they were considered only by very few respondents. This may be due to its being high and very advanced marine science course, but considered its inclusion in the identified marine sciences. This group of courses and the atmosphere are as closely related dynamical systems. To mention a few of this study is the phenomenon of the "El Niño" and the weather conditions prevailing in the different parts of the world.

Relevance of Training Skills in Subject Areas for Marine Fisheries Technology Course

Fishery Educators and Supervisors perceptions on the relevance of training skills in subject areas for marine fisheries technology course. All of the twelve subject areas are perceived as "very much" relevant to the training skills for the course on marine fisheries technology as indicated by their weighted mean in Table 7. The following subject areas are: (1) coastal resources management, 4.93; (2) marine electronics, 4.70; (3) marine ecology, 4.80 (4) fisheries oceanography, 4.83; (5) fishing gear design and construction, 4.87; (6) fish handling and cold storage, 4.40 (7) navigation, 4.73; (8) deck seamanship and ropeworks, 4.69; (9) survival of life at sea, 4.60; (10) marine engineering, 4.67; (11) marine fisheries management, 4.86; and (12) systematics of fishes, 4.79.

Marine Fisheries Technology course deals with marine species of fish and their methods of harvest and fishing techniques are employed in catching these species in the surface, mid-water and at the bottom of the sea. Fishing is just one of the marine-based industries in the Philippines.

Table 7

Fishery Educators' and Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Marine Fisheries Technology Course

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resource Management	28	140	2	8	0	0	0	0	0	0	30	148	4.93
Marine Electronics	24	120	3	12	3	9	0	0	0	0	30	141	4.70
Marine Ecology	26	130	2	8	2	6	0	0	0	0	30	144	4.80
Fisheries Oceanography	26	130	3	12	1	3	0	0	0	0	30	145	4.83
Fishing Gear Design & Construction	27	135	2	8	1	3	0	0	0	0	30	146	4.87
Fish Handling & Cold Storage	27	135	3	12	0	0	0	0	0	0	30	147	4.90
Navigation	25	125	3	12	1	3	1	2	0	0	30	142	4.73
Deck Seamanship & Ropework	23	115	3	12	3	9	0	0	0	0	29	136	4.69
Survival of Life at Sea	23	115	3	12	3	9	1	2	0	0	30	138	4.60
Marine Engineering	23	115	4	16	3	9	0	0	0	0	30	140	4.67
Marine Fisheries Management	24	120	4	16	0	0	0	0	0	0	28	136	4.86
Systematics of Fisheries	25	125	2	8	2	6	0	0	0	0	29	139	4.97
Total	301	1505	34	140	19	57	2	4	0	0	356	1706	4.79

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.0 - 1.50 Not At All (NAA)

Under the fisheries sector, marine fisheries sub-sector contributed 65% to the country's fish production from tuna fisheries, small pelagic fisheries , demersal fisheries, marine invertebrates, seaweeds, and coral reef fisheries. Finding and locating these fisheries needs the knowledge and skills in fishing science and technology which is very essential in ensuring the relevance of the course and in developing marine-based industries.

As stated above, the group of respondents considered the training skills in subject areas as very much relevant as indicated by the weighted mean of 4.79 which is "very much" and therefore the subject areas are relevant to the course in marine fisheries technology. Being educators or supervisors in fishery establishment, they have insights and foresee training skills needed by the marine-based industries especially in marine fisheries sub-sector industry.

<u>Fishery instructors and students perceptions on the relevance of training skills in subject areas for marine fisheries technology course.</u> As perceived by the fishery instructors and students, the twelve subject areas are only much relevant to the training skills in marine fisheries technology course as indicated by their weighted mean in

Table 8. The following subject areas are "much" relevant: (1) coastal resources management, 3.76; (2) marine electronics, 3.94; (3) marine ecology, 4.38; (4) fisheries oceanography, 4.01; (5) fishing gear design and construction, 4.17; (6) fish handling and cold storage, 4.42; (7) navigation, 4.12; (8) deck seamanship and rope works, 4.36; (9) survival of life at sea, 4.32; (10) marine engineering, 4.25; (11) marine fisheries management, 4.41; and (12) systematic of fishes, 4.33.

With an indicated weighted mean of 4.20 which is "much" relevant in comparison to that of the fishery educators and supervisors perceptions as very much relevant, they are closely related; however the fishery instructors and students group of respondents less experience and exposure or never have been in the industry and therefore have low interest on the relevance of training skills in subject areas for marine fisheries technology course. Rated "much" is still relevant and therefore the perceptions of this group of respondents is considered favorable for the inclusion of the subject areas in the offering of marine fisheries technology course.

Table 8

Fishery Instructors and Students Perceptions on the Relevance of Training Skills in the Subject Areas for Marine Fisheries Technology Course

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resource Management	83	415	40	160	30	90	23	46	18	18	194	729	3.76
Marine Electronics	78	390	58	23	32	76	29	58	0	0	197	776	3.94
Marine Ecology	101	505	71	248	25	75	0	0	0	0	197	864	4.38
Fisheries Oceanography	83	416	57	228	32	96	25	50	0	0	197	190	4.01
Fishing Gear Design & Construction	107	535	35	148	28	87	26	52	0	0	197	822	4.17
Fish Handling & Cold Storage	105	525	41	164	31	93	0	0	0	0	177	782	4.42
Navigation	79	395	61	164	55	165	0	0	0	0	195	804	4.12
Deck Seamanship & Ropework	99	495	68	272	28	84	0	0	0	0	195	851	4.36
Survival of Life at Sea	92	460	77	308	28	84	0	0	0	0	197	852	4.32
Marine Engineering	81	405	72	288	34	102	0	0	0	0	187	795	4.25
Marine Fisheries Management	108	540	48	192	21	93	0	0	0	0	187	825	4.41
Systematics of Fisheries	103	515	59	236	30	90	4	8			196	849	4.33
Total	1119	5596	687	2756	285	1155	107	217	18	18	2318	9739	4.20

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

Local government officials perception on the relevance of training skills in subject areas for marine fisheries technology course. The local government officials perceived that the training skills in subject areas are "much" relevance to the marine fisheries technology course as indicated by their weighted means of 4.45 (Table 9). The perceptions of the local government officials to the training skills in subject areas for the course in marine fisheries technology is a division of forceable training skills as evident by seven or 58.33 percent of the twelve subject areas are "very much" and five or 41.67 percent are much relevant. The seven or 58.33 percent subject areas that were considered very much relevant are: (1) coastal resources management, 4.60; (2) marine ecology, 4.62 (3) fishing gear design and construction, 4.58; (4) fish handling and cold storage, 4.54; (5) marine engineering, 4.56; (6) marine fisheries management, 4.51; and (7) systematic of fishes, 4.57. The five or 41.67 percent of the twelve subject areas that are much relevant: (1) marine electronics, 4.46; (4) deck seamanship and rope works, 4.35; and (5) survival of life at sea, 3.79.

Table 9

Local Government Officials Perceptions on the Relevance of Training Skills in the Subject Areas for Marine Fisheries Technology Course

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resource Management	31	155	21	84	0	0	0	0	0	0	52	293	4.60
Marine Electronics	30	150	10	40	6	18	4	8	0	0	50	216	4.32
Marine Ecology	32	160	20	80	1	3	0	0	0	0	52	40	4.62
Fisheries Oceanography	31	155	10	40	7	21	2	4	0	0	50	220	4.40
Fishing Gear Design & Construction	31	155	20	80	1	3	0	0	0	0	52	238	4.58
Fish Handling & Cold Storage	28	140	24	96	0	0	0	0	0	0	52	236	4.54
Navigation	28	140	20	80	4	12	0	0	0	0	52	232	4.46
Deck Seamanship & Ropework	28	140	18	72	3	9	2	4	1	1	52	226	4.35
Survival of Life at Sea	14	70	12	48	10	30	5	10	1	1	42	159	3.79
Marine Engineering	30	150	18	72	2	6	0	0	0	0	50	228	4.56
Marine Fisheries Management	28	140	21	84	2	6	0	0	0	0	51	230	4.51
Systematics of Fisheries	26	130	24	100	1	3	0	0	0	0	51	233	4.57
Total	337	1658	218	876	36	111	13	26	2	2	606	2697	4.45

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Observation tells us that some of the local government officials who responded to the questionnaire owned, or have experienced and have been exposed to the nature of being with marine-based industries while others have not experienced or otherwise and did not have any economic activity in marine-based industries especially marine fisheries sub-sector industry.

Non-government organizations, business, and industry organizations perceptions on the relevance of training skills in subject areas for marine fisheries technology course. Table 10 reveals that the training skills in subject areas is very much relevant to the marine fisheries technology course with a weighted mean of 4.52. Seven or 58.33 percent of the subject areas are perceived as very much with a weighted mean as follows: (1) coastal resources management, 4.57; (2) marine ecology, 4.58; (3) fisheries oceanography, 4.56; (4) fishing gear design and construction, 4.63; (5) fish handling and cold storage, 4.59; (6) marine engineering, 4.62; and (7) systematics of fishes, 4.68. Five or 41.67 percent are much relevant with a weighted mean. These are the marine electronics, 4.37; navigation, 4.46; and deck seamanship and rope works, 4.48.

Table 10

NGO's and Business Industry Organizations Perceptions on the Relevance of Training Skills in the Subject Areas for Marine Fisheries Technology Course

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resource Management	24	120	10	40	2	6	1	2	1	1	37	169	4.57
Marine Electronics	20	100	12	48	6	18	0	0	0	0	38	166	4.37
Marine Ecology	24	120	12	48	1	3	0	0	0	0	38	174	4.58
Fisheries Oceanography	24	120	12	48	1	3	1	2	0	0	38	173	4.56
Fishing Gear Design & Construction	26	130	10	40	2	6	0	0	0	0	38	176	4.63
Fish Handling & Cold Storage	20	100	14	56	0	0	0	0	0	0	34	156	4.59
Navigation	24	120	8	32	3	9	2	4	0	0	37	165	4.46
Deck Seamanship & Ropework	24	120	10	40	2	6	2	4	0	0	38	170	4.48
Survival of Life at Sea	20	100	12	48	3	9	2	4	1	1	38	162	4.26
Marine Engineering	24	120	12	48	3	9	2	4	0	0	37	171	4.62
Marine Fisheries Management	26	130	8	32	2	6	1	2	1	1	38	171	4.50
Systematics of Fisheries	26	130	12	48	0	0	0	0	0	0	38	178	4.68
Total	282	1410	132	528	24	72	19	32	3	3	450	2032	4.52

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Others are: survival of life at sea, 4.26; and marine fisheries management, 4.50.

Again, there is a division of foreseeable training skills in the subject areas as perceived by non-government organizations, business and industry organizations. However, scientific and technological aspects of the subject areas are complementary. The non-government organizations had given more weight to the protection and conservation of the marine fisheries resources while the business and industry organizations emphasized technology which therefore resulted in very much relevant perceptions of the training skills in subject areas for marine fisheries technology course.

Relevance of Training Skills in Subject Areas for Aquamarine Technology Course

Fishery educators and supervisors perceptions on the relevance of training skills in subject areas for aquamarine technology course (Table 11). The subject areas are perceived as very much relevant by the fishery educators and supervisors as indicated by their weighted mean: (1) coastal resources management, 4.50; (2) fry collection, handling and transport, 4.70; (3) fish breeding and early life history, 4.80; and (4) nursery management techniques, 4.90.

Table 11

Fishery Educators' And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Aquamarine Technology Course

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resource Management	26	130	2	8	1	3	0	0	0	0	30	135	4.50
Fry Collection, Handling & Transport	24	120	3	12	3	9	0	0	0	0	30	141	4.70
Fish Breeding and Early Life History	25	125	4	16	1	3	0	0	0	0	30	144	4.80
Nursery Management Techniques	28	140	1	4	1	3	0	0	0	0	30	147	4.90
Broodstock Culture and Management	26	130	1	4	2	6	1	2	0	0	30	142	4.73
Microalgae	23	115	4	16	2	6	1	2	0	0	30	139	4.63
Hatchery Design Management	24	120	2	8	2	6	2	4	0	0	30	138	4.60
Fish & Crustaceans Diseases & Control	25	125	2	8	1	3	2	4	0	0	30	140	4.67
Larval Culture & Transport	26	130	1	4	1	3	1	2	0	0	29	139	4.79
Fish Population Dynamics	20	100	5	20	3	9	0	0	0	0	28	129	4.61
Fishpond Design and Management	26	130	3	12	1	3	0	0	0	0	30	145	4.83
Integrated Fish Culture	24	120	3	12	2	6	0	0	0	0	29	138	4.76
Marine Fish & Shellfish Culture/Farming	28	140	2	8	0	0	0	0	0	0	30	148	7.93
Fish Culture Methods & Techniques	27	135	2	8	1	3	0	0	0	0	30	146	7.87
Systematics of Fishes	23	115	3	12	2	6	2	4	0	0	30	137	7.57
Total	375	1875	39	156	23	69	9	18	0	0	446	2118	4.75

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

Next is (5) broad stock culture and management, 4.73; (6) micro algae, 4.63; (7) hatchery design management, 4.60; (8) fish and crustaceans diseases and control, 4.67; (9) larval culture and transport, 4.79; (10) fish population dynamics, 4.61; (11) fishpond design and management, 4.83; (12) integrated fish culture, 4.76; (13) marine fish and shellfish culture/farming, 4.93; (14) fish culture methods and techniques, 4.87; and (15) systematics of fishes, 4.57.

Aquamarine technology course is concerned with farming and ranching of culturable marine and inland species. Among the fisheries contributed to the production of fish in aquamarine sub-sector are: tiger prawn/shrimps, milkfish, tilapia, groupers, seabass, marine mollusks and seaweeds. Mariculture projects and industry are also marine-based industries because their supply of brood stock and other forms of stocks are dependent upon the coastal marine waters. The subject areas are then very much relevant considering the needs of the community to develop their fisheries sector which would drawn training skills needed for the industry.

<u>Fishery instructors and students perceptions on the relevance of training skills in subject areas for aquamarine technology course (Table 12).</u> The table shows that the subject areas are perceived as much relevant to the training skills in aquamarine technology course as reflected by their weighted mean: (1) coastal resources management, 3.58; (2) fry collection, handling and transport, 3.99; (3) fish breeding and early life history, 3.02; (4) nursery management techniques, 3.68; (5) broad stock culture and management, 3.68; (6) micro algae, 3.64; (7) hatchery design management, 3.70; (8) fish and crustaceans diseases and control, 3.58; (9) larval culture and transport, 3.99; (10) fish population dynamics, 3.95; (11) fishpond design and management, 3.97; (12) integrated fish culture, 4.05; (13) marine fish and shellfish culture/farming, 4.09; (14) fish culture methods and techniques, 4.06; and (15) systematics of fishes, 3.62.

The subject areas contributed much to the relevance of the course in aquamarine technology as there are fishery and marine resources available for the development of economic activities of the socio-economic life of the community.

Table 12

Fishery Instructors' And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Aquamarine Technology Course

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resource Management	84	420	40	160	24	72	25	50	19	19	192	688	3.58
Fry Collection, Handling & Transport	90	400	44	176	24	72	25	50	19	19	173	690	3.99
Fish Breeding and Early Life History	76	380	43	172	24	72	26	52	20	20	189	624	3.03
Nursery Management Techniques	78	390	41	164	28	84	26	52	20	20	193	710	3.68
Broodstock Culture and Management	78	380	43	172	27	81	26	52	20	20	192	705	3.68
Microalgae	74	370	44	176	27	81	26	52	20	20	191	699	3.64
Hatchery Design Management	77	385	42	168	26	78	25	50	19	19	189	700	3.70
Fish & Crustaceans Diseases & Control	77	138	45	180	26	78	25	50	19	19	192	688	3.85
Larval Culture & Transport	76	380	45	180	26	78	26	52	0	0	173	690	3.99
Fish Population Dynamics	73	365	45	180	27	81	27	54	0	0	172	680	3.95
Fishpond Design and Management	76	380	45	180	27	81	27	54	0	0	175	695	3.97
Integrated Fish Culture	32	410	43	172	23	69	25	50	0	0	173	701	4.05
Marine Fish & Shellfish Culture/Farming	32	410	42	172	25	75	23	46	0	0	172	703	4.09
Fish Culture Methods & Techniques	31	405	44	176	25	75	23	46	0	0	173	702	4.06
Systematics of Fishes	75	375	45	100	27	81	26	52	2	20	193	698	3.62
Total	1029	5588	651	2528	386	1158	381	762	158	176	2742	10373	3.78

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

Local government officials perceptions on the relevance of training skills in subject areas for aquamarine technology course (Table 13). The table reveals that three of the subject areas are perceived as very much relevant by the local government officials as indicated by their weighted mean: (1) coastal resources management, 4.60; (2) fry collection, handling and transport, 4.52; (3) fish culture methods and techniques, 4.70. Perceived a much relevant by them as indicated by their weighted mean are: (1) fish breeding and early life history, 3.73; (2) nursery management techniques, 3.73; (3) brood stock culture and management, 3.84; (4) microalgae, 3.29; (5) hatchery design and management, 3.85; (6) fish and crustaceans diseases and control, 4.15; (7) larval culture and transport, 4.12; (8) fish population dynamics, 3.73; (9) fishpond design and management, 4.00; (10) integrated fish culture, 3.90; (11) marine fish and shellfish culture, 4.31; (12) systematics of fishes, 3.73.

The three subject areas that are perceived as very much relevant to the aquamarine technology by the local government is that these subjects must be given more emphasis due to the fact that there is a shortage of fry or broodstock for culture.

Table 13

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Aquamarine Technology Course

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resource Management	31	155	21	84	0	0	0	0	0	0	52	239	4.60
Fry Collection, Handling & Transport	31	150	20	80	1	3	1	2	0	0	50	235	4.52
Fish Breeding and Early Life History	18	90	12	48	12	36	10	20	0	0	52	194	3.73
Nursery Management Techniques	17	85	14	56	11	33	10	20	0	0	52	194	3.73
Broodstock Culture and Management	19	95	14	56	9	27	6	12	2	2	50	192	3.84
Microalgae	20	100	11	44	11	33	10	20	0	0	52	197	3.79
Hatchery Design Management	22	110	10	40	10	30	10	20	0	0	52	200	3.85
Fish & Crustaceans Diseases & Control	25	125	17	68	5	15	3	6	2	2	52	216	4.15
Larval Culture & Transport	20	100	20	80	10	30	2	2	0	0	52	214	4.12
Fish Population Dynamics	18	90	12	48	12	36	10	20	0	0	52	194	3.73
Fishpond Design and Management	20	100	18	72	10	30	2	4	2	2	52	208	4.00
Integrated Fish Culture	17	85	20	80	10	30	3	6	2	2	52	203	3.90
Marine Fish & Shellfish Culture/Farming	25	125	20	80	5	15	2	4	0	0	52	224	4.31
Fish Culture Methods & Techniques	20	100	20	80	15	45	5	10	0	0	50	235	4.70
Systematics of Fishes	18	90	12	48	12	36	10	20	0	0	52	194	3.73
Total	320	1600	241	964	133	399	84	166	8	8	774	3139	4.05

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Mortalities is also experienced in the transport of the fry and techniques in fish farming must be improved to increase production while 12 of the subject areas are considered as much relevant to the course as their role to strengthen their foundation to aquamarine technology.

Non-government organizations, business and industry organizations perceptions on the relevance of training skills in subject areas for aquamarine technology course (Table 14). Thirteen subject areas are perceived as much relevant by the non- government organizations, business and industry organizations as indicated by their weighted mean: (1) coastal resources management, 4.35; (2) fry collection, handling and transport, 3.94; (3) fish breeding and early life history, 3.82; (4) nursery management techniques, 3.84; (5) brood stock culture and management, 3.68; (6) hatchery design and management, 3.76; (7) fish and crustacean diseases and control, 3.59; (8) larval culture and transport, 3.56; (9) fishpond design and management, 4.08; (10) integrated fish culture, 3.92; (11) marine fish and shellfish culture, 4.10; (12) fish culture methods and techniques, 4.00; and (13) systematics of fishes, 3.95.

Table 14

Non-Government Organizations, Business And Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Aquamarine Technology Course

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resource Management	28	140	14	56	10	30	0	0	0	0	52	226	4.35
Fry Collection, Handling & Transport	20	200	12	48	12	36	5	10	2	2	51	201	3.94
Fish Breeding and Early Life History	12	60	12	48	9	27	5	10	0	0	38	154	3.82
Nursery Management Techniques	14	70	10	40	8	24	6	12	0	0	38	146	3.84
Broodstock Culture and Management	12	60	10	40	8	24	8	16	0	0	38	140	3.68
Microalgae	10	50	12	48	8	24	8	16	0	0	38	114	3.00
Hatchery Design Management	16	80	14	56	12	36	8	16	0	0	50	188	3.76
Fish & Crustaceans Diseases & Control	12	60	12	48	10	30	10	20	0	0	44	158	3.59
Larval Culture & Transport	14	70	12	48	12	36	12	24	0	0	50	178	3.56
Fish Population Dynamics	10	50	10	40	10	30	10	20	0	0	40	140	3.50
Fishpond Design and Management	22	110	12	48	10	30	4	8	0	0	48	196	4.08
Integrated Fish Culture	18	90	14	56	10	30	6	12	0	0	48	188	3.92
Marine Fish & Shellfish Culture/Farming	25	125	12	48	10	30	5	10	0	0	52	213	4.10
Fish Culture Methods & Techniques	20	100	14	56	12	36	4	8	0	0	50	200	4.00
Systematics of Fishes	18	90	12	48	8	24	6	12	0	0	44	174	3.95
Total	251	1355	182	728	149	447	97	199	2	2	681	2616	3.84

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Perceived as moderately relevant the non-government organizations as indicated by their weighted mean are the two subject areas; (1) micro algae, 3.00; and (2) fish population dynamics, 3.50.

The subject areas also share the relevance to the course in aquamarine technology. Its relevance is focused on the management of resources and technology of mariculture of fishes.

Relevance of Training Skills in Subject Areas for Foods and Marine Products Technology Course

Fishery educators and supervisors perceptions on the relevance of training skills in subject areas for foods and marine products technology course (Table 15). The table shows that ten subject areas are perceived as very much relevant to the training skills in food and marine products technology course as indicated by their weighted mean: (1) coastal resources management, 4.60; (2) food and fishery industrial technology, 4.90; (3) microbiology, 4.80; (4) food and marine products handling and refrigeration, 4.70; (5) food marketing and economics, 4.73; (6) biochemistry, 4.67; (7) food curing, 4.67; (8) food quality analysis and packaging, 4.67; (9) marine products development, 4.80; and (10) systematics of fishes, 4.53.

Table 15

Fishery Educators And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Food and Marine Products Technology

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	20	100	8	32	2	6	0	0	0	0	30	138	4.60
Food & Fishery Industrial Technology	28	140	2	8	0	0	0	0	0	0	30	156	4.90
Microbiology	25	125	5	20	0	0	0	0	0	0	30	145	4.80
Food & Marine Products Handling & Ref.	23	115	5	20	2	6	0	0	0	0	30	141	4.70
Food Marketing & Economics	24	120	4	16	2	6	0	0	0	0	30	142	4.73
Biochemistry	22	110	6	24	2	6	0	0	0	0	30	140	4.67
Plant Sanitation & Safety	20	100	5	20	3	9	2	4	0	0	30	133	4.43
Food Curing	21	105	8	32	1	3	0	0	0	0	30	140	4.67
Food Quality Analysis & Packaging	25	125	3	12	1	3	1	2	0	0	30	140	4.67
Marine Products Development	26	130	2	8	2	6	0	0	0	0	30	144	4.80
Fermentation	18	90	8	32	2	6	1	2	1	1	30	131	4.37
Principles of Food Engineering	20	100	8	32	2	6	0	0	0	0	30	132	4.40
Foods & Marine Products Processing	23	115	5	20	2	6	0	0	0	0	30	135	4.50
Systematics of Fishes	22	110	4	16	2	6	2	4	0	0	30	136	4.53
Total	317	1585	73	292	23	69	6	12	1	1	420	1953	4.65

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Perceived as much relevant training skills in subject areas are (1) plant sanitation and safety, 4.43; (2) fermentation, 4.37; (3) principles of food engineering, 4.40; and (4) food and marine products processing, 4.50.

The ten or 71.43 percent of the subject areas are very much relevant and only four or 28.57 percent are much relevant to the training skills in food and marine product technology but not are considered moderately relevant and not much relevant which give a congruency of the subject areas to the course in the foods and marine products technology and therefore contribute to the economic needs of the community.

Fishery instructors and students perceptions on the relevance of training skills in subject areas for foods and marine products technology course (Table 16). The table reveals that the training skills in subject areas are relevant to the foods and marine products technology course as indicated by their weighted mean of 4.19. The subject areas that are much relevant as perceived by the fishery instructors and students are as follows: (1) coastal resources management, 3.85; (2) food and fishery industrial technology, 4.27; (3) microbiology, 4.20; (4) food and marine products handling and refrigeration, 4.21.

Table 16

Fishery Instructors And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Food and Marine Products Technology

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	71	355	60	240	40	120	15	30	10	10	196	755	3.85
Food & Fishery Industrial Technology	88	440	70	280	35	105	0	0	0	0	193	825	4.27
Microbiology	84	420	65	260	45	135	0	0	0	0	194	812	4.20
Food & Marine Products Handling & Ref.	82	410	75	300	40	120	0	0	0	0	197	830	4.21
Food Marketing & Economics	85	425	75	300	35	105	2	4	0	0	197	834	4.23
Biochemistry	80	400	70	280	30	90	15	30	2	2	197	802	4.07
Plant Sanitation & Safety	86	430	74	296	30	90	7	14	0	0	197	830	4.21
Food Curing	80	450	75	300	30	90	0	0	0	0	195	840	4.31
Food Quality Analysis & Packaging	81	455	78	312	25	75	0	0	0	0	194	842	4.34
Marine Products Development	80	400	80	320	30	90	5	10	0	0	195	820	4.21
Fermentation	75	375	70	280	10	120	5	10	0	0	190	785	4.13
Principles of Food Engineering	32	410	80	320	32	96	0	0	0	0	194	826	4.26
Foods & Marine Products Processing	90	450	82	328	25	75	0	0	0	0	197	853	4.33
Systematics of Fishes	72	360	75	300	35	105	10	20	0	0	192	785	4.09
Total	1086	5780	1029	4116	442	1416	59	118	12	12	2728	11442	4.19

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA).

Others are: (5) food marketing and economics, 4.23; (6) biochemistry, 4.07; (7) plants sanitation and safety, 4.21; (8) food curing, 4.31; (9) food quality analysis and packaging, 4.34; (10) marine products development, 4.21; (11) fermentation, 4.13; (12) principles of food engineering, 4.26; (13) food and marine products processing, 4.33; and (14) systematics of fishes, 4.09.

The training skills in all the fourteen subjects are perceived as very much relevant to the course in foods and marine products technology and their contribution to the economic activities of the people in the community and will uplift their socio-economic life conditions in the rural community. The course deals with different methods of processing. Food science and its application to marine products with training skills in these subject areas are very much relevant.

Local government officials perceptions on the relevance of training skills in subject areas for foods and marine products technology course (Table 17). Nine subject areas are perceived as very much relevant to the training skills in foods and marine products technology course as indicated by their weighted mean.

Table 17

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Food and Marine Products Technology

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	25	125	20	80	5	15	2	4	0	0	52	224	4.31
Food & Fishery Industrial Technology	30	150	20	80	2	6	0	0	0	0	52	236	4.54
Microbiology	28	140	20	80	3	9	1	2	0	0	52	231	4.44
Food & Marine Products Handling & Ref.	29	145	20	80	3	9	0	0	0	0	52	234	4.50
Food Marketing & Economics	32	160	20	80	0	0	0	0	0	0	52	240	4.62
Biochemistry	30	150	20	80	2	6	0	0	0	0	52	236	4.54
Plant Sanitation & Safety	33	165	19	76	0	0	0	0	0	0	52	241	4.63
Food Curing	28	140	20	80	4	12	0	0	0	0	52	232	4.46
Food Quality Analysis & Packaging	65	175	10	40	5	15	0	0	0	0	50	230	4.60
Marine Products Development	40	200	10	40	2	6	0	0	0	0	52	246	4.73
Fermentation	35	175	15	60	2	6	0	0	0	0	52	241	4.63
Principles of Food Engineering	38	190	10	40	2	6	2	4	0	0	52	240	4.62
Foods & Marine Products Processing	36	180	15	60	1	3	0	0	0	0	52	243	4.67
Systematics of Fishes	30	150	15	60	5	15	2	4			52	229	4.40
Total	449	2245	234	936	36	108	7	14	0	0	726	3303	4.55

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

These are:(1) foods and fishery industrial technology, 4.54; (2) food marketing and economics, 4.62; (3) bio-chemistry, 4.54; (4) plant sanitation and safety, 4.63; (5) food quality analysis and packaging, 4.60; (6) marine products development, 4.73 (7) fermentation, 4.63; (8) principles of food engineering, 4.62; and (9) food and marine products, 4.67. Perceived as much relevant as indicated by their weighted mean are: (1) coastal resources management, 4.31; (2) microbiology, 4.44; (3) food and marine products handling and refrigeration, 4.50; (4) food curing, 4.46; and (5) systematics of fishes.

Training skills in subject areas for the foods and marine products technology course is very much relevant as indicated by the weighted mean of 4.55 and therefore helps improve and develop the existing food and marine products processing technology in the community where there are available fishery and marine resources. They also help develop the community resources and in the protection and conservation measures of the available resources for economic and fishery industrial development that ensure the food security of the community which could be worthy for a progressive citizenry and community.

<u>Non-government organization, business and industry organizations perceptions on the relevance of training skills in subject areas for foods and marine products technology course (Table 18).</u> The training skills in these subject areas are perceived by non-government, business and industry organizations as being much relevant to the course in foods and marine products technology with a weighted mean of 3.93. The following subject areas are considered as much relevant to the course indicated by their weighted means: (1) coastal resources management, 3.89; (2) food and fishery industrial technology, 3.95; (3) microbiology, 3.79; (4) food and marine products handling and refrigeration, 4.11; (5) food marketing and economics, 4.05; (6) biochemistry, 3.95 (7) plants sanitation and safety, 4.13; (8) food curing, 3.63; (9) food quality, analysis and packaging, 4.05; (10) marine products development, 3.97; (11) fermentation, 3.58; (12) principles of food engineering, 3.95; (13) food and marine products processing, 3.89; and (14) systematics of fishes, 4.11.

As there are already existing technology, the training skills in subject areas for the course in foods and marine products technology are only much relevant as perceived by the non-government, business and industry organizations.

Table 18

Non-Government Organizations, Business And Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Food and Marine Products Technology

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	14	70	12	48	6	18	6	12	0	0	38	148	3.89
Food & Fishery Industrial Technology	14	70	12	48	8	24	4	8	0	0	38	150	3.95
Microbiology	12	60	12	48	8	24	6	12	0	0	38	144	3.79
Food & Marine Products Handling & Ref.	14	70	14	56	10	30	0	0	0	0	38	156	4.11
Food Marketing & Economics	14	70	14	56	8	24	2	4	0	0	38	154	4.05
Biochemistry	12	60	14	56	10	30	2	4	0	0	38	150	3.95
Plant Sanitation & Safety	15	75	14	56	8	24	1	2	0	0	38	157	4.13
Food Curing	10	50	12	48	12	36	2	4			38	138	3.63
Food Quality Analysis & Packaging	15	75	14	56	5	15	4	8	0	0	38	165	4.05
Marine Products Development	14	70	14	56	5	15	5	10	0	0	38	151	3.97
Fermentation	10	50	10	40	10	30	8	16			38	136	3.58
Principles of Food Engineering	16	80	10	40	6	18	6	12	0	0	38	150	3.95
Foods & Marine Products Processing	14	70	12	47	6	18	6	12			38	148	3.89
Systematics of Fishes	14	70	14	56	10	30	0	0	0	0	38	156	4.11
Total	188	940	178	712	112	336	52	104	0	0	532	2092	3.93

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

They need very much but this does not mean that the subject areas are not needed. The much relevant perceptions of the respondents on the training skills in the subject areas are an addition to their needs in the development processing of food and marine products in their community.

Relevance of Training Skills in Subject Areas for Fishery Business Management Course.

Fishery educators and supervisors perceptions on the relevance of training skills in subject areas for fishery business management course (Table 19).

All the thirteen subject areas are perceived as very much relevant to the training skills for the course fishery business management. The following subject areas as indicated by their weighted means: (1) coastal resources management, 4.63; (2) systematics of fishes, 4.67; (3) principles of economics, 4.77; (4) fishery business and economics, 4.90; (5) fishery resource management, 4.83; (6) business organization and management, 4.80; (7) coastal and ocean law, 4.70; (8) fundamentals of accounting, credit and banking, 4.70; (9) coastal and deep-sea fishing and management, 4.87; and (10) fish culture methods and management, 4.87.

Table 19

Fishery Educators And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Fishery Business Management.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	23	115	4	16	2	6	1	2	0	0	30	139	4.63
Systematics of Fishes	24	130	3	12	2	6	1	2	0	0	30	140	4.67
Principles of Economics	26	120	2	8	1	3	1	2	0	0	30	143	4.77
Fishery Business & Economics	28	140	1	4	1	3	0	0	0	0	30	147	4.90
Fishery Resource Management	26	130	3	12	1	3	0	0	0	0	30	145	4.83
Business Organization & Management	25	125	4	16	1	3	0	0	0	0	30	144	4.80
Coastal and Ocean Law	24	120	4	16	1	3	1	2	0	0	30	141	4.70
Fundamentals of Accnt Credit & Banking	24	120	3	12	3	9	0	0	0	0	30	141	4.70
Coastal & Deep Sea Fishing and Mngt.	27	135	2	8	1	3	0	0	0	0	30	146	4.87
Fish Culture Method & Management	27	135	2	8	1	3	0	0	0	0	30	146	4.87
Marine Products Processing & Mngt.	27	135	2	8	1	3	0	0	0	0	30	146	4.87
Aquamarine Culture & Management	28	130	1	4	1	3	0	0	0	0	30	147	4.90
Business Forecasting & Budgeting	26	140	2	8	2	6	0	0	0	0	30	144	4.80
Total	335	1675	33	132	18	54	4	8	0	0	390	1869	4.79

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

The last three subject areas are: (11) marine products processing and management, 4.87; (12) aquamarine culture and management, 4.90; and (13) business forecasting and budgeting, 4.80.

As perceived by the fishery educators and supervisors the training skills in subject areas are very much relevant to the course in fishery business management which ensure the success and development of business either a small-scale or large-scale enterprise that will give encouragement for the individual engage in entrepreneurial activity.

Fishery instructors and students perceptions on the relevance of training skills in subject areas for fishery business management course (Table 20). As perceived by the fishery instructors and students, the training skills in subject areas is very much relevant to the course in fishery business management as indicated by their weighted means: (1) coastal resources management, 3.68; (2) systematics of fishes, 3.74; (3) principles of economics, 4.06; (4) fishery business and economics, 4.12; (5) fishery resource management, 4.16; (6) business organization and management, 4.28; (7) coastal and ocean law, 4.17; and (8) fundamentals of accounting, credit and banking, 4.17.

Table 20

Fishery Instructors And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Fishery Business Management.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	77	385	43	172	31	93	26	52	19	19	196	721	3.68
Systematics of Fishes	70	350	50	200	30	90	30	60	10	10	190	710	3.74
Principles of Economics	78	390	56	224	46	138	10	20	0	0	190	772	4.06
Fishery Business & Economics	80	400	61	244	43	159	0	0	0	0	194	800	4.12
Fishery Resource Management	75	375	72	288	45	135	0	0	0	0	192	798	4.16
Business Organization & Management	85	425	80	320	30	90	0	0	0	0	195	835	4.28
Coastal and Ocean Law	75	375	73	292	42	126	0	0	0	0	190	793	4.17
Fundamentals of Accnt Credit & Banking	78	390	67	268	46	138	0	0	0	0	191	796	4.17
Coastal & Deep Sea Fishing and Mngt.	80	400	60	240	52	156	0	0	0	0	192	796	4.15
Fish Culture Method & Management	72	360	70	280	50	150	0	0	0	0	192	790	4.11
Marine Products Processing & Mngt.	85	425	69	276	41	123	0	0	0	0	195	824	4.22
Aquamarine Culture & Management	87	435	72	288	31	93	0	0	0	0	190	816	4.29
Business Forecasting & Budgeting	84	420	68	272	43	129	0	0	0	0	195	821	4.21
Total	1026	5130	841	3364	530	1620	66	132	29	29	2502	10272	4.11

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Others are: (9) coastal and deep-sea fishing and management, 4.15; (10) fish culture methods and management, 4.11; (11) marine products processing and management, 4.22; (12) aquamarine culture and management, 4.29; and (13) business forecasting and budgeting, 4.21. The relevance of training skills in subject areas for the course in fishery business management is much relevant which therefore needs some additional training skills to supplement or enrich the course content according to the fishery instructors and students in the community. This group of respondents are wanting more of knowledge and information in their quest for quality product or graduates and the needs for training skills are in their foreseeable skills needed in the course.

<u>Local government officials perceptions on the relevance of training skills in subject areas for fishery business management course (Table 21).</u> The training skills in nine subject areas are perceived as very much relevant to the course in fishery business management as indicated by their weighted means: (1) coastal resources management, 4.62; (2) fishery business and economics, 4.58; (3) business organization and management, 4.51 and; (4) fundamentals of accounting, credit and banking, 4.54.

Table 21

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Fishery Business Management.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	32	160	20	80	0	0	0	0	0	0	52	240	4.62
Systematics of Fishes	24	120	24	96	0	0	0	0	0	0	48	216	4.50
Principles of Economics	24	120	20	80	6	18	2	4	0	0	52	222	4.27
Fishery Business & Economics	32	160	18	72	2	6	0	0	0	0	52	238	4.58
Fishery Resource Management	28	140	22	88	1	3	1	2	0	0	52	233	4.48
Business Organization & Management	28	140	21	84	2	6	0	0	0	0	51	230	4.51
Coastal and Ocean Law	24	120	20	80	6	18	0	0	0	0	50	218	4.36
Fundamentals of Accnt Credit & Banking	30	150	20	80	2	6	0	0	0	0	52	236	4.54
Coastal & Deep Sea Fishing and Mngt.	31	155	20	80	1	3	0	0	0	0	52	238	4.58
Fish Culture Method & Management	30	150	20	80	1	3	0	0	0	0	51	233	4.57
Marine Products Processing & Mngt.	36	180	15	60	1	3	0	0	0	0	52	143	4.67
Aquamarine Culture & Management	34	170	16	64	1	3	0	0	0	0	51	237	4.65
Business Forecasting & Budgeting	30	150	20	80	2	6	0	0	0	0	52	236	4.54
Total	383	1915	256	1024	25	75	3	6	0	0	667	2920	4.38

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Next are: (5) coastal and deep-sea fishing and management, 4.58; (6) fish culture methods and management, 4.57; (7) marine products processing and management, 4.67; (8) aquamarine culture and management, 4.65; and (9) business forecasting and budgeting, 4.54. Perceived as much relevant in the training skills of subject areas for the course are: (1) systematics of fishes, 4.50; (2) principles of economics, 4.27; (3) fishery resource management, 4.48; and (4) coastal and ocean law, 4.36;

The composition of the subject areas in the fishery business management course is very important and needed in the operation and management of a fishery business enterprise as indicated by the weighted mean of nine subject areas or 69.23 percent that are very much relevant and only four subject areas or 30.77 percent are much relevant to the course as perceived by the local government officials.

<u>Non-government organizations, business and industry organization perceptions on the relevance of training skills in subject areas for fishery business management course (Table 22).</u> Ten subject areas are very much relevant to the course in fishery business management as perceived by the non-government, business and industry organizations.

Table 22

Non-Government Organizations, Business And Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Fishery Business Management.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	24	120	8	32	6	18	0	0	0	0	38	170	4.47
Systematics of Fishes	24	120	10	40	4	12	0	0	0	0	38	172	4.53
Principles of Economics	28	140	8	32	2	6	0	0	0	0	38	188	4.95
Fishery Business & Economics	26	130	12	48	0	0	0	0	0	0	38	178	4.68
Fishery Resource Management	27	135	10	40	1	3	0	0	0	0	38	178	4.68
Business Organization & Management	30	150	4	16	4	12	0	0	0	0	38	178	4.68
Coastal and Ocean Law	25	125	9	36	4	12	0	0	0	0	38	173	4.55
Fundamentals of Accnt Credit & Banking	24	120	12	48	2	6	0	0	0	0	38	174	4.58
Coastal & Deep Sea Fishing and Mngt.	22	110	14	56	2	6	0	0	0	0	38	172	4.53
Fish Culture Method & Management	20	100	16	64	2	6	0	0	0	0	38	178	4.68
Marine Products Processing & Mngt.	20	100	18	72	0	0	0	0	0	0	38	172	4.53
Aquamarine Culture & Management	22	110	12	48	4	12	0	0	0	0	38	170	4.47
Business Forecasting & Budgeting	18	90	16	64	4	12	0	0	0	0	38	116	4.37
Total	310	1550	149	596	36	105	0	0	0	0	494	2219	4.46

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.0 – 1.50 Not At All (NAA)

They were as indicated by their weighted means: (1) systematics of fishes, 4.53; (2) principles of economics, 4.95; (3) fishery business and economics, 4.68; (4) fishery resource management, 4.68; (5) business organization and management, 4.68; (6) coastal and ocean law, 4.55; (7) fundamentals of accounting, credit and banking, 4.58; (8) coastal and deep-sea fishing and management, 4.53; (9) fish culture methods and management, 4.68; and (10) marine products processing and management, 4.53. Perceived as much relevant to the training skills needed for the course are three subject areas: (1) coastal resources management, 4.47; (2) aquamarine culture and management, 4.47; and (3) business forecasting and budgeting, 4.37.

The training skills in subject areas are needed in the course for fishery business management as indicated by their weighted mean of 4.56 relevancy in the economic activities or business operation and management in the community and enable to enhance the growth of entrepreneurship especially the fisheries sector of the industry.

Relevance of Training Skills Subject Areas for Fisheries Economics Course

Fishery educators and supervisors perceptions on the relevance of training skills in subjects for fisheries economics course (Table 23). The perceptions of the fishery educators and supervisors on the relevance of training skills in subject areas are very much relevant to the course in fisheries economics as indicated by their weighted means: (1) coastal resources management, 4.60; (2) principles of economics, 4.87; (3) fishery scarcity and choice, 4.93; (4) specialization, exchange and money, 4.80; (5) money and banking system, 4.73; (6) fishery market mechanism and elasticity, 4.73; (7) fiscal policy, 4.53; (8) business organization and management, 4.80; (9) fishery aggregate supply and demand, 4.80; (10) cost and perfectly competitive supply, economic and efficiency, 4.87; and (11) fishery markets between monopoly and competition, 4.93.

The subject areas are very much relevant to the training skills needed in the fisheries economic course, since the course deals with fisheries economics aspects of fisheries planning, regulation, management, and development, which means that the composition of the subject areas are needed in the analysis and appraisal in fisheries which then helps improve and develop the fisheries sector of our economy.

Table 23

Fishery Educators And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Economics.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	20	110	8	32	2	6	0	0	0	0	30	138	4.60
Principles of Economics	26	130	4	16	0	0	0	0	0	0	30	146	4.87
Fishery Scarcity & Choice	28	140	2	8	0	0	0	0	0	0	30	148	4.93
Specialization Exchange & Money	26	130	2	8	2	6	0	0	0	0	30	144	4.80
Money & Banking System	24	120	4	16	2	6	0	0	0	0	30	142	4.73
Fishery Market Mechanism & Elasticity	23	115	6	24	1	3	0	0	0	0	30	142	4.73
Fiscal Policy	20	100	6	24	4	12	0	0	0	0	30	136	4.53
Business Organization & Management	24	120	6	24	0	0	0	0	0	0	30	144	4.80
Fishery Aggregate Supply and Demand	25	125	4	16	1	3	0	0	0	0	30	144	4.80
Cost & Perfectly Competitive Sup., Eco.	26	130	4	16	0	0	0	0	0	0	30	146	4.87
Fishery Market bet. Monopoly & Competition	28	140	2	8	0	0	0	0	0	0	30	148	4.93
Total	270	1360	48	192	12	36	0	0	0	0	330	1578	4.78

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Fishery instructors and students perceptions on the relevance of training skills in subject areas for fisheries economics course (Table 24). All of the eleven subject areas are much relevant to the training skills in fisheries business management course as perceived by the fishery instructors and students group of respondents as indicated by their weighted means are as follows: (1) coastal resources management, 3.95; (2) principles of economics, 4.05; (3) fishery scarcity and choice, 4.40; (4) specialization, exchange and money, 4.27; (5) money and banking system, 4.33; (6) fishery market mechanism and elasticity, 4.95; (7) fiscal policy, 4.02; (8) business organization and management, 4.22; (9) fishery aggregate supply and demand, 4.10; (10) cost and perfectly competitive supply, economic and efficiency, 4.27; and (11) fishery markets between monopoly and competition, 4.34.

The training skills in subject areas contributed much to the course as perceived by them and therefore needing some additional knowledge, information, and skills needed for fisheries economics development, planning, regulation and management for effective curricular program and its relevancy to socio-economic development of the community.

Table 24

Fishery Instructors And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Economics.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	75	375	52	208	45	135	20	40	0	0	192	758	3.95
Principles of Economics	80	400	64	256	34	102	18	36	0	0	196	794	4.05
Fishery Scarcity & Choice	96	480	82	328	18	54	0	0	0	0	196	862	4.40
Specialization Exchange & Money	85	426	76	304	34	102	0	0	0	0	196	832	4.27
Money & Banking System	90	450	80	320	25	75	0	0	0	0	195	845	4.33
Fishery Market Mechanism & Elasticity	77	385	53	212	34	102	26	52	0	0	190	751	3.95
Fiscal Policy	72	360	72	288	71	153	0	0	0	0	195	801	4.02
Business Organization & Management	82	410	72	288	40	120	0	0	0	0	194	818	4.22
Fishery Aggregate Supply and Demand	72	360	72	288	52	156	0	0	0	0	196	804	4.10
Cost & Perfectly Competitive Sup., Eco.	84	420	82	328	31	93	0	0	0	0	197	841	4.27
Fishery Market bet. Monopoly & Competition	90	450	84	336	23	69	0	0	0	0	197	855	4.34
Total	903	4516	789	3156	407	1161	64	128	0	0	2144	8961	4.18

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

<u>Local government officials perceptions on the relevance of training skills in subject areas for fisheries economics course (Table 25).</u> Eight or 72.73 percent of the eleven subject areas are perceived as very much relevant to the training skills in fisheries economics course as indicated by their weighted means: (1) coastal resources management, 4.54; (2) principles of economics, 4.70; (3) fishery scarcity and choice, 4.62; (4) specialization, exchange and money, 4.46; (5) business organization and management, 4.62; (6) fishery aggregate supply, economic and efficiency, 4.65; and (8) fishery markets between monopoly and competition, 4.62. While three or 27.27 percent are perceived as much relevant by the local government officials are: (1) money and banking system, 4.37; (2) fishery market mechanism and elasticity, 4.50; and (3) fiscal policy, 4.31. Their perceptions manifested a very much relevant with weighted mean of 4.57. The local government officials considered the training skills in the subject areas as very much relevant whereby the needed skills in fisheries economics development, regulation, and management are within the components of the training skills in the subject areas for the insurance of well- balanced fisheries industry of the economy of the community.

Table 25

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Economics.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	30	150	20	80	2	6	0	0	0	0	52	236	4.54
Principles of Economics	36	180	16	64	0	0	0	0	0	0	52	244	4.70
Fishery Scarcity & Choice	34	170	16	64	2	6	0	0	0	0	52	240	4.62
Specialization Exchange & Money	28	140	20	80	4	12	0	0	0	0	52	232	4.46
Money & Banking System	25	125	20	80	6	18	0	0	0	0	51	233	4.37
Fishery Market Mechanism & Elasticity	30	150	18	72	4	12	0	0	0	0	52	234	4.50
Fiscal Policy	24	120	20	80	8	24	0	0	0	0	52	224	4.31
Business Organization & Management	32	160	20	80	0	0	0	0	0	0	52	240	4.62
Fishery Aggregate Supply and Demand	38	190	14	56	0	0	0	0	0	0	52	246	4.73
Cost & Perfectly Competitive Sup., Eco.	34	170	18	72	0	0	0	0	0	0	52	242	4.65
Fishery Market bet. Monopoly & Competition	36	180	12	48	4	12	0	0	0	0	52	240	4.62
Total	347	1735	194	776	30	90	0	0	0	0	571	2611	4.57

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

Non-government organizations, business and industry organization perceptions on the relevance of training skills in subject areas for fisheries economics (Table 26). There are 8 out of eleven subject areas perceived as very much relevant to the training skills for the course in fisheries economics as indicated by the weighted mean: (1) principles of economic, 4.63; (2) fishery scarcity and choice, 4.63; (3) specialization exchange and money, 4.74; (4) money and banking system, 4.53; (5) fishery market mechanism and elasticity, 4.68; (6) business organization and management, 4.53; (7) cost and perfectly competitive supply, economic and efficiency, 4.63; and (8) fishery markets between monopoly and competition, 4.68. Three perceived as much relevant to the training skills of the subject areas in fisheries economics course as indicated by their weighted mean: (1) coastal resources management, 4.37; (2) fiscal policy, 4.47; and (3) fishery aggregate supply and demand, 4.47.

The weighted mean of 4.60 means very much relevant as perceived by the non-government, business and industry organizations on the relevance of training skills in subject areas for the course in fisheries economics.

Table 26

Non-Government Organizations, Business And Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Economics.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Resources Management	22	110	8	32	8	24	0	0	0	0	38	166	4.37
Principles of Economics	24	120	10	40	4	16	0	0	0	0	38	176	4.63
Fishery Scarcity & Choice	26	130	10	40	2	6	0	0	0	0	38	176	4.63
Specialization Exchange & Money	24	120	12	48	4	12	0	0	0	0	38	180	4.74
Money & Banking System	20	100	18	72	0	0	0	0	0	0	38	172	4.53
Fishery Market Mechanism & Elasticity	26	135	12	48	0	0	0	0	0	0	38	178	4.68
Fiscal Policy	22	110	12	48	4	12	0	0	0	0	38	170	4.47
Business Organization & Management	22	110	14	56	2	6	0	0	0	0	38	172	4.53
Fishery Aggregate Supply and Demand	28	140	10	40	0	0	0	0	0	0	38	180	4.47
Cost & Perfectly Competitive Sup., Eco.	26	130	10	40	2	6	0	0	0	0	38	176	4.63
Fishery Market bet. Monopoly & Competition	28	140	8	32	2	6	0	0	0	0	38	178	4.68
Total	268	1340	124	496	28	88		0	0	0	418	1924	4.60

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

The subject areas components are considered to give its share to fisheries sector of the community's economic which enhance the utilization of the resources to its best in the upliftment of livelihood in the community.

Relevance of Training Skills in Subject Areas for Fisheries Biology Course

Fishery educators and supervisors perceptions on the relevance of training skills in subject areas for fisheries biology course (Table 27). The fishery educators and supervisors perceived 12 subject areas s very much relevant to the training skills for the course in fisheries biology as indicated by their weighted mean: (1) marine biology and ecology, 4.90; (2) ichthyology, 4.76; (3) fish population dynamics, 4.67; (4) marine flora and fauna, 4.90; (5) fishing gears and methods, 4.73; (6) oceanography, 4.70; (7) fish pathology and physiology, 4.70; (8) fish genetics, 4.87; (9) coral reef ecology, 4.90; (10) zoogeography, 5.00; (11) seaweeds productivity and ecology, 4.80; and (12) biostatistics, 4.73.

Perceived as much relevant subject area is histology and microtechniques with a weighted mean of 4.47.

Table 27

Fishery Educators And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Biology Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Marine Biology & Ecology	28	140	1	4	1	3	0	0	0	0	30	147	4.90
Ichthyology	26	130	2	8	1	3	1	2	0	0	30	143	4.76
Fish Population Dynamics	28	140	2	8	0	0	0	0	0	0	30	148	4.67
Marine Flora & Fauna	28	140	1	4	1	3	0	0	0	0	30	147	4.90
Fishing Gears & Methods	25	125	3	12	1	3	1	2	0	0	30	142	4.73
Oceanography	24	120	3	12	3	9	0	0	0	0	30	141	4.70
Histology & Micro-techniques	20	100	5	20	4	12	1	2	0	0	30	134	4.47
Fish Pathology & Physiology	23	115	5	20	2	6	0	0	0	0	30	141	4.70
Fish Genetics	26	130	4	16	0	0	0	0	0	0	30	146	4.87
Coral Reef Ecology	27	135	3	12	0	0	0	0	0	0	30	147	4.90
Zoogeography	29	145	1	4	0	0	0	0	0	0	30	150	5.00
Seaweeds Productivity & Ecology	26	130	2	8	2	6	0	0	0	0	30	144	4.80
Biostatistics	24	120	4	16	2	6	0	0	0	0	30	142	4.73
Total	334	1670	36	144	17	51	3	6	0	0	390	1872	4.80

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

The weighted mean of 4.80 is very much relevant. The subject areas are needed in the training skills of the course in fisheries biology in order to provide the necessary knowledge and skills in the proper and wise utilization and conservation of fishery and marine resources for sustainable use of the community.

Fishery instructors and students perceptions on the relevance of training skills in subject areas for fisheries biology course (Table 28). Only the zoogeography subject area is perceived by the fishery instructors and students as very much relevant to the training skills needed in the fisheries biology course. Perceived as much relevant are 12 subject areas as indicated by their weighted means: (1) marine biology and ecology, 4.06; (2) ichthyology, 4.14; (3) fish population dynamics, 4.19; (4) marine flora and fauna, 4.36; (5) fishing gears and methods, 4.28; (6) oceanography, 4.50; (7) histology and microtechniques, 4.02; (8) fish pathology and physiology, 4.28; (9) fish genetics, 4.28; (10) coral reef ecology, 4.38; (11) seaweeds productivity and ecology, 4.37; and (12) biostatistics, 4.33.

Table 28

Fishery Instructors And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Biology Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Marine Biology & Ecology	80	400	56	224	45	135	12	24	0	0	193	783	4.06
Ichthyology	86	430	57	228	46	238	6	12	0	0	195	808	4.14
Fish Population Dynamics	90	450	60	240	34	102	10	20	0	0	194	812	4.19
Marine Flora & Fauna	100	500	70	280	20	60	5	10	0	0	195	850	4.36
Fishing Gears & Methods	85	425	80	320	30	90	0	0	0	0	195	835	4.28
Oceanography	95	495	85	340	17	51	0	0	0	0	197	886	4.50
Histology & Micro-techniques	70	350	70	280	42	126	12	24	0	0	194	780	4.02
Fish Pathology & Physiology	87	435	76	304	32	96	0	0	0	0	195	835	4.28
Fish Genetics	92	460	72	288	30	90	3	6	0	0	197	844	4.28
Coral Reef Ecology	90	450	90	260	16	48	0	0	0	0	196	858	4.38
Zoogeography	105	525	86	244	4	12.3	0	0	0	0	195	881	4.52
Seaweeds Productivity & Ecology	92	460	82	328	20	60	0	0	0	0	194	848	4.37
Biostatistics	88	440	80	320	18	54	4	8	0	0	190	822	4.33
Total	1160	5820	964	3856	354	1162	52	104	0	0	2530	10842	4.29

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

A weighted mean of 4.29 of the training skills in subject areas for course in fisheries biology as perceived by the fishery instructors and students is much relevant. Training skills is this subject areas are important and considered as components of the course to properly explore the biological aspects of the fisheries community in the marine environment.

Local government officials perceptions on the relevance of training skills in subject areas for fisheries biology course (Table 29). The training skills in subject areas for the course in fisheries biology are perceived as much relevant as indicated by their weighted much relevant as indicated by their weighted means: (1) marine biology and ecology, 4.12; (2) ichthyology, 4.27; (3) fish population dynamics, 4.27; (4) marine flora and fauna, 3.92; (5) fishing gears and methods, 4.15; (6) oceanography, 3.90; (7) histology and microtechniques, 3.88; (8) fish pathology and physiology, 3.83; (9) fish genetics, 3.81; (10) coral reef ecology, 3.81; (11) zoogeography, 4.04; (11) seaweeds productivity and ecology, 4.12; and (13) biostatistics, 3.92.

Table 29

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Biology Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Marine Biology & Ecology	20	100	18	72	14	42	0	0	0	0	52	214	4.12
Ichthyology	24	120	18	72	10	30	0	0	0	0	52	222	4.27
Fish Population Dynamics	22	110	16	64	14	42	0	0	0	0	52	216	4.15
Marine Flora & Fauna	20	100	16	64	8	24	8	16	0	0	52	204	3.92
Fishing Gears & Methods	20	100	20	80	12	36	0	0	0	0	52	216	4.15
Oceanography	18	90	15	60	15	45	4	8	0	0	52	203	3.90
Histology & Micro-techniques	16	80	18	72	14	42	4	8	0	0	52	202	3.88
Fish Pathology & Physiology	16	80	16	64	15	45	5	10	0	0	52	199	3.83
Fish Genetics	18	90	15	60	10	30	9	18	0	0	52	198	3.81
Coral Reef Ecology	18	90	15	60	10	30	9	18	0	0	52	198	3.81
Zoogeography	20	100	16	64	14	42	2	4	0	0	52	210	4.04
Seaweeds Productivity & Ecology	20	100	20	80	10	30	2	4	0	0	52	214	4.12
Biostatistics	20	100	16	64	8	24	8	16	0	0	52	205	3.92
Total	252	1260	219	876	154	462	51	102	0	0	676	2700	3.99

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

The needs for training skills in the subject areas ensures the right attitude and values towards work ethical practices in the biological studies of the fisheries, abounds the marine waters. These subject areas are much needed as many have no knowledge and awareness of fisheries biology.

Non-government organizations, business and industry organizations perceptions on the relevance of training skills in subject areas for fisheries biology course (Table 30). The subject areas are perceived by the non-government, business and industry organizations as much relevant to the training skills needed for the course in fisheries biology as indicated by their weighted mean: (1) marine biology and ecology, 4.21; (2) ichthyology, 4.37; (3) fish population dynamics, 4.32; (4) marine flora and fauna, 3.95; (5) fishing gears and methods, 3.79; (6) oceanography, 4.00; (7) histology and microtechniques, 3.74; (8) fish pathology and physiology, 4.21; (9) fish genetics, 4.26; (10) coral reef ecology, 4.26; (11) zoogeography, 3.97; (12) seaweeds productivity and ecology, 4.26; and (13) biostatistics, 4.16.

Table 30

Non-government Organizations and Business Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Biology Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Marine Biology & Ecology	16	80	14	56	8	24	0	0	0	0	38	160	4.21
Ichthyology	18	90	16	64	4	12	0	0	0	0	38	166	4.37
Fish Population Dynamics	18	90	14	56	6	18	0	0	0	0	38	164	4.32
Marine Flora & Fauna	14	70	12	58	8	24	4	8	0	0	38	150	3.95
Fishing Gears & Methods	12	60	12	58	8	24	6	12	0	0	38	144	3.79
Oceanography	14	70	14	56	6	18	4	8	0	0	38	152	4.00
Histology & Micro-techniques	12	60	10	40	10	30	6	12	0	0	38	142	3.74
Fish Pathology & Physiology	16	80	14	56	8	24	0	0	0	0	38	160	4.21
Fish Genetics	18	90	14	56	4	12	2	4	0	0	38	162	4.26
Coral Reef Ecology	16	80	16	64	6	18	0	0	0	0	38	162	4.26
Zoogeography	14	70	14	56	5	15	5	10	0	0	38	151	3.97
Seaweeds Productivity & Ecology	16	80	16	64	6	18	0	0	0	0	38	162	4.26
Biostatistics	16	80	12	48	10	30	0	0	0	0	38	158	4.16
Total	200	1000	178	712	89	267	27	54	0	0	494	2033	4.12

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

A weighted mean of 4.12 is much relevant to the training skills in subject areas needed by the course in fisheries biology. There is a need for understanding and appreciation of the different aspects of fisheries biology which leads the community to a better and more comprehensive knowledge of fisheries in their community.

Relevance of Training Skills in Subject Areas for Fisheries Oceanography Course

Fishery educators and supervisors perceptions on the relevance of training skills in subject areas for fisheries oceanography course (Table 31). The 12 subject areas are perceived as very much relevant to the training skills needed in the course for fisheries oceanography. As indicated by their weighted mean, the following subject areas are: (1) history and microtechniques, 4.73; (2) fish pathology, 4.60; (3) zoogeography, 4.87; (6) seaweeds productivity and ecology, 4.73; (7) biostatistics, 4.67; (8) fish and environmental interactions, 4.80; (9) acceptable catch and its estimation, 4.93; (10) fish finding and migration in relation to environmental factors, 4.87; (11) ocean environment and its variability, 4.83; and (12) systematics of fishes, 4.60.

Table 31

Fishery Educators And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Histology & Micro-techniques	24	120	4	16	2	6	0	0	0	0	30	142	4.73
Fish Pathology & Physiology	24	120	3	12	3	9	0	0	0	0	30	141	4.70
Fish Genetics	25	125	3	12	2	6	0	0	0	0	30	143	4.77
Coral Reef Ecology	24	120	6	18	0	0	0	0	0	0	30	138	4.60
Zoogeography	26	130	4	16	0	0	0	0	0	0	30	146	4.87
Seaweeds Productivity & Ecology	24	120	4	16	2	6	0	0	0	0	30	142	4.73
Biostatistics	22	110	6	24	2	6	0	0	0	0	30	140	4.67
Fish & Environmental Interactions	26	130	2	8	2	6	0	0	0	0	30	144	4.80
Acceptable Catch & Its Estimation	28	140	2	8	0	0	0	0	0	0	30	148	4.93
Fish Finding & Migration in Rel. to Env.	28	140	1	4	1	2	0	0	0	0	30	146	4.87
Ocean Environment & its Variability	27	135	2	8	1	2	0	0	0	0	30	145	4.83
Systematics of Fishes	24	120	3	12	3	9	0	0	0	0	30	138	4.60
Total	302	1510	40	154	18	49	0	0	0	0	360	1713	4.76

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

The subject areas are very much relevant to the course in fisheries oceanography. A component of the course is in dealing with different aspects of oceanography which can be applied to fisheries ecology, fisheries management, and practical fishing and also with variability of the oceanographic conditions in relation to marine fisheries. The marine fisheries of the high seas have become internationally competitive, and an economically risky business in which, therefore, there is the need to secure the economic survival of a given fishery of the Philippine Exclusive Economic Zone in the region where it has become necessary to utilize the available technological and scientific knowledge for improving fishing conditions of the community or of the rural coastal area.

Fishery instructors and students perceptions on the relevance of training skills in subject areas for fisheries oceanography course (Table 32). Six subject areas are perceived as very much relevant by the fishery instructors and students respondents to training skills needed in the fisheries oceanography course as indicated by their weighted mean: (1) zoogeography, 4.66; (2) biostatistics, 4.65; (3) fish and environmental interactions, 4.69; (4) acceptable catch and its estimation, 4.73.

Table 32

Fishery Instructors And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Histology & Micro-techniques	69	345	60	340	43	129	21	42	0	0	193	756	3.92
Fish Pathology & Physiology	78	390	72	288	40	120	4	8	0	0	194	806	4.15
Fish Genetics	115	575	62	248	20	60	0	0	0	0	197	883	4.48
Coral Reef Ecology	105	525	71	284	19	57	2	4	0	0	197	870	4.42
Zoogeography	132	660	63	252	2	6	0	0	0	0	197	918	4.66
Seaweeds Productivity & Ecology	102	410	84	336	10	30	1	2	0	0	197	878	4.46
Biostatistics	120	600	73	292	2	6	0	0	0	0	193	898	4.65
Fish & Environmental Interactions	134	670	61	244	0	0	0	0	0	0	195	914	4.69
Acceptable Catch & Its Estimation	145	725	50	200	2	6	0	0	0	0	197	131	4.73
Fish Finding & Migration in Rel. to Env.	153	765	41	164	2	6	0	0	0	0	196	136	4.77
Ocean Environment & its Variability	156	780	27	108	12	36	0	0	0	0	195	924	4.74
Systematics of Fishes	107	535	64	256	23	69	0	0	0	0	194	860	4.43
Total	1416	7080	728	3012	175	525	28	56	0	0	2347	8974	4.55

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Next are: (5) fish finding and migration in relation to environmental factors, 4.77; (6) ocean environment and its variability, 4.74. Also six subject areas are perceived much relevant s indicated by their weighted mean: (1) histology and microtechniques, 3.92; (2) fish pathology and physiology, 4.15; (3) fish genetics, 4.48; (4) coral reef ecology, 4.48; (5) seaweeds productivity and ecology, 4.46; and (6) systematics of fishes, 4.43. The training and skills in subject areas is perceived as very much relevant to the course in fisheries oceanography with a weighted mean of 4.55. The composition of the subject areas would show how to apply accumulated knowledge of the environment to fisheries problems and how to utilize environmental forecasting services for fisheries in the community so that knowledge on the relation between fish and its environment can be practical or have its practical applications for the exploration of deep-sea or offshore marine fisheries resources in order to promote the marine fisheries sector of the industry.

Local government officials perceptions on the relevance of training skills in subject areas for fisheries oceanography course (Table 33). Five subject areas are perceived as very much relevant by the local government officials as indicated by their weighted mean: (1) fish genetics, 4.58; (2) coral reef ecology, 4.54; (3) zoogeography, 4.81; (5) seaweeds productivity and ecology, 4.69; and (6) fish and environmental interactions, 4.62. While seven subject areas are perceived as much relevant to the training skills in fisheries oceanography course as indicated by their weighted means as follows: (1) histology and micro-techniques, 4.31; (2) fish pathology and physiology, 4.50; (3) biostatistics, 4.46; (4) acceptable catch and its estimation, 4.35; (5) fish finding and migration in relation to environment factors, 4.38; (6) ocean environment and its variability, 4.38; and (7) systematics of fishes, 4.38.

The perceptions of the local government officials to the training skills in subject areas is much relevant to the course in fisheries oceanography which is considered to help the problem in relation to the marine fisheries resources which are limited and exploited near the limit of their maximum production.

Table 33

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Histology & Micro-techniques	24	120	20	80	8	24	0	0	0	0	52	224	4.31
Fish Pathology & Physiology	30	150	18	72	4	12	0	0	0	0	52	234	4.50
Fish Genetics	32	160	18	72	2	6	0	0	0	0	52	238	4.58
Coral Reef Ecology	30	150	20	80	2	6	0	0	0	0	52	236	4.54
Zoogeography	42	210	10	40	0	0	0	0	0	0	52	250	4.81
Seaweeds Productivity & Ecology	40	200	8	32	4	12	0	0	0	0	52	244	4.69
Biostatistics	28	140	20	80	4	12	0	0	0	0	52	232	4.46
Fish & Environmental Interactions	34	170	16	64	2	6	0	0	0	0	52	240	4.62
Acceptable Catch & Its Estimation	25	125	20	80	7	21	0	0	0	0	52	226	4.35
Fish Finding & Migration in Rel. to Env.	26	130	20	80	6	18	0	0	0	0	52	228	4.38
Ocean Environment & its Variability	25	125	22	88	5	15	0	0	0	0	52	228	4.38
Systematics of Fishes	23	115	26	104	3	9	0	0	0	0	52	228	4.38
Total	359	1795	218	872	47	141	0	0	0	0	624	2808	4.50

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Exploitation of marine fisheries resources especially the migratory species requires the knowledge of the relation between fish and its environment and therefore the subject areas are relevant to the course.

Non-government organizations, business and industry organizations perceptions on the relevance of training skills in subject areas for fisheries oceanography course (Table 34). Seven subject areas are perceived as very much relevant by the non-government organizations, business and industry organizations to the training skills in fisheries oceanography course, as indicated by their weighted mean: (1) zoogeography, 4.53; (2) seaweeds productivity and ecology, 4.53; (3) fish and environmental interactions, 4.68; (4) acceptable catch and its estimation, 4.53; (5) fish finding and migration in relation to environmental factors, 4.63; (6) ocean environment and its variability, 4.58; and (7) systematics of fishes, 4.58. Perceived much relevant to the training skills in subject areas for the course are: (1) histology and micro techniques, 4.37, (2) fish pathology and physiology, 4.47; (3) fish genetics, 4.42; (4) coral reef ecology, 4.45; and (5) biostatistics, 4.37.

Table 34

Non-Government Organizations, Business And Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Fisheries Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Histology & Micro-techniques	18	90	16	64	4	12	0	0	0	0	38	166	4.37
Fish Pathology & Physiology	20	100	16	64	2	6	0	0	0	0	38	170	4.47
Fish Genetics	18	90	18	72	2	6	0	0	0	0	38	168	4.42
Coral Reef Ecology	20	100	15	60	3	9	0	0	0	0	38	169	4.45
Zoogeography	20	100	18	72	0	0	0	0	0	0	38	172	4.53
Seaweeds Productivity & Ecology	22	110	14	56	2	6	0	0	0	0	38	172	4.53
Biostatistics	20	100	12	48	6	18	0	0	0	0	38	166	4.37
Fish & Environmental Interactions	26	130	12	48	0	0	0	0	0	0	38	178	4.68
Acceptable Catch & Its Estimation	24	120	10	40	4	12	0	0	0	0	38	172	4.53
Fish Finding & Migration in Rel. to Env.	24	120	14	56	0	0	0	0	0	0	38	176	4.63
Ocean Environment & its Variability	24	120	12	48	2	6	0	0	0	0	38	174	4.58
Systematics of Fishes	22	110	16	640	0	0	0	0	0	0	38	174	4.58
Total	258	1290	173	1268	25	75	0	0	0	0	456	2057	4.51

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

A weighted mean of 4.51 is a very much relevant perception on the training skills in subject areas for the course in fisheries oceanography. Considering the contribution of the subject components, considerable efforts are expanded on the resource conservation and on the methods and means of sharing the available resources between different communities in the region. Knowledge and skills in the subject areas are needed to ensure modern methods for fisheries resource management.

Relevance of Training Skills in Subject Areas for Coastal Oceanography Course.

Fishery educators and supervisors perceptions on the relevance of training skills in subject areas for coastal oceanography course (Table 35). The subject areas are perceived as very much relevant to the training skills for coastal oceanography course by the fishery educators and supervisors group of respondents as indicated by their weighted mean: (1) oceanography and coastal waters, 4.77; (2) estuarine and coastal ocean dynamics, 4.80; (3) benthic ecology, 4.80; (4) nearshore dynamics, 4.83; (5) coastal zone planning and management, 4.87; (6) coastal water pollution, 4.83; (7) coastal and fluvial sedimentation, 4.77; and (8) marine environment ecology, 4.70.

Table 35

Fishery Educators And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Coastal Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Oceanography of Coastal Waters	24	120	5	20	1	3	0	0	0	0	30	143	4.77
Estuarine & Coastal Ocean Dynamics	24	120	6	24	0	0	0	0	0	0	30	144	4.80
Benthic Ecology	25	125	6	24	0	0	0	0	0	0	30	144	4.80
Nearshore Dynamics	25	125	4	16	1	3	0	0	0	0	30	145	4.83
Coastal Water Pollution	26	130	4	16	0	0	0	0	0	0	30	146	4.87
Coastal Zone Planning & Management	26	130	3	12	1	3	0	0	0	0	30	145	4.83
Coastal & Fluvial Sedimentation	25	125	3	12	2	6	0	0	0	0	30	143	4.77
Marine Environment Ecology	24	120	3	12	3	9	0	0	0	0	30	141	4.70
Plankton Ecology	24	120	4	16	2	6	0	0	0	0	30	142	4.73
Coral Ecology	25	125	3	12	2	6	0	0	0	0	30	143	4.77
Toxics Chem. & Power Stations on Cos.	25	125	2	8	3	9	0	0	0	0	30	142	4.73
Systematics of Fishes	21	105	8	32	1	3	0	0	0	0	30	140	4.67
Total	294	1470	51	204	16	48	0	0	0	0	360	1718	4.77

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Others are: (9) plankton ecology, 4.73; (10) coral ecology, 4.77; (11) toxic chemical and power stations on coastal plankton, 4.73; and (12) systematics of fishes, 4.67.

The fishery educators and supervisors perceived the training skills in subject areas for the course in coastal oceanography as indicated by a weighted mean of 4.77. The nearshore and coastal zone of the littoral boundaries of the community bounds the different marine organisms that are so useful for economic maintenance that are not given due attention because of lack of knowledge and skills in coastal oceanography and therefore the subject areas composition in the course enhancement and great awareness of the dynamics of nearshore environment.

<u>Fishery instructors and students perceptions on the relevance of training skills in subject areas for coastal oceanography course (Table 36).</u> Perceived as very much relevant by the fishery instructors and students group of respondents are nine subject areas relevant to the training skills for the course in coastal oceanography as indicated by their weighted mean: (1) benthic ecology, 4.53; (2) nearshore dynamics, 4.52; (3) coastal zone planning and management, 4.61; and (4) coastal water pollution, 4.56.

Table 36

Fishery Instructors And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Coastal Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Oceanography of Coastal Waters	102	510	63	252	30	90	0	0	0	0	195	892	4.37
Estuarine & Coastal Ocean Dynamics	108	540	74	296	13	39	0	0	0	0	195	875	4.49
Benthic Ecology	106	530	84	336	4	12	0	0	0	0	194	878	4.53
Nearshore Dynamics	102	510	94	376	0	0	0	0	0	0	196	886	4.52
Coastal Water Pollution	120	600	86	304	0	0	0	0	0	0	196	904	4.61
Coastal Zone Planning & Management	114	570	84	296	6	18	0	0	0	0	194	884	4.56
Coastal & Fluvial Sedimentation	112	560	82	328	0	0	0	0	0	0	194	888	4.58
Marine Environment Ecology	115	585	82	328	0	0	0	0	0	0	197	903	4.54
Plankton Ecology	118	590	65	260	12	36	0	0	0	0	195	886	4.58
Coral Ecology	110	550	75	300	9	27	0	0	0	0	194	877	4.52
Toxics Chem. & Power Stations on Cos.	121	605	62	248	13	39	0	0	0	0	196	892	4.55
Systematics of Fishes	98	490	92	368	5	15	0	0	0	0	195	873	4.48
Total	1326	6630	923	3692	92	276	0	0	0	0	2341	10638	4.54

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

Next are: (5) coastal and fluvial sedimentation, 4.58; (6) marine environmental ecology, 4.54; (7) plankton ecology, 4.58; (8) coral ecology, 4.52; and (9) toxic chemical and power stations on coastal plankton, 4.55. Three are perceived much relevant as indicated by their weighted mean as follows: (1) oceanography of coastal waters, 4.37; (2) estuarine and coastal ocean dynamics, 4.49; and (3) systematics of fishes, 4.48.

With a weighted mean of 4.54 which is very much relevant, the training skills in subject areas for coastal oceanography is beneficial for the enhancement of the coastal zone of the community thereby providing greater effort to protect the coastal resources of the community to preserve and maintain the livelihood.

<u>Local government officials perceptions on the relevance of training skills in subject areas for coastal oceanography course (Table 37).</u> The relevance of training skills in subject areas is perceived as much relevant by the local government officials as indicated by a weighted mean of 4.23. The following subject areas relevant to the training skills for the course in coastal oceanography.

Table 37

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Coastal Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Oceanography of Coastal Waters	24	120	22	88	6	18	0	0	0	0	52	226	4.35
Estuarine & Coastal Ocean Dynamics	23	115	17	68	12	36	0	0	0	0	52	219	4.21
Benthic Ecology	21	105	18	72	14	42	0	0	0	0	52	219	4.21
Nearshore Dynamics	21	105	16	64	15	45	0	0	0	0	52	214	4.12
Coastal Water Pollution	25	125	20	80	7	21	0	0	0	0	52	226	4.35
Coastal Zone Planning & Management	25	105	15	60	12	36	0	0	0	0	52	221	4.25
Coastal & Fluvial Sedimentation	20	100	18	2	14	42	0	0	0	0	52	214	4.12
Marine Environment Ecology	24	120	20	80	8	24	0	0	0	0	52	224	4.31
Plankton Ecology	20	100	21	84	11	33	0	0	0	0	52	217	4.17
Coral Ecology	21	105	20	80	11	33	0	0	0	0	52	218	4.19
Toxics Chem. & Power Stations on Cos.	25	125	21	84	6	18	0	0	0	0	52	227	4.37
Systematics of Fishes	18	90	20	80	14	42	0	0	0	0	52	212	4.08
Total	267	1315	228	912	130	390	0	0	0	0	624	2637	4.23

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

They are as follows: (1) oceanography and coastal waters, 4.35; (2) estuarine and coastal ocean dynamics, 4.21; (3) benthic ecology, 4.21; (4) nearshore dynamics, 4.12; (5) coastal zone planning and management, 4.35; (6) coastal water pollution, 4.25; (7) coastal and fluvial sedimentation, 4.12; (8) marine environment ecology, 4.31; (9) plankton ecology, 4.17; (10) coral ecology, 4.19; (11) toxic chemical and power stations on coastal plankton, 4.37; and (12) systematics of fishes, 4.08.

Coastal water resources need ecological and environmental protection to sustain its economic importance. It is in the coastal waters where marine species aggregates and breeds, especially the juvenile or the young and therefore the knowledge and skills in the subject areas are much relevant to the course in coastal oceanography.

Non-government organizations, business and industry organizations perceptions on the relevance of training skills in subject areas for coastal oceanography course (Table 38). Six subject areas are perceived as very much relevant to the training skills for the course in coastal oceanography by the non-government organizations, business and industry organizations.

Table 38

Non-Government Organizations, Business And Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Coastal Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Oceanography of Coastal Waters	24	120	10	40	4	12	0	0	0	0	38	172	4.53
Estuarine & Coastal Ocean Dynamics	26	230	10	40	2	6	0	0	0	0	38	176	4.63
Benthic Ecology	22	110	10	40	6	18	0	0	0	0	38	168	4.42
Nearshore Dynamics	24	120	8	32	6	18	0	0	0	0	38	170	4.47
Coastal Water Pollution	24	120	12	48	2	6	0	0	0	0	38	174	4.58
Coastal Zone Planning & Management	26	130	8	32	4	12	0	0	0	0	38	174	4.58
Coastal & Fluvial Sedimentation	22	110	8	32	8	24	0	0	0	0	38	166	4.37
Marine Environment Ecology	26	130	6	24	6	18	0	0	0	0	38	172	4.53
Plankton Ecology	20	100	10	40	8	24	0	0	0	0	38	164	4.32
Coral Ecology	24	120	8	32	6	18	0	0	0	0	38	170	4.47
Toxics Chem. & Power Stations on Cos.	26	140	12	48	0	0	0	0	0	0	38	178	4.68
Systematics of Fishes	24	120	7	28	7	21	0	0	0	0	38	169	4.45
Total	288	1550	109	436	59	177	0	0	0	0	456	2053	4.50

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

They were as indicated by their weighted mean: (1) oceanography and coastal waters, 4.53; (2) estuarine and coastal ocean dynamics, 4.63; (3) coastal zone planning and management, 4.58; (4) coastal water pollution, 4.58; (5) marine environment ecology, 4.53; (6) toxic chemical and power stations on coastal plankton, 4.68. Perceived much relevant subject areas as indicated by their weighted mean are: (1) benthic ecology, 4.53; (2) nearshore dynamics, 4.47; (3)coastal and fluvial sedimentation, 4.37; (4) plankton ecology, 4.32; (5) coral ecology, 4.47; and (6) systematics of fishes.

The shallower part of the ocean is the most productive and where in most of the coral formations are found. This division of oceanography has to be developed and to combat the growing threat of over-fishing, destructive method of fishing, and deadly mix of human induced stresses such as pollution and siltation. The subject areas contents advocates judicious utilization of coastal marine resources and conservation of coral reefs in the coastal communities of the region, through the right and socially effective individual in the community.

Relevance of Training Skills in Subject Areas for Oceanography Course.

Fishery educator and supervisors perceptions of training skills in subject areas for oceanography course (Table 39). Level subject areas are perceived as very much relevant to training skills for oceanography course as indicated by their weighted mean: (1) ocean basins and the seabid, 4.70; (2) progresses on the continental shelf, 4.77; (3) waves and tides, 4.67; (4) navigation and bathymetry, 4.70; (5) sedimentations and materials of the sea floor, 4.73; (6) topography and formation bottom feature, 4.73; (7) temperature, salinity and pressure, 4.53; (8) density and equation of state of sea water, 4.67; (9) stability and colligative properties of seawater, (10) the equation of motion in oceanography, 4.80; (11) major ocean currents and surface waves, 4.87; and (12) instrumentation and data processing, 4.80. Perceived much relevant subject area to the training skills for the course in oceanography is large scale processes with a weighted mean of 4.43.

Consider the limitations in the use of relatively smaller vessel for exploring the exclusive economic zone of 200 mile and improving the efficiency of fishing.

Table 39

Fishery Educators And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Ocean Basins & the Seabed	24	120	4	16	1	3	1	2	0	0	30	141	4.70
Large Scale Processes	21	105	7	28	2	6	0	0	0	0	30	133	4.43
Processes on the Continental Shelf	24	120	5	20	1	3	0	0	0	0	30	143	4.77
Waves & Tides	24	120	2	8	4	12	0	0	0	0	30	140	4.67
Navigation & Bathymetry	24	120	3	12	3	9	0	0	0	0	30	141	4.70
Sedimentation & Mat. of the Sea Floor	24	120	4	16	2	6	0	0	0	0	30	142	4.73
Topography & Formation Bottom Feat.	23	115	6	24	1	3	0	0	0	0	30	142	4.73
Temperature, Salinity & Pressure	23	115	5	20	2	6	0	0	0	0	30	136	4.53
Density & Equation of State of Seawater	23	115	4	16	3	9	0	0	0	0	30	140	4.67
Stability & Colligative Prop. of Seawater	23	115	7	28	0	0	0	0	0	0	30	143	4.77
TheEquation of Motion in Oceanography	24	120	6	24	0	0	0	0	0	0	30	144	4.80
Major Ocean Currents Surface Waves	26	130	4	16	0	0	0	0	0	0	30	146	4.87
Instrumentation & Data Processing	26	130	2	8	2	6	0	0	0	0	30	144	4.80
Total	309	1545	59	231	21	63	1	2	0	0	390	1835	4.71

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

A much more effective utilization of meteorological and oceanography forecasts is needed. The solution of this task depends on the development of better long-range forecasts which could ultimately allow supervisor advance planning of fishing and so the knowledge and skills in the subject areas is very much relevant to oceanography.

Fishery instructors and students perceptions on the relevance of training skills in subject areas for oceanography course (Table 40). The training skills in subject areas for the course in oceanography are perceived as very much relevant by the fishery instructors and students as indicated by the fishery instructors and students, as indicated by the fishery instructors and students, as indicated by their weighted mean: (1) ocean basins and the seabed, 4.60; (2) large scale processes, 4.60; (3) processes on the continental shelf, 4.67; (4) waves and tides, 4.66; (5) navigation and bathymetry, 4.66; (6) sedimentations and materials of the sea floor, 4.64; (7) topography and formation bottom feature, 4.70; (8) temperature, salinity and pressure, 4.68; (9) density and equation of motion in oceanography, 4.69; (12) major ocean currents and surface waves, 4.64; and (13) instrumentation and data processing, 4.68.

Table 40

Fishery Instructors And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Ocean Basins & the Seabed	138	690	36	144	21	63	0	0	0	0	195	897	4.60
Large Scale Processes	140	700	36	144	21	63	0	0	0	0	197	907	4.60
Processes on the Continental Shelf	137	685	54	216	5	15	0	0	0	0	196	916	4.67
Waves & Tides	136	680	60	240	0	0	0	0	0	0	196	920	4.69
Navigation & Bathymetry	137	685	50	200	8	24	0	0	0	0	195	903	4.66
Sedimentation & Mat. of the Sea Floor	138	690	46	184	12	36	0	0	0	0	196	910	4.64
Topography & Formation Bottom Feat.	137	685	60	240	0	0	0	0	0	0	197	925	4.70
Temperature, Salinity & Pressure	136	680	58	232	2	6	0	0	0	0	196	918	4.68
Density & Equation of State of Seawater	135	675	62	248	0	0	0	0	0	0	197	923	4.69
Stability & Colligative Prop. of Seawater	140	700	50	200	7	21	0	0	0	0	197	921	4.68
TheEquation of Motion in Oceanography	137	685	58	232	2	6	0	0	0	0	197	923	4.69
Major Ocean Currents Surface Waves	138	680	56	224	2	6	0	0	0	0	196	910	4.64
Instrumentation & Data Processing	136	680	56	224	3	9	0	0	0	0	195	913	4.68
Total	1785	8915	682	2728	83	222	0	0	0	0	2550	11886	4.66

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

The very much relevant perceptions of the fishery instructors and students of the training skills in subject areas for oceanography course is due to the fact that it is considered that predictions and change of a given property of the ocean in natures requires, besides a knowledge of the forces and processes, an accurate assignment of the initial state of the ocean that is about analysis. Variety of analysis or methods has to be used or applied in the analysis of oceanographic parameters to get what is needed for fishing. In this way it helps improve the technology in the community.

Local government officials perceptions on the relevance of training skills in subject areas for oceanography course (Table 41). Ten subject areas are very much relevant to the training skills for oceanography course as perceived by the local government officials, as indicated by their weighted mean as follows: (1) large scale processes, 4.581; (2) processes on the continental shelf, 4.62; (3) waves and tides, 4.58; (4) navigation and bathymentry, 4.63; (5) sedimentations and materials of the seafloor, 4.54; (6) topography and formation of bottoms feature, 4.69; and (7) temperature, salinity and pressure, 4.65.

Table 41

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Ocean Basins & the Seabed	34	170	16	64	2	6	0	0	0	0	52	240	4.36
Large Scale Processes	34	170	14	56	4	12	0	0	0	0	52	238	4.58
Processes on the Continental Shelf	33	165	18	72	1	3	0	0	0	0	52	240	4.62
Waves & Tides	36	180	10	40	6	18	0	0	0	0	52	238	4.58
Navigation & Bathymetry	35	175	15	60	2	6	0	0	0	0	52	241	4.63
Sedimentation & Mat. of the Sea Floor	35	175	10	40	7	21	0	0	0	0	52	236	4.54
Topography & Formation Bottom Feat.	38	190	12	48	2	6	0	0	0	0	52	244	4.69
Temperature, Salinity & Pressure	38	190	10	40	4	12	0	0	0	0	52	242	4.65
Density & Equation of State of Seawater	38	190	8	32	6	18	0	0	0	0	52	240	4.62
Stability & Colligative Prop. of Seawater	35	175	9	36	8	24	0	0	0	0	52	235	4.52
TheEquation of Motion in Oceanography	34	170	10	40	8	24	0	0	0	0	52	235	4.50
Major Ocean Currents Surface Waves	34	170	9	36	9	27	0	0	0	0	52	233	4.48
Instrumentation & Data Processing	34	170	12	48	6	18	0	0	0	0	52	236	4.54
Total	458	2295	153	616	65	198	0	2	0	1	676	3098	4.58

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

The others are: (8) density and equation of state of seawater, 4.62; (9) stability and colligative properties of seawater, 4.52; and (10) instrumentation and date processing, 4.54. Perceived much relevant to the training skills in subjects are: (1) ocean basins and the scabbed, 4.36; (2) this equation of motion in oceanography, 4.50; and (3) major ocean currents and surface waves, 4.48.

The local government officials considered it very much relevant that the ocean regions and distribution of fisheries or fish communities have some global interest which are dealings on economic problems concerning the deep-sea fisheries which in practice that one community on nations should be made responsible for work on the environmental analysis and regional or inter-governmental organizations such as the Bureau of Fisheries and Aquatic Resources which is expected that this organization in the future will be more active in fisheries services. Local administrations are usually concerned with one fisheries on few particular fisheries.

Non-government organizations, business and industry organizations perceptions on the relevance of training skills in subject areas for oceanography course (Table 42).

Table 42

Non-Government Organizations, Business And Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Oceanography Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Ocean Basins & the Seabed	22	110	10	40	6	18	0	0	0	0	38	168	4.42
Large Scale Processes	22	110	12	48	4	12	0	0	0	0	38	174	4.58
Processes on the Continental Shelf	26	130	10	40	2	6	0	0	0	0	38	176	4.63
Waves & Tides	26	130	6	24	6	18	0	0	0	0	38	172	4.53
Navigation & Bathymetry	24	120	12	48	2	6	0	0	0	0	38	174	4.58
Sedimentation & Mat. of the Sea Floor	24	120	10	40	4	12	0	0	0	0	38	172	4.53
Topography & Formation Bottom Feat.	24	120	8	32	6	18	0	0	0	0	38	170	4.47
Temperature, Salinity & Pressure	24	120	7	28	7	21	0	0	0	0	38	169	4.45
Density & Equation of State of Seawater	22	110	10	40	6	18	0	0	0	0	38	168	4.42
Stability & Colligative Prop. of Seawater	22	110	8	32	8	24	0	0	0	0	38	166	4.37
TheEquation of Motion in Oceanography	22	110	9	36	7	21	0	0	0	0	38	167	4.40
Major Ocean Currents Surface Waves	22	110	12	48	4	12	0	0	0	0	38	170	4.47
Instrumentation & Data Processing	26	130	8	32	4	12	0	0	0	0	38	173	4.58
Total	306	1530	122	488	66	202	0	0	0	0	494	2219	4.49

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

Six subject areas are very much relevant to the training skills for the course in oceanography as perceived by the non-government, business and industry organizations as indicated by their weighted mean: (1) large scale processes, 4.58; (2) processes on the continental shelf, 4.63; (3) waves and tides, 4.53; (4) navigation and bathymentry, 4.58; (5) sedimentations and materials of the seafloor, 4.53; and (6) instrumentation and date processing, 4.58. While seven are perceived much relevant as indicated by their weighted mean: (1) ocean basins and the seabed, 4.42; (2) topography and formation of bottoms feature, 4.47; (3) temperature, salinity and pressure, 4.45; (4) density and equation of state of seawater, 4.42; (5) stability and colligative properties of seawater, 4.37; (6)the equation of motion in oceanography, 4.40; and (7) major ocean currents and surface waves, 4.47.

Changes have occurred in marine fisheries and many pelagic stocks have declined. Many of these changes indicate that most fishery resources seem to be under intensive exploitation and some stocks have been overexploited which was caused by extension of jurisdiction over fishery resources and their management by coastal country to 200 nautical miles from the coast. This requires a new management approach that the fishery resources under jurisdiction be managed on the basis of knowledge on the resources, how they fluctuate, how other marine animals affects them, and how they respond to changing fisheries. Therefore the knowledge and skills in the subject areas for the course in oceanography is very much relevant to the training skills in the community to enable them to know and understand the conditions prevailing in the high seas, to the limit of the 200 exclusive economic zone from the coast.

Relevance of Training Skills in Subject Areas for Marine Biology Course.

Fishery educators and supervisors perceptions on the relevance of training skills in subject areas for marine biology course (Table 43). All the fifteen subject areas are very much relevant to the training skills in marine biology course as perceived by the fishery instructors and students as indicated by their weighted mean: (1) fundamentals of marine biology, 4.80; (2) marine botany, 4.87; (3) marine invertebrates, 4.90; (4) micro-techniques, 4.70; (5) comparative vertebrate anatomy, 4.67; (6) genetics and eugenetics, 4.77; (7) biostatistics, 4.70; and (8) quantitative chemistry, 4.77.

Table 43

Fishery Educators And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Marine Biology Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Fundamentals of Marine Biology	25	125	4	16	1	3	0	0	0	0	30	144	4.80
Marine Botany	27	135	2	8	1	3	0	0	0	0	30	146	4.87
Marine Invertebrate	27	135	3	12	0	0	0	0	0	0	30	147	4.90
Micro-technique	23	115	5	20	2	6	0	0	0	0	30	141	4.70
Comparative Vertebrate Anatomy	23	115	4	16	3	9	0	0	0	0	30	140	4.67
Genetics & Eugenics	25	125	3	12	2	6	0	0	0	0	30	143	4.77
Biostatistics	24	120	3	12	3	9	0	0	0	0	30	141	4.70
Quantitative Chemistry	25	125	3	12	2	6	0	0	0	0	30	143	4.77
Marine Plankton	26	130	4	16	0	0	0	0	0	0	30	146	4.87
Oceanography: Its Chem. & Phy. Prop.	26	130	2	8	2	6	0	0	0	0	30	144	4.80
Systematics of Fishes	24	120	4	16	2	6	0	0	0	0	30	142	4.73
Biochemistry	23	115	6	24	1	3	0	0	0	0	30	142	4.73
Marine Embriology	24	120	4	16	2	6	0	0	0	0	30	142	4.73
Marine Environment & Ecology	26	130	2	8	2	6	0	0	0	0	30	144	4.80
Mariculture	24	120	5	20	1	3	0	0	0	0	30	143	4.77
Total	372	1860	54	216	24	72	0	0	0	0	450	2148	4.77

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

The other areas are the: (9) marine plankton, 4.87; (10) oceanography, its chemical and physical properties, 4.80; (11) systematics of dishes, 4.73; (12) biochemiostry, 4.73; (13) marine embryology, 4.73; (14) marine environment and ecology, 4.80; and (15) mariculture, 4.77.

The subject areas are very much relevant to the training skills for the course in marine biology as the knowledge of marine life helps appreciate and understand the aspects of marine resources to support the economic activities in the community.

Fishery instructors and students perceptions on the relevance of training skills in subject areas for marine biology course (Table 44). Fourteen subject areas are very much relevant as perceived by the fishery instructors and students group of respondents, to the training skills in subject areas for the course in marine biology. As indicated by their weighted mean the following subjects are: (1) fundamentals of marine biology, 4.68; (2) marine botany, 4.68; (3) marine invertebrates, 4.66; (4) micro-techniques, 4.58; (5) comparative vertebrate anatomy, 4.51; (6) genetics and eugenics, 4.53; (7) biostatistics, 4.54; (8) marine plankton, 4.65; and (9) oceanography, its chemical and physical properties, 4.70.

Table 44

Fishery Instructors And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Marine Biology Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Fundamentals of Marine Biology	144	720	42	168	11	33	0	0	0	0	197	921	4.68
Marine Botany	145	725	40	160	12	36	0	0	0	0	197	921	4.68
Marine Invertebrate	146	730	36	144	15	45	0	0	0	0	197	919	4.66
Micro-technique	131	655	50	200	16	48	0	0	0	0	197	803	4.58
Comparative Vertebrate Anatomy	130	650	36	144	30	90	0	0	0	0	196	886	4.51
Genetics & Eugenics	124	620	51	204	20	60	0	0	0	0	195	884	4.53
Biostatistics	120	600	62	248	14	42	0	0	0	0	196	890	4.54
Quantitative Chemistry	115	175	60	240	20	60	0	0	0	0	195	875	4.49
Marine Plankton	138	690	48	192	10	30	0	0	0	0	196	912	4.65
Oceanography: Its Chem. & Phy. Prop.	146	370	42	168	9	27	0	0	0	0	197	925	4.70
Systematics of Fishes	135	675	53	212	9	27	0	0	0	0	197	914	4.64
Biochemistry	133	665	50	200	13	39	0	0	0	0	196	905	4.62
Marine Embriology	135	675	48	192	12	36	0	0	0	0	195	903	4.63
Marine Environment & Ecology	135	675	50	200	12	36	0	0	0	0	197	911	4.62
Mariculture	134	670	60	300	0	0	0	0	0	0	194	970	5.00
Total	2011	9295	728	2972	203	609	0	0	0	0	2942	13539	4.60

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

Other areas are: (10) systematics of fishes, 4.54; (11) biochemiostry, 4.62; (13) marine embryology, 4.63; (14) mariculture, 5.00. Perceived much relevant to the training skills in subject areas by this group of respondents is quantative chemistry with a weighted mean of 4.49.

The biology of the living organisms in the marine environment helps in the appreciation and awareness of the relationship of plant and animal life in the sea and their role to support and sustain the marine resources for food security and maintenance of livelihood in the community. It is from this point that the subject areas for the course is very much relevant.

Local government officials perceptions on the relevance of training skills in subject areas for marine biology course (Table 45). The fifteen subject areas are much relevant to the training skills in subject areas are much relevant to the training skills in subject for the course in marine biology as perceived by the local government officials as indicated by their weighted mean: (1) fundamentals of marine biology, 4.38; (2) marine botany, 4.42; (3) marine invertebrates, 4.38; (4) micro-techniques, 4.35; (5) comparative vertebrate anatomy, 4.40; (6) genetics and eugenics, 4.31 and (7) biostatistics, 4.38.

Table 45

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Marine Biology Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Fundamentals of Marine Biology	28	140	18	72	4	12	2	4	0	0	52	228	4.38
Marine Botany	28	140	20	80	2	6	2	4	0	0	52	230	4.42
Marine Invertebrate	27	135	20	80	3	9	2	4	0	0	52	228	4.38
Micro-technique	27	135	18	72	5	15	2	4	0	0	52	226	4.35
Comparative Vertebrate Anatomy	28	140	18	72	5	15	1	2	0	0	52	229	4.40
Genetics & Eugenics	26	130	16	64	10	30	0	0	0	0	52	224	4.31
Biostatistics	26	130	20	80	6	18	0	0	0	0	52	228	4.38
Quantitative Chemistry	24	120	20	80	8	24	0	0	0	0	52	224	4.31
Marine Plankton	28	140	20	80	4	12	0	0	0	0	52	232	4.46
Oceanography: Its Chem. & Phy. Prop.	26	130	20	80	6	18	0	0	0	0	52	228	4.46
Systematics of Fishes	24	120	24	96	4	12	0	0	0	0	52	228	4.38
Biochemistry	22	110	24	96	6	18	0	0	0	0	52	224	4.31
Marine Embriology	20	100	24	96	8	24	0	0	0	0	52	220	4.23
Marine Environment & Ecology	27	135	30	120	0	0	0	0	0	0	52	225	4.33
Mariculture	28	140	16	64	8	24	0	0	0	0	52	228	4.38
Total	389	1945	308	1232	81	235	9	18	0	0	780	3402	4.36

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

Others are: (8) quantitative chemistry, 4.31; (9) marine plankton, 4.46; (10) oceanography: its chemical and physical properties, 4.38; (11) systematics of fishes, 4.38; (12) biochemistry, 4.31; (13) marine embryology, 4.23; (14) marine environment and ecology, 4.33; and (15) mariculture, 4.38.

An understanding pf marine life is needed to appreciate the contribution of marine resources in the socio-economic life in the community and the importance of marine environment to fisheries economics and how they should be protected and conserved for sustainable and productive source of income. From these foreseeable conditions, this group of respondents considered the subject areas as very much relevant to the course in marine biology.

<u>Non-government organizations, business and industry organizations perceptions on the relevance of training skills in subject areas for marine biology course (Table 46).</u> On the relevance of training skills in subject areas for the course in marine biology, the non-government, business and industry organizations perceived seven subject areas relevant to the course as indicated by their weighted mean.

Table 46

Non-Government Organizations, Business And Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Marine Biology Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Fundamentals of Marine Biology	24	120	10	40	4	12	0	0	0	0	38	172	4.53
Marine Botany	24	120	12	48	2	6	0	0	0	0	38	174	4.58
Marine Invertebrate	26	130	10	40	2	6	0	0	0	0	38	176	4.63
Micro-technique	24	120	8	32	6	18	0	0	0	0	38	170	4.47
Comparative Vertebrate Anatomy	36	130	8	32	4	12	0	0	0	0	38	174	4.58
Genetics & Eugenics	26	130	12	48	0	0	0	0	0	0	38	178	4.68
Biostatistics	26	130	6	24	6	18	0	0	0	0	38	172	4.53
Quantitative Chemistry	24	120	8	32	4	12	0	0	0	0	38	168	4.42
Marine Plankton	26	130	12	48	0	0	0	0	0	0	38	178	4.68
Oceanography: Its Chem. & Phy. Prop.	26	130	6	24	4	12	0	0	0	0	38	170	4.47
Systematics of Fishes	24	120	6	24	6	18	0	0	0	0	38	166	4.37
Biochemistry	24	120	8	32	6	18	0	0	0	0	38	166	4.37
Marine Embriology	24	120	6	24	4	12	0	0	0	0	38	162	4.26
Marine Environment & Ecology	24	120	6	24	4	12	0	0	0	0	38	164	4.32
Mariculture	26	130	6	24	4	12	0	0	0	0	38	170	4.47
Total	384	1870	124	496	56	168	16	32	2	2	570	2560	4.49

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

They were as follows: (1) fundamentals of marine biology, 4.53; (2) marine botany, 4.58; (3) marine invertebrates, 4.63; (4) comparative vertebrate anatomy, 4.58; (5) genetics and eugenics, 4.68; (6) biostatistics, 4.53; (7) marine plankton, 4.68. Perceived much relevant are the following: (1) micro-techniques, 4.47; (2) quantitative chemistry, 4.42; (3) oceanography: its chemical and physical properties, 4.47; (4) systematics of fishes, 4.37; (5) biochemistry, 4.37; (6)marine embryology, 4.26; (7) marine environment and ecology, 4.32; and (8) mariculture, 4.47.

The life of marine plants and animals is considered very important in the sustainability of economic activities. Each marine plants and animals has to be known due to their economic usefulness for food, drugs, pharmaceutical and industrial use which therefore assume a continuous operation of commerce or industry. The main foresights gives them the answers to the needs of the subject areas for the course in marine biology.

Relevance of Training Skills in Subject Areas for Living Marine Resources Course.

Fishery educators and supervisors perceptions on the relevance of training skills in subject areas for marine biology course (Table 47). Very much relevant is the perceptions of the fishery educators and supervisors on the training skills in subject areas for the course in living marine resources as indicated by their weighted mean: (1) biological oceanography and its environment, 4.83; (2) introduction to fishery science, 4.80; (3) marine and aquatic algae, 4.90; (4) fishes and their environment, 4.77; (5) fish stocks and management, 4.73; (6) parasites and non-parasitic diseases of marine organisms, 4.67; (7) mariculture, 4.83; (8) structure and functions of marine ecological systems, 4.77; (9) taxonomy of marine invertebrates, 4.80; (10) invertebrates embryology, 4.70; (11)marine organisms and microbiology, 4.77; (12) plankton and microplankton, 4.60; (14) systematics of fishes, 4.67; and (15) marine zoogeography, 4.73.

Man has used the marine living resources of the sea as a source of food.

Table 47

Fishery Educators And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Living Marine Resource Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Biological Oceanography & its Environ.	26	130	3	12	1	3	0	0	0	0	30	145	4.83
Introduction to Fishery Science	26	130	2	9	2	6	0	0	0	0	30	144	4.80
Marine & Aquatic Algae	25	125	4	16	1	3	0	0	0	0	30	144	4.80
Fishes & Their Environment	25	125	3	12	2	6	0	0	0	0	30	143	4.77
Fish Stocks & Management	24	120	4	16	2	6	0	0	0	0	30	142	4.73
Parasites & Non-parasitic Diseases of Marine Org	22	110	6	24	2	6	0	0	0	0	30	140	4.67
Mariculture	25	125	5	20	0	0	0	0	0	0	30	145	4.83
Struct. & Func. of Marine Ecological Sys.	25	125	3	12	2	6	0	0	0	0	30	143	4.80
Taxonomy of Marine Invertebrates	25	125	4	16	1	3	0	0	0	0	30	144	4.70
Invertebrates Embryology	25	125	2	8	2	6	0	0	0	0	30	141	4.77
Marine Organism & Microbiology	25	125	3	12	2	6	0	0	0	0	30	143	4.67
Plankton & Microplankton	25	125	3	12	1	3	0	0	0	0	30	140	4.60
Physiology of Marine Org. & Biochem.	25	125	0	0	3	9	0	0	0	0	30	138	4.67
Systematics of Fishes	25	125	0	0	5	15	0	0	0	0	30	140	4.73
Marine Zoogeography	25	125	3	12	1	3	0	0	0	0	30	142	4.73
Total	373	1865	45	181	27	81	5	10	0	0	450	2134	4.74

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

For a very long time and one can anticipate with some confidence that by the year 2000 pressure on wild stocks of living resources will increase greater than in previous years which would result in competition among the people of the community over the use of living resources. Understanding and awareness of theses living resources is needed in which the components of the subject areas for the course in living marine resources share the importance in the relevancy of the course to the community.

Fishery instructors and students perceptions on the relevance of training skills in subject areas for living marine resources course (Table 48). The perceptions of the fishery instructors and students on the relevance of training skills in subject areas for the course in living marine resources is very much relevant as indicated by their weighted mean: (1) biological oceanography and its environment, 4.64; (2) introduction to fishery science, 4.67; (3) marine and aquatic algae, 4.71; (4) fishes and their environment, 4.67; (5) fish stocks and management, 4.72; (6) parasites and non-parasitic diseases of marine organisms, 4.66; (7) mariculture, 4.53; (8) structure and functions of marine ecological systems, 4.53; and (9) taxonomy of marine invertebrates, 4.61.

Table 48

Fishery Instructors And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Living Marine Resource Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Biological Oceanography & its Environ.	135	675	50	200	10	30	0	0	0	0	195	906	4.64
Introduction to Fishery Science	140	700	45	180	10	30	0	0	0	0	195	910	4.67
Marine & Aquatic Algae	145	725	45	180	6	18	0	0	0	0	196	923	4.71
Fishes & Thele Environment	144	720	40	160	12	36	0	0	0	0	196	916	4.67
Fish Stocks & Management	154	770	30	120	13	39	0	0	0	0	197	929	4.72
Parasites & Non-parasitic Diseases of Marine Org	143	712	42	168	12	36	0	0	0	0	197	919	4.66
Mariculture	130	650	43	172	20	60	3	6	0	0	196	888	4.53
Struct. & Func. of Marine Ecological Sys.	128	640	50	200	10	30	9	18	0	0	197	888	4.53
Taxonomy of Marine Invertebrates	136	680	54	216	4	12	3	6	0	0	197	908	4.61
Invertebrates Embryology	138	690	36	144	13	36	10	20	0	0	197	893	4.53
Marine Organism & Microbiology	135	675	40	160	20	60	0	0	0	0	195	895	4.59
Plankton & Microplankton	142	710	40	160	10	30	4	8	0	0	196	908	4.63
Physiology of Marine Org. & Biochem.	143	715	50	200	0	0	0	0	0	0	193	915	4.74
Systematics of Fishes	132	660	50	200	10	30	4	8	0	0	196	989	4.58
Marine Zoogeography	131	655	53	212	6	18	6	12	0	0	195	897	4.60
Total	2076	10380	668	2672	156	468	39	78	0	0	2938	13684	4.66

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Other subject areas are: (10)invertebrates embryology, 4.53; (11)marine organisms and microbiology, 4.59; (12) plankton and microplankton, 4.63; (13) physiological of marine organism and biochemistry, 4.74; (14) systematics of fishes, 4.58; and (15) marine zoogeography, 4.60.

This group of respondents looks forward from the needs of the subject areas in the course for living marine resources to the problems that arise with increased use of living resources of the sea on the management of their use in such a manner as to minimize interaction among communities or places on the people and to keep them in sustainably productive conditions thus require knowledge of living resources for their solution.

Local government officials perceptions on the relevance of training skills in subject areas for living marine resources course (Table 49). Seven subject areas are perceived very much relevant to the training skills in subject areas by the local government officials as indicated by their weighted mean as follows: (1) biological oceanography and its environment, 4.54; (2) marine and aquatic algae, 4.69; (3) fishes and their environment, 4.69;(4) fish stocks and management, 4.77; and(5) parasites and non-parasitic diseases of marine organisms, 4.54.

Table 49

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Living Marine Resource Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Biological Oceanography & its Environ.	30	150	20	80	2	6	0	0	0	0	52	236	4.54
Introduction to Fishery Science	27	130	20	80	3	9	2	4	0	0	52	228	4.38
Marine & Aquatic Algae	38	190	12	48	2	6	0	0	0	0	52	244	4.69
Fishes & Thele Environment	40	200	10	40	2	6	0	0	0	0	52	246	4.73
Fish Stocks & Management	40	200	12	48	0	0	0	0	0	0	52	248	4.77
Parasites & Non-parasitic Diseases of Marine Org	37	185	8	32	5	15	2	4	0	0	52	236	4.54
Mariculture	35	175	8	32	7	21	2	4	0	0	52	232	4.46
Struct. & Func. of Marine Ecological Sys.	27	135	14	56	6	18	5	10	0	0	52	219	4.21
Taxonomy of Marine Invertebrates	39	195	8	32	5	15	0	0	0	0	52	242	4.65
Invertebrates Embryology	26	130	12	48	7	21	7	14	0	0	52	213	4.10
Marine Organism & Microbiology	26	130	10	40	10	30	6	12	0	0	52	212	4.08
Plankton & Microplankton	28	140	10	40	10	30	4	8	0	0	52	218	4.19
Physiology of Marine Org. & Biochem.	30	150	15	60	4	12	3	6	0	0	52	228	4.38
Systematics of Fishes	25	125	17	68	5	15	5	10	0	0	52	218	4.19
Marine Zoogeography	40	200	8	32	2	6	2	4	0	0	52	242	4.65
Total	488	2435	184	736	70	210	38	76	0	0	780	3462	4.44

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Next are: (6) taxonomy of marine invertebrates, 4.65; and (7) marine zoogeography, 4.65. Perceived much relevant are: (1) introduction to fishery science, 4.38; (2) mariculture, 4.46; (3) structure and functions of marine ecological systems, 4.21; (4) invertebrates embryology, 4.10; (5) marine organisms and microbiology, 4.08; (6) plankton and microplankton, 4.19; (7) physiology of marine organisms and biochemistry, 4.38; and (8) systematics of fishes, 4.19.

The bulk of fishery resources supporting commercial fisheries either live in the high seas or at coastal areas of the sea at some stage of their life history. In the high seas the living resources are freely available to the big and multi-million investors of the country. There is unlimited entry into their harvest. The individual fisherman has no private rights to the high seas resources and cannot obtain such right are basically different sort of economics for their use. The coastal living resources are open access to fishermen and to the community; in a manner, they can govern the use of particular living resources for their benefit. This is what made the subject areas very relevant and beneficial to the course in living marine resources.

Non-government organizations, business and industry organizations perceptions on the relevance of training skills in subject areas for living marine resources course (Table 50). The non-government, business and industry organizations perceived ten very much relevant subject areas to the training skills for living marine resources course as indicated by their weighted mean: (1) biological oceanography and its environment, 4.58; (2) introduction to fishery science, 4.53; (3) marine and aquatic algae, 4.53; (4) fish stocks and management, 4.61; (5) structure and functions of marine ecological systems, 4.55; (6) taxonomy of marine invertebrates, 4.66; (7) invertebrates embryology, 4.53; (8) physiology of marine organisms and biochemistry, 4.55; (9) systematics of fishes, 4.58; and (10) marine zoogeography, 4.53. Five are perceived much relevant to the training skills in subject areas are: (1) fishes and their environment, 4.47; (2) parasites and non-parasitic diseases of marine organisms, 4.45; (3) mariculture, 4.47; (4) marine organisms and microbiology, 4.45; and (5) plankton and microplankton, 4.50.

Table 50

Non-Government Organizations, Business And Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Living Marine Resource Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Biological Oceanography & its Environ.	26	130	8	32	4	12	0	0	0	0	38	174	4.58
Introduction to Fishery Science	25	125	8	32	5	15	0	0	0	0	38	172	4.53
Marine & Aquatic Algae	26	130	6	24	6	18	0	0	0	0	38	172	4.53
Fishes & Thele Environment	24	120	8	32	6	18	0	0	0	0	38	170	4.47
Fish Stocks & Management	26	130	9	36	3	9	0	0	0	0	38	175	4.61
Parasites & Non-parasitic Diseases of Marine Org	24	120	7	28	7	21	0	0	0	0	38	169	4.45
Mariculture	24	120	8	32	6	18	0	0	0	0	38	170	4.47
Struct. & Func. of Marine Ecological Sys.	26	130	7	28	5	15	0	0	0	0	38	173	4.55
Taxonomy of Marine Invertebrates	28	140	7	28	3	9	0	0	0	0	38	177	4.66
Invertebrates Embryology	24	120	10	40	4	12	0	0	0	0	38	172	4.53
Marine Organism & Microbiology	24	120	7	28	7	21	0	0	0	0	38	169	4.45
Plankton & Microplankton	24	120	9	36	5	15	0	0	0	0	38	171	4.50
Physiology of Marine Org. & Biochem.	25	125	9	36	4	12	0	0	0	0	38	173	4.55
Systematics of Fishes	25	125	10	40	3	9	0	0	0	0	38	174	4.58
Marine Zoogeography	25	125	8	32	5	15	0	0	0	0	38	172	4.53
Total	376	1880	121	484	73	219	0	0	0	0	570	2583	4.53

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

The non-government, business and industry organizations are concerned with living marine resources for economic and industry which is essential to socio-political stability of a nation. Substantially, all marine living resources are migratory at some stage in the life history of each species. Judicial boundaries drawn by man upon the sea are not relevant to the biological needs of these resources. The living resources are renewable resources. If their harvest is properly managed they can be kept producing crops of stable size indefinitely which therefore can maintain and sustain the operation of the industry and economic activities in the community.

Relevance of Training Skills in Subject Areas for Ocean Engineering Course.

Fishery educators and supervisors perceptions on the relevance of training skills in subject areas for ocean engineering course (Table 51). The subject areas are perceived as very much relevant by the fishery educators and supervisors to the training skills for the course in ocean engineering as indicated by a weighted mean of 4.48.

Table 51

Fishery Educators And Supervisors' Perceptions on the Relevance of Training Skills in the Subject Areas for Ocean Engineering Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Hydrodynamics	26	130	3	12	1	3	0	0	0	0	30	145	4.83
Coastal Structural Design	20	100	4	16	4	12	2	4	0	0	30	132	4.40
Oceanographic Measurement	26	130	4	16	0	0	0	0	0	0	30	146	4.87
Underwater Acoustics	26	130	2	8	2	6	0	0	0	0	30	144	4.80
Investigations of Special Project	24	120	5	20	1	3	0	0	0	0	30	143	4.77
Applied Ocean Hydrodynamics	26	130	2	8	1	3	1	2	0	0	30	143	4.77
Shoreline Processes	26	130	2	8	2	6	0	0	0	0	30	144	4.80
Ocean Structures	27	135	2	8	1	3	0	0	0	0	30	146	4.87
Numerical Techniques in Ocean Eng'g	27	135	3	12	0	0	0	0	0	0	30	147	4.90
Tides & Waves in Shallow Water	26	130	3	12	0	0	1	2	0	0	30	144	4.80
Materials in the Marine Environment	27	135	2	8	0	0	1	2	0	0	30	145	4.83
Total	281	1405	32	128	12	36	5	10	0	0	330	1579	4.78

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

The subject areas are the following: (1) coastal hydrodynamics, 4.83; (2) coastal structural design, 4.40; (3) oceanographic measurement, 4.87; (4) underwater acoustics, 4.80; (5) investigations of special project, 4.77; (6) applied ocean hydrodynamics, 4.77; (7) shoreline processes, 4.80; (8) ocean structure, 4.87; (9) numerical techniques in ocean engineering, 4.90; (10) tides and waves in shallow water, 4.80; and (11) materials in the marine environment, 4.83.

The course in ocean engineering concentrates on the problems associated with the interaction of the ocean on the open sea and the works of man in the community. So the training skills in subject areas for the course is very much relevant because many of the development projects are skills beneficial to the community and those are the content of the subject areas in ocean engineering.

Fishery instructors and students perceptions on the relevance of training skills in subject areas for ocean engineering course (Table 52). The fishing instructors and student respondents perceived the training skills in subject areas for the course in ocean engineering as very much relevant with a weighted mean of 4.60.

Table 52

Fishery Instructors And Students' Perceptions on the Relevance of Training Skills in the Subject Areas for Ocean Engineering Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Hydrodynamics	129	645	52	208	15	45	0	0	0	0	196	898	4.58
Coastal Structural Design	136	680	31	124	30	90	0	0	0	0	167	894	4.54
Oceanographic Measurement	136	680	36	144	20	60	5	10	0	0	197	884	4.49
Underwater Acoustics	130	680	43	172	20	60	2	4	0	0	195	916	4.70
Investigations of Special Project	137	635	51	204	12	36	7	14	0	0	197	889	4.51
Applied Ocean Hydrodynamics	136	680	31	124	29	87	0	0	0	0	196	891	4.55
Shoreline Processes	135	675	43	172	11	33	8	16	0	0	197	896	4.55
Ocean Structures	133	665	52	208	6	18	4	8	0	0	195	899	4.61
Numerical Techniques in Ocean Eng'g	138	690	45	810	10	30	4	8	0	0	197	908	4.61
Tides & Waves in Shallow Water	137	685	43	172	16	48	0	0	0	0	196	905	4.62
Materials in the Marine Environment	137	685	40	160	18	54	0	0	0	0	195	899	4.61
Total	1484	7400	467	2498	187	561	30	60	0	0	2158	9879	4.58

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

The following are the subject areas: (1) coastal hydrodynamics, 4.58; (2) coastal structural design, 4.54; (3) oceanographic measurement, 4.49; (4) underwater acoustics, 4.20; (5) investigations of special project, 4.51; (6) applied ocean hydrodynamics, 4.55; (7) shoreline processes, 4.55; (8) ocean structure, 4.61; (9) numerical techniques in ocean engineering, 4.61; (10) tides and waves in shallow water, 4.62; and (11) materials in the marine environment, 4.61.

Fishery instructors and students perceptions on the training skills in subject areas are very much relevant since an ocean engineering course needs the combination of competence as an engineer with practical experience and a theoretical understanding of the ocean. The subject components would benefit them to develop towards the engineering aspects of the sea. .

<u>Local government officials perceptions on the relevance of training skills in subject areas for ocean engineering course (Table 53).</u> Seven subject areas are very much relevant to the training skills for the course in ocean engineering as perceived by the local government officials respondents.

Table 53

Local Government Officials' Perceptions on the Relevance of Training Skills in the Subject Areas for Ocean Engineering Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Hydrodynamics	28	140	20	80	4	12	0	0	0	0	52	232	4.46
Coastal Structural Design	29	145	20	80	3	9	0	0	0	0	52	234	4.50
Oceanographic Measurement	39	195	10	40	3	9	0	0	0	0	52	244	4.69
Underwater Acoustics	40	200	10	40	2	6	0	0	0	0	52	246	4.73
Investigations of Special Project	39	195	11	44	2	6	0	0	0	0	52	246	4.73
Applied Ocean Hydrodynamics	24	120	18	72	10	10	0	0	0	0	52	222	4.27
Shoreline Processes	25	125	19	76	8	24	0	0	0	0	52	225	4.33
Ocean Structures	40	200	10	40	2	6	0	0	0	0	52	246	4.73
Numerical Techniques in Ocean Eng'g	41	205	10	40	1	3	0	0	0	0	52	248	4.77
Tides & Waves in Shallow Water	32	160	20	80	0	0	0	0	0	0	52	240	4.62
Materials in the Marine Environment	40	205	8	32	3	9	0	0	0	0	52	246	4.73
Total	378	1890	156	624	38	94	0	0	0	0	572	2629	4.60

Legend:
4.51 – 5.00 Very Much (VM)
3.51 – 4.50 Much (M)
2.51 – 3.50 Moderately (Mo)
1.50 – 2.50 Not Much (NM)
1.00 – 1.50 Not At All (NAA)

The following subject areas are as follows: (1) oceanographic measurement, 4.69; (2) underwater acoustics, 4.73; (3) investigations of special projects, 4.73; (4) ocean structures, 4.73; (5) numerical techniques in ocean engineering, 4.77; (6) tides and waves in shallow water, 4.62; and (7) materials in the marine environment, 4.73.

The course in ocean engineering lays the foundation of competence, experience and understanding of coastal engineering which is the concern of the coastal community. As times move towards the industrialization phase of development most part of the community that is affected are the coastal areas as these are accessible and feasible for physical development of the industry thus community would benefit from it.

<u>Non-government, business and industry organizations perceptions on the relevance of training skills in subject areas for ocean engineering course (Table 54).</u> The non-government, business and industry organizations perceived the training skills in subject areas for the course in ocean engineering as very much relevant with a weighted mean of 4.56. The following are the subject areas: (1) coastal hydrodynamics, 4.58; (2) coastal structural design, 4.53; and (3) oceanographic measurement, 4.55.

Table 54

Non-Government Organizations, Business And Industry Organizations' Perceptions on the Relevance of Training Skills in the Subject Areas for Ocean Engineering Course.

Training Skills in Subject Areas	Relevance of Training Skills												
	VM	5	M	4	Mo	3	NM	2	NAA	1	Total		Wt. Mean
Coastal Hydrodynamics	25	125	10	10	3	9	0	0	0	0	38	174	4.58
Coastal Structural Design	25	125	8	32	5	15	0	0	0	0	38	172	4.53
Oceanographic Measurement	25	125	9	36	4	12	0	0	0	0	38	173	4.55
Underwater Acoustics	26	130	6	24	6	18	0	0	0	0	38	172	4.53
Investigations of Special Project	26	130	8	32	4	12	0	0	0	0	38	174	4.58
Applied Ocean Hydrodynamics	26	130	9	36	3	9	0	0	0	0	38	175	4.61
Shoreline Processes	26	130	10	40	2	6	0	0	0	0	38	176	4.63
Ocean Structures	25	125	7	28	6	18	0	0	0	0	38	171	4.50
Numerical Techniques in Ocean Eng'g	25	125	8	32	5	15	0	0	0	0	38	172	4.53
Tides & Waves in Shallow Water	25	125	10	40	0	0	3	9	0	0	38	174	4.58
Materials in the Marine Environment	25	125	9	36	0	0	4	12	0	0	38	173	4.55
Total	279	1395	94	346	38	114	7	21	0	0	418	1906	4.56

Legend:
4.51 - 5.00 Very Much (VM)
3.51 - 4.50 Much (M)
2.51 - 3.50 Moderately (Mo)
1.50 - 2.50 Not Much (NM)
1.00 - 1.50 Not At All (NAA)

Other areas are: (4) underwater acoustics, 4.53; (5) investigations of special project, 4.58; (6) applied ocean hydrodynamics, 4.61; (7) shoreline processes, 4.63; (8) ocean structure, 4.50; (9) numerical techniques in ocean engineering, 4.53; (10) tides and waves in shallow water, 4.58; and (11) materials in the marine environment, 4.55.

Offshore engineering is remote but it needs underwater acoustics, and ocean measurement and marine geotechnics. These concerns about the basic principles of design and operation of offshore structure and terminal, and others are needed by the business and industry communities. It is for these concerns that training skills in subject areas are very much relevant to the course in ocean engineering.

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for the Fisheries and Marine Science Courses

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Marine Fisheries Technology Course

The perception ranks of the four groups of respondents on the relevance of training skills in subject areas for marine fisheries technology course. (Details of the perception ranks are shown in Appendix C). Coastal resources management is ranked 1 by the instructors and students, ranked 46 by the educations and supervisors, ranked 32.5 by the local government officials, and ranked 27.5 by the non-government organizations, business and industry organizations. Marine electronics is ranked 40 by the educators and supervisors, ranked 3 by the instructors and students, ranked 9.5 by the local government officials, ranked 14 by the non-government business and industry officials, ranked 14 by the non-government business and industry organizations. Marine ecology is ranked 42 by the educators and supervisors, ranked 15 by the instructors and students, ranked 34.5 by the local government officials, and ranked 29.5 by the non-government, business and industry organizations. Fisheries oceanography is ranked 43, 4, 16 and 25.5 in that order. Fishing gear design and construction is ranked 44 by the educators and supervisors, ranked 6 by the instructors and students, ranked 29.5 by the local government officials, and ranked 36 by the non-government, business and industry organizations. Fish handling and cold storage is ranked 45 by the educators and supervisors, ranked 18 by the instructors and students, ranked 24 by the local government officials and ranked 31 by the non-government, business and industry organizations.

Navigation is ranked 41 by the educators and supervisors, ranked 5 by the instructors and students, ranked 19.5 by the local government officials and by the non-government, business and industry organizations. Deck seamanship and ropeworks is ranked 39 by the educators and supervisors, ranked 13 by the instructors and students, ranked 12 by the local government officials, and ranked 21 by the non-government, business and industry organizations. Survival of life at sea is ranked 32.5 by the educators and supervisors, ranked 9.5 by the instructors and students, ranked 2 by the local government officials, and ranked 8 by the non-government, business and industry organizations. Marine engineering is ranked 37 by the educators and supervisors, ranked seven by the instructors and students, ranked 25.5 by the local government officials and ranked 34.5 by the non-government organizations, business and industry organizations. Marine fisheries management is ranked 48 by the educators and supervisors, ranked 17 by the instructors and students, ranked 23 by the local government officials, and ranked 22 by the non-government, business and industry organizations. While systematics of fishes is ranked 4 by the educators and supervisors, ranked 11 by the instructors and students, ranked 27.5 by the local government officials, ranked 38 by the non-government, business and industry organizations.

As reflected in Appendix C, the educators and supervisors have a total ranks of 504 which is the highest, followed by the non-government organizations, business and industry organization with a total ranks of 306.50; local government, business and industry organizations with a total ranks of 306.50; local government officials with 228; and the lowest is the instructors and students with total rank of 109.50. Now using the Kruskal-Wallis ANOVA determines the significant difference in the perception ranks of the respondents with reference to the critical value of chi square.

Table 55 shows the Kruskal-Wallis One Way Analysis of Variance for the perceptions ranks of the four groups of respondents on the relevance of training skills in subject areas for marine fisheries technology course. The statistical results show that the computed value H of 36.58 is greater than the critical value of chi-square at both .5 and .01 level of significance at degree of freedom of three. The null hypothesis is therefore rejected "that there is no significant difference in the perceptions of the four groups of respondents on the relevance of training skills in subject areas for marine fisheries technology course."

With reference to the critical value of chi-square it discloses that the probability associated with the occurrence under the null hypothesis of a value as large as H = 26.58, df = 3, the probability is smaller at .05 and .01 level of significance, the decision that leads to the rejection of the null hypothesis in favor of alternative hypothesis. It is therefore concluded that the relevance of the subject areas varies significantly with the perceptions of the respondents, on the training skills in marine fisheries technology course.

Table 55

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Marine Fisheries Technology Course

No.of Subject/Cases		Degree of Freedom: K-1		Computed: Value of H	Critical Value of Chi-Square .05	.01
(12x4)	48	(4-1)	3	36.58	7.82	11.34

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Aquamarine Technology Course

Details in Appendix D reveals the following results of the perceptions ranks in the relevance of training skills in subject areas for aquamarine technology course: Coastal resources management is ranked 43 by the educators and supervisors; ranked 5.5 by the instructors and students; ranked 46.5 by the local government officials; and ranked 542 by the non-government, business and industry organizations. Fry collections, handling and transport is ranked 51.5 by the educators and supervisors; ranked 30.5 by the instructors and students; ranked 44 by the local government officials; and ranked 26 by the non-government, business and industry organizations. Fish breeding and early life history is ranked 56 by the educators and supervisors; ranked 2 by the instructors and students; ranked 14.3 by the local government officials; ranked 20 by the non-government, business and industry organizations. Nursery management techniques is ranked 59 by the educators and supervisors; ranked 10.8 by the instructors and students; ranked 14.3 by the local government officials; and ranked 21.5 by the non-government, business and industry. Broodstock culture and management is ranked 53 by the educators and supervisions; ranked 10.8 by the instructors and students; ranked 21.5 by the local government officials; ranked 10.8 by the non-government, business and industry organizations. Micro-algae is ranked 49 by the educators and supervisors; ranked 9 by the instructors and students; ranked 19 by the local government officials; and ranked 1 by the non-government, business and industry organizations. Hatchery management is 46.5 by the educators and supervisors; ranked 13 by the instructors and students; ranked 23 by the local government officials; and ranked 19 by the non-government, business and industry organizations. Fish and crustaceans diseases and control is ranked 50 by the educators and supervisors; ranked 5.5 by the instructors and students; ranked 40 by the local government officials; and ranked 7 by the non-government, business and industry organizations. Larval culture and transport is ranked 55 by the educators and supervisors; ranked 30.5 by the instructors and students; ranked 39 by the local government officials; ranked 4 by the non-government, business and industry organizations. Fish population dynamics is ranked 48 by the educators and supervisors; ranked 27.5 by the instructors and students; ranked 14.3 by the local government officials; and ranked 3 by the non-government, business and industry organizations. Fishpond design and management is ranked 57 by the educators and supervisors; ranked 29 by the instructors and supervisors; ranked 32.5 by the local government officials; and ranked 36 by the non-government, business and industry organizations. Integrated fish culture is ranked 54 by the educators and supervisors; ranked 34 by the instructors and students; ranked 23 by the local government officials and ranked 25 by the non-government, business and industry organization. Marine fish and shell fish farming is ranked 60 by the educators and supervisors; ranked 37 by the instructors and students; ranked 41 by the local government officials; and ranked 38 by the non-government, business and industry organizations. Fish culture methods and techniques is ranked 58 by the educators and supervisors; ranked 35 by the instructors and students; ranked 51.5 by the local government officials ranked 32.5 by the non-government, business and industry organizations. Systematics of fishes if ranked 45 by the educators and supervisors; ranked 8 by the instructors and students; ranked 14.5 by the local government officials; and ranked 27.5 by the non-government, business and industry organizations.

In the respondents groups of ranks the educators and supervisors have the sum of the ranks of 785 followed by local government officials with 439.20, and then by the non-government, business and industry organizations, and the lowest sums of the rank is 288.10 by the instructors and students.

The Kruskal-Wallis analysis of variance in Table 56 shows that there is significant difference in the perceptions of the four groups of respondents on the relevance of training skills in subject areas in aquamarine technology course. The computed H-value of 33.31 is larger than the critical value of chi-square of 7.85 at .05 level of significance and 11.34 at .01 level of significance at 3 df. The hypothesis that "there is no significant difference in the perceptions of the four groups of respondents on the relevance of training skills in subject areas for aquamarine technology course" is rejected in favor of alternative hypothesis that "the perceptions of the four groups of respondents on the relevance of training skills in subject areas for aquamarine technology course significantly differ from each other." This means that the perceptions of the four groups of respondents varies significantly with the relevance of the subject areas on the training skills in the aquamarine technology course.

Table 56

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Aquamarine Technology Course

No.of Subject/Cases	Degree of Freedom: K-1	Computed: Value of H	Critical Value of Chi-Square .05	.01
(15x4) 60	(4-1) 3	33.31	7.82	11.34

<u>Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Food and Marine Products Technology Course</u>

The ranks in Appendix E gives the following results on perceptions of the four groups of respondents on the relevance of training skills in subject areas for foods and marine products technology course: Coastal resources management is ranked 41.5 by the educators and supervisors; ranked 4 by the instructors and students; ranked 26.5 by the local government officials; and ranked 5.5 by the non-government, business and industry organizations. Foods and fishery industrial technology is ranked 56 by the educators and supervisors, ranked 25 by the instructors and students; ranked 39.5 by the local government officials; and ranked 7 by the non-government, business and industry organizations. Microbiology is ranked 54.5 by the educators and supervisors; ranked 19 by the instructors and students; ranked 34 by the local government officials; and ranked 3 by the non-government officials; and ranked 3 by the non-government organizations, business and industry organizations. Foods and marine products handling and refrigeration is ranked 51 by the educators and supervisors; ranked 20.5 by the instructors and students; ranked 36.5 by the local government officials; and ranked 15.5 by the non-government organizations, business and industry organizations. Food marketing and economics is ranked 52.5 by the educators and supervisors; ranked 23 by the instructors and students; ranked 43.5 by the local government officials; and ranked 11.5 by the non-government organizations, business and industry organizations. Biochemistry is ranked 47.5 by the educators and supervisors; ranked 13 by the instructors and students; ranked 39.5 by the local government officials; and ranked 8 by the non-government organizations, business and industry organizations. Plants sanitation and safety is ranked 33 by the educators and supervisors; ranked 20.5 by the instructors and students; ranked 45.5 by the local government officials; and ranked 17.5 by the non-government organizations, business and industry organizations. Foods curing is ranked 47.5 by the educators and supervisors; ranked 26.5 by the instructors and students; ranked 35 by the local government officials; and ranked 2 by the non-government organizations, business and industry organizations.

The sum of the ranks of educators and supervisors is 621.50; instructors and students, 284.50; local government officials, 562.50; and non-government, business and industry organizations, 122.5. The results in Table 57 of the analysis of variance shows a computed H-value of 43.50 which is larger than the table of critical value of chi-square of 7.82 at .05 level of significance and 11.34 at .01 level of significance with 3 degrees of freedom. The null hypothesis that "there is no significant difference in the perceptions of the fours groups of respondents on the relevance of training skills in subject areas for foods and marine products technology course" is rejected. The decision in the rejection of the null hypothesis is in favor of the alternative hypothesis which means that there is significant difference of perceptions of the four groups of respondents on the relevance of training skills in subject areas for foods and marine products technology course. The perceptions varies significantly with the relevance of the subject areas on the training skills in foods and marine products technology course.

Table 57

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Foods and Marine Products Technology Course

No.of : Subject/Cases		Degree of Freedom: K-1		Computed: Value of H	Critical Value of Chi-Square .05	: .01
(14x4)	56	(4-1)	3	43.50	7.82	11.34

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Fishery Business Management Course

The perception ranks of the four groups of respondents on the relevance of training skills in subject areas for fishery business management course where the sum of ranks of the educators and supervisors group is 573; instructors and students, 93; local government officials; and non-government, business and industry organizations, 377 (refer to Appendix F). Viewing through the ranks of the subject areas, the educators and supervisors ranked coastal resources management as rank 33; ranked 1 by the instructors and students; ranked 32 by the local government officials; and ranked 17.5 by the non-government, business and industry organizations. Systematic of fishes is ranked 35.5 by the educators and supervisors; ranked 2 by the instructors and students; ranked 20 by the local government officials; and ranked 22.5 by the non-government, business and industry organizations. Principles of economics is ranked 43 by the educators and supervisors; ranked 3 by the instructors and students; ranked 12 by the local government officials; and ranked 52 by the non-government, business and industry organizations. Fishery business and economics is ranked 50.5 by the educators and supervisors; ranked 5 by the instructors and students; ranked 29.5 by the local government officials and ranked 37.5 by the non-government, business and industry organizations. Fishery resource management is ranked 46 by the educators and supervisors, ranked 7 by the instructors and students; ranked 19 by the local government officials; and ranked 37.5 by the non-government, business and industry organizations. Business organizations and management is ranked 44.5 by the educators and supervisors; ranked 13 by the instructors and students; ranked 21 by the local government officials; and ranked 37.5 by the non-government, business and industry organizations. Coastal and ocean laws is ranked 41.5 by the educators and supervisors; ranked 8.5 by the instructors and students; ranked 1.5 by the local government officials; and ranked 27 by the non-government, business and industry organizations. Fundamentals of accounting, credit and banking 8.5 by the instructors and students; ranked 25.5 by the local government officials; and ranked 29.5 by the non-government, business and industry organizations. Coastal and deep sea fishing and management is ranked 47.5 by the educators and supervisors; ranked 6 by the instructors and students; ranked 29.5 by the local government officials; and ranked 22.5 by the non-government, business and industry organizations. Fish culture methods and management is ranked 47.5 by the educators and supervisors; ranked 4 by the instructors and students; ranked 38 by the local government officials; and ranked 37.5 by the non-government, business and industry organizations. Marine products processing and management is ranked 47.5 by the educators and supervisors; ranked 11 by the instructors and students' ranked 35.5 by the local government officials; and ranked 22.5 by the non-government, business and industry organizations.

Aquamarine culture and management is ranked 50.5 by the educators and supervisors; ranked 14 by the instructors and students; ranked 34 by the local government officials; and ranked 17.5 by the non-government, business and industry organizations. Business forecasting and budgeting is ranked 44.5 by the educators and supervisors, ranked 10 by the instructors and students; ranked 25.5 by the local government officials; and ranked 16 by the non-government, business and industry organizations.

The results on the analysis of variance in Table 58 reveals a computed H-value of 37.17 which is greater than the table of critical value of chi-square of 7.82 at .05 level of significance and 11.35 at .01 level of significance with degree of freedom 3. The decision is to reject the null hypothesis that " there is no significant difference in the perceptions of the four groups of respondents on the relevance of training skills in subject areas for fishing business management course." This favors the acceptance of the alternative hypothesis that "the perceptions of the four groups of respondents on the relevance of training skills in subject areas for fishery business management course significantly differ from each other." It means that the perceptions of the four groups of respondents vary significantly with the relevance of the subject areas in the training skills in fishery business management.

Table 58

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Fishery Business Management Course

No.of : Subject/Cases	Degree of Freedom: K-1	Computed: Value of H	Critical Value of Chi-Square .05	: .01
(13x4) 52	(4-1) 3	43.17	7.82	11.34

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Fishery Economics Course

A cursor view of Appendix G gives results of 397 and 267 sum of the ranks for educators and supervisors groups and non-government, business and industry organizations respectively and followed by total of ranks of 247.5 for local government officials. Instructors and students group have the least sum of the ranks of 71. Examining through the ranks of the subject areas as ranked by the respondents are as follows:

Coastal resources management is ranked 23 by the educators and supervisors; ranked 1.5 by the instructors and students; ranked 22 by the local government officials; and ranked 12.5 by the non-government, business and industry organizations. Principles of economic is ranked 41.5 by the educators and supervisors; ranked 4 by the instructors and students; ranked 33 by the local government officials; and ranked 27.5 by the non-government, business and industry organizations. Fishery scarcity and choice is ranked 43.5 by the educators and supervisors; ranked 14 by the instructors and students; ranked 24.5 by the local government officials; and ranked 27.5 by the non-government, business and industry organizations. Specialization, exchange and money is ranked 38.5 by the educators and supervisors, ranked 7.5 by the instructors and students; ranked 15 by the local government officials; and ranked 37 by the non-government, business and industry organizations. Money and banking system is ranked 34.5 by the educators and supervisors; ranked 34.5 by the educators and supervisors; ranked 10 by the instructors and students; and ranked 19.5 by the non-government, business and industry organizations.

Fishery market mechanism and elasticity is ranked 34,5 by the educators and supervisors; ranked 1.5 by the instructors and students; ranked 18 by the local government officials; and ranked 31.5 by the non-government, business and industry organizations. Fiscal policy is ranked 19.5 by the educators and supervisors; ranked 3 by the instructors and students; ranked 9 by the local government officials and non-government, business and industry organizations. Business organizations and management is ranked 38.5 by the educators and supervisors; ranked 6 by the instructors and students; ranked 24.5 by the local government officials; and ranked 19.5 by the non-government, business and industry organizations. Fishery aggregate, supply and demand is ranked 38.5 by the educators and supervisors; ranked 5 by the instructors and students; ranked 34.5 by the local government officials; and ranked 16.5 by the non-government, business and industry organizations. Cost and perfectly competitive supply and economic efficiency is ranked 41.5 by the educators and supervisors; ranked 7.5 by the instructors and students; ranked 39 by the local government officials; and ranked 27.5 by the non-government, business and industry organizations. Fishery markets between monopoly and competition is ranked 43.5 by the educators and supervisors; ranked 11 by the instructors and students, ranked 24.5 by the local government officials; and ranked 31.5 by the non-government, business and industry organizations.

The result of the sum of the ranks tell us that there is significant difference in the perceptions of the four groups of respondents on the relevance of training skills in subject areas for fishery economic course. This conclusion is manifested in Table 59 on the analysis of variance by Kruskal-Wallis with reference to the table on critical value of chi square. Rejection of the null hypothesis that " there is no significant difference in the perceptions of the four groups of respondents on the relevance of training skills in subject areas for fishery economic course," is strongly indicated by the computed H-value of 27.69 which is larger than the critical value of chi square of 7.82 at .05 level of significance and 11.45 at .01 level of significance with degree of freedom of 3. This means that the perceptions varies significantly with the relevance of the subject areas in the training skills in fishery economics course.

Table 59

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Fishery Economics Course

No.of Subject/Cases	Degree of Freedom K-1	Computed Value of H	Critical Value of Chi-Square .05	.01
(11x4) 44	(4-1) 3	27.64	7.82	11.34

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Fishery Biology Course

The perception ranks of the four groups of respondents on the relevance of training skills in subject areas for fisheries biology course is reflected in Appendix H. Training skills in subject areas are indicated by their rank in a chronological order of respondent's group as follows: educators and supervisors groups, instructors and students group; local government officials; and lastly non-government organizations, business and industry organizations group.

Marine biology and ecology is ranked 49.5; 15; 16.5 and 23.5. Ichthyology is ranked 46,18,28, and 35.5. Fish population dynamics is ranked 41, 22, 19.5, and 32. Marine flora and fauna is ranked 49.5, 34, 8.5 and 10. Fishing gears and methods is ranked 44.5, 29.5, 19.5, and 2.

Oceanography is ranked 42.5, 39.7, and 12. Histology and micro-techniques is ranked 38, 13, 6, and 1.

Fish pathology and physiology is ranked 42.5, 29.5, 5, and 23.5. Fish genetics is ranked 48, 29.5, 3.5, and 25.5. coral reef ecology is ranked 49.5, 37, 3.5, and 25.5. Zoogeography is ranked 52, 40, 14, and 11. Seaweeds productivity and ecology is ranked 47, 35.5, 16.5, and 25.5. Bio statistics is ranked 44.5, 33, 8.5, and 21.

The educators and supervisors have a sum of the ranks of 594; instructors and students 376; local government officials 156; and non-government organizations, business and industry organizations 248. A glance at these figures give a significant results on the perceptions of the respondents and this is manifested in table 60 where the computed H-value of 35.48 is greater than the table of critical value of chi square of 7.82 at .05 level of significance and 11.34 at .01 level of significance with degree of freedom of 3. The decision is to reject the null hypothesis that " there is no significant difference in the perceptions of the four groups of respondents on the relevance of training skills in subject areas for fisheries biology course." The rejection of the null hypothesis is in favor of the alternative hypothesis that " the perceptions of the group of respondents on the relevance of training skills in subject areas for fisheries biology course significantly differ from each other." It is concluded that the relevance of the subject areas varies significantly with the perceptions of the respondents on the training skills in fisheries biology course.

Table 60

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Fisheries Biology Course

No.of Subject/Cases	Degree of Freedom K-1	Computed Value of H	Critical Value of ChiSq .05	.01
(13x4) 52	(4-1) 3	35.48	7.82	11.34

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Fishery Oceanography Course

In the perception ranks gleaned from Appendix I on the relevance of training skills in subject areas for fisheries oceanography course, the educators and supervisors group obtained 466.50 sum of the ranks which is almost half of the sum of the ranks obtained by the instructors and students, 271.5; local government officials, 214; and non-government organizations, business and industry organizations, 218.

Based on the ranks of the four groups of respondents in Table 26-A, histology and micro-techniques is ranked 37.5 by the educators and supervisors, ranked 1 by the instructors and students; ranked 3 by the local government officials; and ranked 5.5 by the non-government, business and industry organizations. Fish pathology and physiology is ranked 36 by the educators and supervisors; ranked 2 by the instructors and students; ranked 18 by the local government officials; and ranked 16 by the non-government, business and industry organizations. Fish genetics is ranked 41.5 by the educators and supervisors; ranked 17 by the instructors and students; ranked 23.5 by the local government officials; and ranked 10.5 by the non-government, business and industry organizations. Coral reef ecology is ranked 26.5 by the educators and supervisors; ranked 10.5 by the instructors and students; ranked 22 by the local government officials; and ranked 13 by the non-government, business and industry organizations. Zoogeography is ranked 46.5 by the educators and supervisors; ranked 31 by the instructors and students; ranked 44 by the local government officials; and ranked

19.5 by the non-government, business and industry organizations.

Seaweeds productivity and ecology is ranked 37.5 by the educators and supervisors; ranked 14.5 by the instructors and students; ranked 34.5 by the local government officials; and ranked 19.5 by the non-government, business and industry organizations. Biostatistics is ranked 32 by the educators and supervisors; ranked 30 by the instructors and students; ranked 14.5 by the local government officials; and ranked 5.5 by the non-government, business and industry organizations. Fish and environmental interactions is ranked 43 by the educators and supervisors; ranked 34.5 by the instructors and students; ranked 28 by the local government officials; and ranked 33 by the non-government, business and industry organizations. Acceptable catch and its estimation is ranked 48 by the educators and supervisors; ranked 37.5 by the instructors and students; ranked 4 by the local government officials; and ranked 19.5 by the non-government, business and industry organizations. Fish finding and migration in relation to environmental factors is ranked 46.5 by the educators and supervisors; ranked 41.5 by the instructors and students; ranked 7.5 by the local government officials; and ranked 29 by the non-government, business and industry organizations. Ocean environment and its variability is ranked 45 by the educators and supervisors; ranked 40 by the instructors and students; ranked 7.5 by the local government officials; and ranked 23.5 by the non-government, business and industry organizations. Systematic of fishes is ranked 26.5 by the educators and supervisors; ranked 12 by the instructors and students; ranked 7.5 by the local government officials; and ranked 23.5 by the non-government, business and industry organizations.

An analysis of variance on the ranks of the subject areas is reflected in Table 61 based on statistical treatment by Kruskall-Wallis one-way model. The results reveal that the value of H=16.54 is greater than the critical value of shi square of 7.82 at .05 level of significance and 11.34 at .01 level of significance with 3 df. Since the computed value of H is greater than the tabular value at .05 level of significance the corresponding decision is to reject the null hypothesis and appears to accept the alternative hypothesis. Therefore it is concluded that there is significant difference in the perceptions of the four groups of respondents. This perceptions varies significantly with the relevance of training skills in subject areas in fisheries oceanography course.

Table 61

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Fisheries Oceanography Course

No.of Subject/Cases	Degree of Freedom K-1	Computed Value of H	Critical Value of ChiSq .05	.01
(12x4) 48	(4-1) 3	16.54	7.82	11.34

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Coastal Oceanography Course

Based on the perception ranks of the four groups of respondents (Refer to Appendix J), the educators and supervisors group obtained a sum of the ranks of 507.50; instructors and students, 303; local government officials, 81.5; and non-government, business and industry organizations, 275.5. The following are the ranks of the subject areas on the relevance of training skills for coastal oceanography course: Oceanography of coastal water, 41.5 for the educators and supervisors; 13.5 for the instructors and students; 11.5 for the local government officials; and 24.5 for the non-government, business and industry organizations. Estuarine and coastal ocean dynamics, 44.5 for the educators and supervisors; 21 for the instructors and students; 6.5 for the local government officials; and 35 for the local government officials; and 35 for the non-government, business and industry organizations. Benthic ecology, 44.5 for the educators and supervisors; 24.5 for the educators and supervisors; 24.5 for the instructors and students; 6.5 for the local government officials; and 16 for the non-government, business and industry organizations. Near shore dynamics, 46.5 for the educators and supervisors; 22.5 for the instructors and students; 2.5 for the local government officials; and 18.5 for the non-government, business and industry organizations. Coastal water pollution, 48 for the educators and supervisors; 34 for the instructors and students; 11.5 for the local government officials; and 30.5 for the non-government, business and industry organizations. Coastal zone planning and management, 46.5 for the educators and supervisors; 29 for the instructors and students; 8 for the local government officials; and 30.5 for non-government, business and industry organizations.

Coastal and fluvial sedimentation, 41.5 for the educators and supervisors; 30.5 for the instructors and students; 2.5 for the local government officials; and 13.5 for the non-government, business and industry organizations. Marine environment ecology, 38 for the educators and supervisors; 27 for the instructors and students; 9 for the local government officials; and 24.5 for the non-government, business and industry organizations. Plankton ecology, 39.5 for the educators and supervisors; 30.5 for the instructors and students; 4 for the local government officials; and 10 for the non-government, business and industry organizations. Coral ecology, 41.5 for the educators and supervisors; 22.5 for the instructors and students; 5 for the local government officials; 18.5 for the non-government, business and industry organizations. Toxic chemical and power stations on coastal plankton, 39.5 for the educators and supervisors, 28.0 for the instructors and students; 15.4 for the local government officials; and 37 for the non-government, business and industry organizations. Systematic of fishes, 36 for the educators and supervisors; 20 for the instructors and students; 1 for the local government officials; and 17 for the non-government, business and industry organizations.

From the perception ranks of the respondents, an analysis of variance was made using the Kruskal-Wallis one way ANOVA to determine whether there is significant difference on the perception ranks made by the respondents. Table 62 gives the result where the computed H-value of 36.63 is larger than the critical value of chi square of 7.82 at .05 level of significance and 11.34 at .01 level of significance with degree of freedom of 3. Since the value of computed H is greater than the critical value of chi square the decision is to reject the null hypothesis in favor of the alternative hypothesis. Therefore there is a significant difference and this varies significantly with the relevance of the subject areas as perceived by the respondents in training skills for fisheries oceanography course.

Table 62

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Coastal Oceanography Course

No.of Subject/Cases	Degree of Freedom K-1	Computed Value of H	Critical Value of ChiSq .05	.01
(12x4) 48	(4-1) 3	36.63	7.82	11.34

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Oceanography Course

Based on the table of Appendix K, the fishery educators and supervisors group obtained a sum of the ranks of 519; the fishery instructors and students group with total of 450; the local government officials, 257; and the non-government organizations, business and industry organizations with 153.50 (see details in Appendix K). As gleaned from table of Appendix K, ocean basins and the seabed is ranked 44 by the educators and supervisors; ranked 23.5 by the instructors and students; ranked 1 by the local government officials; ranked 4.5 by the non-government, business and industry organizations. Large scale processes is ranked 6 by the educators and supervisors; ranked 23.5 by the instructors and students; ranked 20 by the local government officials, and the non-government, business and industry organizations. Processes on the continental shelf is ranked 48.5 by the educators and supervisors; ranked 34 by the instructors and students; ranked 25.5 by the local government officials; and ranked 27.5 by the non-government, business and industry organizations. Waves and tides is ranked 34 by the educators and supervisors; ranked 20 by the local government officials; and ranked 14 by the non-government, business and industry organizations. Navigation and bathymetry is ranked 44 by the educators and supervisors; ranked 32 by the instructors and students; ranked 27.5 by the local government officials; and ranked 20 by the non-government, business and industry organizations. Sedimentations and materials of the sea floor is ranked 46.5 by the educators and supervisors; ranked 29.5 by the instructors and students; ranked 16.5 by the local government officials; and ranked 14 by the non-government, business and industry organizations. Topography and bottom formation feasture is ranked 46.5 by the educators and supervisors; ranked 44 by the instructors and students; ranked 40.5 by the local government officials and ranked 8.5 by the non-government, business and industry organizations. Temperature, salinity and pressure is ranked 14 by the educators and supervisors; ranked 37 by the instructors and students; ranked 31 by the local government officials; and ranked 7 by the non-government, business and industry organizations.

Density and equation of state of the ocean is ranked 34 by the educators and supervisors; ranked 40.5 by the instructors and students; ranked 25.5 by the local government officials; and ranked 4.5 by the non-government, business and industry organizations. Stability and colligative properties of seawater is ranked 48.5 by the educators and supervisors; ranked 37 by the instructors and students ranked 12 by the local government officials; and ranked 2 by the non-government, business and industry organizations. The equation of motion in oceanography is ranked 50.5 by the educators and supervisors; ranked 40.5 by the instructors and students; ranked 11 by the local government officials. Major ocean currents and surface waves is ranked 52 by the educators and supervisors; ranked 29.5 by the instructors and students; ranked 10 by the local government officials; and ranked 8.5 by the non-government, business and industry organizations. Instrumentation and data processing is ranked 50.5 by the educators and supervisors; ranked 37 by the instructors and students; ranked 16.5 by the local government officials; and ranked 20 by the non-government, business and industry organizations.

The results in Table 63 revealed an analysis of variance, using the Kruskal-Wallis one way ANOVA, a computed value of square of 7.82 at .05 level of significance, and 11.34 at .01 level of significance with a degree of freedom of 3. The decision is to reject the null hypothesis in favor of the alternative hypothesis. Therefore, there is a significant difference and this varies significantly with the relevance of the subject areas as perceived by the respondents in the training skills for oceanography.

Table 63

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Oceanography Course

No.of Subject/Cases	Degree of Freedom K-1	Computed Value of H	Critical Value of ChiSq .05	.01
(13x4) 52	(4-1) 3	29.05	7.82	11.34

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Marine Biology Course

The revelation in table Appendix L is the results of the perception ranks of the respondents in the training skills in subject areas for the course in marine biology. The fishery educators and supervisors obtained a total ranks of 759.50; the fishery instructors and students, 759.50; the local government officials, 203.50; and non-government organizations, business and industry organizations, 735.

The perceptions ranks of training skills in subject areas are the following: Fundamentals of marine biology, 54, the educators and supervisors; 41.5 the instructors and students; 5.5 the local government officials; and 26 by the non-government, business and industry organizations. Marine botany, 56.5 by the educators and supervisors; 41.5 by the instructors and students and students; 16.5 by the local government officials; and 30 by the non-government, business and industry organizations. Marine invertebrates, 58.5 by the educators and supervisors; 38 by the instructors and students; 12.5 by the local government officials and 34.5 by the non-government, business and industry organizations. Micro-technique, 45 by the educators and supervisors; 30 by the instructors and students; 8 by the local government officials; and 21 by the non-government, business and industry organizations. Comparative vertebrates anatomy, 39 by the educators and supervisors; 24 by the instructors and students; 15 by the local government officials; and 30 by the non-government, business and industry organizations. Genetics and eugenics, 51 by the educators and supervisors; 26 by the instructors and students; 4 by the local government officials; and 41.5 by the non-government, business and industry organizations. Bio statistics, 45 by the educators and supervisors; 28 by the instructors and students; 12.5 by the local government officials; and 26 by the non-government, business and industry organizations. Quantitative chemistry, 51 by the educators and supervisors; 23 by the instructors and students; 4 by the local government officials; and 16.5 by the non-government, business and industry organizations.

Marine plankton, 56.5 by the educators and supervisors; 37 by the instructors and students; 18.5 by the local government officials; and 41.5 by the non-government, business and industry organizations. Oceanography its chemical and physical properties, 54 by the educators and supervisors; 45 by the instructors and students; 18.5 by the local government officials; and 21 by the non-government, business and industry organizations. Systematic of fishes, 48 by the educators and supervisors; 36 by the instructors and students; 12.5 by the local government officials; and 9.5 by the non-government, business and industry organizations. Biochemistry, 48 by the educators and supervisors; 32.5 by the instructors and students; 4 by the local government officials; and 9.5 by the non-government, business and industry organizations. Marine embryology, 48 by the educators and supervisors; 34.5 by the instructors and students; 1 by the local government officials; and 2 by the non- organizations, business and industry organizations. Marine environment and ecology, 54 by the educators and supervisors; 32.5 by the instructors and students; 58.5 by the local government officials; and 5.5 by the non-government, business and industry organizations. Mariculture, 51 by the educators and supervisors; 60 by the instructors and students; 12.5 by the local government officials; and 21 by the non-government, business and industry organizations.

The results of Kruskal-Wallis one way analysis of variance revealed in Table 64 that there is significant difference in the perception of the four groups of respondents on the relevance of training skills in subject areas for marine biology course. Analysis of the results revealed that the decision is to reject the null hypothesis in favor of the alternative hypothesis. This is supported by the obtained value of H= 37.94 which is larger than the critical value of chi square of 7.82 at .05 level of significance, and 11.34 at .01 level of significance with 3 df. The significant difference lies on the perceptions of the respondents on the relevance of training skills in subject areas for the course in marine biology.

Table 64

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Marine Biology Course

No.of Subject/Cases	Degree of Freedom K-1	Computed Value of H	Critical Value of Chi-Sq .05	.01
(15x4) 60	(4-1) 3	37.94	7.82	11.34

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Living Marine Resources Course

The details in Appendix M give a total rank of 746 for, fishery education instructors and students; 298.50 for local government officials; and 289 for non-government, business and industry organizations. The following are the ranks on the relevance of training skills in subject areas; Biological oceanography and its environment, 59.5 by the educators and supervisors; 34 by the instructors and students; 21.5 by the local government officials; and 26 by the non-government, business and industry organizations. Introduction to fishery science, 57 by the educators and supervisors; 41 by the instructors and students; 6.5 by the local government officials; and 17 by the non-government, business and industry organizations. Marine and aquatic algae, 57 by the educators and supervisors; 46 by the instructors and students; 44 by the local government officials; and 44 by the non-government, business and industry organizations. Fishes and their environment, 54.5 by the educators and supervisors; 41 by the instructors and students; 49 by the local government officials; and 11.5 by the non-government, business and industry organizations. Fish stocks and management, 49 by the educators and supervisors; 47 by the instructors and students; 53.5 by the local government officials; and 31.5 by the local government officials; and 31.5 by the non-government, business and industry organizations. Parasites and non-parasitic diseases of marine organisms, 41 by the educators and supervisors; 37.5 by the instructors and students; 21.5 by the local government officials; and 8.5 by the non-government, business and industry organizations. Mariculture, 59.5 by the educators and supervisors; 17 by the instructors and students; 10 by the local government officials; and 11.5 by the non-government, business and industry organizations. Structure and functions of marine ecological systems, 53.5 by the educators and supervisors; 17 by the instructors and students; 5 by the local government officials; and 23.5 by the non-government, business and industry organizations.

Taxonomy of marine invertebrates, 57 by the educators and supervisors; 31.5 by the instructors and students; and 37.5 by the non-government, business and industry organizations. Invertebrates embryology, 45 by the educators and supervisors; 17 by the instructors and students; 2 by the local government officials; and 17 by the non-government, business and industry organizations. Marine organisms and microbiology, 53.5 by the educators and supervisors; 28 by the instructors and students; 1 by the local government officials; and 8.5 by the non-government, business and industry organizations. Plankton and microplankton, 41 by the educators and supervisors; 33 by the instructors and students; 3.5 by local government officials; and 13 by the non-government, business and industry organizations. Physiology of marine organisms and biochemistry, 29.5 educators and supervisors; 51 by the instructors and students; 6.5 by the local government officials; and 23.5 by the non-government, business and industry organizations. Systematics of fishes, 41 by the educators and supervisors; 26 by the instructors and students; 3.5 by the local government officials; and 26 by the non-government, business and industry organizations. Marine zoo geography, 49 by the educators and supervisors; 29.5 by the instructors and students; 35.5 by the local government officials; and 17 by the non-government, business and industry organizations.

Kruskal-Wallis analysis of variance in Table 65 gives a computed value of H = 30.25 which is greater than the critical value of chi square of 7.82 at .05 level of significance and 11.34 at .01 level of significance with df = 3. Since the value of obtained H is greater than the critical value, the decision is to reject the null hypothesis and accepts the alternative hypothesis. Therefore there is a significant difference and this varies significantly with the perceptions of the respondents on the relevance of training skills in the subject areas for the course in living marine resources.

Table 65

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Living Marine Resources Course

No.of Subject/Cases	Degree of Freedom K-1	Computed Value of H	Critical Value of ChiSq .05	.01
(15x4) 60	(4-1) 3	30.25	7.82	11.34

Kruskal-Wallis ANOVA on the Training Skills in Subject Areas for Ocean Engineering Course

The findings on the perception ranks of the four groups of respondents where the fishery educators and supervisors obtained a total ranks of 397; the fishery instructors and students, 194.5; the local government officials, 228; and the non-government, business and industry organizations (see for details Appendix N). The ranks on the training skills in subject areas are as follows: Coastal and hydrodynamics, 40.5 by the educators and supervisors; 18.5 by the instructors and students; 4 by the local government officials; and 18.5 by the non-government, business and industry organizations. Coastal structural design, 3 by the educators and supervisors; 12 by the instructors and students; 6.5 by the local government officials; and 10 by the non-government, business and industry organizations. Oceanography measurement, 42.5 by the educators and supervisors; 5 by the instructors and students; 28 by the local government officials; and 14.5 by the non-government, business and industry organizations. Underwater acoustics, 38 by the educators and supervisors; 29 by the instructors and students; 32.5 by the local government officials; and 10 by the non-government, business and industry organizations. Investigation of special project, 35 by the educators and supervisors; 8 by the instructors and students; 31.5 by the local government officials; and 18.5 by the non-government, business and industry organizations. Applied ocean hydrodynamics, 35 by the educators and supervisors; 14.5 by the instructors and students; 1 by the local government officials; and 22.5 by the non-government, business and industry organizations.

Shoreline processes, 38 by the educators and supervisors; 14.5 by the instructors and students; 2 by the local government officials; and 27 by the non-government, business and industry organizations. Ocean structures, 42.5 by the educators and supervisors; 22.5 by the instructors and students; 31.5 by the local government officials; and 6.5 by the non-government, business and industry organizations. Numerical techniques in ocean engineering 44 by the educators and supervisors; 22.5 instructors and students; 35 by the local government officials; and 10 by the non-government, business and industry organizations. Tides and waves in shallow water, 38 by the educators and supervisors; 25.5 by the instructors and students, and by the local government officials; and 18.5 by the non-government, business and industry organizations. Materials in the marine environment, 40.5 by the educators and supervisors; 22.5 by the instructors and students; 31.5 by the local government officials; and 14.5 by the non-government, business and industry organizations.

Based on Table 66 in the analysis of variance by Kruskal-Wallis one way analysis of variance revealed a significant difference. The computed H = 17.34 is greater than the critical value of chi square of 7.82 at .05 level of significance and 11.34 at .01 level of significance with df = 3. Since the computed H value is more than the critical value of the chi square, the decision is to reject the null hypothesis in favor of alternative hypothesis. The perception of the respondents varies significantly with the relevance of the subject areas for the course.

Table 66

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Ocean Engineering Course

No.of Subject/Cases	Degree of Freedom K-1	Computed Value of H	Critical Value of ChiSq .05	.01
(11x4) 44	(4-1) 3	17.34	7.82	11.34

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of findings, conclusions, and recommendations of this study.

SUMMARY OF FINDINGS

The finding revealed in this study are the answers to the questions posed in Chapter 1.

Fishery and Marine Resources Available in the Communities

The fishery and marine resources available in the communities where the fisheries schools are located were made as bases for the development of resource-based curricular programs in fisheries and marine sciences. What is presented here is the profile since quantifying the different resources is very difficult. Whether the availability of these fishery and marine resources in the communities is developed or under-developed, its usefulness as basis for the development of courses or curricular program is of prime important. Their existence is enough in developing these resources, into a realistic usefulness and availability, thus improving the economic activities of the community.

The following are the fishery and marine resources available in the communities where the fisheries schools are located:

A. Fishery and Marine Resource Available in Albuera

1. Abalone
2. Bivalves
3. Bangus fry
4. Coral reefs
5. Coves
6. Continental shelf
7. Crabs
8. Crabs
9. Commercial fishes
10. Clear coastal water
11. Demersal
12. Estuaries
13. Fishing ground
14. Grouper/fry/juvenile
15. Industrial fishes
16. Jellyfish
17. Lobster
18. Mangrove swamps
19. Open sea
21. Oysters
22. Pelagic
23. Rivers
24. Rays
25. Swamps lands
26. Sandy beach
27. Surf shells
28. Sea grass
29. Squids
30. Sharks
31. Shrimps/prawns
32. Sea urchin
33. Sea weeds
34. Siganid/fry/juvenile
35. Scallop
36. Sea cucumber
37. Sargassm
38. Sugpo fry
39. Sponges

20. Octopus
40. Univalves

B. <u>Fishery and Marine Resources Available in Bato</u>

1. Abalone
2. Bivalves
3. Bangus fry
4. Coral reef
5. Continental shelf
6. Crabs
7. Clams
8. Commercial fishes
9. Clear coastal waters
10. Demersal
11. Estuaries
12. Fishing grounds
13. Industrial fishes
14. Jelly fish
15. Mangrove swamps
16. Open sea
17. Octopus
18. Oyster
19. Pelagic
20. Rivers
21. Rays
22. Swamp lands
23. Sandy beach
24. Surf shells
25. Sea grass
26. Squids
27. Sharks
28. Seaweeds
29. Scallop
30. Sea cucumber
31. Univalves

C. <u>Fishery and Marine Resources Available in Bobon</u>

1. Abalone
2. Bivalves
3. Bangus fry
19. Ocean
20. Octopus
21. Pelagic

4. Coral reefs
5. Crabs
6. Clams
7. Commercial fishes
8. Clear coastal water
9. Demersal
10. Deep coast
11. Estuaries
12. Grouper fry/juvenile
13. Industrial fishes
14. Lobster
15. Mangrove swamps
16. Mud crabs
17. Mussel
18. Open sea
22. Rivers
23. Swamps lands
24. Sandy beach
25. Sea grass
26. Squids
27. Sharks
28. Sugpo fry
29. Sponges
30. Shrimps
31. Sea urchin
32. Sea weeds
33. Siganid fry/juvenile
34. Sea weeds
35. Univalves

D. Fishery and Marine Resources Available in Calbayog

1. Bivalves
2. Bangus fry
3. Coral reefs
4. Crabs
5. Clams
6. Commercial fishes
17. Open sea
18. Octopus
19. Pelagic
20. Rivers
21. Rays
22. Swamp lands

7. Clear coastal water
8. Demersal
9. Estuaries
10. Fishing grounds
11. Grouper fry/juvenile
12. Industrial fishes
13. Jelly fish
14. Lobster
15. Mangrove swamps
16. Mud crab
23. Sandy beach
24. Sea grass
25. Squids
26. Sharks
27. Sugpo fry
28. Shrimps/prawn
29. Sea urchin
30. Sea cucumber
31. Univalves

E. <u>Fishery and Marine Resources Available in Carigara</u>

1. Bay
2. Bivalves
3. Bangus fry
4. Coral reef
5. Continental shelf
6. Crabs
7. Clams
8. Commercial fishes
9. Clear coastal water
10. Demersal
11. Estuaries
12. Fishing ground
16. Mud crab
17. Open sea
18. Octopus
19. Oyster
20. Pelagic
21. Rivers
22. Rays
23. Swamp lands
24. Sandy beach
25. Surf shells
26. Sea grass
27. Squids

13. Industrial fishes
14. Jelly fish
15. Mangrove swamps
28. Shrimps/prawns
29. Univalves

F. Fishery and Marine Resources Available in Catbalogan

1. Abalone
2. Bay
3. Bivalves
4. Coral reefs
5. Coves
6. Continental shelf
7. Crabs
8. Clams
9. Commercial fishes
10. Clear coastal water
11. Demersal
12. Estuaries
13. Fishing grounds
14. Grouper fry/juvenile
15. Industrial fishes
16. Shrimps/prawn
17. Sea urchin
18. Siganid fry/juvenile
19. Jelly fish
20. Mangroves swamps
21. Mussel
22. Open sea
23. Octopus
24. Oyster
25. Pelagic
26. Rivers
27. Bays
28. Rays
29. Swamp lands
30. Sandy beach
31. Surf shells
29. Squids
30. Sharks
31. Scallop
32. Sea cucumber
33. Univalves

G. Fishery and Marine Resources Available in Naval

1. Abalone
2. Bivalves
3. Bangus fry
4. Coral reef
5. Coves
6. Continental shelf
7. Crabs
8. Clams
9. Commercial fishes
10. Clear coastal water
11. Demersal
12. Estuaries
13. Fishing ground
14. Grouper fry/juvenile
15. Industrial fishes
16. Jelly fish
17. Lobster
18. Mangrove swamps
19. Mud crab
20. Mussel
21. Open sea
22. Octopus
23. Oyster
24. Pelagic
25. Rivers
26. Rays
27. Swamp lands
28. Sandy beach
29. Surf shells
30. Squids
31. Sharks
32. Sugpo fry
33. Shrimps/prawn
34. Sea urchin
35. Sigarid fry/juvenile
36. Univalves

H. Fishery and Marine Resources Available in Sta. Margarita

1. Abalone
2. Continental shelf
3. Crabs
15. Open sea
16. Octopus
17. Pelagic

4. Clams
5. Commercial fishes
6. Clear coastal water
7. Demersal
8. Estuario
9. Fishing ground
10. Grouper fry/juvenile
11. Industrial fishes
12. Jelly fish
13. Mangrove swamps
14. Mud crabs
18. Rivers
19. Rays
20. Swamp lands
21. Sandy beach
22. Squids
23. Sharks
24. Sugpo fry
25. Shrimps/prawn
26. Sea cucumber
27. Univalve

I. <u>Fishery and Marine Resources Available in Salcedo</u>

1. Abalone
2. Bay
3. Bivalve
4. Bangus fry
5. Coral reef
6. Crabs
7. Clams
8. Commercial fishes
9. Clear coastal water
10. Demersal
11. Deep coast
12. Estuarines
13. Fishing ground
14. Grouper fry/juvenile
15. Industrial fishes
16. Jelly fish
17. Lobster
27. Sandy beach
28. Sea grass
29. Squids
30. Sharks
31. Sugpo fry

18. Mangrove swamps
19. Mud crab
20. Mussel
21. Open sea
22. Ocean
23. Octopus
24. Oyster
25. Pėlagic
26. Rays
32. Sponges
33. Shrimps
34. Sea urchin
35. Sea weeds
36. Siganid fry/juvenile
37. Scallop
38. Sea cucumber
39. Univalves

J. Fishery and Marine Resources Available in Tolosa

1. Bivalves
2. Crabs
3. Clams
4. Commercial fishes
5. Clear coastal water
6. Demersal
7. Estuaries
8. Fishing grounds
9. Grouper fry/juvenile
10. Industrial fishes
11. Jelly fish
12. Mangrove swamps
13. Open sea
14. Octopus
15. Oyster
16. Pelagic
17. Rays
18. Swamp lands
19. Sandy beach
20. Sea grass
21. Squids
22. Sharks
23. Sigarid fry/juvenile
24. Univalves

Fishery Business/Commercial/Industrial or Economic Activities in the Communities

The availability of resources usually become the basis in generating business/commercial/industrial or economic activities but only fishing, fish drying, fish trading, and fishpond operation are the most common forms of business in the communities where the fisheries schools are located.

The following are the fisheries business/ commercial/industrial or economic activities undertaken in the communities in the region.

A. Fishery Business/Commercial/Industrial or Economic Activities in Albuera

1. Boat building
2. Dynamite fishing
3. Fish vending
4. Fish drying
5. Fish salting
6. Fish smoking
7. Fishing with nets
8. Fishing boat operation
9. Fishermen's cooperative
12. Fish trading
13. Fish gear making
14. Fishing w/ fine-mesh net
15. Hook and line fishing
16. Icing fish
17. Ice dealer
18. Middleman
19. Marine technician
20. Marine products buyer

10. Fisheries researcher
11. Hatchery operator
21. Fishpond operator

B. Fishery Business/commercial/Industrial or Economic Activities in Bato

1. Aquamarine seaweeds farming
2. Bangus fishpond operator
3. Bangus fry gatherer
4. Boat building
5. Dynamite fishing
6. Fish vending
7. Fish trading
8. Fishing w/ fine-mesh
9. Fish drying
10. Fish salting
11. Fishing with nets
12. Fishing boat operator
13. Fishing supply retailer
14. Fisheries researcher
15. Gulaman gatherer
16. Hook & line fishing
17. Icing fish
18. Ice dealer
19. Middlemen
20. Marine products buyer

C. Fishery Business/Commercial/Industrial or Economic Activities in Bobon

1. Aquamarine siganid grower
2. Aquamarine fry/juvenile gatherer
13. Fishing supply retailer
14. Fisheries researcher
15. Gulaman gatherer

3. Bangus fishpond operator
4. Boat building
5. Dynamite fishing
6. Fish vending
7. Fish trading
8. Fishing with fine-mess
9. Fish drying
10. Fish salting
11. Fishing with nets
12. Fishing boat operator
16. Gulaman dealer
17. Gulaman making
18. Hook & line fishing
19. Icing fish
20. Ice dealer
21. Middlemen
22. Marine products dealer

D. Fishery Business/Commercial/Industrial or Economic Activities in Calbayog

1. Bangus fishpond operator
2. Bangus fry gatherer
3. Boat building
4. Coral gatherer
5. Fishing with fine-mess
6. Fish drying
7. Fish salting
8. Fish smoking
9. Fishing with nets
10. Fishing boat operator
15. Dynamite fishing
16. Fish vending
17. Fish trading
18. Fishing gear making
19. Hatchery operator
20. Hook and line fishing
21. Icing fish
22. Marine products dealer
23. Middlemen
24. Marine technician

11. Fish coral fishing
12. Fishing supply retailer
13. Fishermen's coop.D.
14. Fisheries researcher
25. Marine products buyer
26. Shrimp fry gatherer
27. Sugpo fry gatherer
28. Sugpo fishpond operator

E. Fishery Business/Commercial/Industrial or Economic Activities in Carigara

1. Bangus fishpond operator
2. Boat building
3. Dynamite fishing
4. Fish vending
5. Fish trading
6. Fishing gear making
7. Fish drying
8. Fish salting
9. Fishing boat operator
10. Fishing supply retailer
11. Fishermen cooperative
12. Fisheries researcher
13. Hook & line fishing
14. Icing fish
15. Ice dealer
16. Middlemen
17. Marine products buyer
18. Sugpo fishpond operator

F. Fishery Business/Commercial/Industrial or Economic Activities in Catbalogan

1. Bangus fishpond operator
2. Dynamite fishing
3. Fish vending
4. Fish trading
5. Fishing gear making
13. Fishermen cooperative
14. Fisheries researcher
15. Gulaman making
16. Hook and line fishing
17. Ice plant

6. Fishing with fine-mess
7. Fish drying
8. Fish salting
9. Fish smoking
10. Fishing with nets
11. Fishing boat operator
12. Fishing supply retailer
18. Icing fish
19. Ice dealer
20. Marine technician
21. Sugpo fry gatherer
22. Marine products buyer
23. Shellcraft making

G. Fishery Business/Commercial/Industrial or Economic Activities in Naval.

1. Aquamarine fry/ juvenile gatherer
2. Bangus fishpond operator
3. Bangus fry gatherer
4. Fish vending
5. Fish trading
6. Fishing boat operator
7. Fishing supply retailer
8. Fishermen cooperative
9. Gulaman gatherer
10. Gulaman dealer
11. Gulaman making
12. Fishing gear making
13. Fishing with fine-mesh
14. Fish drying
15. Fish salting
16. Fishing with nets
17. Hook and line fishing
18. Ice dealer
19. Middlemen
20. Marine technician
21. Sugpo fry gatherer

H. Fishery Business/Commercial/Industrial or Economic Activities in Sta. Margarita.

1. Aquamarine fry/ Juvenile gatherer
2. Bangus fishpond operator
3. Bangus fry gatherer
4. Dynamite fishing
5. Fish vending
6. Fish trading
7. Fishing with fine-mesh
8. Fish drying
9. Fish salting
10. Fishing with nets
11. Fishing boat operator
12. Hook & line fishing
13. Icing fish
14. Ice dealer
15. Middlemen
16. Marine products buyer
17. Shrimp fry gatherer
18. Sugpo fry gatherer

I. Fishery Business/Commercial/Industrial or Economic Activities in Salcedo

1. Dynamite fishing
2. Fish vending
3. Fish trading
4. Fisheries researcher
5. Hook and line fishing
6. Icing fish
7. Ice dealer

J. Fishery Business/Commercial/Industrial or Economic Activities in Tolosa

1. Fish vending
2. Fish trading
3. Fisheries researcher
4. Hook and line fishing
5. Icing fish
6. Ice dealer

In the foregoing findings in the fisheries/business/ commercial/ industrial or economic activities, two economic activities are still prevalent in the region. These activities are the illegal means of fishing which are dynamite fishing and fishing with fine mesh-nets.

Fisheries and Marine Science Resource-Based Non-Ladderized and Ladderized Degree Courses Or Curricular Programs Relevant to the Business/Commercial/Industrial or Economic Activities of the Communities

There are 20 fisheries and marine science resource-based non-ladderized and ladderized courses or curricular programs which can be offered in the communities as reflected in Table 4 and 5. For purposes of identifying their relevance to the business/commercial/industrial or economic activities of the communities in the region, their ranks are correspondingly presented for each course or curricular program.

A. Non-Ladderized Fisheries and Marine Science Resource-Based Courses or Curricular Programs Relevant to the Business/Commercial/Industrial or Economic Activities of the Communities

There are 20 non-ladderized fisheries and marine science resource-based courses or curricular programs perceived as relevant to the communities with their corresponding ranks:

Marine Environmental Science	1
Foods and Marine Products Technology	2.5
Aquamarine Technology	2.5
Living Marine Resources	4
Fishery Education	5
Marine Fisheries Technology	6.5
Fishery Business Management	6.5
Fisheries Oceanography	8
Coastal Oceanography	10
Ocean Engineering	10
Coastal and Ocean Laws/Marine Affairs	10
Fishery Extension Education	12
Fisheries Biology	13
Marine Biology	14

Fisheries Management	15
Fisheries Economics	16
Oceanography	17
Marine and Atmospheric Chemistry	19
Marine Geology and Physical oceanography	19
Meteorology and Physical Oceanography	19

B. Ladderized Fisheries and Marine Science Resource-Based Courses or Curricular Programs Relevant to the Business/Commercial/Industrial or Economic Activities of the Communities

There are also 20 ladderized fisheries and marine science resource-based courses or curricular programs perceived as relevant to the communities with their corresponding ranks:

Foods and Marine Products Technology	1
Aquamarine Technology	2
Marine Fisheries Technology	3
Fishery Extension Education	4.5
Marine Environmental Science	4.5
Coastal Oceanography	6.5
Coastal and Ocean Laws/Marine Affairs	6.5
Fisheries Oceanography	8.5
Ocean Engineering	8.5
Marine Biology	10

Fishery Education	11
Fisheries Biology	12
Fisheries Management	13
Fisheries Economics	14
Oceanography	15
Fishery Business Management	16
Living Marine Resources	17
Marine and Atmospheric Chemistry	18
Marine Geology and Physical Oceanography	19.5
Meteorology and Physical Oceanography	19.5

Priority Offering of Fisheries and Marine Science Resource-Based Courses or Curricular Programs Relevant to the Needs of the Communities

Priority is one way of identifying which comes first in their order of importance, need, urgency, and gravity. For purposes of distinguishing the priorities of offering fisheries and marine science resource-based courses or curricular programs relevant to the needs of the communities, the following are presented in their order of priorities as perceived by the four groups of respondents:

First Priority Courses/Curricular Programs:

Foods and Marine Products Technology

Marine Environmental Sciences

Aquamarine Technology

Fishery Business Management

Marine Fisheries Technology

Fishery Education

Second Priority Courses/Curricular Programs

Fishery Extension Education

Coastal and Ocean Laws/Marine Affairs

Fisheries Economics

Fisheries Management

Third Priority Courses/Curricular Programs

Fisheries Biology

Coastal Oceanography

Marine Biology

Fisheries Oceanography

Oceanography

Fourth Priority Courses/Curricular Programs

Ocean Engineering

Living Marine Resources

Fifth Priority Course/Curricular Programs

Marine and Atmospheric Chemistry

Marine Geology and Physical Oceanography

Meteorology and Physical Oceanography

Relevance of Training Skills in Subject Areas

A. For Marine Fisheries Technology Courses

All the subject areas are "very much relevant" to the course in marine fisheries technology course as perceived by the fishery educators and supervisors group of respondents. The fishery instructor and students group perceived them "much relevant". Though the local government officials perceived the subject areas "much relevant" to the course, seven of the subject areas are "very much relevant" as follows: (1) coastal resource management, (2) marine ecology, (3) Fishing gear design and construction, (4) Fish handling and cold storage, (5) marine engineering, (6) marine fisheries management, and (7) systematics of fishes; while the following are perceived as "much relevant" are: (1) marine electronics, (2) fisheries oceanography, (3) navigation, (4) deck seamanship and ropework, and (5) survival of life at sea. The subject areas are perceived "very much relevant" by the non-government organizations, business and industry organizations to the training skills for the course in marine fisheries technology course. Seven are very much relevant: (1) coastal resources management, (2) marine ecology, (3) fisheries oceanography, (4) fishing gear design and construction, (5) fish handling and cold storage, (6) marine engineering, and (7) systematics of fishes; while five subject areas are perceived much relevant are: (1) marine electronics, (2) navigation, (3) deck seamanship and ropework, (4) survival of life at sea, and (5) marine fisheries management.

B. <u>For Aquamarine Technology Course</u>

The training skills in subject areas for aquamarine technology course are perceived "very much relevant" by the fishery educators and supervisors group of respondents. These subject areas are: (1) coastal resources management, (2) fry collection, handling and transport, (3) fish breeding and early life history, (4) nursery management techniques, (5) broodstock culture and management, (6) microalgae, (7) hatchery design and management, (8) fish and crustaceans diseases and control, (9) larvae culture and transport, (10) fish population dynamics, (11) fishpond design and management, (12) integrated fish culture, (13) marine fish and shellfish farming, (14) fish culture methods and techniques, and (5) systematics of fishes. While the other three groups of respondents which are the fishery instructors and students, local government officials, and the non-government, business and industry organizations perceived the skills as "much relevant". Fish breeding and early life history is perceived "moderately relevant" by the fishery instructors and students group. Microalgae and fish population dynamics subject areas are also perceived moderately relevant by the non-government, business and industry organizations to the training skills in aquamarine technology course.

C. For Foods and Marine Products Technology Course

The fishery educators and supervisors, and the local government officials group of respondents, perceived the training skills in subject areas as "very much relevant" for the course in foods and marine products technology. However, they vary in perceptions as to the different subject areas that are perceived "very much relevant." The subject areas perceived very much relevant by the fishery educators and supervisors are: (1) coastal resources management, (2) foods and fishery industrial technology, (3) microbiology, (4) foods and marine products handling and refrigeration,

(5) foods marketing and economics, (6) biochemistry, (7) foods curing, (8) food quality analysis and packaging, (9) marine products development, and (10) systematics of fishes; while four subject areas are perceived much relevant: (1) plant sanitation and safety, (2) fermentation, (3) principles of foods engineering, and (4) foods and marine products processing.

The instructors and students group and the non-government, business and industry organizations group perceived the subject areas as "much relevant" to the training skills in foods and marine products technology course.

D. For Fishery Business Management Course

The training skills in subject areas for the course in fishery business management are perceived as "very much relevant" by the educators and supervisors and the non-government, business and industry organizations groups of respondents. All the subject areas are perceived as "much relevant" by the fishery instructors and students respondents. Though perceived "much relevant" by the local government officials, the nine subject areas which are perceived very much relevant are: (1) coastal resources management, (2) fishery business and economics, (3) business organizations, (4) fundamentals of accounting, credit and banking, (5) coastal and deep-sea fishing and management, (6) fish culture methods and management, (7) marine products processing and management, (8) aquamarine culture and management, and (9) business forecasting and budgeting, while four subject areas are perceived as "much relevant": (1) systematics of fishes, (2) principles of economicsm, (3) fishery resource management, and (4) coastal and ocean laws. The fishery instructors and students group of respondents perceive the subject areas as "much relevant" to the training skills for the course in fishery business management.

E. For Fisheries Economics Course

The three groups of respondents, namely: the fishery educators and supervisors group, local government officials group, and the non-government, business and industry organizations, perceived the subject areas as "very much relevant to the training skills for the course in fisheries economics. The following subject areas are very much relevant: (1) coastal resources management, (2) principles of economics, (3) fishery scarcity and choice, (4) specialization, exchange and money, (5) money and banking system, (6) fishery market mechanism and elasticity, (7) fiscal policy, (8) business organization and management (9) fishery aggregate, supply and demand, (10) cost and perfectly competitive supply, economic efficiency, and (11) fishery markets between monopoly and competition. The same listing of subject areas are perceived as "much relevant" by the fishery instructors and students group of respondents.

F. For Fisheries Biology Course

Of the four groups of respondents, only the fishery educators and supervisors group perceived the subject areas as "very much" relevant to the training skills for the course in fisheries biology. The following are the subject areas: (1) marine biology and ecology, (2) ichthyology, (3) fish population dynamics, (4) marine flora and fauna, (5) fishing gears and methods, (6) oceanography, (7) histology and micro-techniques, (8) fish pathology and physiology, (9) fish genetics, (10) coral reef ecology, (11) zoogeography, (12) seaweeds productivity and ecology, and (13) biostatistics. All the thirteen subject areas are perceived much relevant by the fishery instructors and students, local government officials, and the non-government organizations, business and industry organizations group of respondents.

G. For Fisheries Oceanography Course

The training skills in subject areas are perceived as "very much relevant" by the fishery educators and supervisors, the fishery instructors and students, and the non-government, business and industry organizations. The local government officials perceived them as "much relevant." The following are the subjects that are perceived as "very much relevant" by the groups of respondents: (1) histology and micro-techniques, (2) fish pathology and physiology, (3) fish genetics, (4) coral reef ecology, (5) zoogeography, (6) seaweeds productivity and ecology, (7) biostatistics, (8) fish and environmental interactions, (9) acceptable catch and its estimation, (10) fish finding and migration in relation to environmental factors, (11) ocean environment and its variability, and (12) systematics of fishes. Though the training skills in subject areas are perceived "much relevant" by the local government officials, five subject areas are perceived "very much relevant": (1) fish genetics, (2) coral reef ecology, (3) zoogeography, (4) seaweeds productivity and ecology, and (5) fish and environmental interactions; while the seven subject areas are perceived "much relevant" are: (1) histology and micro-techniques, (2) fish pathology and physiology, (3) biostatistics, (4) acceptable catch and its estimation, (5) fish finding and migration in relation to environmental factors, (6) ocean environment and its variability, and (7) systematics of fishes.

H. For Coastal Oceanography Course

The fishery educators and supervisors group, and the fishery instructors and students group of respondents perceived the training skills in subject areas for the course in coastal oceanography as very much relevant; while the other two groups of respondents, the local government officials and the non-government, business and industry organizations group perceived them as "much relevant". Six subject areas are perceive as "very much relevant" and also six subjects are perceived as "much relevant" to the training skills for coastal oceanography course by the non-government organizations. These are: (1) oceanography of coastal waters, (2) estuarine and coastal ocean dynamics, (3) coastal zone planning and management, (4) coastal water pollution, (5) marine environment ecology, and (6) toxics chemical and power stations on coastal plankton; and the other six much relevant subject areas: (1) benthic ecology, (2) nearshore dynamics, (3) coastal and fluvial sedimentations, (4) plankton ecology, (5) coral ecology, and (6) systematics of fishes.

I. For Oceanography Course

"Very much relevant" is the perception of the three groups of respondents the fishery educators and supervisors group, the fishery instructors and students group, and the local government officials group, to the training skills in subject areas for oceanography course. The following are the subject areas: (1) ocean basins and seabeds, (2) large scale processes, (3) processes or continental shelf, (4) waves and tides, (5) navigation and bathymetry, (6) sedimentations and materials of the sea floor, (7) topography and formation of bottom feature, (8) temperature, salinity and pressure, (9) density and equation of state of seawater, (10) stability and colligative properties of seawater, (11) the equation of motion in oceanography, (12) major ocean currents and surface waves, and (13) instrumentation and data processing. The non-government, business and industry organizations perceived the subject areas as "much relevant". Six subject areas are "very much relevant," while seven subject areas are much relevant: (1) ocean basins and seabeds, (2) topography and formation of bottom feature, (3) temperature, salinity and pressure, (4) density and equation of state of sea water, (5) Stability and colligative properties of seawater, (6) the equation of motion in oceanography, and (7) major ocean currents and surface waves.

J. For Marine Biology Course

Two groups of respondents perceived the training skills in subject areas as "very much relevant" to the course in marine biology. These two groups are: the fishery educators and supervisors group and the fishery instructors and students group. The local government officials and the non-government, business and industry organizations perceived the subject areas as "much relevant" to the training skills in marine biology course. Seven subject areas are perceived "very much relevant" by the non-government, business and industry organizations. These are: (1) fundamentals of marine biology, (2) marine botany, (3) marine invertebrates, (4) comparative vertebrate anatomy, (5) genetics and eugenics, (6) biostatistics, and (7) marine plankton; while eight subjects are much relevant: (1) micro-techniques, (2) quantitative chemistry, (3) oceanography: its chemical and physical properties, (4) systematics of fishes, (5) biochemistry, (6) marine embryology, (7) marine environment and ecology, and (8) mariculture.

K. For Living Marine Resources Course

The training skills in subject areas are perceived as "very much relevant" for living marine resources course by the fishery educators and supervisors, fishery instructors and students, and the non-government, business and industry organizations. The following are the subject areas: (1) biological oceanography and its environment, (2) introduction to fishery sciences, (3) marine and aquatic algae, (4) fishes and their environment, (5) fish stocks and management, (6) parasites and non-parasitic diseases of marine organisms, (7) mariculture, (8) structure and functions of marine ecological systems, (9) taxonomy of marine invertebrates, (10) invertebrates embryology, (11) marine organism and microbiology, (12) plankton and microplankton, (13) physiology of marine organism and biochemistry, (14) sytematics of fishes, and (15) marine zoogeography. These subject areas are perceived as "much relevant"1 by the local government officials and seven of which are "very much relevant," while eight subject areas are "much relevant": (1) introduction to fishery science, (2) culture, (3) structure and functions of marine ecological systems, (4) invertebrates embryology, (5) marine organisms and microbiology, (6) plankton and microplankton, (7) physiology of marine organism and biochemistry, and (8) systematics of fishes.

L. For Ocean Engineering Course

The four groups of respondents, the fishery educators and supervisors group, the instructors and students group, the local government officials group, and the non-government, business and industry organizations group perceived the training skills in subject areas as "very much relevant" to the course in ocean engineering. Though they perceived them as "very much relevant," oceanographic measurement subject areas are perceived "much relevant" by fishery instructors and students group; coastal hydrodynamics, coastal structural design, applied ocean dynamics, and shoreline processes by the local government officials; and ocean structures by the non-government, business and industry organizations.

Kruskal-Wallis Analysis of Variance for the Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas.

The perceptions of the four groups of respondents on the relevance of training skills in subject areas for the different courses or curricular programs in fisheries and marine sciences is that, the relevance of training skills in subject areas are "very much and much relevant" except in aquamarine technology where two subject areas are "moderately relevant," and these subject areas are micro-algae and fish population dynamics.

Based on the Kruskal-Wallis one way analysis of variance, the ranks of the four groups of respondents obtained the following H-value: For marine fisheries technology course, 36.58; aquamarine technology course, 33.31; foods and marine products technology course, 43.50; fishery business management course, 37.17; fishery economics course, 27.64; fisheries biology course, 35.48; fisheries oceanography course, 16.54; coastal oceanography course, 36.63; oceanography course, 29.05; marine biology course, 37.94; living marine resources course, 30.25; and ocean engineering course, 17.34. The computed value of H in the twelve fisheries and marine science courses are greater than the critical value of 7.82 at .05 level of significance and 11.34 at .01 level of significance with 3 df, correspondingly, the decision is to reject the null hypothesis. The computed result revealed that there is a significant difference in the perceptions of the respondents on the relevance of subject areas in the twelve courses.

CONCLUSIONS

In the light of the foregoing findings, the following conclusions are drawn:

1. There are 49 fishery and marine resources identified and not all are available in each community which are both developed and undeveloped which could be tapped and utilized for education and training, scientific research, programs and projects for relevant fisheries and marine science education and development, with 40 in

Albuera recorded as the highest number and with 24 in Tolosa recorded as the lowest number.

2. There are 49 identified fishery business/ commercial/industrial or economic activities with two are illegal means of economic activities used in fishing. The most prominent and common forms or types of business are fishing, fish icing and trading, fishpond operation, and fish salting and drying.

3. There are 20 identified fisheries and marine science courses or curricular programs. The first top 10 ranks and second top 10 ranks of both non-ladderized and ladderized degree programs are relevant to the business/commercial/industrial or economic activities of the communities.

4. The training skills in subject areas for the 12 fisheries and marine science courses or curricular programs are "much relevant" and "very much relevant" and therefore can be offered as major subjects.

5. There are six fisheries and marine science courses for first priority; two course for fourth priority and three courses for fifth priority that can be offered by higher institution which are relevant to the needs of the communities.

6. The perceptions of the four groups of respondents vary significantly with the relevance of training skills in subject areas as perceived by them.

RECOMMENDATIONS

On the basis of the conclusion and findings, the following recommendations are presented:

1. The fisheries schools should maximize the utilization of fishery and marine resources available in the locality where they are located for a relevant and effective education and training.

2. Fisheries schools should have fisheries and marine science researchers to conduct research or studies on the undeveloped or underdeveloped fishery and marine resources for proper utilization and conservation.

3. Fishery extension education should be conducted on the communities on the wise utilization, conservation, and management of fishery and marine resources for the development of marine-based industries.

4. Course priorities offering should be considered and subject them to continuous studies or assessment to determine future needs and demands in the communities and in the country.

5. The training skills in two subject areas that are moderately relevant in marine fisheries technology course should be integrated with the other subject areas for enrichment of the training skills.

6. The subject areas should be offered as major subjects for the twelve (12) fisheries and marine science courses or curricular programs.

7. The curriculum model should be piloted in one of the fisheries schools under the higher education or may be adopted by a state college as authorized under its charter to offer fisheries programs.

Chapter 6

MODEL CURRICULUM FOR FISHERIES AND MARINE SCIENCE CURRICULAR PROGRAMS IN EASTERN VISAYAS

Rationale

This chapter presents a curriculum for fisheries and marine science and technology programs that would serve as a model for adoption by higher institution of learning. The proposed curriculum is based the results of the study for the first priority curricular programs with its focal indepth investigation on the training skills of the subject areas to form part of the major subjects or a field of specialization.

The courses and the major subjects in this model have been based on the fishery and marine resources situations and conditions to charter the directions of resources development on what scientific knowledge, education, and training are required toward the socio-economic upliftment of the community.

It is designed to improve the curricular offering of an institution of higher learning and envision top guide school leaders and managers, students and other sectors of the society on the industrial and occupational needs in the year 2000 and in the next millennium.

The proposed curriculum is quite different from other forms or types of curriculum in the sense that scientific learning is based on material resource development. Seas are promising environment to man and dangerous environments to many. Fishing, marine culture, collecting mineral resources from the sea floor and below it and dumping of all sorts of waste are activities that urgently require scientific consideration. Everybody knows that the seas cover wide areas. Therefore, even today few facts are known from nearshore and offshore. The marine resources provides new discoveries continually with the peculiarities of living marine fauna and flora beneath the sea.

Because of restriction on manpower, the vast sea areas need strategies and processes to investigate. Wise use and management of fishery and marine resources and environment are more important concerns for humanity. The social and economic changes in our country cause increased demands for our fisheries industry sectors in marine fisheries, aquaculture and inland fisheries.

The development trends in fisheries and marine-based industries and the education sector provide valuable insights on the probable composition, structure, growth patterns, training skills and expertise requirements of the industry to improve the rural communities.

As its response to the Philippines 2000, the curriculum proposed in this study necessitate to reconsider how to train and educate people at higher level in order to produce fishery and marine science experts who can effectively contribute to the complex management, planning, and research problems of today and of the future.

Fishery and marine science education is needed in our country and in many countries to produce leaders for the marine-based industries, fisheries management, and environmental planning, as well as to produce research scientists and educators. Leaders and managers in government fishery agencies often lack fishery and marine science education in their background, and this may limit the effectiveness of the proposed curriculum.

According to the Commission on Higher Education in the Philippines (1995:6-8), there are four goals and to attain these goals are certain objectives in order to ensure the realization of empowered and globally competitive Filipinos. Only the first two goals of Higher Education in the Philippines were reviewed in this chapter:

Goal 1. Quality and Excellence. Provision of undergraduate and graduate education which meet international standards of quality and excellence.

Objective 1. Establish and support regional and national centers of excellence in key or priority disciplines/areas.

Goal 2. Relevance and Responsiveness. Generation and diffusion of knowledge in the broad range of disciplines relevant and responsive to the dynamically domestic and international environment.

Objectives. 1. Encourage HEIs to improve or enrich higher education curricular and undertake educational innovations or reforms to cope with the emerging needs and demands of newly industrializing country;

2. Support higher education programs which are relevant and responsive to national and international developments.

3. Provide attractive incentives for students to pursue scientific, engineering and technology programs and other programs related to the strategic needs of the country; and

4. Modernize instruction, facilities and equipment of HEIs offering priority programs.

One of the strategies and policies to achieve the goal or relevance and responsiveness is prioritization of course offerings crucially required for national and regional industrializing economy (e.g. mining engineering in Baguio; geothermal engineering in Bicol; petroleum engineering in potential sources of petroleum). Eastern Visayas Region is surrounded by Leyte Gulf, Visayas Sea, Samar Sea, and Philippine Sea on the eastern side of the region, which are rich in fishery and marine resources and are potential sources of fisheries and marine-based industries which is therefore strategically feasible. It is sustainable to offer priority courses in fisheries and marine science courses.

Table 6 on page 78 of Chapter 4 manifested the results of the study on prioritization of courses which is one of the policies and strategies to achieve the goal on relevance and responsiveness of higher education.

Presented here are the guiding principles and minimum standards for the proposed curricular programs for fisheries and marine sciences and technology. Cortes (1987:52) quoted Harbison and Myers that in their study of 75 nations it led them to conclude that educational and economic development are positively correlated. On this basis, they underscored the importance of education in relation to national development in these words: "Not capital, nor income, nor material resources constitute the ultimate basis for the wealth of nations. Capital and natural resources are passive factors of production, human beings are the active agents, who accumulate capital, exploit natural resources, build social, economic and political organization and carry forward national development. Clearly, a country which is unable to develop skills and knowledge of its people and to utilize them effectively will be unable to develop anything else."

GUIDING PRINCIPLES AND MINIMUM STANDARDS FOR THE BACHELOR OF SCIENCE PROGRAMS FOR THE PROPOSED CURRICULAR PROGRAMS IN FISHERIES AND MARINE SCIENCES

I. GUIDELINES

A. Curriculum Objectives

To produce professionals capable of meeting the country's need for adequately trained technologists, managers/supervisors, researchers, extension workers, and specialist in fisheries or in marine science.

B. Programs

1. Instruction and Training

The curriculum should have a well-balanced general education and professional courses on subjects.

An institution must satisfy the Bachelor of Science curricular requirements before it can be authorized to offer a program in any other area. For purposes of satisfying, the institution is allowed to have a consortium with other educational institution.

2. Extension and Production

To strengthen and upgrade its academic programs, an institution must undertake extension and production activities. Extension activities will enable an institution to translate its research findings and production to serve as pilot project in generating revenue and encourage entrepreneurship.

3. Research and Development

To upgrade and enhance complementary and supplementary development in science and technology and dissemination of mature technologies to backstop countryside development in fisheries and marine resource-based industries.

C. Resources

1. Faculty

There should be a minimum number of qualified instructors/professors to handle the courses or subjects in the curricular programs.

2. Student

The institution should adopt an admission policy which provides equal access to students from lower income groups without sacrificing academic standards.

3. Instruction and Training Facilities

The existence of adequate instruction and training facilities and equipment is a pre-requisite to insure the offering of a quality and excellence underqraduate programs in any of the curricula.

D. Organization

Programs and resources of an institution must be organized in such a way that the three main functions of the institution (instruction and training, extension and production, and research and development) could be carried out effectively.

E. Outputs/Product Competencies

Graduates of the program should be well-equipped in their and skills in their field of specialization for employment and entrepreneurial or economic activities.

II. MINIMUM STANDARDS

A. Programs

1. Instruction and Training

The minimum units required for the curricular programs is reflected in the proposed curricula.

2. Extension and Production

Extension programs must conform with the Bureau of Fisheries and Aquatic Resources Programs and production with the rules and regulations of Commission on Audit and the Office of Budget and Management.

3. Research and Development

Applied research must be prioritized and conform with the National Aquatic Research and Development System or with the Philippine Council for Aquatic and Marine Research and Development of the Department of Science and Technology. It should be established to meet the development needs of the region as well as to provide dynamism and relevance to the instructional and training program of the institution.

B. Resources

1. Faculty

a. At the start of the program there should be at least three full-time faculty members per curricular program or in the field of specializations.

b. At full operation of the program, there should be at least six full-time faculty members per field of specialization.

The maximum factory-student ratio is 1:20 using the full-time equivalent for teaching.

c. All members of the faculty should have a bachelor's degree in fisheries or related fields of specialization (e.g. food science, marine biology, oceanography, economics, fisheries biology, etc.). At least 50 percent of the full-time faculty must have a master's degree in their field of specialization or related field of specialization. Preferably, there should be one or two doctorate degree holders in fisheries or related field of specialization.

d. There should be a faculty and staff development program as reflected in its annual budget allocation both formal and non-formal education and training.

2. Land

The institution should be strategically located in areas where the requirements of the programs can be maximized and effectively carried out (e.g., proximity to fish landings, fishing grounds, aquamarine areas, etc.).

3. Physical Facilities and Equipment

a. Building Requirements

1. School Building

A school building should conform to appropriate zoning and building regulations.

The classroom floor space should be at least 1.20 sq.m. per student.

2. Laboratories

An institution should have adequate laboratory equipment and space for the following:

Fishery and marine sciences
Physical Sciences
Chemical Sciences
Biological Sciences
Wet Laboratory
Processing Laboratory
Workshop

b. Equipment (see list of equipment)

c. Water and Power

An institution should have its own electric power source if the source of electricity in the community is inadequate. A good source of water supply for institution use is very essential.

d. Library

1. Minimum library seating capacity equivalent to 25 percent of the total number of students and staff.

2. Minimum of three books titles per subject for the general education subjects and at least five book titles for each of the major subjects.

3. Minimum of three technical journal titles (current) for each of the major areas.

e. Support Services

1. Health Services

There should be adequate functional, medical and dental clinics for the students, staff and their dependents.

2. Student, Personnel and Placement Service

There should be adequate student accommodation, food service, recreational facilities, counseling, and graduate placement service.

3. There should be adequate security services for the institution.

C. Organization

The institution must have a built-in system for planning, implementation, monitoring and evaluation of its instruction and training, extension and production, and research and development programs.

D. Output/Product Competencies

Graduates of the programs should be well-equipped in theory and skills in their field of specialization.

MODEL CURRICULUM FOR BACHELOR OF SCIENCE IN FOODS AND MARINE PRODUCTS TECHNOLOGY

FIRST YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
English 101	Communication Skills	3-0	3
Filipino 101	Sining ng Pakikipag-Talastasan	3-0	3
Foods Technology 101	Introduction to Foods and Fishery Industries Technology	3-0	3
Biology 101	Botany	3-6	5
Chemistry 101	General and Inorganic Chemistry	3-6	5
Physical Education 101	Fundamentals of Rhythmic Movements	3-0	2
CMT 11	Naval Science Reserve Officer Training Corp.		(1.5)
			21

Second Semester

Subject	Description	Hours Class-Lab.	Units
English 102	Communication Skills II	3-0	3
Filipino 102	Panitikang Filipino	3-0	3
Social Science 102	Introduction to Behavioral Science	3-0	3
Mathematics 102	College Algebra	3-0	3
Biology 102	Zoology	3-6	5
Chemistry 102	Organic and Analytical Chemistry	3-6	5
P.E. 102	Fundamentals of Group Sports & Games	3-0	2
CMT 12	Naval Science ROTC		(1.5)
			24

SECOND YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
English 201	Introduction to Literature	3-0	3
Mathematics 201	Trigonometry	3-0	3
Aquatic Biology 101	Systematics of Marine Organism, Fishes Morphology and Anatomy	3-6	5
Fishery Science	Coastal Resources Management	3-0	3
Social Science	Principles of Governance and Politics and Constitution	3-0	3
Foods Technology 201	Microbiology	3-0	2
P.E. 201	First Aid and Safety	3-0	2
CMT 21	Naval Science Reserve Officer Training Corp.		(1.5)
			24

Second Semester

Subject	Description	Hours Class-Lab.	Units
English 202	Writing of Scientific Papers/ Technical Writing	3-0	3
Social Science 202	Principles of Economics	3-0	3
Mathematics 202	Calculus	3-0	3
Physics 202	College Physics	3-0	3
Foods Technology 202	Biochemistry	3-6	5
Foods Technology 202[1]	Principles of Food Engineering	2-6	4
P.E. 202	Swimming, Diving and Boating	3-0	2
CMT 22	Naval Science ROTC		(1.5)
			23

THIRD YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
Statistics	Biostatistics	2-3	3
Physics 301	Mechanics and Heat	2-3	3
Social Science 301	Sociology and Anthropology	3-0	5
Foods Technology 301	Foods Quality and Packaging	2-6	4
Foods Technology 301_1	Foods and Marine Products Curing	3-0	3
			18

Second Semester

Subject	Description	Hours Class-Lab.	Units
Physics 302	Electricity and Magnetism	3-0	3
Foods Technology 302	Foods and Marine Products Development	2-6	4
Foods Technology 302_1	Foods and Marine Products Canning Process	3-6	5
Research Methods	Research Project and Data Analysis	2-3	3
Computer I	Data Encoding	2-3	3
Humanities 302	Introduction to Humanities	3-0	3
			21

Summer - On-the-Job Training 240 hours

FOURTH YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
Fisheries Extension Educ. 1	Principles & Practices of Extension Educ.	1-6	3
Foods Technology 401	Foods and Marine Products Fermentation	2-6	4
Foods Technology 401₁	Seminar in Food Technology and Current Issues	3-0	3
Humanities 401	Ethics	3-0	3
Computer 2	Data Processing	0-9	3
			16

Second Semester

Subject	Description	Hours Class-Lab.	Units
Special Problem	Undergraduate Thesis	0-9	3
Fisheries Extension Education 2	Tools, Methods and Approaches to Extension	1-6	3
Fisheries Business	Principles & Practices Of Bus. Mngt.	3-0	3
Cooperative	Principles & Practices Of Cooperatives	3-0	3
			12

MODEL CURRICULUM FOR BACHELOR OF SCIENCE IN AQUAMARINE TECHNOLOGY

FIRST YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
English 101	Communication Skills 1	3-0	3
Filipino 101	Sining ng Pakikipag-Talastasan	3-0	3
Aquamarine Technology 101	Introduction to Aquamarine Technology	3-0	3
Biology 101	Botany	3-6	5
Chemistry 101	General and Inorganic Chemistry	3-6	5
Physical Education 101	Fundamentals of Rhythmic Movements	3-0	2
CMT 11	Naval Science Reserve Officer Training Corp.		(1.5)
			21

Second Semester

Subject	Description	Hours Class-Lab.	Units
English 102	Communication Skills II	3-0	3
Filipino 102	Panitikang Filipino	3-0	3
Social Science 102	Introduction to Behavioral Science	3-0	3
Mathematics 102	College Algebra	3-0	3
Biology 102	Zoology	3-6	5
Chemistry 102	Organic and Analytical Chemistry	3-6	5
P.E. 102	Fundamentals of Group Sports & Games	3-0	2
CMT 12	Naval Science ROTC		(1.5)
			24

SECOND YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
English 201	Introduction to Literature	3-0	3
Mathematics 201	Trigonometry	3-0	3
Aquatic Biology	Systematics of Marine Organism, Fishes Morphology and Anatomy	3-6	5
Fishery Science	Coastal Resources Management	3-0	3
Social Science 201	Principles of Governance and Politics and Constitution	3-0	3
Aquamarine Technology 201	Nursery Management Techniques	2-6	4
P.E. 201	First Aid and Safety	3-0	2
CMT 21	Naval Science Reserve Officer Training Corp.		(1.5)
			23

Second Semester

Subject	Description	Hours Class-Lab.	Units
English 202	Writing of Scientific Papers	2-3	3
Social Science 202	Principles of Economics	3-0	3
Mathematics 202	Calculus	3-0	3
Physics 202	College Physics	3-0	3
Aquamarine Technology 202	Fish Breeding and Early Life History	2-3	3
Aquamarine Technology 202[1]	Fry Collections, Handling and Transport	2-6	4
P.E. 202	Swimming, Diving and Boating	2-3	3
CMT 22	Naval Science ROTC		(1.5)
			22

THIRD YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
Statistics	Biostatistics	2-3	3
Physics 301	Mechanics and Heat	2-3	3
Social Science 301	Sociology and Anthropology	3-0	5
Aquamarine Technology 301	Hatchery Design and Management	2-6	4
Aquamarine Technology 301₁	Broodstock Culture and Management	2-3	3
			20

Second Semester

Subject	Description	Hours Class-Lab.	Units
Physics 302	Electricity and Magnetism	3-0	3
Aquamarine Technology 302	Fish and Crustaceans Diseases & Control	2-3	3
Aquamarine Technology 302_1	Larvae Culture, Rearing Transport & Mrktng.	2-6	4
Aquamarine Technology 302_2	Inland Fisheries Mngt.	2-6	4
Research Methods	Research Project and Data Analysis	2-3	3
Computer I	Data Encoding	2-3	3
Humanities 302	Introduction to Humanities	3-0	3
			22

FOURTH YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
Fisheries Extension Educ. 1	Principles & Practices of Extension Educ.	1-6	3
Aquamarine Technology 401	Fishpond Design & Mngt.	3-6	5
Aquamarine Technology 401_1	Integrated Fish Farming	2-6	4
Aquamarine Technology 401_2	Mariculture	2-6	4
Humanities 401	Ethics	3-0	3
Computer 2	Data Processing	0-9	3
			21

Second Semester

Subject	Description	Hours Class-Lab.	Units
Special Problem	Undergraduate Thesis	0-9	3
Fisheries Extension Education 2	Tools, Methods and Approaches to Extension	1-6	3
Fisheries Business	Principles & Practices Of Business Mngt.	3-0	3
Cooperative	Principles & Practices Of Cooperatives	3-0	3
Aquamarine Technology 402	Marine Fish and Shellfish	3-6	5
Aquamarine Technology 402_1	Fish Culture Methods and Techniques	2-6	4
			21

MODEL CURRICULUM FOR BACHELOR OF SCIENCE IN MARINE FISHERIES TECHNOLOGY

FIRST YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
English 101	Communication Skills 1	3-0	3
Filipino 101	Sining ng Pakikipag-Talastasan	3-0	3
MFT 101	Fish Handling & Cold Storage	3-0	3
Biology 101	Botany	3-6	5
Chemistry 101	General and Inorganic Chemistry	3-6	5
Physical Education 101	Fundamentals of Rhythmic Movements	3-0	2
CMT 11	Naval Science Reserve Officer Training Corp.		(1.5)
			21

Second Semester

Subject	Description	Hours Class-Lab.	Units
English 102	Communication Skills II	3-0	3
Filipino 102	Panitikang Filipino	3-0	3
Social Science 102	Introduction to Behavioral Science	3-0	3
Mathematics 102	College Algebra	3-0	3
Biology 102	Zoology	3-6	5
Chemistry 102	Organic and Analytical Chemistry	3-6	5
P.E. 102	Fundamentals of Group Sports & Games	3-0	2
CMT 12	Naval Science ROTC		(1.5)
			24

SECOND YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
English 201	Introduction to Literature	3-0	3
Mathematics 201	Trigonometry	3-0	3
Aquatic Biology	Systematics of Marine Organism, Fishes Morphology and Anatomy	3-6	5
Fishery Science	Coastal Resources Management	3-0	3
Social Science 201	Principles of Governance and Politics and Constitution	3-0	3
Seamanship	Deck, Ropework, SOLAS And Rules of the Road	3-6	5
P.E. 201	First Aid and Safety	3-0	2
CMT 21	Naval Science Reserve Officer Training Corp.		(1.5)
			24

Second Semester

Subject	Description	Hours Class-Lab.	Units
English 202	Writing of Scientific Papers	2-3	3
Social Science 202	Principles of Economics	3-0	3
Mathematics 202	Calculus	3-0	3
Physics 202	College Physics	3-0	3
MFT 202	Marine Electronics	2-3	4
Navigation	Coastal & High Seas Navigation	3-6	5
P.E. 202	Swimming, Diving and Boating	3-0	2
CMT 22	Naval Science ROTC		(1.5)
			24

THIRD YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
Statistics	Biostatistics	2-3	3
Physics 301	Mechanics and Heat	2-3	3
Social Science 301	Sociology and Anthropology	3-0	3
Marine Science 301	Marine Ecology & Fisheries Oceanography	3-6	5
Marine Science 301$_1$	Marine Engineering	3-6	5
Computer I	Data Encoding	2-3	3
			22

Second Semester

Subject	Description	Hours Class-Lab.	Units
Physics 302	Electricity and Magnetism	3-0	3
Fishery Science 302	Marine Fisheries Mngt.	3-0	3
MFT 302	Fishing Boat Design And Management	3-0	5
MFT 302$_1$	Coastal and Offshore Fisheries	3-6	5
Humanities 302	Introduction to Humanities	3-0	3
			19

Summer - On-the-job Training 240 hrs.

FOURTH YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
Fisheries Extension Educ. 1	Principles & Practices of Extension Educ.	1-6	3
MFT 401	Fishing Gear Design & Construction I	3-6	5
MFT 401₁	Seminar in Fisheries Current Issues	3-0	3
Humanities 401	Ethics	3-0	3
Computer 2	Data Processing	0-9	3
			17

Second Semester

Special Problem	Undergraduate Thesis	0-9	3
Fisheries Extension Education 2	Tools, Methods and Approaches to Extension	1-6	3
Fisheries Business	Principles & Practices Of Business Mngt.	3-0	3
Cooperative	Principles & Practices Of Cooperatives	3-0	3
MFT 402	Fishing Gear Design And Construction II	3-6	5
			17

MODEL CURRICULUM FOR BACHELOR OF SCIENCE IN FISHERY BUSINESS MANAGEMENT

FIRST YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
English 101	Communication Skills 1	3-0	3
Filipino 101	Sining ng Pakikipag-Talastasan	3-0	3
Fishery Science	Coastal Resources Mngt.	3-0	3
Biology 101	Botany	3-6	5
Psychology 101	Personality Development	3-0	3
Social Science 101	Introduction to Sociology	3-0	3
P.E. 101	Fundamentals of Rhythmic Movements	3-0	2
CMT 11	Naval Science Reserve Officer Training Corp.		(1.5)
			22

Second Semester

Subject	Description	Hours Class-Lab.	Units
English 102	Communication Skills II	3-0	3
Filipino 102	Panitikang Filipino	3-0	3
Biology 102	Zoology	3-6	5
Mathematics 102	College Algebra	3-0	3
Physics 102	College Physics	12	4
P.E. 102	Fundamentals of Group Sports & Games	3-0	2
CMT 12	Naval Science ROTC		(1.5)
			20

SECOND YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
English 201	Communication Skills	3-0	3
Chemistry 201	Inorganic & Organic Chemistry	15	5
Fishery Science	Systematics of Marine Organisms & Fishes	3-6	5
Economics 201	Principles of Economics	3-0	3
Fishery Business 201	Fishery Business & Economics	3-0	3
P.E. 201	First Aid and Safety	3-0	2
CMT 21	Naval Science Reserve Officer Training Corp.		(1.5)
			24

Second Semester

Subject	Description	Hours Class-Lab.	Units
Fishery Science	Fishery Resources Mngt.	2-6	4
Mathematics 201	Algebra & Trigonometry	3-0	3
English 202	Business Correspondence	3-0	3
Mathematics 202	Mathematics of Investment	3-0	3
Management 202	Human Behavior in Organization	3-0	3
Management 202A	Business Organization And Management	3-0	3
P.E. 202	Swimming, Diving and Boating	3-0	2
CMT 22	Naval Science ROTC		(1.5)
			21

THIRD YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
Fishery Science 301	Fishery Laws and Regulation	3-0	3
Acctg. 301	Fundamentals of Accounting	3-0	3
Finance 301	Principles of Money, Credit and Banking	3-0	3
Business Law 301	Obligations & Contracts	3-0	3
Marketing	Principles of Marketing	3-0	3
Taxation 301	Fundamentals of Business Taxation	3-0	3
Fishery Business & Management I	Coastal Offshore Fishing and F/B Management	3-6	5
			23

Second Semester

Subject	Description	Hours Class-Lab.	Units
Acct. 302	Partnership & Corporation	3-0	3
Business Law 302	Laws on Scales & Bailments	3-0	3
Philosophy	Ethics	3-0	3
Mngt. 302	Industrial Organization & Management	3-0	3
Mngt. 302 A	Office Mangement and Sales Management	3-0	3
Economics 302	Macroeconomics	3-0	3
Fishery Business Management II	Fish Culture Methods and Management	3-6	5
			23

FOURTH YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
Mngt. 401	Personnel Management	3-0	3
Mngt. 401 A	Quantitative Techniques & Decision Making	3-0	3
Mngt. 401 B	Production Management	3-0	3
FBM 401	Business Forecasting And Budgeting	3-0	3
Business Law 401	Laws on Partnership And Corporation	3-0	3
Fishery Business Management III	Marine Products Processing, Fish Handling, Transport And Refrigeration	3-6	5
			20

Second Semester

Subject	Description	Hours Class-Lab.	Units
FBM 402	Business Policy	3-0	3
FBM 402 A	Seminar in Business Management	3-0	3
FBM 402 B	Special Problem	2-3	3
Business Law 402	Laws on Negotiable Instrument	3-0	3
Computer 402	Electronic Data Processing	3-0	3
Fishery Business Management IV	Aquamarine Farming Projects	3-6	5
			20

MODEL CURRICULUM FOR BACHELOR OF SCIENCE IN MARINE ENVIRONMENTAL SCIENCE

Majors in : Coastal Oceanography
Coastal Resources Management

FIRST YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
English 101	Communication Skills	3-0	3
Filipino 101	Sining ng Pakikipag-Talastasan	3-0	3
MES 101	Coastal Zone Management	3-0	3
Biology 101	Botany	3-6	5
Chemistry 101	General and Inorganic Chemistry	3-6	5
Physical Education 101	Fundamentals of Rhythmic Movements	3-0	2
CMT 11	Naval Science Reserve Officer Training Corp.		(1.5)

Second Semester

Subject	Description	Hours Class-Lab.	Units
English 102	Communication Skills II	3-0	3
Filipino 102	Panitikang Filipino	3-0	3
Social Science 102	Introduction to Behavioral Science	3-0	3
Mathematics 102	College Algebra	3-0	3
Biology 102	Zoology	3-6	5
Chemistry 102	Organic and Analytical Chemistry	3-6	5
P.E. 102	Fundamentals of Group Sports & Games	3-0	2
CMT 12	Naval Science ROTC		(1.5)

SECOND YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
English 201	Introduction to Literature	3-0	3
Mathematics 201	Trigonometry	3-0	3
Aquatic Biology 101	Systematics of Marine Organism, Fishes Morphology and Anatomy	3-6	5
Social Science	Principles of Governance and Politics and Constitution	3-0	3
P.E. 201	First Aid and Safety	3-0	2
CMT 21	Naval Science Reserve Officer Training Corp.		(1.5)

Majors:

Coastal Oceanography:

Oceanography of Coastal Waters	3

Coastal Resources Management:

Introduction to Coastal Resources Management	3

SECOND YEAR

Second Semester

English 202	Technical & Scientific Paper Writing	2-3	3
Social Science 202	Principles of Economics	3-0	3
Mathematics 202	Calculus	3-0	3
Physics 202	College Physics	2-3	3
P.E. 202	Swimming, Diving and Boating	3-0	2
CMT 22	Naval Science ROTC		(1.5)

Majors:

Coastal Oceanography:

Estuarine and Coastal Ocean Dynamics	2-3	3
Benthic Ecology	2-3	3

Coastal Resources Management:

Principles and concepts Of Ecology	2-3	3
The Species and the Individual in the Ecosystem	2-3	3

THIRD YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
Statistics	Biostatistics	2-3	3
Physics 301	Mechanics and Heat	2-3	3
Social Science 301	Sociology and Anthropology	3-0	5

Majors:

Coastal Oceanography:

Nearshore Dynamics	2-3	3
Coastal Water Pollution	2-3	3

Coastal Resources Management:

Systems Ecology	2-3	3
Pollutions and Environment	2-3	3

Second Semester

Physics 302	Electricity and Magnetism	3-0	3
Research Methods	Research Project and Data Analysis	2-3	3
Computer I	Data Encoding	2-3	3
Humanities 302	Introduction to Humanities	3-0	3

Majors:

Coastal Oceanography:

Coastal Zone Planning and Management	2-3	3
Coastal & Fluvial Sedimentation	2-3	3

Coastal Resources Management:

The Resources & Terrestial

Ecology	2-3	3
Marine & Estuarine Ecology	2-3	3

FOURTH YEAR

First Semester

Subject	Description	Hours Class-Lab.	Units
Fisheries Extension Educ. 1	Principles & Practices of Extension Educ.	1-6	3
Humanities 401	Ethics	3-0	3
Computer 2	Data Processing	0-9	3

Majors:

Coastal Oceanography:

Marine Environment Ecology	2-3	3
Plankton Ecology	2-3	3

Coastal Resources Management:

Coastal Water Productivity & Ecology	2-3	3
Oceanography of Coastal Water	2-3	3
Coastal & Fisheries Laws		3

FOURTH YEAR

Second Semester

Special Problem	Undergraduate Thesis	0-9	3
Fisheries Extension Education 2	Tools, Methods and Approaches to Extension	1-6	3
Fisheries Business	Principles & Practices Of Bus. Mngt.	3-0	3
Cooperative	Principles & Practices Of Cooperatives	3-0	3

Majors:

Coastal Oceanography:

Coral Ecology	2-3	3
Toxics chemical & Power Stations on Coastal Plankton	2-3	3

Coastal Resources Management:

Coastal Resources Management Process, Strategies and Approaches		3
Special Problem/Case Study	0-9	3

DESCRIPTION OF SUBJECTS

I. General Education Subjects

A. Language and Literature

English - 12 units

English I - Communication Skills I - 3 units

Skills of listening, speaking, reading and writing

English II - Communication Skills II - 3 units

Intermediate skills of listening, speaking, reading and writing

English III - Introduction to Literature -3 units

The study of literary types, fiction, poetry, drama, essay and biography. Skills in communication continue to be developed through discussion and reports.

English IV - Writing of Specific Paper/Technical Writing - 3 units

Filipino - 6 units

Filipino I- Sining ng Pakikipagtalastasan-3 units

Mga paraan sa pakikipagtalastasan o pagpapahayag, paglalarawan, pagsasalaysay, paglalahad at pangangatwiran.

Filipino II- Panitikang Filipino - 3 units

Mga piling katha ng mga manunulat na Filipino

B. Mathematics - 12 units

Mathematics I - College Algebra - 3 units

Linear equations, quadratics, complex numbers, binomial theorem, progression of theory and equations.

Mathematics II - Trigonometry - 3 units

Trigonometric functions, solution of polygons, logarithms and application; radian and inverse trigonometric functions and complex numbers.

Mathematics III - Calculus - 3 units

Basic statistical concepts; applied non-parametric and parametric statistics for science and technology.

C. Natural Sciences - 25 units

Biology I - Botany - 5 units

General Botany and Flora of the Sea

Biology II - Zoology - 5 units

General Zoology and Fauna of the Sea

Chemistry I - General and Inorganic Chemistry- 5 units

General principles, theory, and experimentation in Chemistry

Chemistry II - Organic and Analytical Chemistry-4units

Organic structural theory and introduction to reaction mechanisms and structure of organic compound and their analysis.

Physics I - Mechanics and Heat - 3 units

Inertia, motion, forces and energy, properties and laws of solids and liquids, temperature measurements and effects on properties of materials and heat flow.

Physics II - Electricity and Magnetism - 3 units

Sources, effects, measurements and uses of electricity; magnetism, fundamentals of wave motion applied to the study of sound and light.

D. Social Sciences - 12 units

Social Science I - Introduction to Behavioral Science - 3 units

Basic principles, theories, concepts and process of human behavior. The social cultural and psychological bases of contemporary Philippine condition on population, education, social changes and rural development.

Social Science II - Principles of Government Politics and Constitution - 3 units

Principles and concepts of political science, especially as they apply to the Philippines; the historical development of political institutions from pre-Spanish times to the present with special emphasis on the new constitution.

Social Science III - Principles of Economics - 3 units

Introduction to economics, the basic concepts of microeconomics, money and banking, economic growth and development and international economics.

Social Science IV - Sociology and Anthropology-3 units

An introduction to the basic concepts in sociology and anthropology stressing man's inter-relationship with others and also his environment. Basic to the course is the study of culture and social change.

E. Humanities - 6 units

Humanities I - Introduction to Humanities - 3 units

The field of music and the visual arts, study of principles underlying them.

Humanities II - Values and Ethics - 3 units

Reflection on moral experience, foundations of moral values, values and society, the family. Reflection of Filipino values, contemporary problems, and work ethics.

II - Common Subjects

Fishery Science - Coastal Resource Management - 3 units

Fisheries laws, policies, rules and regulation, survey of fisheries and resources, their production and conservation.

Aquatic Biology - General Morphology, Anatomy and Systematics of Marine Organism and Fishes-5 units

Fisheries Extension Education I - Principles and Practices of Extension Education - 3 units

Principles and methods of technology transfer and diffusion; concept of organization; extension program development, implementation and evaluation.

Fisheries Extension Education II - Tools, methods and approaches to extension work and field practices - 3 units

Research Methods - Design of research projects and data analysis with emphasis on statistical techniques - 3 units

Fisheries Business - Principles and practices of business management - 3 units

Cooperatives - Fishery Cooperatives - 3 units

Principles and practices, history of cooperatives in the Philippines, the relationship of cooperatives to rural and national economic development.

Computer 1 - Data Encoding - 3 units

Computer 2 - Data Processing - 3 units

III - Major Subjects

A. Foods and Marine Products

Foods and Fishery Industrial Technology - 3 units

An introduction to industrial technology in foods and fishery products.

Microbiology - 5 units

Bacteria, yeast, molds and parasites associated with food, their characteristics and importance.

Biochemistry - 5 units

An integrated application of the theories of organic chemistry to the properties and chemical reactivities of protein, fats and carbohydrates, chemical components of fish, meat and other marine products. Instrumental methods of analysis.

Food and Marine Products Handling and Refrigeration - 4 units

Principles and techniques of handling and refrigeration of food and other fisheries products.

Foods Quality Analysis and Packaging - 4 units

Quality assessment and packaging of food and fisheries products.

Principles of Food Engineering - 4 units

Technical, safety, hygiene, machineries, operation and processing.

Food and Marine Products Curing Process - 5 units

Principles and Methods of food processing with emphasis on curing.

Food and Marine Products Development - 4 units

Utilization of by-products, seaweeds and other minor marine products.

Food and Marine Products Canning Process -5 units

Canning of meat, fish and other products.

Food and Marine Products Fermentation - 4 units

Principles and methods of fermentation and its application.

Seminar on Food Technology and Current Issues - 3 units

Special Problem - Undergraduate Thesis - 3 units

On-the-Job Training - Internship, field work or extension service in private or government establishments (240 hrs.)

B. Major Subjects

AQUAMARINE TECHNOLOGY

Introduction to Aquamarine Technology - 3 units

Nursery Management Techniques - 4 units

Study of the occurrence and spread of fish parasites, soil isolation and prevention and control of diseases, nutrition and nutrients requirements.

Fish Breeding and Early Life History - 3 units

Environmental factor, distribution and adaptation of fishes and genetics.

Fry Collection, Handling and Transport - 4 units

Identification of fry nursery grounds, feeding management and handling.

Hatchery Design and Management - 4 units

Designing and construction, food production, broodstock management.

Broodstock Culture and Management - 4 units

Microalgae - 3 units

Biology, taxonomy and distribution of microflora.

Fish and Crustacean Diseases and Control - 4 units

Larvae Culture, Rearing and Transport - 4 units

Metabolism of protein, fats, carbohydrates in relation to fishes, sytems of handling.

Inland Fisheries Management - 3 units

Principles and Methods of Management and Conservation of inland waters in relation to fisheries.

Fishpond Design and Management - 5 units

Site selection, survey design and layout, construction, installation and maintenance of facilities.

Integrated Fish Farming - 4 units

Designing/Modification of pond design to suit other species for farming.

Mariculture - 4 units

Seaweed culture and sea launching

Marine Fish and Shellfish Farming - 5 units

Fish Culture Methods and Techniques - 4 units

The use of pens, cages and other methods of culture or propagation.

C. Marine Fisheries Technology

Fish Handling and Cold Storage - 3 units

Principles and methods, practices of fish handling and storage on board.

Deck, Ropework, SOLAS, & Rules of the Road - 5 units

Coastal and High Sea Navigation - 5 units

Piloting and sailing in high seas.

Marine ecology and Fisheries Oceanography - 5 units

The principles of ecology, the physical, chemical and biological properties and their influence to fish abundance and distribution.

Marine Electronics - 4 units

Operation and maintenance of marine navigation and fishing instruments on board.

Marine Engineering - 5 units

Operation and maintenance of marine machineries and equipment on board.

Marine Fisheries Management - 3 units

Principles and methods of population dynamics management and conservation of fisheries in marine waters.

Fishing Boat Design and Managemetn - 5 units

Design, construction, operation and management of fishing boat.

Coastal and Offshore Fisheries - 5 units

Operation and maintenance of small scale fishing gear for capture of commercially important species.

Fishing Gear Design and Construction I - 5 units

Designing and Construction, operation of small scale fishing gear.

Fishing Gear Design and Construction II - 5 units

Design and construction, operation of large scale fishing gear.

Seminar in Fisheries -	3 units

D. Fishery Business Management

Fishery Business and Economics -	3 units
Mathematics of Investment -	3 units
Human Behavior in Organization -	3 units
Business Organization and Management -	3 units
Fundamentals of Accounting -	3 units
Principles of Money, Credit & Banking -	3 units
Obligation and Contracts -	3 units
Fundamentals of Business Taxation -	3 units
Coastal-Offshore Fishing and Fishing Boat Management -	5 units
Partnership and Corporation -	3 units
Laws on Scales and Bailments -	3 units
Industrial Organization and Management -	3 units
Office Management and Sales Management -	3 units
Macroeconomics -	3 units
Fish Culture Methods and Management -	3 units
Personnel Management -	3 units
Production Management -	3 units
Quantitative Techniques & Decision Making -	3 units
Business Forecasting and Budgeting -	3 units
Laws on Partnership and Corporation -	3 units

Marine Products Processing, Fish Handling,
Transport and Refrigeration - 5 units

Aquamarine Farming and Management - 5 units

E. Coastal Oceanography

Oceanography of Coastal Waters	3 units
Estuarine and Coastal Ocean Dynamics	3 units
Benthic Ecology	3 units
Nearshore Dynamics	3 units
Coastal Water Pollution	3 units
Coastal Zone Planning and Management	3 units
Coastal and Fluvial Sedimentation	3 units
Marine Environment and Ecology	3 units
Plankton Ecology	3 units
Coral Ecology	3 units
Toxic, Chemical and Power Stations on Coastal Planktons	3 units

F. Coastal Resources Management

Introduction to Coastal Resources Management -	3 units
Principles and Concepts of Ecology -	3 units
The Species and the Individual in the Ecosystem -	3 units

Systems Ecology -	3 units
Pollution and Environment -	3 units
The Resources and Terrestial Ecology -	3 units
Marine and Estuarine Ecology -	3 units
Coastal Water Productivity and Ecology -	3 units
Oceanography of Coastal Water -	3 units
Coastal and Fisheries Laws -	3 units
Coastal Resources Management Process, Strategies and Approaches -	3 units
Special Problem/Case Study -	3 units

List of Equipment and Other Materials for Fisheries and Marine Science Courses

A. Fish Farming Laboratory

1. Student microscope, compound (1 for every 3 students)
2. Research microscope (at least 3)
3. Dissecting microscope (at least 2)
4. Refractometers/Hydrometers
5. pH meters
6. Oxygen meters (at least 2)
7. Secchi discs
8. Plankton net
9. Thermometer
10. Drying oven
11. Toploading Balance
12. Analytical Balance
13. Transit and stadia rods
14. Marine pumps
15. Laboratory centrifuge
16. Aquaria and accessories (at least 6 units)
17. Tally counters
18. Blenders/mixers
19. Planimeter
20. Grinders
21. Water bath
22. Sterilizer
23. Distilling apparatus
24. Glass dessicators (at least 2)
25. Crucibles (at least 2 dozens)
26. Freezer (1 set)
27. Soil sampler
28. Bottom grab (dredge)
29. Water sampler
30. Fat extractor
31. Crude fiber (glassware)
32. Muffle furnace
33. Kieldahl apparatus
34. Standard laboratory glasswares

B. Navigation Laboratory

1. Radio direction finder
2. Aneroid Barometer
3. Azimuth mirror

4. Azimuth circle
5. Chronometer
6. Course protractors
7. Deviation tables
8. Compass
9. Drafting/Long tables
10. Magnetic Compas
11. Parallel rulers
12. Pelorus
13. Radar
14. Set of navigational charts and astronomical charts
15. Sextant
16. Stadimeter and range finder
17. Three arm protractor
18. Taffrail log
19. Tide tables and almanac

C. Seamanship Laboratory

1. Blocks
2. Room Devits
3. Chain hoist
4. Hooks and thimbles
5. Life vasts
6. Ropes, twines, strands, cables
7. Shackles
8. Skiff and oars
9. Tackles, swivels
10. Thimbles eyes with rope clips
11. Wire rope clamps
12. Wire rope clips

D. Fishing Gear and Net Loft

1. Assorted mesh qauges
2. Assorted net needles
3. Bench vises
4. Chain block - 1 ton
5. Chain cutter
6. Hammer
7. Hand carts
8. Hand winch
9. Line hauler
10. Marine spikes
11. Net rollers
12. Netting knives

13. Protective gloves

E. Net and Gear Preparation

1. Bag net
2. Gill nets
3. Long line or hand lines
4. Fish pots
5. Purse seine nets or ring nets
6. Models or charts of different large and small scale fishing gear
7. Other fishing gears

(Note: Items 1-5 may be available depending on local conditions)

F. Fishing Boats[1]

1. 1 Wooden hulled fishing boat, 10 gross tons designed for bag net and ring net fishing
2. 1 motorized utility pumpboat powered by 16 HP engine
3. 1 motorized pumpboat for long lining
4. 5 units wooden canoe with outriggers for multiple handlines fishing and gill net.

G. Deck Machinery and Hydraulics Laboratory

1. Chainblocks ½ ton and 1 ton
2. Winch
3. Electrical power supply
4. Electrician pliers
5. Electrician screwdrivers
6. Grease guns
7. Gas leak detectors
8. Hack saws
9. Heavy duty screwdrivers
10. Hydraulic oil tank and circuit
11. Hydraulic pump and motor
12. Pipe cutter
13. Pipe treading tools
14. Pipe wrenches

[1]At least one of the items listed under letter E should be available.

15. Tube benders and cutter
16. Valves bands and cocks
17. Vises
18. Water pumps
19. Water tank and piping circuit
20. Wrenches

H. Oceanography Laboratory

1. Cartographic instruments
2. Chemical analysis glassware
3. Calorimeter photoelectric graphical
4. Compound microscope
5. Depth recorder
6. Centrifuge, table model
7. Iron ring
8. Iron stand
9. Magnetic stirrer
10. Pantograph
11. Titration apparatus
12. pH meter
13. Portable water quality analyzer
14. Sea water samplers
15. Wind vane
16. Anemometer
17. Barometer
18. Rain gauge
19. Weather charts
20. Refrigerators
21. Ring illuminator, magnifying glass, flexible neck
22. Salinity bottles
23. Standard seawater calorimeter set
24. Standard seawater ampules
25. Thermometer (0-100^{0}C)
26. Thermostatic bath
27. Utility clamp
28. Nutrients analyzer

I. Boat and Engine Laboratory

1. Carpentry tools
2. Mechanical tools
3. Deck layout model
4. Drafting tables
5. Diesel engine

6. Hall structure model
7. Hydraulic pump unit
8. Outboard motor
9. Portable generator
10. Water pump system

J. Fish Processing Laboratory

1. Polythylene or plastic bag sealer
2. Internal time (15 second 50 2 hours)
3. Refrigerator - 14 cu. Ft.
4. Toledo balance - 200 kg.
5. Portable weighing scale - 2.5 k.g
6. Pressure cooker
7. Vaccum gauge - 30 in. test gauges
8. Basic kitchen equipment such as cutting board, sauce pan, can opener, etc.
9. Steamer
10. Electric meat mixer grinder
11. Freezer
12. Smoke house
13. Suasage making set
14. Potentiometer
15. Portable pH metr
16. Probe thermometer
17. Salinometer
18. Solar dryer and accessories (set)
19. Can sealer

K. Microbiology Laboratory

1. Aucoclave
2. Water distiller
3. Osterizer
4. Balance, triple beam
5. Water bath
6. Incubator
7. Refrigerator
8. Bunsen burner
9. Alcohol lamps
10. pH meter
11. Hot plate with magnetic stirrer
12. Analytical balance
13. Glasswares
    - petri dishes
    - beakers

test tubes
pipettes

14. Microscope, 3 objectives
15. Incubator for various temperature settings

L. Chemistry Laboratory

Thermometer	Furnace
Kieldahl set-up	Dessicator
Centrifuge	Conway units
Oven	Spectrophotometer/Calorimeter

M. Sensory Room

Taste panel booth and accessories

BIBLIOGRAPHY

BIBLIOGRAPHY

A. BOOKS

Aquino, Gaudencio V. Curriculum Planning for Better Schools. Manila: Rex Book Store, 1986.

Andres, Tomas. Q.D. and Francisco, F. Curriculum Development in the Philippine Setting. Metro Manila: National Book Store, 1989.

Botor, Celeste O. and Ortinero, Aniceta M. (Eds.). Philosophy of Education Concerns: Purposes, Content, and Methods of Education, Concerns: Purposes, Context, and Methods of Education. Philippines: Rex Bookstore, 1994.

Conner, First E. and Ellena, William J. Curriculum Handbook for School Administrators. Washington DC. American Association of School Administrators, 1967.

Corson, John J. The Governance of Colleges and Universities: Modernizing Structure and Processes. New York: McGraw-Hill Book Company, Inc., Revised Edition, 1975.

Cortes, Josefina R. Education and National Development: The Philippine Experience and Future Possibilities. Diliman, Q.C.: Publisher's Printing Press, 1987.

Dagoon, Jesse D. and Dagoon, Joy P. Teaching Strategies in Livelihood and Vocational Education Today. Manila: Rex Book Store, 1986.

Ellis, Arthus K. et al. Introduction to the Foundation of Education. New Jersey: Prentice-Hall Inc., 1981.

Franco, Ernesto A. (Ed.). A How-To-Book for Traineesand Teachers Training. Center for Development Management and Productivity and Franco Institute: National Book Store, 1991.

Garcia, Dolores G. Curriculum Theory and Application. Quezon City: Alemar-Phoenix Publishing House, Inc., 1973.

Giachino, J.W. and Gallington, R.O. Course Construction in Industrial Arts, Vocational and Technical Education. Chicago: AMerican Technical Society, 1977.

Kelly, A.V. The Curriculum: Theory and Practice. London: Harper and Row Ltd., Second Edition, 1982.

Laevastu, Taivo and Hayes, Murray L. Fisheries Oceanography and Ecology. Surrey, England: Fishing News Books Ltd., 1981.

Laevastu, Taivo and Larkins, Herbert A. Marine Fisheries Ecosystems: Its quantitative Evaluation and Management. Surrey, England: Fishing News Books Ltd., 1981.

Miranda, Greogorio S. Business and Government. Metro Manila, National Book Store, Fourth Edition, 1988.

Oliver, Albert I. Curriculum Improvement: Guide to Problems, Principles and Procedures. New York: Dodd and Mead and Co., Inc., 1971.

Skeel, Dorothy J. and Hagen, Owen A. The Process of Curriculum Change. California: GoodYear Publishing Co., 1971.

Soriano, Luz E. et al. Sustainable Development: A Philippine Perspective. Manila: Phoenix Publishing House Inc. 1995.

Study Team, UPLB Rural Development. Philippine Rural Development: Problem, Issues and Directions. U.P. Los Banos, 1991.

Schumacher, E. F. Small is Beautiful Economics as if People Mattered. New York: Harper and Row Publisher, Inc. 1973.

Wolotkiewics, Rita J. College Administrators handbook. Massachusetts: Allyn and Bacon Inc. 1980.

B. DOCUMENTS

Bureau of Technical and Vocational Education, 1993 Annual Report, Pasig, Metro Manila.

Commission on Higher Education, (1994) Long-Term Higher Education Development Plan. CHED, Pasig City, Philippines, The Philippine Vision 2005, and Higher Education Mission and Vision 2005.

DAP, Task Force on Human Settlements, (1976) The Vision of New Society: A Framework for the Nation, Vol. 2, Metro Manila.

DA-BFAR, (1998). Administrative Order No. 3: Implementing Rules and Regulation of the Philippine Fisheries Code of 1998, Series of 1998.

Joint Administrative Order No. 2 on IRP of E.O. No. 240, 1996.

National Statistics Office, 1994, Philippine Yearbook, Manila.

NEDA (1984) Philippine Statitical Yearbook 1984, Manila, Paragraph 2, Section 2, 1994 Higher Education Act.

Philippine Atlas FAPE 1995, Vol. 1, Manila, Philippines.

Philippine Council for Aquatic and Marine Research and Development, PCAMRD Annual Report 1996, Los Banos, Laguna, PCAMRD, 1996.

PCSD. A Primer on Philippine Agenda 21.

Republic Act No. 1241. "Reorganization Act Transfering the PIFT to the University Philippines and the other School of Fisheries to the Bureau of Vocational Education". January 1957.

Task Force to Study Higher Education. (1987) Report on State Universities and Colleges in the Philippines, Vol. 1, Manila: Ministry of Education, Culture and Sports.

C. UNPUBLISHED WORKS

Abdurahman, Latip S. "Technician Education in Fishery Schools in Eastern Visayas: A Baseline Study". (Unpublished Master's Thesis), SSPC, Catbalogan, Samar, 1990.

Abawag, Josefina D. "The Techno-Vocational Graduates: Their Contribution to the Socio-Economic Status of Samar", Unpublished Doctoral Dissertation, SSPC, Catbalogan, Samar 1990.

Babalcon, Simon P. "A Development Plan for Trade-Technical Schools and the Industrial Manpower Needs in Eastern Visayas". (Doctoral Dissertation), DWU, Tacloban City, 1992.

Bardelas, Serafin A. "Curriculum Offerings of Trade-Technical Schools and the Industrial Manpower Needs in Eastern Visayas." (Doctoral Dissertation), DWU, Tacloban City, 1988.

Cabanganan, Dominador Q. "Vocational-Technical Education: Focus on the In-Plant Training Program." (Doctoral Dissertation), DWU, Tacloban City, 1982.

Marco, Deborah T. "An Assessment of the Maqueda Bay area Development Program: Basis for the Creation of the Maqueda Bay Development Authority". (Doctoral Dissertation), SSPC, Catbalogan, Samar, March 1993.

Obsequio, Antonio S. "Management of Vocational-Technical Schools and Its Relevance to Manpower Development", Unpublished Doctoral Dissertation, DWU, Tacloban City, 1987.

Oliva, Bernardo S. "High level Manpower Demand and Supply in Eastern Visayas", Unpublished Doctoral Dissertation, DWU, Tacloban City, 1987.

Quitalig, Luisito M. "A Proposed Model for Relevantizing Technical-Vocational Education Curriculum in Eastern Visayas", Unpublished Doctoral Dissertation, SSPC, Catbalogan, Samar, 1991.

Suyom, Violeta B. "Higher Education and Manpower Development in Region VIII: An Exploratory Study", Unpublished Doctoral Dissertation, DWU, Tacloban City, 1984.

D. PERIODICALS

Alcala, Angel C. "Marine Reserves: A Strategy for Sustainable Shallow-Water Fisheries". SYMBIOSIS, EMB-DENR, July-Dec. 1995.

Belen, Hermogenes F. "Education and Manpower Development". PASS EDUCATION DIGEST, Vol. 1, 1969.

Gonzales, Felix R. “Philippine Fisheries Program Report”. Fisheries Newsletter, Commemorative Issue, October 18-24, 1980.

Juliano, R.O. and Flores, E.E.S. “Fisheries Education and Training in the Philippines”. In Fisheries Education and Training in Asia: Workshop Proceeding. ASIAN FISHERIES SOCIETY SPECIAL PUBLICATION, No. 2, 1988.

Philippine Council for Academic and Marine Research and Development, PCAMRD Annual Report 1996, Los Banos, Laguna, PCARMD, 1996

PCARMD. Updated Five-Year R and D Plan (1988-1992) of the National Aquatic Resources Research and Development System (NARRSD), 1990, DOST, Los Banos, Laguna.

Southeast Asian Fisheries Development Center. SEAFDEC Annual Report, 1995, Bangkok, Thailand: SEAFDEC 1995.

UNESCO. Unesco Reports in Marine Science: Syllabus for Training Marine Technicians, UNESCO, 1979, Paris, France.

UNESCO, Unesco Reports in Marine Science: Fishery Science Teaching at the University Level, UNESCO, 1981, Paris, France.

UNESCO, Unesco Reports in Marine Science: Marine Science Teaching and Training at First Degree (Undergraduate Level, UNESCO, 1987, Paris, France.

APPENDICES

APPENDIX A

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar
GRADUATE AND POST-GRADUATE STUDIES

QUESTIONNAIRE

Dear Respondent:

You are a choiced partner for this research work that I am undertaking in the development of relevant fisheries and marine sciences courses or curricular programs for fishery education and marine-based industries development.

The data you will provide will be very useful for this research. Please answer the questions as accurately as possible. Your responses will be treated strictly confidential.

Thank you for your cooperation and wholehearted support.

Very truly yours,

(Sgd.) LATIP S. ABDURAHMAN
Researcher

Instruction: Indicate your answer with a checkmark [/] or write important data if necessary.

Name of Respondent: ______________________________
Home Address: ______________________________
Office/Business Address: ______________________________

1. What fishery and marine resources for fisheries and marine sciences courses are available in your community and vicinities? (Please check)

- ______ Abalone
- ______ Bay
- ______ Bivalves (shells)
- ______ Bangus fry
- ______ Coral reefs
- ______ Coves
- ______ Channel
- ______ Continental shelf
- ______ Crabs
- ______ Clams
- ______ Commercial fishes
- ______ Clear coastal water
- ______ Demersal (bottom fishes)
- ______ Deep coast
- ______ Estuary (ies)
- ______ Fishing grounds/areas
- ______ Grouper fry/juvenile
- ______ Industrial fishes
- ______ Jelly fish
- ______ Lobster
- ______ Lakes
- ______ Mangrove swamps
- ______ Mud crabs/Alimango
- ______ Mussels
- ______ Open sea
- ______ Ocean
- ______ Octopus
- ______ Oysters
- ______ Pelagic (surface/ midwater fishes)
- ______ Kelp/large brown seaweeds
- ______ Reef fishes
- ______ Rivers
- ______ Rays
- ______ Swamplands
- ______ Sandy beach
- ______ Surf shells
- ______ Sea grass
- ______ Squids
- ______ Sharks
- ______ Sugpo fry
- ______ sponges
- ______ Shrimps/prawns
- ______ Sea urchins
- ______ Seaweeds/euchu
- ______ Siganid fry/ juvenile
- ______ Scallops
- ______ Sea cucumbers
- ______ Strait
- ______ Sargassum(floating seaweeds
- ______ Univalves (shells)

2. What fishery business/commercial/industrial or economic activities are undertaken in your community and vicinities? (Please check)

- ______ Aquamarine seaweed farming
- ______ Aquamarine Lapulapu grower
- ______ Aquamarine Lobster grower
- ______ Aquamarine siganid grower
- ______ Gulaman gatherer
- ______ Gulaman dealer
- ______ Gulaman making
- ______ Gulaman exporting
- ______ Hatchery operator
- ______ Hook and line fishing
- ______ Ice plant

______ Aquamarine Talakitok grower
______ Aquamarine fry/juvenile gatherer
______ Bangus fishpond operator
______ Bangus fry gatherer
______ Boat building/making
______ Coral gatherer
______ Dynamite fishing
______ Fish vendor/vending
______ Fish dealer/trading
______ Fishing gear designer/ making
______ Fishing with fine mesh
______ Fish drying
______ Fish salting
______ Fish smoking/bottling
______ Fishing with nets
______ Fishing boat operator
______ Fish coral fishing
______ Fish exported/exporting
______ Fishing supplies retailer
______ Fishermen's cooperatives
______ Fisheries researcher

______ Icing fish
______ Ice dealer
______ Middlemen (labasero)
______ Marine technicians
______ Mussel farming
______ Marine science researcher
______ Marine products
______ Buyer/dealer
______ Oyster farming
______ Sponges gatherer
______ Pearl culture
______ Scuba diving
______ Salt making
______ Shellcrafts making
______ Shellcrafts dealer/ exporter
______ Shrimp fry gatherer
______ Sugpo fry gatherer
______ Sugpo fishpond operator

3. What degree and ladderized degree fisheries and marine resource-based curricular programs can be offered by fishery and marine sciences institution that are beneficial and relevant to the business/commercial or economic needs of your community to improve the socio-economic life of the people. (Please check)

Curricular Programs/ Courses	Degree (Non-Ladderized)	Ladderized Degree
Food and Marine Product Technology	______	______
Aquamarine Technology	______	______
Marine Fisheries Technology	______	______
Fishery Business Management	______	______
Fisheries Biology	______	______
Fisheries Management	______	______

Fisheries Economics	______	______
Fishery Education	______	______
Fishery Extension Education	______	______
Fisheries Oceanography	______	______
Oceanography	______	______
Coastal Oceanography	______	______
Ocean Engineering	______	______
Coastal and Ocean Law/Marine Affairs	______	______
Marine Environmental Science	______	______
Marine Biology	______	______
Marine an Atmospheric Chemistry	______	______
Marine Geology and Physical Oceanography	______	______
Meteorology and Physical Oceanography	______	______
Living Marine Resources	______	______

4. From the identified courses or curricular programs in question no. 3, which of these are relevant and can be offered in your community. (Rank them according to priority and write 1 for first priority, 2 for second priority, etc.)

Curricular Program/Courses	Priority Rank
Food and Marine Products Technology	______
Aquamarine Technology	______
Marine Fisheries Technology	______
Fisheries Business Management	______
Fisheries Biology	______
Fisheries Management	______
Fisheries Economics	______
Fishery Education	______
Fishery Extension Education	______
Fisheries Oceanography	______
Oceanography	______
Coastal Oceanography	______
Ocean Engineering	______
Coastal and Ocean Law/Marine Affairs	______
Marine Environmental Sciences	______
Marine Biology	______

Marine and Atmospheric Chemistry	____
Marine Geology and Physical Oceanography	____
Meteorology and Physical Oceanography	____
Living Marine Resources	____

5. How relevant is the training skills of the subject areas do you perceive in the following courses or curricular programs. (Please check the characteristics)

5.1 MARINE FISHERIES TECHNOLOGY

Training Skills in Subject Areas	Relevance of Training Skills				
	Very Much (5)	Much (4)	Mode-rate (3)	Not Much (2)	Not at all (1)
Coastal Resources Management	____	____	____	____	____
Marine Electronics	____	____	____	____	____
Marine Ecology	____	____	____	____	____
Fisheries Oceanography	____	____	____	____	____
Fishing Gear Design and Construction	____	____	____	____	____
Fish Handling and Cold Storage	____	____	____	____	____
Navigation	____	____	____	____	____
Deck Seamanship and Ropework	____	____	____	____	____
Survival of Life at Sea	____	____	____	____	____
Marine Engineering	____	____	____	____	____
Marine Fisheries Management	____	____	____	____	____
Systematic of Fishes	____	____	____	____	____

5.2 AQUAMARINE TECHNOLOGY

Coastal Resource Management	____	____	____	____	____
Fry Collection, Handling And Transport	____	____	____	____	____

Fish Breeding and Early Life History	____	____	____	____	____
Nursery Management Techniques	____	____	____	____	____
Broodstock Culture and Management	____	____	____	____	____
Microalgae	____	____	____	____	____
Hatchery Design and Management	____	____	____	____	____
Fish and Crustaceans Diseases and Control	____	____	____	____	____
Larvae Culture and Transport	____	____	____	____	____
Fish Population Dynamics	____	____	____	____	____
Fishpond Design and Management	____	____	____	____	____
Integrated Fish Culture	____	____	____	____	____
Marine Fish and Shellfish Culture	____	____	____	____	____
Fish Culture Methods And Techniques	____	____	____	____	____
Systematics of Fishes	____	____	____	____	____

5.4 FISHERY BUSINESS MANAGEMENT

Coastal Resources Management	____	____	____	____	____
Systematics of Fishes	____	____	____	____	____
Principles of Economics	____	____	____	____	____
Fisheries Business and Economics	____	____	____	____	____
Fishery Resource Management	____	____	____	____	____
Business Organization And Management	____	____	____	____	____
Coastal and Ocean Law	____	____	____	____	____
Fundamentals of Accounting Credit and Banking	____	____	____	____	____
Coastal and Deep Sea Fishing and Management	____	____	____	____	____
Fish Culture Methods and Management	____	____	____	____	____
Marine Products Processing And Management	____	____	____	____	____

Aquamarine Culture and Management	_____	_____	_____	_____	_____
Business Forecasting and Budgeting	_____	_____	_____	_____	_____

5.5 FISHERIES ECONOMICS

Coastal Resources Management	_____	_____	_____	_____	_____
Principles of Economics	_____	_____	_____	_____	_____
Fishery Scarcity and Choice	_____	_____	_____	_____	_____
Specialization, Exchange and Money	_____	_____	_____	_____	_____
Money and Banking System	_____	_____	_____	_____	_____
Fishery Market Mechanism and Elasticity	_____	_____	_____	_____	_____
Piscal Policy	_____	_____	_____	_____	_____
Business Organization and Management	_____	_____	_____	_____	_____
Fishery Aggregate Supply and Demand	_____	_____	_____	_____	_____
Cost and Perfectly Competitive Supply, and Economic Efficiency	_____	_____	_____	_____	_____

5.6 FISHERIES BIOLOGY

Marine Biology and Ecology	_____	_____	_____	_____	_____
Ichthyology	_____	_____	_____	_____	_____
Fish Population Dynamics	_____	_____	_____	_____	_____
Marine Flora and Fauna	_____	_____	_____	_____	_____
Fishing Gears and Methods	_____	_____	_____	_____	_____
Oceanography	_____	_____	_____	_____	_____
Histology and Microtechniques	_____	_____	_____	_____	_____
Fish Pathology and Physiology	_____	_____	_____	_____	_____
Fish Genetics	_____	_____	_____	_____	_____
Coral Reef Ecology	_____	_____	_____	_____	_____
Zoogeography	_____	_____	_____	_____	_____
Seaweed Productivity and Ecology	_____	_____	_____	_____	_____
Biostatistics	_____	_____	_____	_____	_____

5.7 FISHERIES OCEANOGRAPHY

Histology and Microtechniques	____	____	____	____	____
Fish Pathology and Physiology	____	____	____	____	____
Fish Genetics	____	____	____	____	____
Coral Reef Ecology	____	____	____	____	____
Zoogeography	____	____	____	____	____
Seaweed Productivity and Ecology	____	____	____	____	____
Biostatistics	____	____	____	____	____
Fish and Environmental Interactions	____	____	____	____	____
Acceptable Catch and Its Estimation	____	____	____	____	____
Fish Finding and Migration In Relation to Environmental Factors	____	____	____	____	____
Ocean Environment and Its Variability	____	____	____	____	____
Systematics of Fishes	____	____	____	____	____

5.8 COASTAL OCEANOGRAPHY

Oceanology of Coastal Waters	____	____	____	____	____
Estuarine and Coastal Ocean Dynamics	____	____	____	____	____
Benthic Ecology	____	____	____	____	____
Nearshore Dynamics	____	____	____	____	____
Coastal Zone Planning And Management	____	____	____	____	____
Coastal Water Pollution	____	____	____	____	____
Coastal and Fluvial Sedimentation	____	____	____	____	____
Marine Environment Ecology	____	____	____	____	____
Plankton Ecology	____	____	____	____	____
Coral Ecology	____	____	____	____	____
Toxic Chemicals and Power Stations on Coastal Plankton	____	____	____	____	____
Systematics of Fishes	____	____	____	____	____

5.9 OCEANOGRAPHY

Ocean Basins and the Seabed					
Large Scale Processes					
Processes on the Continental Shelf					
Waves and Tides					
Navigation and Bathymetry					
Sedimentations and Materials Of the Sea Floor					
Topography and Formation Bottom Feature					
Temperature, Salinity, and Pressure					
Density and Equation Of State of the Ocean					
Stability and Colligative Properties of Seawater					
The Equation of Motion In Oceanography					
Major Ocean Currents and Surface Waves					
Instrumentation and Data Processing					

5.10 MARINE BIOLOGY

Fundamentals of Marine Biology					
Marine Botany					
Marine Invertebrates					
Microtechniques					
Comparative Vertebrate Anatomy					
Genetics and Eugenics					
Biostatistics					
Quantitative Chemistry					
Marine Plankton					
Oceanography: Its Chemicals and Physical Properties					
Systematics of Fishes					
Biochemistry					

Marine Embryology					
Marine Environment and Ecology					
Mariculture					

5.11 LIVING MARINE RESOURCES

Biological Oceanography and Its Environment					
Introduction to Fishery Science					
Marine and Aquatic Algae					
Fishes and their Environment					
Fish Stocks and Management					
Parasites and Non-Parasitic Diseases of Marine Organism					
Mariculture					
Structure and Functions Of Marine Ecological Systems					
Taxonomy of Marine Invertebrates					
Invertebrates Embryology					
Marine Organism and Microbiology					
Plakton and Microplankton					
Physiology of Marine Organism And Biochemistry					
Systematics of Fishes					
Marine Zoogeography					

5.12 OCEAN ENGINEERING

Coastal Hydrodynamics					
Coastal Structural Design					
Oceanographic Measurement					
Underwater Acoustics					
Investigations of Special Projects					
Applied Ocean Hydrodynamics					
Shoreline Processes					
Ocean Structures					

Numerical Techniques in Ocean Engineering					
Tides and Waves in Shallow Water					
Materials in the Marine Environment					

APPENDIX B

TABLE C. TABLE OF CRITICAL VALUES OF CHI SQUARE*

df	Probability under H_0 that $x^3 \geq$ chi square													
	.99	.98	.95	.90	.80	.70	.50	.30	.20	.10	.05	.02	.01	.001
1	.00016	.00063	.0039	.016	.064	.15	.46	1.07	1.64	2.71	3.84	5.41	6.64	10.83
2	.02	.04	.10	.21	.45	.71	1.39	2.41	3.22	4.60	5.99	7.82	9.21	13.82
3	.12	.18	.35	.58	1.00	1.42	2.37	3.66	4.64	6.25	7.82	9.84	11.34	16.27
4	.30	.43	.71	1.06	1.65	2.20	3.36	4.88	5.99	7.78	9.49	11.67	13.28	18.46
5	.55	.75	1.14	1.61	2.34	3.00	4.35	6.06	7.29	9.24	11.07	13.39	15.09	20.52
6	.87	1.13	1.64	2.20	3.07	3.83	5.36	7.23	8.56	10.64	12.59	15.03	16.81	22.46
7	1.24	1.56	2.17	2.83	3.82	4.67	6.35	8.38	9.80	12.02	14.07	16.62	18.48	24.32
8	1.65	2.03	2.73	3.49	4.59	5.53	7.34	9.52	11.03	13.36	15.51	18.17	20.09	26.12
9	2.09	2.53	3.32	4.17	5.38	6.30	8.34	10.66	12.24	14.68	16.92	19.68	21.67	27.88
10	2.56	3.06	3.94	4.86	6.18	7.27	9.34	11.78	13.44	15.99	18.31	21.16	23.21	29.59
11	3.05	3.61	4.58	5.58	6.99	8.15	10.34	12.90	14.63	17.28	19.68	22.62	24.72	31.26
12	3.57	4.18	5.23	6.30	7.81	9.03	11.34	14.01	15.81	18.55	21.03	24.05	26.22	32.91
13	4.11	4.76	5.89	7.04	8.63	9.93	12.34	15.12	16.98	19.81	22.36	25.47	27.69	34.53
14	4.66	5.37	6.57	7.79	9.47	10.82	13.34	16.22	18.15	21.06	23.68	26.87	29.14	36.12
15	5.33	5.98	7.26	8.55	10.31	11.72	14.34	17.82	19.31	22.31	25.00	28.26	30.58	37.70
16	5.81	6.60	7.96	9.31	11.15	12.62	15.34	18.42	20.45	23.54	26.30	29.63	32.00	39.29
17	6.41	7.26	8.67	10.08	12.00	13.53	16.34	19.51	21.62	24.77	27.59	31.00	33.41	40.75
18	7.02	7.91	9.39	10.86	12.86	14.44	17.34	20.60	22.76	25.99	28.87	32.35	34.80	42.31
19	7.03	8.58	10.12	11.65	13.72	15.35	18.34	21.69	23.90	27.20	30.14	33.69	36.19	43.82
20	8.26	9.24	10.85	12.44	14.58	16.27	19.34	22.78	25.04	28.41	31.41	35.02	37.57	45.32
21	8.90	9.92	11.59	13.24	15.44	17.18	20.34	23.80	26.17	29.62	32.67	36.34	38.93	46.80
22	9.54	10.00	12.34	14.04	16.31	18.10	21.24	24.94	27.30	30.81	33.92	37.66	40.29	48.27
23	10.20	11.29	13.09	14.85	17.19	19.02	22.34	26.02	28.43	32.01	35.17	38.97	41.64	49.78
24	10.86	11.99	13.85	15.65	18.06	19.94	23.34	27.10	29.55	33.20	36.42	40.27	42.98	51.18
25	11.52	12.70	14.61	16.47	18.94	20.87	24.34	28.17	30.68	34.88	37.65	41.57	44.31	52.62
26	12.20	13.41	15.38	17.29	19.82	21.79	25.34	29.35	31.50	35.56	38.88	42.86	45.64	64.05
27	12.88	14.18	16.15	18.11	20.70	22.72	26.34	30.32	32.91	36.74	40.11	44.14	46.96	55.48
28	13.56	14.85	16.93	18.94	21.59	23.65	27.34	31.39	34.03	37.92	41.34	45.42	48.28	56.89
29	14.26	15.57	17.71	19.77	22.48	24.58	25.34	32.46	35.14	39.09	42.56	46.69	49.59	58.80
30	14.95	16.31	18.49	20.00	23.86	25.51	29.34	33.53	35.25	40.26	43.77	47.96	50.89	59.70

*Table C is abridged from Table IV of Fisher and Yates: *Statistical Tables for biological, agricultural and medical research,* published by Oliver and Boyd Ltd., Edinburgh, by permission of the authors and publishers.

(Siegel, 1956:249)

APPENDIX C

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject areas for Marine Fisheries Technology Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Coastal Resource Management	46	1	32.5	27.5
Marine Electronics	40	3	9.5	14
Marine Ecology	42	15	34.5	29.5
Fisheries Oceanography	43	4	16	25.5
Fishing Gear Design & Construction	44	6	29.5	36
Fish Handling & Cold Storage	45	18	24	31
Navigation	41	5	19.5	19.5
Deck Seamanship & Ropework	39	13	12	21
Survival of Life at Sea	32.5	9.5	2	8
Marine Engineering	37	7	25.5	34.5
Marine Fisheries Management	48	17	23	22
Systematics of Fisheries	47	11	27.5	38
Total (sum of the ranks R)	504.50	109.50	228.0	306.50

APPENDIX D

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject areas for Aquamarine Technology Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Coastal Resource Management	43	5.5	46.5	42
Fry Collection, Handling & Transport	51.5	30.5	44	26
Fish Breeding and Early Life History	56	2	14.3	20
Nursery Management Techniques	59	10.8	14.3	21.5
Broodstock Culture and Management	53	10.8	21.5	10.8
Microalgae	49	9	19	1
Hatchery Design Management	46.5	13	23	18
Fish & Crustaceans Diseases & Control	50	5.5	40	7
Larval Culture & Transport	55	30.5	39	4
Fish Population Dynamics	48	27.5	14.3	3
Fishpond Design and Management	57	29	32.5	36
Integrated Fish Culture	54	34	24	25
Marine Fish & Shellfish Culture/Farming	60	37	41	38
Fish Culture Methods & Techniques	58	35	51.5	32.5
Systematics of Fishes	45	8	14.3	27.5
Total (sum of the ranks R)	785.00	288.10	439.20	312.30

APPENDIX E

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject areas for Food and Marine Products Technology Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Coastal Resources Management	41.5	4	26.5	5.5
Food & Fishery Industrial Technology	56	25	39.5	8
Microbiology	54.5	19	34	3
Food & Marine Products Handling & Ref.	51	20.5	36.5	15.5
Food Marketing & Economics	52.5	23	43.5	11.5
Biochemistry	47.5	13	39.5	8
Plant Sanitation & Safety	33	20.5	45.5	17.54
Food Curing	47.5	26.5	35	2
Food Quality Analysis & Packaging	47.5	29	41.5	11.5
Marine Products Development	54.5	20.5	52.5	10
Fermentation	30	17.5	45.5	1
Principles of Food Engineering	31.5	24	43.5	8
Foods & Marine Products Processing	36.5	28	47.5	5.5
Systematics of Fishes	38	14	31.5	15.5
Total (sum of the ranks R)	621.50	284.50	562.00	122.5

APPENDIX F

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject areas for Fishery Business Management Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Coastal Resources Management	33	1	32	17.5
Systematics of Fishes	35.5	2	20	22.5
Principle of Economics	43	3	12	52
Fishery Business & Economics	50.5	5	29.5	37.5
Fishery Resource Management	46	7	19	37.5
Business Organization & Management	44.5	13	21	37.5
Coastal and Ocean Law	41.5	8.5	15	27
Fundamentals of Accnt Credit & Banking	41.5	8.5	25.5	29.5
Coastal & Deep Sea Fishing and Mngt.	47.5	6	29.5	22.5
Fish Culture Method & Management	47.5	4	28	37.5
Marine Products Processing & Mngt.	47.5	11	35.5	22.5
Aquamarine Culture & Management	50.5	14	34	17.5
Business Forecasting & Budgeting	44.5	10	25.5	16
Total (sum of the ranks R)	573.00	93	326.50	377

APPENDIX G

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject areas for Fishery Economics Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Coastal Resources Management	23	1.5	22	12.5
Principle of Economics	41.5	4	33	27.5
Fishery Scarcity & Choice	43.5	14	24.5	27.5
Specialization Exchange & Money	38.5	7.5	15	37
Money & Banking System	34.5	10	12.5	19.5
Fishery Market Mechanism & Elasticity	34.5	1.5	18	31.5
Fiscal Policy	19.5	3	9	16.5
Business Organization & Management	38.5	6	24.5	19.5
Fishery Aggregate Supply and Demand	38.5	5	34.5	16.5
Cost & Perfectly Competitive Sup., Eco.	41.5	7.5	30	27.5
Fishery Market bet. Monopoly & Comp.	43.5	11	24.5	31.5
Total (sum of the ranks R)	397.00	71.00	247.50	267

APPENDIX H

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject areas for Fisheries Biology Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Marine Biology & Ecology	49.5	15	16.5	23.5
Ichthyology	46	18	28	35.5
Fish Population Dynamics	41	22	19.5	32
Marine Flora & Fauna	49.5	34	8.5	10
Fishing Gears & Methods	44.5	29.5	19.5	2
Oceanography	42.5	39	7	12
Histology & Micro-techniques	38	13	6	1
Fish Pathology & Physiology	42.5	29.5	5	23.5
Fish Genetics	48	29.5	3.6	25.5
Coral Reef Ecology	49.5	37	3.6	25.5
Zoogeography	52	40	14	11
Seaweeds Productivity & Ecology	47	35.5	16.5	25.5
Biostatistics	44.5	33	8.5	21
Total (sum of the ranks R)	594.50	375.00	156.00	248.00

APPENDIX I

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Fisheries Oceanography Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Histology & Micro-techniques	37.5	1	3	5.5
Fish Pathology & Physiology	36	2	18	16
Fish Genetics	41.5	17	23.5	10.5
Coral Reef Ecology	26.5	10.5	22	13
Zoogeography	46.5	31	44	19.5
Seaweeds Productivity & Ecology	37.5	14.5	34.5	19.5
Biostatistics	32	30	14.5	5.5
Fish & Environmental Interactions	43	34.5	28	33
Acceptable Catch & Its Estimation	48	37.5	4	19.5
Fish Finding & Migration in Rel. to Env.	46.5	41.5	7.5	29
Ocean Environment & its Variability	45	40	7.5	23.5
Systematic of Fishes	26.5	12	7.5	23.5
Total (sum of the ranks R)	466.50	271.5	214.00	218

APPENDIX J

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Coastal Oceanography Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Oceanography of Coastal Waters	41.5	13.5	11.5	24.5
Estuarine & Coastal Ocean Dynamics	44.5	21	6.5	35
Benthic Ecology	44.5	24.5	6.5	16
Nearshore Dynamics	46.5	22.5	2.5	18.5
Coastal Water Pollution	48	34	11.5	30.5
Coastal Zone Planning & Management	46.5	29	8	30.5
Coastal & Fluvial Sedimentation	41.5	30.5	2.5	13.5
Marine Environment Ecology	38	27	9	24.5
Plankton Ecology	39.5	30.5	4	10
Coral Ecology	41.5	22.5	5	18.5
Toxics Chem. & Power Stations on Cos.	39.5	28	13.5	37
Systematics of Fishes	36	20	1	17
Total (sum of the ranks R)	507.50	303	81.6	275.5

APPENDIX K

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Oceanography Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Ocean Basins & the Seabed	44	23.5	1	4.5
Large Scale Processes	6	23.5	20.0	20.0
Processes on the Continental Shelf	48.5	34.0	25.5	27.5
Waves & Tides	34.0	42.0	20.0	14.0
Navigation & Bathymetry	44.0	32	27.5	20.0
Sedimentation & Mat. of the Sea Floor	46.5	29.5	16.5	14.0
Topography & Formation Bottom Feat.	46.5	44.0	40.5	8.5
Temperature, Salinity & Pressure	14.0	37.0	31	7
Density & Equation of State of Seawater	34.0	40.5	25.5	4.5
Stability & Colligative Prop. of Seawater	48.5	37.0	12	2
TheEquation of Motion in Oceanography	50.5	40.5	11	3
Major Ocean Currents Surface Waves	52	29.5	10	8.5
Instrumentation & Data Processing	50.5	37.0	16.5	20.0
Total (sum of the ranks R)	519.00	450.00	257.00	153.50

APPENDIX L

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Marine Biology Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Fundamentals of Marine Biology	54.0	41.0	5.5	26
Marine Botany	56.5	41.0	16.5	30
Marine Invertebrate	58.5	38	12.5	34.5
Micro-technique	45.0	30.0	8	21
Comparative Vertebrate Anatomy	39	24	15	30
Genetics & Eugenics	51	26	4	41.5
Biostatistics	45.0	28	12.5	26
Quantitative Chemistry	51.0	23	4.0	16.5
Marine Plankton	56.5	37	18.5	41
Oceanography: Its Chem. & Phy. Prop.	54.0	45.0	18.5	21
Systematics of Fishes	48.0	36	12.5	9.5
Biochemistry	48.0	32.5	4	9.5
Marine Embriology	48.0	34.5	1	2
Marine Environment & Ecology	54.0	32.5	58.5	5.5
Mariculture	51.0	60	12.5	21
Total (sum of the ranks R)	759.50	528.50	203.50	335

APPENDIX M

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Living Resources Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Biological Oceanography & its Environment	59.5	34	21.5	26.0
Introduction to Fishery Science	57.0	41.0	6.5	17.0
Marine & Aquatic Algae	57.0	46	44	17.0
Fishes & Thele Environment	53.5	41.0	49.0	11.5
Fish Stocks & Management	49.0	47	53.5	31.5
Parasites & Non-parasitic Dis. of Marine	41.0	37.5	21.5	8.5
Mariculture	59.5	17.0	10	11.5
Struct. & Func. of Marine Ecological Sys.	53.5	17.0	5	23.5
Taxonomy of Marine Invertebrates	57.0	31.5	35.5	37.5
Invertebrates Embryology	45	17.0	2	17.0
Marine Organism & Microbiology	53.5	28	1	8.5
Plankton & Microplankton	41.0	33	3.5	13
Physiology of Marine Org. & Biochem.	29.5	51	6.5	23.5
Systematics of Fishes	41.0	26.0	3.5	26.0
Marine Zoogeography	49.0	29.5	35.5	17.0
Total (sum of the ranks R)	746.00	496.50	298.50	289.00

APPENDIX N

Perception Ranks of the Four Groups of Respondents on the Relevance of Training Skills in Subject Areas for Ocean Engineering Course.

Training Skills in Subject Areas	Perception Ranks on Relevance of Training Skills			
	Educator's Supervisor	Instructors Students	Local Gov't. Unit	NGO Business Industry
	R1	R2	R3	R4
Coastal Hydrodynamics	40.5	18.5	4	18.5
Coastal Structural Design	3	12	6.5	10.0
Oceanographic Measurement	42.5	5	28	14.5
Underwater Acoustics	38.0	29	31.5	10.0
Investigations of Special Project	35.0	8	31.5	18.5
Applied Ocean Hydrodynamics	35.0	14.5	1	22.5
Shoreline Processes	38.0	14.5	2	27
Ocean Structures	42.5	22.5	31.5	6.5
Numerical Techniques in Ocean Eng.	44	22.5	35	10.0
Tides & Waves in Shallow Water	38.0	25.5	25.5	18.5
Materials in the Marine Environment	40.5	22.5	31.5	14.5
Total (sum of the ranks R)	397.00	194.5	228	170.50

APPENDIX O

Samar State Polytechnic College
Post Graduate Studies
Catbalogan, Samar

January 17, 1997

The Dean
Post Graduate Studies
Samar State Polytechnic College
Catbalogan, Samar

Madam:

I have the honor to submit for approval one of the problems for my dissertation proposal, preferably problem no. 1.

1. RELEVANT FISHERY EDUCATION THROUGH TRAINING AND SKILLS IN CURRICULAR PROGRAMS: A SYSTEMS MODEL IN TERTIARY EDUCATION

2. FISHERY EDUCATION IN EASTERN VISAYAS: A DIRECTIONAL ANALYSIS

3. FISHERIES MANPOWER SUPPLY AND DEMAND IN EASTERN VISAYAS: AN ASSESSMENT

Your favorable action on this matter is highly appreciated.

Very truly yours,

LATIP S. ABDURAHMAN
Researcher

APPROVED:

(SGD.) RIZALINA M. URBIZTONDO, Ed.D.
Dean, Graduate and Post Graduate Studies

APPENDIX P

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

SCHOOL OF GRADUATE STUDIES

APPLICATION FOR ASSIGNMENT OF ADVISER

NAME: ABDURAHMAN, LATIP S.
Surname *First Name* *Middle Name*

CANDIDATE FOR DEGREE: DOCTOR OF PHILOSOPHY

AREA OF SPECIALIZATION: EDUCATIONAL MANAGEMENT

TITLE OF PROPOSED DISSERTATION:

RELEVANT FISHERY EDUCATION THROUGH TRAINING AND SKILLS IN CURRICULAR PROGRAMS: A SYSTEMS MODEL IN TERTIARY EDUCATION.

(SGD.) LATIP S. ABDURAHMAN
Applicant

Dr. BERNARDO S. OLIVA
Name of Designated Adviser

APPROVED:

CONFORME:

(SGD.) RIZALINA M. URBIZTONDO, Ed.D.
Dean, Graduate Studies

(SGD.) BERNARDO S. OLIVA, Ph.D.
Adviser

In 3 copies: 1st copy - for the Dean
2nd copy - for the Adviser
3rd copy - for the Applicant

APPENDIX Q

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar
GRADUATE AND POST-GRADUATE STUDIES

October 6, 1997

The Dean
Graduate School
Samar State Polytechnic College
Catbalogan, Samar

Madam:

I have the honor to apply for Pre/Final Oral Defense of my thesis/Dissertation entitled RELEVANT FISHERY EDUCATION THROUGH TRAINING AND SKILLS IN CURRICULAR PROGRAMS: A SYSTEMS MODEL on the date convenient for your Office.

Very truly yours,

(SGD.) LATIP S. ABDURAHMAN
Graduate Student

Recommending Approval:

(SGD.) BERNARDO S. OLIVA, Ph. D.
Adviser

APPROVED:

(SGD.) RIZALINA M. URBIZTONDO. Ed. D.
Dean, Graduate & Post Graduate Studies

Date: October 27, 1997

Time: 2:00 P.M.

APPENDIX R

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

November 11, 1997

Mr. Ildefonso L. Betana
Vocational School Superintendent
Ruperto K. Kangleon Memorial Agro-
Fisheries Technical Institute
Bontoc, Southern Leyte

S i r:

Relative to my dissertation entitled "Development of Relevant Tertiary Fishery Education in Eastern Visayas", I would like to request permission from your office to conduct a dry-run of my questionnaire.

Thank you and more power.

Very truly yours,

(SGD.) LATIP S. ABDURAHMAN
Researcher

Approved:

(SGD.) ILDEFONSO L. BETANA
Vocational School Superintendent

APPENDIX S

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

November 17, 1997

CIRILO R. BALAGAPO JR., Ph. D.
Regional Director
Department of Agriculture
Tacloban City

S i r:

Relative to the policy of higher education for curriculum redirection and in line with the program of the Philippines 2000 for quality education, I have the honor to request permission to field questionnaires for the doctoral dissertation proposal entitled "Development of Relevant Tertiary Fishery Education in Eastern Visayas", to the respondents on the Bureau of Fisheries and Aquatic Resources.

Your favorable assistance and action on this request will be greatly appreciated.

Very truly yours,

(SGD.) LATIP S. ABDURAHMAN
Researcher

Approved:

(SGD.) CIRILO R. BALAGAPO JR., Ph. D.
Regional Director

APPENDIX T

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

November 17, 1997

ATTY. ROBERTO C. ABEJERO
Regional Director
Department of Interior and Local Government
Tacloban City

S i r:

Relative to the policy of higher education for curriculum redirection and in line with the program of the Philippines 2000 for quality education, I have the honor to request permission to field questionnaires for the doctoral dissertation proposal entitled "Development of Relevant Tertiary Fishery Education in Eastern Visayas", to the respondents in the Local Municipal or City Government Officials.

Your favorable assistance and action on this request will be greatly appreciated.

Very truly yours,

(SGD.) LATIP S. ABDURAHMAN
Researcher

Approved:

(SGD.) ATTY. ROBERTO C. ABEJERO
Regional Director

APPENDIX U

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar
GRADUATE AND POST-GRADUATE STUDIES

December 8, 1998

The Dean
Graduate School
Samar State Polytechnic College
Catbalogan, Samar

Madam:

I have the honor to apply for Pre/Final Oral Defense of my thesis/Dissertation entitled DEVELOPMENT OF RELEVANT TERTIARY FISHERY EDUCATION IN EASTERN VISAYAS on the date convenient for your Office.

Very truly yours,

(SGD.) LATIP S. ABDURAHMAN
Graduate Student

Recommending Approval:

(SGD.) BERNARDO S. OLIVA, Ph. D.
Adviser

APPROVED:

(SGD.) RIZALINA M. URBIZTONDO. Ed. D.
Dean, Graduate & Post Graduate Studies

Date: December 12, 1998

Time: 10:00 A.M.

APPENDIX V

CURRICULUM VITAE

A. PERSONAL DATA

NAME	:	LATIP S. ABDURAHMAN
PLACE OF BIRTH	:	Balas, Lamitan, Basilan
DATE OF BIRTH	:	November 19, 1948
PRESENT POSITION	:	Secondary School Principal II
STATION	:	Samar Regional School of Fisheries
NAME OF SPOUSE	:	Carmelita Carnacite Abdurahman
NAME OF CHILDREN	:	Marisol C. Abdurahman
	:	Alimar C. Abdurahman
	:	Jheamil C. Abdurahman
	:	Rheamil C. Abdurahman

B. EDUCATIONAL BACKGROUND

Primary	:	Balas Primary School, Balas, Lamitan, Basilan
Intermediate	:	San Jose Gusu Elementary School San Jose Gusu, Zamboanga City
Secondary	:	Mindanao Regional School of Fisheries (MRSF) Zamboanga, City
College	:	MRSF - Two-Year Technical MRSF - Bachelor of Science in Fisheries (now ZSCMST) SHC - BSE
Graduate Studies	:	SSPC, MAVE - Administration & Supervision
Post-Graduate Studies	:	SSPC, Ph. D. in Educational Management

C. CIVIL SERVICE ELIGIBILITY

: Regional Cultural Community Officer
: Fishery Technologist
: Teacher's Board

D. POSITIONS/DESIGNATION HELD

: Secondary School Teacher
: Junior College Instructor
: Secondary School Head Teacher II
: OIC-RLMSF, Tinambacan, Calbayog City
: OIC-SRSF, Catbalogan, Samar

E. SCHOLARSHIPS/FELLOWSHIPS

Summer Training Program in Fisheries: Bachelor of Science in Fisheries, Marikina School of Arts & Trade, Marikina, Rizal, 1976 to 1977, Mindanao Regional School of Fisheries, Zamboanga City, 1978

EDPITAF- WB Technical Assistance Program for Fisheries Training Project: Diploma in Fisheries, Humberside College of Higher Education, Grimsby, South Humberside, England, 1982 - 1983

F. FISHERIES RESEARCH PROJECTS

National Fisheries Manpower Study - Team Leader for Region VIII, EDPITAF-BU, November 1981 to March 1984.

University of the Philippines in the Visayas College of Fisheries - World Bank - Technical Assistance Projects:

Study Leader - "Identification of Fishing Areas in Southeastern Part of Samar Sea, 1985 - 1986"

"Danish Seine Test Fishing in Samar Sea, 1987-1988"

WESAMAR Research on Artisanal Fishermen - Assistant Consultant, October 1 to December 1995

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