A CURRICULUM GUIDE FOR SCUBA DIVING INSTRUCTION

By

DOUGLAS DONALD GORRIE II

Bachelor of Arts in Physical Education
University of California
at
Santa Barbara
Santa Barbara, California
1952

Master of Science in Education
University of Southern California
Los Angeles, California
1961

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A CURRICULUM GUIDE FOR SCUBA DIVING INSTRUCTION

Thesis Approved:

Betty M. Abercrombie
Thesis Adviser

Thomas C. Harman

Orin B. Harrison

John G. Bayless

Norman N. Durham
Dean of the Graduate College

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CHAPTER I

INTRODUCTION

In the years since Jacques-Yves Cousteau developed an efficient, self-contained underwater breathing apparatus (SCUBA), scuba diving has been transformed from a strictly limited usage--i.e., the Naval underwater demolition teams of World War II--to a popular sport which men and women of all ages can enjoy.

Today, scuba divers utilize all available bodies of water to pursue this healthful and recreational activity which can be safe when conducted within the limits of knowledge and good sense. Between the two extremes of military and recreational diving is the ever-increasing vocational diving market. As man gains knowledge of the underwater world, and as a noticeable improvement in technological equipment continues, the possibilities for both recreational and vocational diving expand. Marine biologists perform much of their own research underwater rather than depending on an expert diver with no scientific knowledge to perform search tasks. Marine technology--e.g., underwater repairs, construction of various types--requires an individual who has diving expertise as well as the ability to perform work underwater. Along the California and Florida coasts, divers

actively search for treasure from long sunk Spanish galleons, thus combining the dream of gaining wealth and fame. Still other divers clean the bottoms of bays, lakes and slow moving rivers, helping to resolve the problem of waste and pollution existing below the surface. The vast majority of scuba divers, however, dive for the pure enjoyment the activity offers in the areas of exploration, adventure, underwater photography, rock and shell collecting, or simply to "get away from it all."

As more and more people of both sexes and of all ages are being drawn to the fascinating exploration of the underwater world, the need for high quality, professional instruction has grown increasingly apparent. It is inevitable, therefore, that sooner or later Scuba Diving institutional programs would be incorporated into the physical education curriculum. Hartmann's survey of colleges and universities provided evidence that has already happened, for out of the 435 schools consulted, 141--or over 30%--have included it in their programs.[1] But the act of curricular acceptance by physical education was tempered by the sobering fact that diving places the student in a new environment which subjects him to those implacable laws of pressure (diving physics) with their consequent and potentially harmful effect upon one's personal safety and continued well-being (underwater physiology) if they were violated.

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[1]Joyce Hartmann, "Scuba Training in United States Colleges," The Journal of Health, Physical Education, and Recreation, Vol. 42, No. 3 (March, 1971), p. 81.

The consequences of coping with the potential hazards of scuba diving were so great, Waglow argued, as to exclude it from the school physical education curriculum.[2] He cited 13 drownings by scuba divers and one death which occurred when the tank blew up while being worn on the back of the victim. Ascertaining the specific causes of the 13 deaths was difficult, however, because newspaper accounts of the fatalities were the basis of the reports rather than an objective inquiry conducted by experts.

Reeves presented a strong rebuttal to Waglow's concern about the place of scuba diving in the physical education curriculum.[3] Scuba objectives, he said, were consistent with the objectives of physical education, which were general organic stimulation, development of knowledge, acquisition of skills, and development of social competency.

Reeves stated that scuba diving belongs in the curriculum because:

> The purpose of scuba diving in education is to minimize error through competent instruction, not to maximize it by ignoring the situation. We cannot pretend that scuba diving is not here. It is here and must be included as an important part of the physical education program.[4]

In addition, physical education, he stated, was the

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[2] J. F. Waglow, "Scuba Diving--Physical Education Activity?" The Physical Educator, Vol. 19, No. 2 (May, 1962), p. 64.

[3] G. L. Reeves and J. J. McCarthy, "Scuba Diving--Physical Education Activity," The Physical Educator, Vol. 19, No. 3 (October, 1962), pp. 104-5.

[4] Ibid., p. 104.

logical college department to offer scuba diving because of the professional instructor's knowledge of physiology of exercise, swimming, and physics. Beyond this obvious fact was the need for the student, during his learning phase, to understand thoroughly the effects that the underwater environment had upon the diver and his equipment. This knowledge correctly used, concluded Reeves, engendered confidence and diminished panic, the primary cause of scuba diving accidents.

Further argument which supported the need for scuba diving within the physical education curriculum was advanced by McCarthy who compared college scuba diving programs with those offered by the graduates of the Y. M. C. A. Scuba Training Program and the N. A. U. I. (National Association of Underwater Instructors).[5] The courses, for the most part, were not taught by college graduates who had had formal training in either teaching or the several natural sciences involved with the theory of diving. This resulted in a wide range of teaching abilities, and the student could not be certain that he was receiving the best instruction. Six advantages of teaching scuba in a school or college were cited by McCarthy:

1. Schools have the financial support necessary to provide the necessary equipment, teachers, teaching aids, and frequency of offerings to meet the criteria of the program and the needs

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[5]Jean J. McCarthy, "School Scuba," The Physical Educator, Vol. 25, No. 1 (March, 1968), pp. 59-61.

of the community.

2. The institution has a ready-made physical plant for a diving program. Most have indoor pools and all have classrooms under the same roof for easy transition from theory to practice.

3. Schools have authorities in the allied areas immediately available for the scuba diving instructors assistance. Teachers of biology, physics, first aid, and health lend a resource depth not possible elsewhere. It is possible for students to develop interrelatedness between these disciplines.

4. Schools are purposefully designed and organized to accomplish the objectives in instruction resulting in a smoothness or operation not inherent in other organizations.

5. Schools can offer diving courses for academic credit and/or as courses leading to graduation requirements. A school or college transcript adds a status and permanency that no diving operation can parallel.

6. Most important is the quality of the instruction. A high school or college teacher will have one or more college degrees and possibly additional graduate credit. His educational background is, therefore, broad and deep. If he has also completed a Y. M. C. A. or N. A. U. I. instructor's course in diving, he should be eminantly qualified to do a good job.[6]

Egstrom supported McCarthy's rationale to institutionalize scuba diving instruction when he noted that it has grown to the point where students of scuba should only be taught by professionally trained teachers and not simply by good divers who knew little or nothing about instruction. Expert diving skills, Reseck, too, observed that quality diving skill has often been confused with teaching capability.

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[6]Ibid., pp. 60-61.

He maintained that, as a general rule, it was easier to make a good diver out of a good teacher, than a good teacher out of a good diver. Much of the thinking behind these statements was based upon the fact that the professional instructor has already spent hundreds of hours preparing to teach and usually has stayed up-to-date regarding changes in teaching methods. Such a working knowledge of learning theory is essential in order to lead the neophyte diver through a planned and logical learning progression that moves from simple to complex skills.

Egstrom's position was reinforced by Brawley, who argued for high quality instruction because the state of the art was constantly changing and the instructor must constantly update his teaching to include the latest information.

> The purpose of any instruction program should be to provide people who can relax and enjoy themselves safely in open water. As educators, we must certainly accept responsibility for developing a training course that does this by a more sophisticated method than student trial and error, with only the strong surviving.[7]

The quality of the instruction, according to Thompson, was the key to effective learning. The instructor, he maintained, must not only be qualified as a teacher, but he must also possess diver expertise. He must understand, and make his student understand how the physical environment can

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[7]Edward Brawley, "Open Water Training," Dive, Vol. VII, No. 2 (January, 1974), pp. 26-28.

positively or negatively affect learning. That is, the teacher can make diving education a pleasurable experience or, unfortunately, something much less. Therefore, said Thompson, lectures must be coordinated with the laboratory sessions in order to enable the student to connect and apply the academic knowledge to actual diving experience. Also, provisions should be made, he warned, for the student who is progressing at a radically different rate from the rest of the class, regardless of whether the learning be faster or slower. Finally, the carefully planned organization of the lessons sustains instructional leadership, which is so vital towards developing responsible divers.

The fact that scuba diving was accepted by physical education was a confirmation that the curriculum leadership was dynamic and viable and possessing the capability to internally initiate constructive and meaningful programs in a manner which accurately reflected the society's current needs and interests. The desire of many leaders within the field of underwater aquatics to include scuba diving within the educational system was an expression of their professional judgment that quality instruction was a primary concern in the development of safe and competent diving programs.

These leaders were adamant that current learning theory and teaching methods be employed to ensure that the necessary knowledge, understanding, value judgments, appreciations and skills would be learned and later applied by their students

during the non-supervised dives following certification.

That those concerns have always been effectively and universally translated into correct teaching has been questioned by both Cramer and Reseck. In a survey of seven universities which taught scuba diving, Cramer found a wide variation among those programs in reference to how each was organized and taught. In four schools, a specific course outline was used; in two, no outline was used, and one failed to answer the question. This brief sampling hinted at the broad differences which might exist among other schools teaching scuba diving.[8]

Reseck stated that not even diving schools such as N. A. U. I., Y. M. C. A. or P. A. D. I. have issued standardized, comprehensive, sequentially developed and integrated curriculum guides. They have published instructor manuals or handbooks which provide information to be learned, but the design of the guides has failed to provide the enormous flexibility necessary for adaptation to the myriad teaching situations and circumstances, even though the information contained within was complete. The limitation, Reseck maintained, was the common fault of lock-stepping the instructor into teaching each unit in a particular way and in a prescribed order. Diving textbooks, he maintained, usually have two common faults: First, much information contained therein has little or no application to basic diving (e.g., wreck

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[8]Cramer, John L. "Status of Scuba Diving as a Physical Education Activity," Journal of Health, Physical Education, and Recreation, Vol. 41, No. 4 (April, 1970), p. 77.

diving) and two, the useful information fails to conform to a pattern of presentation helpful to instructional procedure.[9]

Thus, it was the recognition that the existing body of scuba knowledge needed curricular organization that caused the author to address himself to the task of developing a curriculum guide which would improve instructional programs in underwater diving.

Statement of the Problem

Scuba diving is a rapidly growing physical education activity inside schools. However, many programs are seriously handicapped by inadequate curriculum guides. Bachrach, among others, recognized the importance of a highly organized and integrated method of teaching scuba diving.[10] Since scuba diving is a rapidly growing physical education activity, there exists a need for a curriculum guide which can materially aid the instructor in presenting a highly unified program. Therefore, the purpose of this study is to develop a logical rationale for a curriculum guide which would materially aid the scuba instructor.

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[9]John Reseck, Jr., Interview, May 11, 1973.

[10]Arthur J. Bachrack, "Diving Behavior," Human Performance and Scuba Diving (Chicago, Ill., 1970), pp. 128-137.

Significance of the Study

The development of new curricular patterns and programs are intended to bring educational purposes in line with contemporary needs and interests. Scuba diving programs are representative of the radical shifts from traditional curricular offerings. Interestingly enough, there has been no effort to develop a philosophic basis for scuba diving or a rationale for its inclusion into the physical education curriculum. Second, despite the abundance of literature in the field, no model of instruction has been developed which has proved acceptable as an effective instrument in aiding the instructor in implementing a "carefully reasoned and well-designed continuum of experience for the learner."[11]

Qualifications of the Investigator

The author has spent most of his life in California where much of his recreational and professional interests have been directed to various aquatic activities: swimming, surfing, skin diving and scuba diving. Recreationally, the author has skin dived for more than 15 years and has taught the sport to college students for the past eight years. In 1972 he was certified by the National Association of Underwater Instructors and subsequently has spent many hours diving recreationally.

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[11] Carl E. Willgoose, The Curriculum in Physical Education (Englewood Cliffs, New Jersey, 2nd ed., 1974), pp. 38-39.

The author has aided the scuba diving program at Santa Ana College and most of the open water field trips (ocean) checking out prospective divers as they performed their assigned tasks. Much insight was gained by these experiences, particularly in terms of analyzing whether the preliminary parts of the program were actually preparing the students for such experiences.

In the area of practical curriculum development, the author was responsible for the revision and updating of the total physical education and recreation division courses and programs at Santa Ana College. More specifically, the author was the co-developer of the new Underwater Occupations major at Santa Ana College, a program unique in that a student upon successful completion of the course of study graduates with an Applied Arts degree, an Advanced Divers' Certificate, and an Occupational Certification.

Since his arrival at Oklahoma State University, the author has successfully completed two courses in curriculum development, one in higher education and one in physical education. Both classes improved the author's understanding of the principles and methods of curriculum development and were drawn upon in the writing of the guide. The combination of practical experience, a professional background in curriculum development and organization, reinforced with the professional graduate-level courses in curriculum philosophy, principles and methods has served the author well in the construction of the guide.

Delimitations of Study

The study shall focus exclusively on the learning skills necessary for recreational diving.

Definition of Terms

1. Curriculum: All of the selected and graded experiences provided by the school, including responsibility of the staff for the quality of these experiences which are directed toward providing for the needs of individuals and of the group. . . . The curriculum results from the interaction of the beliefs and the commitments and the competencies of all these persons concerned within the structure of the school, the facilities, and the community environment.[12]

2. Curriculum Guide: A carefully planned work which outlines in orderly and sequential fashion the content to be taught and the purpose of each part.

3. Methods: "A general way of guiding and controlling learning experiences. It refers to the variety of ways in which learning experiences may be organized to achieve the most effective results.[13]

4. Technique: Methods devised into small increments of learning.[14]

5. Laboratory Experiences: Those experiences limited to a confined body of water, such as a swimming pool, and the immediate surrounding area, such as the pool deck.

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[12]Rosalind Cassidy, Curriculum Development in Physical Education (New York, 1954), p. 14.

[13]Clifford E. Brownell, and E. Patricia Hagman, Physical Education--Foundations and Principles (New York, 1951), p. 219.

[14]Elwood C. Davis, and Earl L. Wallis, Toward Better Teaching in Physical Education (Englewood Cliffs, N. J., 1961), p. 252.

6. Lecture: A formal classroom utilizing a variety of teaching methods: either by the instructor or a guest speaker, audio-visual aids, discussion and evaluation.

7. Field Trip (Open Water Dive): A carefully planned excursion to a pre-determined site.

8. Learning Experience: Rather than a series of sharp, clearly identified experiences, it is more closely akin to a series of events which tend to merge, one into the other, but marked by a beginning, a semi-determined procedure, a feeling of resolution followed with a consumatory closure. According to Dewey it is a movement of events which can be recognized as a whole.[15]

9. Psycho-motor: Refers to the development of motor skills, activities involving movements of the body. Although the word "motor" indicates the dominant nature of the activity, all forms of learning interact to produce the end result.[16]

10. Affective Domain: Includes objectives which describe changes in interest, attitudes, and values, and the development of appreciations and adequate adjustment.[17]

Methodology

The philosophical method of research was used for the study to define and provide the rationale for a curriculum guide in scuba diving. According to Morland, the philosophical method of research is: "The rigorous application of the principles and processes of logic within carefully

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[15]Robert Mitchell, "Sport as Experience, Quest (Columbus, Ohio, Summer, 1975), pp. 28-29.

[16]Robert N. Singer et al., Physical Education: An Interdisciplinary Approach (New York, 1972), p. 119.

[17]Benjamin S. Bloom, editor, Taxonomy of Education Objectives, Handbook I: Cognitive Domain (New York, 1956), p. 7.

defined limits to the analysis of non-empirical problems.[18]

Morland also described the key terms within this definition for purposes of clarification. "Rigorous application of the principles and processes of logic" added emphasis to the fact that "every step in the completed study must meet the test of logical consistency for the conclusion to stand." "Within carefully defined limits" was "the discriminating factor that sets off formal research from philosophizing," while "non-empirical problems" constituted the subject matter of the philosophic method" as contrasted to problems "that can be experimental procedures."[19]

The implementation of the philosophical method was enhanced and complemented by the utilization of the integrative process which involved the "organization of learning experiences around a central objective."[20] It functioned to relate the parts to the whole, and yet, as Willgoose stated, "the whole can be anything."[21] In other words, the integration process served to dovetail the many activities and pupil experiences into a meaningful learning environment.

Design

The research design was established upon a broad educational foundation and was then progressively refined into

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[18]Richard B. Morland, "The Philosophic Method of Research," Research Methods in Health, Physical Education, and Recreation (Washington, D.C., 3rd edition, 1973), p. 308.

[19]Ibid.

[20]Willgoose, p. 136.

[21]Ibid.

narrower parameters which became the constraints within which the curriculum guide for scuba diving instruction was constructed.

In this study the philosophy of John Dewey was selected as the foundation and the authoritative source for the philosophy of education. Dewey believed that natural experiences and education together served to energize learning and to make it more meaningful.[22] The general objectives of education as set forth by the Educational Policies Commission were utilized because they were consistent with the pragmatic philosophy of John Dewey.[23] Bucher's general objectives of Physical Education were selected because they blended harmoniously with the general objectives of education.[24] The general objectives of Physical Education were defined into specific objectives within the cognitive, affective, and psycho-motor domains of learning because effective teaching must incorporate this triad of learning.

Learning experiences for accomplishing the objectives were provided in accord with the principles of learning as set forth by Lawther[25] and Bookwalter.[26] The methods of

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[22]John Dewey, Experience and Education (New York, 1938), p. 7.

[23]The Educational Policies Commission (Washington, D. C., 1961), p. 60.

[24]Bucher, Charles A. Foundations of Physical Education. (St. Louis, Missouri, 6th edition, 1968), pp. 155-161.

[25]John D. Lawther and Elwood Davis, Successful Teaching Education (New York, 2nd edition, 1948), p. 500.

[26]Karl Bookwalter and Harold J. Vanderzwaag, Foundations and Principles of Physical Education (Philadelphia, 1969), p. 86.

teaching were based upon modern theories of instruction to carry out the learning experiences to be presented. Finally, the means of evaluation was to determine whether the methods of teaching provided the learning experiences necessary for accomplishing the objectives of scuba diving.

CHAPTER II

REVIEW OF THE LITERATURE

The first serious and extensive treatment about the new sport of scuba diving began with two important books, both published in 1957. The books, The Complete Manual of Free Diving and The New Science of Skin and Scuba Diving, edited by Empleton, were the prototypes for the many books subsequently written on the subject. The New Science of Skin and Scuba Diving became an American best seller and developed the format which almost all other books have adopted. The basic organization of most books published since have blocked the information into the following general topical areas:

1. The Basic Requirements for Scuba Diving: swimming ability and watermanship...physical status of the diver...medical history and examination forms.

2. Physics as Related to Diving: gas, pressure, and the gas laws...gas mixtures...temperature... density, buoyancy, viscosity...humidity... illumination and vision...acoustics.

3. Medical Aspects of Diving: underwater physiology...direct effects of pressure...indirect effects of pressure...what to breathe.

4. Fundamentals of Compressed Gases as Related to Diving: compressed air tanks...care and handling of high-pressure tanks...compressed air...cascade system for recharging small breathing air cylinders.

5. Basic Skin and Scuba Equipment: skin diving equipment...protective clothing...diving tools

and instruments...open-circuit scuba... choosing scuba...repair procedures...compressed air cylinders...manufacturer's instruction manual.

6. Skills of Skin and Scuba Diving: basic skin diving...use of open-circuit scuba types... scuba orientation...methods of entry and exit... buddy breathing...dark-water diving...rescue skills...search patterns.

7. First Aid for Diving Accidents: prevention... general first aid...injuries from contact with marine life...pressure-related illness or injury.

8. Environment and Marine Life: weather...waves... currents...visibility...entering the water... safety summary...marine life.

9. Planning a Scuba Dive: the buddy system...the underwater communications system...emergency assistance plan...the scuba dive...diving safety...the compass...the variety of diving.[1]

The following information derived from the literature departs from the standardized components of diving as described above and considers the kinds of concerns diving experts believe are critical to the development of educationally sound diving programs.

Above all other considerations diving safety must be involved with all facets of the diving program. The beginning diver cannot comprehend the hazards inherent in this activity and the responsibility falls upon the teacher to protect the beginner, for

> The greatest danger to skin divers is the diver himself. Diving accidents will continue to occur, just as accidents occur in all outdoor sports, and for the same reasons. Swimmers drown, water skiers

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[1]Bernard E. Empleton, The New Science of Skin and Scuba Diving (New York, 4th ed., 1974), pp. 5-6.

> are injured, and snow skiers are crippled, maimed or killed at a greater rate than skin divers. Practically all casualties are caused by ignorance of basic safety rules, or carelessness in their observation.[2]

The diver must learn the rules and regulations which are set down by "mother nature" and which apply exclusively to life under the surface. The kind of learning that occurs must ensure that the student graduates fully aware that safe diving is knowledge appropriately applied on each and every dive. This can be accomplished, Lee stated, by imparting to the student "a fundamental knowledge of the tools and techniques of getting safely to and from the underwater domain."[3]

Ketel believed a safety oriented guide to underwater education to be of foremost importance in diving instruction. A particular emphasis should be placed upon the state of mind (feelings) of the diver, and the teacher should be able to evaluate the student within this context. The student should also evaluate himself honestly, for any attempt to deceive himself can do infinitely more harm than good. The following tips prove helpful to the instructor:

> You should possess a keen awareness of the world about you, having almost a sixth sense of what is happening or about to happen. You should be able to recognize early symptoms of fatigue... You should be alert to subtle changes in currents, waves, and depth, and be ready to react to them.

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[2]Bill Barada, Let's Go Diving (Santa Ana, California, 1970), p. 57.

[3]Owen Lee, The Skin Diver's Bible (Garden City, New York, 1968), Introduction.

> You should be able to think ahead and be open to modifying a plan if conditions warrant it.[4]

A good course in scuba diving, Strykowski stated, must include those conditions which influence how knowledge shall be used. These conditions are requisites every teacher must observe if his students are to become safe and competent divers.

First to be considered is judgment, or common sense. There is no substitute for it and once the fundamentals of diving are digested, common sense dictates the diver's procedures underwater. The use of good judgment in both planning and carrying out the dive will result in safe and exciting adventure.

Attitudes, Strykowski believed, were the second invaluable condition to safe diving. A diver must adopt an attitude to learn. He should accept the instructor's advice on the grounds that an experienced teacher always knows more than a beginner. A willing attitude extends beyond learning just the lesson and encourages further study.

Every diver must learn to exert discipline upon his own actions. Strykowski stated that the mark of a good instructor is one who teaches the diver to act in accordance with the rules and has himself under control at all times. Nothing is done without a plan and the plan is carried through the entire dive operation. In the final analysis

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[4]Jack McDowell and Henry Ketels, Safe Skin and Scuba Diving

discipline is really nothing more than developing a mature approach to diving.

Strykowski stated that there was absolutely no substitute for a high degree of physical fitness. Sport diving does not demand great strength, but in an emergency, the diver's endurance and his ability to withstand heavy exertion may be tested. Emotional stability was also considered of paramount importance, for it is stability which enables the diver to handle the emergency situation.[5]

It is the responsibility of the instructor to work these requisites into a diving program for their absence greatly negates meaningful knowledge, reducing it to a sterile, clinical type of experience totally out of context with the real world of diving.

Bachrach offered for consideration a further elaboration of an instructional program based upon

> Successive approximation toward the terminal behavior, in which the pool training is followed not by an open sea checkout dive but by a transition to movement into the sea from the surf, or perhaps, from a shallow cove where the diver trainee can generalize pool experience gradually in an open but still protected environment.[6]

The instructor shapes the behavior gradually, Bachrach continued, and in this way develops increasing skill and concomitant confidence in handling self and equipment in a

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[5]Joe Strykowski, Diving for Fun (Northfield, Illinois, 3rd Rev. Ed., 1971), pp. 1-3.

[6]Arthur Bachrach, "Diving Behavior," Human Performance and Scuba Diving (Chicago, Illinois, 1970), p. 136.

growing complexity of requirements. Shaping the behavior helps the teacher and the student to assess performance correctly and serves as a diagnostic tool of predictability. The importance of shaping correct attitudes is of vital concern to student safety because to the uninformed, the activity appears deceptively simple:

> Because diving is apparently such a simple kind of sport--a regulator, tank, mask and fins, a few rules of thumb (with no clear understanding of the problems and theories involved), a few simple instructions, possibly picked up from seeing a program on television; and what more do you really need to go and play SCUBA DUBEE?[7]

There are many thousands of people, Greenwood explained, who classify themselves as scuba divers whose education was along these very lines. "All very well until an emergency suddenly arises and the diver finds he possesses neither the capability, training, nor fitness to adequately face an emergency."[8] The training program from which all other instructional schools may profitably observe was the U. S. Navy Diver training programs. Greenwood's argument was not that it should be emulated, but that the results of the training did produce a highly disciplined diver who was the anticipated end product of rigorous instructional program. The realities of civilian training schools do not permit a military-type discipline, yet it remains a fact that sloppy, careless divers are usually the end product of a similar

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[7]Michael Greenwood, "Diving Behavior," Human Performance and Scuba Diving (Chicago, Ill., 1970), p. 144.

[8]Ibid., p. 145.

type instruction. Therefore:

> If we are to minimize accidents in diving, then we must increase disciplined behavior through education, and improve the capability of the amateur by first improving the capability and the training of the professional.[9]

In the final analysis, scuba diving instruction must emphasize not only a consideration of "how" but also of "why". This can be achieved, Tilman was convinced, through purposeful practice and knowledgable performance. Instruction based upon these criteria shifts the program away from an overly mechanical approach to diving. One of the ways to achieve effective instruction-learning is through continuous self-evaluation which affords the student "examples of the kinds of understandings and levels of skill that he should be acquiring as progress is made toward mastery of diving."[10] Evaluation as a process considers printed questions as an important self-check on progress. Often, if a student cannot adequately answer the question, it tells him that either further experience is required or the material should be studied more extensively. In either case, the student tends to become more objective about both his skills and knowledge of diving.

Cramer noted that more high schools and colleges are offering recreational scuba diving programs throughout the

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[9]Ibid., p. 146.

[10]Albert A. Tilman, Skin and Scuba Diving (Dubuque, Iowa, 1966), p. v.

country.[11] Many of the institutions are forced to contract outside instructors to teach the programs because there are not a sufficient number of the regular staff who are certified scuba instructors. Administrators or directors responsible for the program must ensure that students receive sufficient and proper training to become safe divers:

> Unfortunately, many of the existing programs fall short of the necessary standards for safety, resulting in the possibility that the institution offering the program may be held liable in the event of an accident.[12]

To assist both the administrator and the physical educator to understand what diving instruction entails, Cramer et al., developed an outline of minimum standards for instructors. These standards also served as a check for the scuba instructor to determine if he was covering the necessary topics of instruction. Such a large body of knowledge must be learned and so many skills mastered that inadvertent deletions of important information become an easy possibility. Cramer stated that accidents are avoided when knowledge and skill are effectively weighed against the diver's personal limitations. The final dive experience becomes the kind in which teacher and student both desire the diver to be free from extreme anxiety and stress.

Learning occurs most "efficasiously when the greater

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[11] John L. Cramer, Skin and Scuba Diving (Garden City, New York, 1975), p. 151.

[12] Ibid.

number of senses are involved in the process."[13] Reinforcing occurs when the instructor takes full advantage of this principle and employs every audio-visual educational aid which meaningfully enhances understanding, such as being liberal with posters placed at critical locations, like pool sites, lecture rooms, dressing rooms and in the library.[14]

Bachman supported the extensive use of teaching aids as important learning tools. They served to attract the student's attention to the subject and to hold it for a longer period of time than would be expected if no aids were utilized. He also stated that significant improvement in student retention occurs when instruction is supported with meaningful aids.

Another problem which plagues instructors Bachman continued, is to find words which have the same meaning for the student as they do for the instructor. The problem is compounded by floods of new technical terms, the differing vocabularies of people involved and, in some cases, by the need to communicate across the barrier of different languages. Use of visual materials will plant in the learner's mind the same mental picture that is visualized by the teacher.

The difficulty of a student to understand the relationships between materials and concepts is familiar to every

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[13] Ibid., p. 6.

[14] Ibid., p. 6.

teacher. If the relationships are presented visually, they are much easier to deal with. For example, the sub-systems within a physical thing are relatively easy to relate to each other through the use of schematics or diagrams. Symbols, graphs, and diagrams can also show relationships of location, size, time, frequency and value. Similarly, by symbolizing the factors involved, it is even possible to visualize relationships between abstracts.

Finally, is the fact that diving instructors are frequently asked to teach more and more in less and less time. Instructional aids are of invaluable assistance in solving this problem. For example, instead of using many verbal paragraphs to describe a sound, object, or function, the instructor can play a recording of the sound and show the object or function visually. Consequently, Bachman states, the student will learn faster and more accurately.[15]

Every part of scuba instruction is related to safety. Safety, in turn, depends upon the quality of instruction, and it significantly influences the kind of learning the student will enjoy. Busch offered several suggestions which, if followed, would result in good, or improved, instruction.[16]

The instructor must be prepared in such areas as class

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[15]National Association of Underwater Instructors, Instructor Handbook (Colton, Calif., 1972), pp. 2.4.2-1.

[16]William Busch, "Beef-Up Your Teaching Presentation," Sixth Proceedings of the National Association of Underwater Instructors (Colton, Calif., 1974), p. 19.

organization and materials. He should begin making lesson preparations the day he finishes his last lesson, or if possible, attempt to start preparing before the previous lecture was finished. Make reading assignments meaningful, to familiarize the student with the material that is to be covered during the next class lecture.

Be organized, and position the students so that all can see and hear the demonstration at hand. Arrange the class so that all will have maximum space in which to practice skill or skills to be learned.

The scuba instructor must communicate confidence to his students in his presentations. Confidence is imparted through a thorough knowledge of the subject matter, for this is the framework from which this quality is constructed. Attempt to teach from the known to the unknown because it will simplify and expand understanding. Busch suggested that the instructor endeavor to create a mental photographic image to check incorrect patterns of movement as they occur. This assists the instructor as he endeavors to correct mistakes during the practical application of the skill (psycho-motor) phase of learning.

The instructor should be able to demonstrate, or better yet, have someone to demonstrate, while he verbalizes the skill. In this way the student learns through two senses, thus increasing the possibility of early comprehension.

Never be impatient with the students. A student should be neither demeaned nor embarrassed, for it not only lowers

morale and damages the teacher's character but may also lose him the respect of his class. The antidote to impatience are words of encouragement, enthusiasm, and the liberal use of one's wit.

Since scuba diving is a voluntary activity, initial interest is high, and there will be a natural desire to learn. Such a favorable learning environment should "enhance the quality of instruction the instructor can produce."[17] However, it must be noted that the advantage is quickly lost if teaching is slip-shod and ill-planned, so hold student interest and enthusiasm by "preparing well to teach well."[18]

Busuttili offered several suggestions that can be profitably employed when teaching basic scuba skills in order to improve learning and to use available time to the best advantage. This is particularly important during pool activity because frequently the class enjoys its use for only a limited period of time. A short briefing, quickly outlining the lesson, reminds them of the potential hazards of the lesson; a review of the exercise, an equipment check, the conditions under which the lesson will be conducted, and a reminder of the signals to be used can all be accomplished in five minutes or less. Once the students are in the water they are expected to follow through the lesson as was demonstrated by the instructor. In this regard, Busuttili made a

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[17] Ibid.

[18] Ibid.

strong argument for developing discipline in the lesson based upon the observance of basic rules and policy guidelines. This kind of discipline, he believed, would maintain order and efficiency in the class and would also develop safe divers, for as he observed, an undisciplined student is an unreliable diver. Finally, a quick debriefing ends the lesson. It should offer solutions to problems, praise where it is appropriate and encouragement when necessary.[19]

Howland clarified the role of the instructor by differentiating between the amateur and the professional. The instructor, he emphasized, must fulfill certain criteria before he may be truly judged a professional even though he may be certified to teach.

First, the instructor must have an effective understanding of the student. He begins by liking his student, thinking of him as an important individual. He does this by developing his interest in the student through stimulating and directing his growth of knowledge in the subject of diving. Make the student persist in correctly applying the knowledge, for this ensures that success occurs. Help the student connect the new ideas with the old, and then teach him to implement this "new" knowledge in a practical manner.

Know as much about the student as possible. Two important outcomes result: the first is that if the student

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[19]Michael Busuttili, "Tighter Teaching Technique," Seventh Proceeding of the National Association of Underwater Instructors (Colton, Calif., 1975), p. 85.

knows the instructor is interested in him and likes him, it serves to motivate him. The second outcome assures better instruction because the more the instructor knows about his student, the more efficiently he may arrange his lesson, determine the rate of instruction, and calculate the limits of student capabilities at every stage of his education.

A teacher and student together need a clear-cut understanding of expected student outcomes. This, what it is they want to do, and what the instructor wants them to accomplish. The outcome should be broadened to make maximum use of all the instructor's diver training techniques and teaching skills to develop the student to be as proficient a diver as he can become. The teacher must elevate the student beyond the ordinary expectations of diving to the end that the individual is a better person because he became a diver.

As important as curriculum development and methodology is, Howland placed it last in his order of instructional priorities, after "knowing and liking the student" and "expected student outcomes." He argued that the work is dull, difficult and it tended to bog the instructor down, thus dampening his own enthusiasm.[20] Howland's argument loses its validity when one considers that in the absence of good methodology there is nothing left but bad methodology.

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[20]Gary Howland, "The Role of the Instructor," Seventh Proceedings of the National Association of Underwater Instructors (Colton, Calif., 1975), pp. 222-228.

Without both sound curriculum development and methodology the first two priorities will soon be neutralized for the organization of the curriculum and the order of the learning experiences are the sine quo non of professional instruction.

Kaufmann summarized a good scuba program as containing the following ingredients:

1. Meeting at least basic standards of the certification agency involved.
2. Enough equipment to enable all the students to experience sufficient pool time.
3. Modern equipment in good condition.
4. Proper teaching organization relative to the number of students and the facility being used.
5. Intelligent choices of open-water dive experiences.[21]

Getting the most in scuba diving instruction is greatly enhanced by the use of audio-visual aids which disseminate information as effectively as possible to students. Cramer noted some of the values which have strong, practical implications for the instructor.

Automatic sound projectors are available for staff use at nearly all secondary and higher education institutions. The purchase cost is comparable to a medium priced movie projector and is much less than a video-tape machine.

Color filmstrip with tape cassette is much less expensive than movie film and video-tape and about one-third less

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[21]Robert E. Kaufmann, "In Pursuit of Instructor Excellence," Seventh Proceedings of the National Association of Underwater Instructors (Colton, Calif., 1975), p. 246.

expensive than slide productions, important considerations for the educator.

Color/sound filmstrips appeal to both audio and visual senses and can be arranged into convenient unit form for lessons and presented in any desired order. They appeal to the student because they add color and interest to class instruction whether covering complex or simple skills. Complex skills can be analyzed, explained, and advanced at the desired pace through stop-action photography. This allows students to get "all" the important information in the time available. It helps the instructor bring out important points in a lecture, to eliminate omitting important information because time has run out, a fact that reduces the value of the lesson.

Audio visual aids, Cramer explained, helped to minimize some common problems relating to safety such as absence, tardiness or slow learning. These problems ordinarily force the instructor either to repeat the material or simply permit the student to miss it altogether. Audio-visual aids reduce this dilemma because any part of the material can be repeated independently by the student without infringing upon class time. The student can learn at his own pace by repeating as many times as is needed. This saves the instructor time and assures that every student has the chance

to learn the important material requisite to safe diving.[22]

Utilizing another approach to effective scuba diving instruction, Sleeper emphasized using objects she described as "illustrative devices" which supplemented and complemented learning. Their use was to relate abstract concepts to concrete objects, so that learning would be facilitated. If a student understands what is being taught, then it should cause a change in his behavior. Purposeful learning occurs through using all the senses and can be related to experiences in the real world to cause a change in behavior.

It is also vital for a student to feel that what is being offered to him is important or worthy of note and that the information is current. If an intense or involving situation can be created in order to utilize the learner's full set of learning equipment, then the chances are greater for long term retention of the learning. Learning is never single-sided. One must be able to do active kinds of things. If that includes yelling, throwing, discussing, twisting, dismantling, assembling, cutting, jumping, or smashing, then maybe that is what needs to be done in order to best teach scuba diving. Again, learning must be an active process, so why not make it fun?[23]

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[22]John L. Cramer, "New Breakthrough in Skin and Scuba Diving Instruction," Sixth Proceedings of the National Association of Underwater Instructors (Colton, Calif., 1974), pp. 74-75.

[23]Jeanne Bear Sleeper, "Play Games: Teach Scuba," Sixth Proceedings of the National Association of Underwater Instructors (Colton, Calif., 1974), p. 369.

The key to learning, or "long term retention", Sleeper stated, was in the student's ability to transfer an abstract concept to a concrete action. An example of this might be first learning that water exerts pressure or how the nose and throat are connected and then applying this learning to solving the problem of what to do when one's mask is pushed too tightly against the face. Meaningful learning is "anchored in experiences and able to be transferred or extended to new areas of application."[24] The student does not memorize many facts and actions, but rather remembers a few generalizations and from them makes broad applications.

Common objects were utilized to bring abstract concepts into the student's range of comprehension, such as a sponge ball which can be readily compressed and expanded to illustrate compressability under water pressure: Boyle's law.

Sleeper stated that many projects can be contrived which will meet a number of objectives. One example given was to assign students the task of assembling an underwater "tunnel" made from plastic pipe. After assembling and anchoring the tunnel to the bottom, the students had to swim through it, both forwards and backwards. The purposes were to learn to work accurately underwater, to swim in small, tight spaces without panicking, and above all, to use common sense and think a problem through in order to solve it.

The student should enjoy learning how to become a scuba

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[24]Ibid., p. 393.

diver, Widmann believed, for within such an environment "learning takes place more efficiently and more effectively in an atmosphere of pleasure, as opposed to an atmosphere of discomfort and pain."[25] But in the back of all students' minds, Widmann cautioned, was the awareness that, potentially, scuba is very hazardous, and that mistakes may have a terminal effect for the careless or unknowledgeable participant. Balance a healthy level of anxiety, which keeps the student respectful of his activity, with a relaxed attitude, for learning to take place effectively. Widmann presented several ideas that would be useful for scuba instructors interested in enlivening instructional methodology.

First, the instructor was encouraged to adapt an open style of teaching. Do not be tense, for this reflects back to the class and may decrease productive teaching. Openness and competency on the part of the instructor must be established in the students' minds from the first day of the class. To develop this attitude early it was important that the teacher know the students, the students know the teacher, and finally that the students know each other--their names, addresses, hobbies, where they work, as much as is reasonable. This brings the group closer together and creates a sense of community among them.

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[25]Robert Widmann, "Making Scuba Fun," Sixth Proceedings of the National Association of Underwater Instructors (Colton, Calif., 1974), p. 393.

Another factor Widmann emphasized was the manner in which the teacher related to his students. He or she must be open to questions and ideas, be sensitive to the group and rely on them to influence class procedures, for suggestions should be welcome as well as criticism. This, he claimed, was an antidote against an over-enlarged ego and provided an excellent way for the student to relate to the instructor. Make the student the object of the class, for "the class should be geared to the student's needs."[26] Attempt to pace the learning rate to the ability of the class, but do not, Widmann cautioned, ignore the exceptionally slow or fast students. These extremes in learning capabilities can usually be assisted by competent teaching assistants.

Widmann stressed that almost all skills can be taught through the "problem solving" method in a "fun" way. The advantages of a fun approach lay in the fact that most of the scuba skills are simple to learn but that their "execution with finesse and under pressure is often the problem which the students need to solve."[27] All the skills need to be over-learned, a situation often leading to boredom for both student and teacher. Providing a number of different fun ways to learn the skills (e.g., mask clearing, snorkel clearing, breath holding, emergency

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[26] Ibid., p. 394.

[27] Ibid., p. 396.

procedures, free ascents) holds student interest while continuing to motivate and bring about the overlearning so that skills may be performed routinely in any future stressful situation. Be cautious about over-emphasizing competition, Widmann warned, for not all students respond to it positively. Some may become so distressed that they withdraw rather than compete.

Barnes concurred that problem solving methods were an indispensable part of the instruction program. If the student graduates as a safe and competent diver, he must be capable of acting-performing independently:

> While in their training, our emphasis should be placed on allowing the students to think, evaluate, and make a decision on the presented situation (exercise). Let them work out for themselves the possible alternatives and solve their problems in their most convenient, comfortable, easiest or fastest way. This is simply done by describing the starting point in detail and the exercise objective. Mention the several alternatives to complete the exercise, but do not demonstrate the procedure or movement sequence.[28]

Trial-and-error under careful supervision, but not direction, has the effect of developing the necessary attributes of independent thinking and acting, the unqualified condition for safe diving.[29]

Sellers further elaborated upon improving the methodological process which, in turn, enhanced effective learning.

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[28]Waldemar F. Barnes, "An Approach to Individuality in Teaching Scuba," Seventh Proceedings of the National Association of Underwater Instructors (Colton, Calif., 1975), p. 40.

[29]Ibid.

He stated that the perceptive teacher who attempted to derive maximum benefit from available learning time was careful to insure that students got enough exposure to the subject matter or skill to be learned so that it could be recalled when necessary. The student should also be provided ample opportunity to rehearse or exercise his new knowledge so it can be put to practical use.

Sellars suggested the first exposure might be an audio-visual presentation. It should be lively, colorful and interesting to motivate the student to learn. For the second presentation of the same information Sellars recommended the textbook or manual. It should be written by a different author to gain a new perspective and to develop a greater depth of knowledge. The next step was to arrange the opportunity for the information to be related to a problem-solving experience. The workbook assists the teacher in this matter for it provides both work problems for the student to solve and the exercises to implement the problem. It is important that a "specific workbook exercise cover the same area of knowledge as its counterpart audio-visual and textbook assignment."[30] Evaluation represented the fourth stage of the learning methodology. Sellars believed that evaluation must be a continuous part of the learning process because it will aid the teacher to isolate both excellent and

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[30]Don Sellars, "The System Approach to Diver Education," Seventh Proceedings of the National Association of Underwater Instructors (Colton, Calif., 1975), p. 404.

poor performance on the student's part, "thus giving the instructor a great advantage in assisting the student to be a knowledgeable diver."[31] Evaluation will serve as an excellent critique for the instructor as he evaluates his own performance, Sellars stated, aiding him in identifying his own instructional weaknesses as well as strengths. He also felt that if students performed well on evaluation it would serve as a morale booster for them and encourage further motivated effort.

"The final learning environment was the water where the 'pre-conditioned' student puts all he has learned from the audio-visual materials, manual, workbook and quiz together."[32] At this stage the student is ready, both academically and emotionally, and learning proceeds--expectedly--at an encouraging rate.

Summary of the Review of the Literature

An extensive review of the literature substantiated that the field of scuba diving did indeed require a curriculum guide, not only to provide an orderly teaching arrangement for the instructor, but to more effectively utilize the many books written on scuba diving. Each book, although pursuing the generalized topical format previously mentioned, still reflected the author's personal area of interest and

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[31] Ibid., p. 406.

[32] Ibid., p. 406.

expertise. For example, The New Science of Skin and Scuba Diving focused heavily upon the scientific considerations of diving, and Tilman, in his little book, Skin and Scuba Diving, directed the thrust of his topics to the skills of diving. Each author presented a particular style, some technical, others more pedantic, and one even humorous. The varying writing styles permit the instructor to select the book, or books, which satisfy the developmental levels and instructional needs of his class. But to employ any of the texts as a curriculum guide would be a sharp departure from sound methodological procedure, for no other reason than they were not designed to fulfill this purpose.

The literature, however, provided much valuable insight regarding particular instructional considerations that different authors believed were important to quality teaching. These areas touched upon diving safety, discipline, teaching techniques, how to teach skills, uses of education instruction aids, underwater communication, and learning, among others. Each topic was discussed separately or in conjunction with others but nowhere in the literature was a composite pattern of instructional methodology and procedure discussed. Much of the information from the literature was used in guide, but it was organized in accordance with the principle of integration in order that the quality of future scuba diving programs be further improved.

CHAPTER III

THE PHILOSOPHY AND OBJECTIVES OF PHYSICAL EDUCATION

Pragmatic Philosophy of Education

In today's rapidly changing society a sound philosophy of education represents not only a commitment to educational excellence but also to the survival of its values and purposes. A philosophy, which also accepts the validity of experience as an important aspect of an educational endeavor, provides within itself the capacity for adjustment to influences at little cost to either its own essence or to its quality. Such then is the pragmatic philosophy which asserts that:

> Education was the reconstruction of events that compose the lives of individuals so that new happenings and new events become more purposeful and more meaningful. Furthermore, through education, individuals will be better able to regulate the direction of ensuing experience.[1]

Bucher, in interpreting Dewey's philosophy, stated:

> The individual's education consists of everything he does from birth until death. . . . Education takes place in the classroom, in the gymnasium, on trips and at home. It is not confined to a school

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[1]Bucher, p. 14.

> or a church but takes place wherever individuals congregate.[2]

Dewey believed that, unlike other philosophies which approached education as a preparation for life, "education was life and that it was obtained through the process of continuous experience which helped an individual to grow and be better able to make adjustments in light of new experience.[3]

The confirmation of this educational philosophy was reinforced when the Educational Policies Commission, in discussing the policies of education in American Education, stated that the primary purpose of education was:

> . . . in effecting the promises of American democracy, and to guard, cherish, advance, and make available in the life of coming generations the funded and growing wisdom, knowledge, and aspirations of the race. This involved the dissemination of knowledge, the liberation of minds, the development of skills, the promotion of free inquiries, the encouragement of the creative or inventive spirit, and the establishment of wholesome attitudes toward order and change--all useful in the good life for each person, in the practical arts, and in the maintenance and improvement of American society. . . .[4]

Over the years, this interweaving of common purposes between education and society, has developed a relationship so close and so mutually interdependent that it appears symbiotic both of its nature and in its characteristics.

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[2]Ibid., p. 14.

[3]Randolph W. Webster, Philosophy of Physical Education (Dubuque, Iowa, 1965), p. 11.

[4]Bucher, p. 14.

Even the qualities descriptive of organic life have often been ascribed to the school and to society in assessing their general well-being or effectiveness; conditions such as vibrant, alive, or healthy, or the opposite extreme, as hardening of the arteries, sick, or moribund.

One characteristic of a healthy biological organism (to carry the analogy one step further) was in the capacity to be able to adapt continuously to the ceaseless forces of the external environment acting upon it. Similarly, dynamic institutional organisms have ever been subject to those "recurrent external crises in society" demanding both adaptability and the resolve to be further strengthened and improved. (Representative of but a few of these influences have been wars, economic fluctuations, population shifts with their attendant sociological implications, evolving value systems, scientific developments, legislative and judicial decisions, and, of critical importance to physical education - increased leisure with the more imperative for its worthwhile expenditure.)

Another characteristic of a healthy educational organism is the ability of self-evaluation and to initiate change internally with an ultimate, positive benefit upon itself, and at the same time, reflect accurately the needs and interests of the society it serves.

Since the turn of the century, numerous events and achievements have verified the capacity of education for self-initiative and constructive change, but no one thing or

one person reflects that position so profoundly as John Dewey, who released education from the:

> Dull stupid quality of current customs . . . which . . . perverts learning into a willingness to follow where others point the way, into conformity, constriction, surrender of skepticism and experiment.[5]

Dewey recognized that the deeper needs of the individual had to be met, for they vitalized his educational experience and enriched his life, but he remained concerned that all of education's citizens received this consideration. He wrote:

> Yet the range of the outlook needs to be enlarged. What the best and wisest person wants for his own child that must the community want for all its children. Any other ideal for our schools is narrow and unlovely; acted upon, it destroys our democracy. All that society has accomplished for itself is put through the agency of the school at the disposal of its future members. All its better thoughts of itself it hopes to realize through the new possibilities thus opened to its future self.[6]

All students, then, have the right to enriching educational experiences. But the challenge to provide them has grown increasingly difficult in view of today's rapidly shifting patterns of life's activities. This fact insists that colleges and universities continuously evaluate their programs with new perspectives to determine whether they are consistent with current needs and interests. Therefore,

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[5]John Dewey, Human Nature and Conduct (New York, 1922), p. 64.

[6]Dewey, The Child and the Curriculum and the School and Society (Chicago, Illinois, 1943), p. 7.

programs (such as scuba diving) which were virtually unheard of a few short years ago can today be included in the curriculum and accepted as legitimate aspects of one's education.

> History demonstrates that educational pruposes change from time to time, as social circumstances change, and as outlooks on life change accordingly. What it means to be educated is contingent upon a specific place and time.[7]

Education, in light of Dewey's philosophy, must be cognizant of and pragmatically geared to the best interests of the individual and not bound to rigid, lifeless, formalized instruction or--even worse--to be subservient to the state and its self-serving purposes:

> For the school cannot build a new social order . . . this is not a matter of courage or cowardice; it is a question of fact which all history of education has proved and which the study of any educational system, even the most radical and revolutionary confirms. . . . The school reflects social demands but does not initiate social change.[8]

Dewey's pragmatism considered education as a "doing phenomenon" in which learning occurred within the entire educational (curriculum) setting, not constrained to a single formalized approach or methodology. According to Dewey, education was a continual process of experiencing and of revising or reorganizing experience. His interpretation of education affirmed that:

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[7]Sowards Wesley and Margaret Scobey, The Changing Curriculum and the Elementary Teacher (Belmont, Calif., 1961), p. 31.

[8]I. L. Kandel, "The School Cannot Build a New Social Order," Readings in Foundations of Education, Vol. 1, pp. 904-905.

> Since life means growth, a living creature lives as truly and positively at one stage as at another, which with the same intrinsic fullness and the same absolute claims. Hence, education means the enterprise of supplying the conditions which insure growth, or adequacy of life, irrespective of age. The process of education is a continuous process of adjustment, having as its aim at every stage an added capacity of growth.[9]

This educational philosophy exploded the old myth of the "split man" concept (the duality of the mind and the body) which has denied the possibilities of cross experiential relationships between (1) the mind, (2) the body, and (3) emotions but also the enrichment of one's attitudes and value systems and characterizing a happy, fulfilling life. A new emphasis arose, embraced by physical education which, in the words of J. F. Williams, provided the assurance that "every human experience is a magnificient mixture," of all the human components and not simplistically a singular response to a particular stimulation:

> We may identify one element as more prominent than another, but we misunderstand the nature of experience whenever we regard any act as exclusively composed of the quality with which we attempt to endow it. Experience is an interaction of the whole organism with its environment, and the environment includes other persons as well as traditions, customs and the local physical surroundings.[10]

Through education was thus articulated the unending interacting of experiences through its curriculum, "that body of experiences that lies between objectives and teaching

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[9]Dewey, Democracy and Education (New York, 1916), p. 61.

[10]Jesse Feiring Williams, "The Physical as Experience," The Journal of Health Education, Vol. 22 (1951), pp. 464-469.

methods."[11] The curriculum became the organic substance of education for all activities, structured and unstructured, planned to spontaneous, but all of which stemmed from life itself, and "to the extent that life experiences provide the eventual context of the curriculum life . . . would be enriched for those who are stimulated by curricular offerings."[12]

Similarly, Bobbit, in dealing with the function of the curriculum, stressed that the purpose of education was to live the good life day-by-day.[13] The good life, Bucher explained, considered the viewpoints of the society and the individual contending that both are involved to their mutual support and welfare. He described the four characteristics of the good life as:

1. A Pleasurable Life: A person should be happy and satisfied. It should be a life characterized by high ideals, for, in Emerson's words 'He who does a good deed is instantly ennobled.' Education helps the individual to develop a philosophy which establishes a fundamental value system desirous of worthy goals.

2. Emotional Security: The person at peace with himself is at peace with others. It is the foundation for sound mental health.
   The development of a value system directed toward healthy human relations, an appreciation for the worth of others, worthy use of leisure time tends to balance the legitimate

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[11] Willgoose, p. 57.

[12] D. Lester and Alice Crow, Introduction to Education (New York, 1950), p. 251.

[13] J. F. Bobbit, The Curriculum of Modern Education (New York, 1941), pp. 6-8.

need for self-concern with a consideration for the rights and dignity of one's fellow man. Education through precept and example, stresses the imperative of moral and spirtual values.

3. Worth and Achievement: It is derived through sustained effort toward worthwhile accomplishment. Not only must the endeavor be personally accepted but it must also be recognized, acknowledged and appreciated by the society in which one lives.
   Education assists the individual to direct his life toward worthwhile and achievable goals by providing training, skills, and developing work, play, and leisure attitudes and habits which contribute to his health.

4. An Interesting Life: Life, to be full and zestful, must be interesting. Excitement over each day's adventure triggers optimism, and anticipation and helps things to happen.[14]

It is interesting to note that Bobbit's four characteristics make no reference to those factors which provide the essential components of a course: objectives, methodology and evaluation. He viewed the curriculum as being more than this. It must contain the things which give one the feeling that he is a better person because of the experience. In this sense a scuba program is uniquely suited to fulfill this condition for by its very nature it calls upon one's deeper resources and a greater commitment to a task. This is true whenever one enters an entirely new experience for "the unknown, with its tonic of anticipation acts as a catalyst in which each individual sees not only himself but but his fellow diver as adventurers."[15] This is one way in

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[14]Bucher, pp. 141-143.

[15]Reseck, Interview, 1975.

which education may direct a person to seek worthwhile, interesting and satisfying goals. It can equip each one with skills, knowledge and understanding that provides the foundation for living an interesting and exciting life.

Objectives of Education

Fundamentally, what has been said is that in support of every sound educational program is a philosophy of life and education, which developed from a concern for the realization of the good life. In recent years, education has expressed this philosophy through the "Policies of Education in American Democracy," as the four major objectives of education. They were:

1. Self-realization, which deals with the desire for learning; the acquisition of the fundamental tools of learning (reading, writing, speaking effectively) correct health knowledge and practice; and the worthy use of leisure.

2. Human relationships, deals with members of the family and community group and the ability to work harmoniously with them.

3. Economic efficiency is the capacity to function effectively in the society through the developing of workmanship, careful vocational selection, occupational adjustment, appreciation and efficiency; and the exercise of good judgment in the course of normal consumer affairs.

4. Civic responsibility is the citizen's responsibility and obligation to the society in which he lives, for its general improvement and also an abiding loyalty to the democratic way of life.[16]

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[16]The Educational Policies Commission, The Purposes of Education in American Democracy (Washington, D.C., 1938), p. 50.

Objectives of Physical Education

Physical education has been defined by Oberteuffer and Ulrich as: "Education by means of experiences which involve activities and movements and which also have emotional, behavioral, and intellectual components."[17]

Physical education, being a part of education, shares the same general goals and offers its contributions to the objectives of education with the understanding that they are developed through the unique physical experience as set forth by the following general objectives of physical education.

1. Physical development. The value of this objective has been proved through much research. Hein and Ryan's conclusions here summarized, are also representative of others' efforts:

   a. Regular exercise aids in the prevention of obesity with its strong influence upon shortened life span and degenerative disease.

   b. Regular physical exercise throughout life seems to inhibit coronary heart disease.

   c. Regular physical activity assists in delaying the aging process and probably favorably influences longevity.

   d. Regular physical activity contributes to a body condition that enables the individual to better meet emergencies and thus, in

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[17]Delbert Oberteuffer and Celeste Ulrich, Physical Education (New York, 3rd edition, 1962), pp. 34-35.

turn, enhances health and avoids disability.[18]

2. Motor and movement development. This has been dedicated to making movement as efficient as possible with the least amount of energy expended. Efficient motor movement depends upon the cooperation between the muscular and nervous systems; that is, it develops skill. Other values of skill development contribute toward building confidence, achieving recognition, enhancing physical and mental health, making participation safer, and appreciating the aesthetic.

   The implication for health and recreation are that acquired skills are influences determining how leisure time will be spent: a matter of increasing importance in today's world.

3. Cognitive development. This deals not only with the accumulation of knowledge and the ability to think through and interpret it, but it also projects into the more abstract level of thought involving the evaluation of materials and value judgments. Cognitive ability is as necessary to success in learning the

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[18] Fred V. Hein and Allan J. Ryan. "The Contributions of Physical Activity to Physical Health," Research Quarterly, Vol. 31, No. 2 (May, 1960), p. 279.

physical skills of scuba diving as it is to the appropriate application of academic knowledge necessary to a particular diving situation.

Therefore, thinking is necessary in learning physical skills, whether it be a gross movement such as swimming or those more delicate skills required of sophisticated movement. As the skill is thought out and repeatedly practiced, it becomes easier and more efficient to perform with the happy consequence that the learning will never be forgotten, even though it may be years before it is applied again.

Other dimensions of mental development involve learning, interpreting and applying rules and regulations of activities. In addition, health principle application, citizenship, social action, are other important facets of well rounded mental development, all of which aims towards social efficiency and good human relations.

4. Social development. Physical education has long recognized the need for individuals to make both personal and group adjustments as members of society. Physical education recognizes that achieving social success represents a basic commitment of a good program and can be achieved through the many kinds of

programs offered.

> The nature of physical education is social because, with certain exceptions, the activities are conducted between pairs of individuals or groups in rather informal settings, necessitating voluntary cooperation with constituted authority, group welfare consciousness and--most important--an awareness of one's personal rights within the group's socialization process. An emphasis in the curriculum upon the higher human qualities of honesty, fairness, truthfulness, courtesy and consideration has always been the mark of a maturing social being, one who would fit into and would contribute to the general welfare, not just to his own.

Although these objectives have remained basically unchanged for many years, the curriculum has required periodic re-evaluation to determine if it were maintaining the kinds of programs which were attractive, worthwhile, and meaningful to the participants. One of the ways to attain relevancy was the incorporation of specialized programs, such as scuba diving, which reflected current needs and interest and, at the same time, was consistent with the objectives of physical education, for "it is not necessary to change the objectives . . . in order to accomplish fundamental curriculum

development."[19]

Scuba diving, Reeves et al. confirmed, belonged in the curriculum of physical education because its objectives were the same as those of physical education, and its need was established. But above all else is the primary objective of all scuba diving programs: to develop divers possessing the knowledge, skill and understanding which maximizes safe and competent diving.[20] The statement appears more as an aim than an objective, but the nature of diving demands it be not only the primary objective but the basic prerequisite for certification. The integration of the major objectives into the design and the development of all parts of the curriculum remains the fundamental responsibility of every teacher involved with scuba diving programs, and this task is aided and abetted by a sound curriculum guide.

The curriculum guide develops naturally out of the general objectives of physical education because it is the articulated expression of the program. It serves the purpose of including all the learning, skills, knowledges and many of the tasks. It proceeds sequentially, integratively and purposefully while at the same time, holding to the characteristics of flexibility necessary for convenient adaptation to the particular teaching-learning circumstances unique to every program.

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[19]John E. Nixon, Introduction to Physical Education (Philadelphia, Pa., 1964), p. 140.

[20]John Reseck, Jr., 1975.

CHAPTER IV

LEARNING, METHODS, EVALUATION

The philosophy of education has been defined within Dewey's pragmatism which considered education as an active, total process which should "endeavor to shape experiences of the young so that instead of reproducing current habits, better habits shall be formed, and thus the future adult society be an improvement on their own."[1]

The general objectives of education were identified to be aspects of a sound philosophy and were concerned with educating the individual for a productive, useful, and happy life. Physical education objectives were understood to be consistent with the foundation of education and its contribution toward learning was effected by "learning through the physical."

This division into explicit areas does not presuppose neat categorization, but serves to delineate the kinds of learning the responsible teacher must be alert to if instruction is to proceed unitarily.

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[1]Arthur Weston, The Making of American Physical Education (New York, 1962), p. 50.

The Definition of Learning

Learning is legitimately considered to be the primary purpose of education because it is both a process and a product of thinking. And yet learning *per se* is not sufficient, for one may learn to be socially undesirable, such as a thief or a rogue. In the specific domain of scuba diving, the same possibilities for negative or undesirable learning exist, and they are considerably more numerous than the correct, or right learning. This is true because the abandonment of learning theory and principles removes all restrictions in terms of the direction instruction will pursue, the procedures it will follow, and the type of methodology and evaluation that could be adopted.

Therefore, learning, as considered and developed within the context of this study, acts as a positive influence upon the mind, feelings, and actions of the learner. It is consistent with Hilgard and Bower's definition which stated that:

> Learning is the process by which an activity originates or is changed through reacting to an encountered situation, provided that the characteristics of the change in activity cannot be explained on the basis of active response tendencies, maturation, or temporary stages of the organism (e.g., fatigue, drugs, etc.)[2]

The specific objectives of scuba diving, being natural outgrowths of the general objectives, are arranged into the

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[2]Ernest R. Hilgard and Gordon H. Bower, *Theories of Learning* (New York, 3rd edition, 1966), p. 2.

three domains of learning: The cognitive, the affective and the psychomotor. An examination of each domain was made and its relationship to the scuba diving program was developed.

The Cognitive Domain

Cognitive learning is the Gestalt, or the wholeness approach to learning, rather than a study of the parts, but it means that the parts are always considered in relation to the totality of that which is to be learned.

> Every whole is a part with respect to some larger whole that embraces it, and every part is a whole when considered in relation to some smaller part contained within it. The superiority of the whole method is most pronounced when the material to be learned is closely articulated internally and tightly knit in structure. When the characteristics of interdependence and continuity are less pronounced, the superiority is correspondingly diminished, although still maintained. It has been, and remains, sound advice to employ the whole method in preference to the part wherever an option is presented to the learner.[3]

One essential aspect of the cognitive domain is relating past meaningful experiences with repetitive experiences currently being learned. Therefore, the learner response is "not to the stimulus, but to his own inner perceptions and restructuring of that stimulus in terms of the total situation."[4] This is ordered by "the trace . . . which persists

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[3]George Hartman, Educational Psychology (New York, 1941), pp. 304-307.

[4]Betty Abercrombie, "A Philosophical Delineation of the Contribution of Physical Education Toward Attaining the Behavioral Goals of General Education" (unpub. doctoral dissertation, Oklahoma State University, 1973), p. 48.

some way in the brain of man and makes possible a carryover from one experience to another."[5] It is a pertinent kind of learning because, as Dewey noted, it brought to learning the "reconstruction of events which make new happenings more pruposeful."[6] The more insight brought to a defined objective as, for example, performing a correct ascent rate from a prescribed depth, the greater should be the degree of skill in that act. The correct rate of ascent then becomes more than a memorized function, but comprehended knowledge which lends meaning to the act. Insight reinforces and gives permanency to learning and even during the practice periods, it places mere repetitive activities above the level of simple mechanical functions. Within this context one never actually "practices" because each practice is performed differently from the one which preceded it and will be different from the one which will follow, as the level of comprehension increases. The improvement is really due to increasing insight or understanding of the total situation. Ideally, "Instead of trial-and-error, would be substituted observation, perception of the situation as a whole, or perception of those parts of the situation that provide a route to the goal."[7] When the student gets the "feel" or "hang" of the skill, he has learned it. Nixon described it as an

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[5]Oberteuffer, Physical Education (New York, 1970), p. 115.

[6]Dewey by Charles Bucher, Foundations of Physical Education (St. Louis, Mo., 1968), p. 14.

[7]Abercrombie, p. 48.

"improved conceptual configuration or understanding of the total situation . . . because the individual functioning as an integrated unit has arrived at the goal by the shortest possible route--the 'Law of Least Action.'"[8]

It is well to remember, however, that no single learning theory operates to the exclusion of other theories. Teaching is, and always will be, a pragmatic affair, and the good instructor maintains an objective attitude, searching for ways to improve the learning process.

The Connectionist theory (over-simplified) for example, holds that skills are learned after a period of practice. Eventually, the skill is learned as a "path" is made in the nervous system. When a participant involved in a skill activity performs it effortlessly again and again, the comment is made that the move is "grooved". The pre-conditions to such a level of performance are noted as the trial-and-error period and are typical of the novice's efforts.

A second learning theory commonly used by teachers is the Conditioning Theory, which holds that learning occurs by the reinforcement of specific behavior patterns. That is, learning results from conditioning through eliciting desirable behavior patterns as a teacher offering praise for good performance while playing down inferior performance.

Bookwalter stated that no serious conflict exists in the adaptation of and the interaction of several learning

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[8]Nixon, p. 113.

theories, supporting one another, for it is more a matter of emphasis than technicalities.[9] Eclecticism represents the common approach to learning, regardless of one's underlying philosophy and has much merit for it offers options the teacher might exercise. But it also has disadvantages, and Oberteuffer cautions that "the assets and liabilities of using too many learning theories should be weighed carefully by the discerning teacher."[10]

The Affective Domain

A Curriculum Guide failing to include the affective domain as a part of its organizational format is neglecting a primary part of the learning domain, because the affective domain of learning is the affirmation that the "whole person" goes to a class, not only the mental and the physical. Feeling, attitudes, perceptions of what things are in terms of one's preconceived notions color attitudes to the end that learning may be either accelerated or inhibited because:

> Man is an integrated whole interacting physically, mentally, socially with his environment. He does not attend an English class with only his mind, an art class with only his feelings, or a physical education class with only his body. If he is principally engaged in learning cognitions, it does not mean that he is only acquiring primary learning. The whole person is involved in

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[9]Karl Bookwalter and Harold Vanderzwaag, Foundations and Principles of Physical Education (Philadelphia, 1969), p. 154.

[10]Oberteuffer, p. 113.

> the learning process; and primary, secondary, and concomitant learning are associated with any learning situation.[11]

Daughtrey's analysis of the affective domain considered:

> Behavior involving attitudes, emotions, and values, which is reflected in the learner's interests, appreciations, and adjustments. It is symbolized by response, organization, and characterization.[12]

In physical education, Daughtrey continued, the "affective domain refers to attitudes which may be expressed in interests, appreciations and life long values that may be developed in physical education."[13] Scuba diving students instructed in a vacuum of purposely defined affective objectives may, thus, become incomplete in their diving education, for attitudes toward diving and all of its parts are indispensable in developing a complete diver; i.e., one who effectively blends responsible techniques with the correct implementing of skills, who practices responsible diving habits, who understands the diving environment and appreciates ecological balance, and who perceives the need for maintaining good safety habits while diving.

The instructional plan for developing the affective domain will influence the quality of the class, and bear upon the student's decision whether or not to dive beyond

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[11] John Rowan Wilson and the editors of Time-Life Books, The Mind (New York, 1969), pp. 105-106.

[12] Greyson Daughtrey and John B. Woods, Methods in Physical Education and Health for Secondary Schools (Philadelphia, Penn., 1967), p. 124.

[13] Ibid., p. 124.

the prescribed class term. For example, the nature of the underwater environment always has been indifferent to whomever or whatever occupies it; that is, man makes accommodations to it, rather than the other way around. But, the manner in which it is introduced to the student may make it an eagerly anticipated event or a dreaded expectation with all the negative implications this carries. Knowledge, in other words, must be passed to the learner positively, (affectively positive), and imbued with feelings which "do not negate the value of the experience for the learner."[14]

Even so, effective strategies and methods of teaching can and must be used to an advantage. Reseck's book, SCUBA, Safe and Simple, for example, by its very title begins with a positive approach to diving. There is much to diving which must be learned, Reseck stated, but one should present it in a manner which does not diminish interest. Diving physics can be dull material, so rather than burden a student with technical details dealing with this subject, place the diving laws within contexts which hold meaning for the student and to which his experience and knowledge can be applied. Steinhaus concurred that learning is made more pleasurable, and its rate is increased, if the complex or unknown can be presented within the boundaries of the familiar ('66). The effort to make information meaningful is a paramount objective, for it stimulates the student's

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[14]Abercrombie, p. 41.

desire to learn (readiness).

For the scuba diving instructor, readiness to learn is characterized by an "internal state enabling the student to select and apprehend stimuli that are appropriate to the learning being undertaken." The chapter related to the reader-student that pressure underwater was correspondingly as normal as atmospheric pressure and was to be considered as a natural phenomena operating within a few well-defined laws which must be observed, just as the law of gravity is obeyed: a simple common sense approach to safety and consequent pleasurable activity.

The instructor, using the Curriculum Guide, makes provision for developing a positive approach to the real underwater world, because that is where "the action is." Because of its great expanse of scenery and animal life, the ocean is where better than 90 percent of all diving occurs.[15] Unfortunately, this is also where most of the myths and mysteries of the underwater world are derived, much of which have been particularly distressing to the student who has yet to arrive at this part of his training. If such feelings were permitted to exist, motivation could be changed and learning affected because:

> Motivation that is too intense (pain, fear, anxiety), may be accompanied by distracting emotional states, so that excessive motivation may be less effective than moderate motivation for

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[15] John Reseck, Jr., SCUBA, Safe and Simple (Englewood Cliffs, New Jersey, 1975), p. 101.

> learning some kinds of tasks, especially those involving difficult discriminations.[16]

It is also true that a "motivated learner acquires what he learns more rapidly than one who is not motivated."[17] Rather than extrapolate the potential hazards of the few dangerous forms of sea life and dwell upon them, Reseck uncomplicatedly describes them as No-No's That Live in the Sea and replaced an unknown fear with specific information and knowledge. Along the Pacific coast, for example, the Morray eel, enjoys the distinction of being the second most feared animal of the sea (next to the shark) due to its ferocious, snake-like form and its many imposing teeth. In point of fact, it is a fish, not a reptile, and is a slow, basically timid creature which retreats from man and only attacks when it feels threatened. The imagined hazards of the underwater world are further dispelled when the lowly sea urchin, an animal with exceptionally limited mobility with spines like a pin cushion is portrayed the most dangerous marine animal because it is profuse in number and its spines cause painful, but not dangerous puncture wounds. Such comparisons are intended to establish proper perspective into the learning attitudes of the student through the replacement of subjectively derived fears with objective knowledge.

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[16] Oxendine, Psychology of Motor Learning, Vol. 61 (1968), pp. 43-44.

[17] Ibid., p. 43.

Attitudes were importantly involved in the learning of the many skills necessary to scuba diving. Some skills (most) do present a modicum of danger because they will have to be performed in depth, which for the beginner may produce extreme uneasiness. Often the skill can be separated into smaller parts and learned in small progressive stages, or the whole skill can be modified in terms of procedure until it is learned. For example, a familiar skill--rate of ascent--requires a particular emphasis upon safety. Westgaard put the student at ease and diminished the hazard of rapid ascent by initially placing him at the deep end of the pool and having him proceed to "ascend" horizontally by gradually swimming to the shallow end. Two practical ends were served: (1) Student anxiety was reduced, and (2) a longer "ascent" was practiced because the distance swum was considerably longer than a vertical ascent from the bottom. Once the rate was mastered, the normal ascent was practiced.

It has been previously stated that the ultimate objective for the scuba diving program was to develop safe and competent divers. Competency, within this context, confers upon the diver the qualities of personal and group responsibility, correct thinking under moderate stress, and the capacity for independent action, encompassed within the constraints of a normal recreational dive. That these kinds of competencies would accrue in the absence of deliberate planning is a naive assumption. That they may be realized as the outcomes of carefully defined objectives of the

affective domain is a reasonable expectation of a learner's capabilities. The development of attitudes, values, and perceptions become powerful determinants molding the kinds of feelings one brings to every fact of the diving discipline, although Kapher admitted that "we do not know very much about changing people's attitudes, but we do think that if you practice behaviors that relate to a given attitude level, the attitude itself might form."[18]

Kapher did, however, provide a model designed to aid the teacher and the pupil to work toward behavioral improvement. Taken after the model, the behavior given in the continuum provided "the learner with attainable stepwise models which he can practice. As a result he possibly will come to hold the related level of attitudes."[19] The model serves as a tool to "bring about positive behavioral modifications in each student, leading toward affective diving competency (independence). A second value permits the student to view himself objectively on the continuum in terms of where he is and how far he wants to go along the path toward independent learning. Further, by capitalizing on the "built-in opportunity for dialogue between students and teachers which this approach provides, failure and frustration in the affective domain are unnecessary."[20]

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[18]Miriam B. Kapher, "An Approach to the Affective Domain," Behavioral Objectives in Curriculum Development (Englewood Cliffs, N. J., 1971), p. 132.

[19]Ibid.

[20]Ibid., p. 134.

Kapher's Sample Affective Domain Objectives and Behavior Continuum directs the student toward the objective of independent thinking:

The student increasingly values independent learning, as observed in his self-initiating, self-directing behaviors

1. Given a teacher - assigned delimited topic with assigned, specified resources, the student follows directions.

2. Given a teacher - assigned delimited topic and assigned alternative resources, the student selects from alternative resources.

3. Given a teacher - assigned delimited topic, the student seeks his own resources.

4. Given a teacher - assigned broad topic, the student delimits the topic and seeks his own resources.

5. Given a student - initiated broad or delimited topic (in or out of school), the student delimits the topic as necessary and seeks his own resources.

The most important function of behavioral objectives, whether affective, cognitive, or psychomotor, is in the direct use of those objectives by the student (1) to learn the expected behaviors and (2) to evaluate his own progress in learning the behavior. With reference to the sample continuum above, students might be told:

> Here is an objective and a continuum of statements describing the behavior of people who have achieved this objective at varying levels.
>
> The objectives and the continuum of behaviors relate to your attitude toward independent thinking.
>
> We do not know very much about changing people's attitudes, but we do think that if you practice behaviors that relate to a given attitude level, the attitude itself might form.

> What you have to do is decide what kind of person you would like to be, how independently you would like to function, what kinds and levels of attitudes you would like to hold, and how you would like other people to perceive you so that your self-concept might grow.
>
> Then you will need to practice the behavior of people who hold the levels of attitude to which you aspire. You will have to begin by evaluating yourself, decide where you are on the continuum, and then decide if you are satisfied with the level you are or if you want to be at a higher level.

The Psychomotor Domain

The third domain of learning involves the student's competency to apply physically all the necessary skills and techniques of diving. This is the psychomotor domain which "places emphasis on the neuromuscular skills and is symbolized by frequency, energy and duration.[21] The defined skills to be learned are numerous and range from the predive tasks as donning a mask, perhaps, to safely maneuvering through a giant kelp forest. It is, in other words, the action phase of the learning domains, or as Dewey and Williams would agree, the "doing", the pragmatic part which energizes and vitalizes learning through physical involvement. Scuba divers are concerned with: manipulating, maneuvering, controlling, adjusting, donning, doffing, entering, exiting, inhaling, exhaling, clearing, floating, dscending, ascending--all the myriad "little" skills which

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[21] Greyson Daughtrey, Methods in Physical Education and Health for Secondary Schools (Philadelphia, Penn., 1967), p. 124.

must be done with a routine expertise--the anticipated outcome of many accurate repetitions.

It is well to remember that although the student performs through the neuromuscular system, prior learning and experiences also attend the lab sessions. An instructor's perfunctory attitude toward skill learning may delude him to consider the movement area to have little in common with the cognitive and affective domains. Such a point of view is understandable because movement is physically seen and objectively observable with evaluation being focused primarily upon performance levels. Obviously the instructional objectives must be measured within this perimeter, for "performance in motor skills is the basic outcome of the learner's response."[22] But Williams would remind the instructor that the "whole being" goes to the class not just nerves and muscles but also attitudes, fears, expectations, and comprehensions--all the elements which prove that the individual is greater than the sum of his parts.[23]

The purpose is to combine the psychomotor domain with all the behavioral objectives in order to improve teaching and learning. Instruction in skills and techniques remain physical in their nature; i.e., no amount of thinking and philosophizing will ever "do" a physical task--it must be performed, executed, manipulated or whatever is required to

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[22] Ibid.

[23] Jesse F. Williams, The Principles of Physical Education (Philadelphia, Pa., 8th edition, 1964), p. 100.

be done. But the understanding of the "why" behind each skill often brings the numerous, apparently discreet, skills into some kind of meaningful relationship with the larger, principled skills. An illustration serves to make the point: one of the most important skills in diving is learning to relax physically, and for the following reasons: (1) less oxygen is consumed, (2) it encourages slower, more inhibited movement, (3) it discourages mental tension, the precursor to panic, (4) it postpones fatigue, (5) it permits the diver literally to see more, perceive and to think things through; in short, to dive safely and enjoyable. Many separate skills require relaxation if they are to be performed well. Clearing the middle ears and sinuses, clearing the regulator, ascending from depth, swimming through the surf, clearing the face mask, are a few examples requiring a larger skill proficiency in order to bring proficiency to the smaller ones and to bring meaning into them.

Lee emphasized that learning a motor skill unified the following three stages: (1) intellectual awareness, (2) neuromuscular skill development, and (3) practice which brings permanency to the action pattern. He further stressed the cognitive, "intellectual," aspect of motor learning by stating that "without understanding the skill will be a series of meaningless motions to the student."[24]

Notwithstanding the need for the planned interacting of

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[24]James M. Lee, Principles and Methods of Secondary Education (New York, 1963), p. 139.

all the domains of learning into the psychomotor domain, it always remains for the instructor to know and apply the fact that motor learning occurs whenever the "bodily movements play a major part."[25] These movements are:

> Patterns of responses to recognized stimuli; i.e., they are perceptual motor responses. The recognized (perceived) stimuli may be visual, kinaesthetic, auditory, or any other sense stimuli or a combination of several. The learned response may be simple or complex, persisting over a time or relatively momentary; and much of the motor response may be inhibitory response.[26]

Learning has been considered through the behavioral objectives encompassing the cognitive, affective, and psychomotor domains. Collectively the domains coordinate the gradual accumulation of appropriate knowledge, comprehension, feelings, and perceptions with purposely developed skills, which together signal positive, constructive and meaningful change within the learner. Bucher's definition supported the nature of learning as a process and/or achievement for constructive change when he stated that:

> Learning implies a change in a person--a change in his method of performing a skill, practicing a habit, gaining ability in performance, or changing an attitude toward a particular thing. Learning implies a progressive change of behavior in an individual. It implies a change that occurs as a result of experience or practice. It results in the modification of behavior as a result of training or environment. It involves such aspects as obtaining knowledge, improving one's skill in an activity, solving a problem, or making an adjustment to a new situation. It implies that knowledge or skill has

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[25] Lawther, p. 338.

[26] Ibid.

> been acquired through instruction received in school or some other setting or through a person's own initiative in personal study.[27]

The behavioral domains, when carefully planned and developed are supportive of Bucher's definition of learning. That is, they are capable of assisting the instructor to evoke permanent and constructive change within the student so that learning will occur. But Daughtrey cautioned that both students and teachers may have difficulty formulating a working procedure to assist them in writing these objectives. First, he stated, the objectives should be written from the simplest level to the most complex level. Second, there should be a guide to assist the instructor in writing behavioral objectives which serves as a check list to ensure that the objectives written meet the criteria of appropriateness, adequacy, correct wording, and the like.[28] Gronlund's format[29] listing them, as Daughtrey suggested, from the most simple to the most complex, such as the cognitive domain, which begins with knowledge and progresses to evaluation. His check list meets the second conditions and aids the teacher to clarify the objectives which are included in the guide.

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[27]Bucher, p. 512.

[28]Daughtrey, p. 124.

[29]Norman E. Gronlund, Measurement and Evaluation in Teaching (New York, 2nd edition, 1971), pp. 528-532. Taxonomies appear in Appendix B.

A Summary of Practical Learning Theories

Learning has been discussed in relation to the behavioral objectives encompassing the cognitive, affective and psychomotor domains. Collectively, the domains refer to the coordinated accumulation of knowledge, comprehension, feelings, perceptions, and accurately controlled movements--all of which signal positive, constructive and meaningful change within the learner.

Hilgard and Bower's succinct definition supported the nature of learning as a process or achievement for constructive change when they stated:

> Learning is the process by which an activity originates or is changed through reacting to an encountered situation, provided that the characteristics of the change in activity cannot be explained on the basis of native response tendencies, maturation, or temporary stages of the organism (i.e., fatigue, drugs, etc.).[30]

The Scuba Diving Curriculum Guide encompassed the previously mentioned philosophy of learning. That is, the student's purpose, which is to become a safe and competent diver, becomes the objective of the guide and the teacher. Some specific factors and conditions to aid one in attaining the objective have been set forth by psychologists as learning principles which can be applied to the scuba diving program as well as to other programs of learning.

A brief sampling of these learning principles include

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[30]Ernest R. Hilgard and Gordon H. Bower, Theories of Learning (New York, 3rd edition, 1966), p. 35.

goal orientation, determination of maximum physical abilities, length and distribution of practice periods, whole-part-whole method of teaching, awareness of individual differences, working toward independent learning, and a number of others which are equally pertinent to effective teaching.[31]

There is one additional "principle" which Reseck added as a vital condition to learning that warrants the teacher's constant attention whenever diving activities are being conducted. He stated that:

> Water carries heat away from the body much faster than air does. If you were to stand nude in 32-degree air, you would be cold, but you could hop around a bit and last a long time. In 32-degree water, you would become unconscious in just a few minutes, and would die shortly thereafter. This is why we consider 70-degrees a good air temperature, but not a good water temperature.
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> In the performance physiology lab at U. C. L. A., Dr. Glen Egstrom and Dr. Weltman have performed some experiments in cold water that show there is a memory loss when the diver is exposed to cold water. It seems that the mind forgets even simple instructions, which makes any job, no matter how simple, a rather difficult chore. This particular loss of memory brings on in the diver a type of inner frustration so that he doesn't really care what he is doing. It has been termed by some as the "what-the-hell" syndrome.[32]

Learning per se and learning principles both are markedly affected when the water temperature drops to a level where one's energy transfers to the maintenance of

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[31]Delbert Oberteuffer and Celeste Ulrich, Physical Education (New York, 1970), p. 206.

[32]John Reseck, Jr., SCUBA, Safe and Simple (Englewood Cliffs, New Jersey, 1975), p. 100.

body comfort. The student's functional I. Q. for all practical purposes, is reduced. The implication for teachers, obviously, is to protect the student with appropriate diving clothing or to perform diving activities in an environmental clime conducive to effective learning. It is necessary that the teacher be alert to the symptoms of approaching cold; i.e., shivering, change in skin color (paler), disinterest, failure to follow directions or carry out assignments, modified movements (clumsy or hurried). Finally the instructor must understand that some students become cold much faster than others. Factors bearing on this are: age, physical condition, amount of fatty tissue, and fatigue, to name the obvious. Therefore, the duration and type of water activities may need to be modified to accommodate individual differences, and ensure that learning, pleasure, and performance all progress to the teacher's and the student's mutually desired objective: a safe and competent diver.

Learning Facilitated Through Methods of Teaching and Evaluation

Teaching methodology, or the manner in which the instructor guides learning, represents a natural extension of a philosophy of life and education. It may be thought of as "how the teacher teaches." "The method used by a given teacher is a reflection of that teacher's understanding of scientific facts of learning as they relate to his belief

about democratic life, and his ability to apply what he believes."[33]

Instructional methodology proceeding toward guided discovery rests upon the philosophical condition perceiving "thinking and reasoning as processes in relation to problems and goals."[34] Therefore, sound methodology always considers the first purpose of education which strengthens all other educational purposes to "aid in the development of the student"s ability to think."[35] For the particular purposes of scuba diving the methodology must implement procedures expounding such a philosophy of education. Great care need be exercised in its implementation, lest it mistakenly misinterprets the democratic educational processes to be something more closely resembling disorder, or to use the pedagogical equivalent, permissiveness. Regrettably, much educational precedent exists confirming the application of such a naive misinterpretation:

> Dewey's principle of growth stressed growth as an educational reality but related it to the necessity of teaching and its guide. In these years growth became an end in itself. Its aim was hazy and the freedom of the child was the watchword. Unfortunately, the common notion of the meaning of progressive education usually includes the child's saying, 'Do I have to do

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[33]Camille Brown and Rosalind Cassidy, Theory in Physical Education (Philadelphia, 1963), p. 110.

[34]Janet Felshin, Perspectives and Principles for Physical Education (New York, 1967), p. 88.

[35]Carl Willgoose, The Curriculum in Physical Education (Englewood Cliffs, New Jersey, 1969), p. 53.

> what I want to today?' or a teacher smiling in a sea of bedlam.[36]

It is also true that much of education has considered applied directed teaching to be a preferable methodology in which all parts of the learning process emanated from the teacher, to be received by the students and acted upon by them as in a response to the directive.

> In respect to movement skills, it was often assumed that the teacher knew the only acceptable way to execute a movement pattern and the student was directed to mimic the actions of the teacher. Such direction had some merit, but it also had the risk of developing parrots who did not understand what they were doing; why they were doing it; or if they could not do it, what they could do.[37]

Somewhere between the two extremes lies the effective methodological mean, not fixed in the center but shifting from command to guided discovery and inevitably returning to command as the conditions and situations relative to the learning process evolved from the preceding learning experiences. It may be roughly likened to the learning curve which traces an optimistic pattern of improvement though its markings admit to individual variance as a perpetual condition to learning rate.

Obviously a curriculum "must be designed with one philosophy in view and therefore--one method."[38] At least

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[36]Felshin, p. 88.

[37]Delbert Oberteuffer and Celeste Ulrich, Physical Education (New York, 1970), p. 203.

[38]Brown, p. 111.

upon the surface of it, such an attitude might carry overtones of arbitrariness and may even threaten methodological freedom. But the philosophy upon which the present curriculum guide was based was democratic in its nature, therefore providing an opportunity for the instructor to exercise maximum responsible methodology. The problem-solving method would appear to assure that the responsible procedures automatically are applied within the teacher's methodology. Brown cautioned, however, that no guaranteed result exists for "problem solving, itself, is not exclusively a democratic method. It is only a democratic method when the values of democracy are applied to the total process.[39]

Exactly how responsible values are imparted within the methodology will, again, depend upon the instructor's concept of good and confidence in democracy, as well as the students' level of maturity, the nature of the class (cooperativeness, attitudes, experience, and motivation). Such conditions clarify the fact that the process of teaching-learning is, in actuality, highly disciplined and difficult to impart simply because democratic goals achieved by democratic methods do not always readily lend themselves to rapid identification of purpose.[40] It demands ideally:

> Teaching-learning be a meaningful, shared, educational adventure. Instead of being directed what to do and being instructed in exactly how to

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[39] Ibid., p. 113.

[40] Tilman Hall, University of Southern California Graduate Class. Principles of Leadership, Spring, 1971.

> do it, the student should be presented with a carefully structured problem (or student and teacher may discover and structure the problem together) and then asked to find solutions to the problem. In this method of guided discovery, the student must analyze, synthesize, and interrelate ideas, and be innovative. The teaching-learning situation must not be governed by the opinionated directives of the teacher. The teacher serves as the thoughtful guide, and as the conceiver of the problem. The solutions to the problems can be many and the teacher must present ideas and concepts around which an individual bases his reasoning in seeking solutions.[41]

It was previously accepted that the student's purpose for enrolling in the Scuba diving program became the teacher's objective and the curriculum guide sets the philosophical foundation for the methodology. It will be used for the kind of learning which is to occur: which is responsible, competent, and independent, undergirded by specific knowledges, skills, and appropriate attitudes to the sport. A particular kind of climate for learning through the democratic process becomes a necessary precondition for learning. Therefore, if the democratic process is to be used then the following guidelines should be helpful to the instructor in shaping his methodology:

1. A climate of accepting differences, of encouraging independent problem solving and creative work.

2. A climate where teachers are mature and cooperative men and women, where the student feels he has a friend; where he can come for counsel.

3. A climate in which there is direct teaching of respect for each individual, helping each to learn respect through study, example, and

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[41] Oberteuffer, p. 203.

through helping each person to be so successful in his own right that he received respect as he is seen of worth. He is not compared with others having different goals and abilities.

4. An evaluation plan based upon democratic values which provides for a non-threatening climate.

5. A climate allowing individuality to show itself, and one in which each individual has pride in his own individuality.

6. A climate which provides for opportunities for voluntary contributions to the good life of the group, valuing group contributions without giving external rewards. A climate in which pleasure and feeling of success and comfortableness in giving of self are developed.

7. A climate which permits all degrees of freedom up to the point where one individual's freedom begins to restrict the freedom of others.

8. A climate in which each individual does his own thinking, being helped to plan for his learning and to understand any requirements and regulations.

9. A climate in which a wide range of reality experiences helps the student feel acceptance, belonging and success.[42]

Methodology also infers the application of principles which particularizes the procedures aiding the teacher in efficiently leading the student-group through the desired learning process. The principles are in harmony with the distinct types of subject matter which are involved in the total educational process: the cognitive, affective and the psychomotor areas of learning. (Methodology points toward these areas inclusively as the principles are developed.)

The first principle rests upon preparation, for

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[42]Brown, pp. 113-114.

knowledge inappropriately presented can change learning outcomes to ends neither anticipated nor desired. Specifically, the methodological principle of presentation seeks to determine the needs of the students, to select and to organize the subject matter deemed to be applicable within light of that knowledge, and to analyze what has been selected. Bookwalter suggested that an analysis begin by setting forth the title and objectives for the lesson, for the objectives serve to refine further the scope of the title and are expressed in concrete statements which tell what may realistically be expected from the lesson.[43]

What is to be learned depends upon the specific nature of the subject matter. In the cognitive area, for example, a carefully analyzed outline of major points to be covered may provide sufficient data for the instructor. Skill performance, however, would be more exacting, and the analysis of the skills would be determined by providing answers to the following questions: (1) What should be done? (2) How should it be done? (3) What are the "key points" in successful performance of the skill?[44] Planning for the affective domain must be carefully designed and consciously included within the preparation phase. This planning aids the teacher in incorporating proper attitudes into his instruction so that, even though they may not be taught

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[43]Bookwalter, Foundations and Principles of Physical Education (Philadelphia, 1969), p. 283.

[44]Ibid., p. 284.

directly, they remain an important part of the instructional process.

A traditional but still very useful aid for careful preparation is the lesson plan. It is a logical extension of the determination of what is to be taught-learned and "evolves directly from the analysis of the subject matter."[45] The nature of a lesson plan includes those things which the teacher considers necessary and is largely an individualized matter as to what material the lesson shall be concerned with.

One way which assists one in developing a lesson plan is reference to a curriculum guide already containing all the necessary knowledge and kinds of skills which could be adapted to accommodate varying teaching-learning conditions.

A lesson plan, as the name suggests, is a carefully planned order for instruction, and Voltmer said it is "one of the most essential problems, which is frequently overlooked."[46] In planning the lesson, the instructor should include those activities and techniques which will provide a positive answer to the following questions:

1. Does the whole lesson constitute a healthful procedure? i.e., Does it consider clean area, proper temperature, appropriately designed exercise period (not too long or too hard), are dangerous acts eliminated, etc.

2. Does the activity fit the facilities? i.e., Is

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[45] Ibid.

[46] Edward F. Voltmer and Arthur A. Esslinger, The Organization and Administration of Physical Education (Appleton-Century-Crofts, Inc., 1949), p. 287.

there enough room, are the supplies and equipment adequate for the activities, etc.?

3. Is this plan educationally sound? i.e., Is it interesting, sound, graded to the level of the students, does it provide participation for each student most of the period, are the students reasonably familiar with the rules and techniques of the acts. Considered, does it fit in well with the lesson that has preceded it and the one that is to follow? Do the various parts of the lesson integrate well?

The Curriculum Guide constructed within the principles of systems analysis comes to the aid of the instructor and serves to promote good instruction. Its value lies in viewing education as a functioning organism or entity.[47] Similarly, scuba diving programs are likened to a viable, functioning organism which, to maintain its health, must be amendable to change. To be a useful instructional tool for the teacher, the curriculum guide must also possess the characteristic of malleability at no sacrifice to either quality or inclusiveness of requisite knowledge. This is accomplished by recognizing that the whole is made up of its several parts, whether it be an organism or a curriculum guide. But it is impractical to teach the many parts which make up the scuba diving curriculum guide in other than small steps or stages. Therefore, the guide was designed in a manner to achieve this expressed need by building it upon the Systems Approach, which by definition is, an "indepenent process composed of the sum total of separate parts

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[47]Burns, p. 231.

working independently and in interaction to achieve previously specified objectives"[48]

Each part stands on its own, being sustained by the following components which permit immediate identification:

1. Objective--stated clearly to convey the intent of the instructions.
2. Rationale--answers the question of "why".
3. Theory (when required)--the principle underlying the fact.
4. Content--salient parts to be learned.
5. Methods--to aid in teaching strategies.
6. Procedures--suggested order or presentation.
7. Evaluation--determination of the objective.

Finally, because each part of the whole was developed as a unit, i.e., step or unit, last minute preparation (sometimes unavoidable) can be conveniently modified without the danger of the objectives being either blurred or lost.

Lawther presented other principles of method which, in varying degrees, may be aided by the system designed curriculum guide. The principles of presentation and explanation, he stated, set the "tone for the lesson."[49] Naturally, the Curriculum Guide cannot do everything, for the "instructor's own interest in the subject matter will be

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[48]Wooten, p. 215.

[49]John D. Lawther/Elwood Davis, Successful Teaching in Physical Education (New York, 1948), p. 500.

very instrumental in generating interest or capitalizing upon the 'natural' interest of the students."[50] A useful guide accommodates individual differences present in every learning process. Therefore, it would be naive to assume that such differences would not apply as pertinently to the instructor. The guide would have been remiss had it failed to take them into account.

In reviewing many curriculum guides, it was noted that there was a seeming insistence upon conformity in terms of both procedure and methodology which could be potentially restrictive for the teacher whose instructional inclinations lay along another path. To paraphrase an old platitude, "one teacher's cup of methodological tea is another teacher's poison."

The guide resolved the problems by reducing sentences to either single words and/or brief phrases which acted as "singals" triggering knowledge, concepts, and principles personally possessed by the instructor. The "key" or "trigger" words/phrases should enable the instructor to develop-enlarge each component learning unit (part) to the degree he deems necessary given his objectives within his teaching capacities. Operating within sound learning theories, freedom of individuality profoundly influences how instruction shall be ordered, presented, explained and demonstrated. The exercise of this freedom is consistent

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[50]Bookwalter, p. 287.

with Dewey's axiom which holds education to be a "series of active enterprises" stimulating both teaching and learning.

CHAPTER V

METHODS OF EVALUATION

Evaluation represents the "final" principle in aiding the instructor to determine whether or not the curriculum guide is doing what it was designed to do: develop a safe, competent scuba diver. Evaluation connotes a final task, much as a final examination represents the last requirement of a course. However, evaluation, to be purposeful for the teacher and meaningful to the student, requires far more than a few limited formalized examinations. Bookwalter stated:

> In the modern day and age, everyone and everything is being evaluated. Everyone is a specialist or a critic. The evaluation may be quite formal and overt, or it may be quite unconsciously or incidentally done. In education, evaluation and evaluative devices have increased by the day. Some evaluation is quite technical and precise. At other times, it may be rather informal and quite subjective. Formal or informal, evaluations are necessary for some purpose: to determine achievement, to resolve a broad issue, etc.
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> Evaluation is not the mere determination of subject-matter mastery . . . nor is it more anthropometric measurement. . . . Evaluation is not necessarily done to derive a mark at the close of a semester. All evaluation should be based on valid and functional standards, when those exist. If evaluation is to be of the most worth, it should not be incidental, for an emergency, or to follow the fashion. Evaluation should be a continuous purposeful process.[1]

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[1] Bookwalter, p. 291.

Scott also concurred that evaluation was not so much a "final act of judgment but rather a means to further progress."[2] Another misconception she clarified was the erroneous view of evaluation as being synonomous with measurement. Measurement, Scott explained, is but one technique used in the process of evaluation.

Larson and Yocum differentiated between measurement and evaluation by stating that measurement was concerned with the product or outcome of educational activity, while evaluation was concerned with the process of educational activity. Evaluation is the determination of whether the objectives are achieved while measurement is the determination of the traits, abilities, and characteristics of the individual or the group.[3]

According to Oberteuffer, evaluation is an indispensable aid to teachers as they worked to improve their program. The teacher uses evaluation as one method to improve the program and to assess the growth and development of the students. If the teacher found that students' enthusiasm was lacking, that the social progression and organic development lagged, he could well "assume either (1) that the activity was inappropriate, (2) the method used to present or teach it was

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[2]Gladys M. Scott and Esther French, Measurement and Evaluation in Physical Education (Dubuque, Iowa, 1959), p. 10.

[3]Leonard A. Larson/Rachael Yocum, Measurement and Evaluation in Physical Education (St. Louis, Missouri, 1951), p. 20.

poor, or (3) the students were constitutionally unreceptive."[4] He considered that generally the first and second causes were the basis for poor student response. Oberteuffer stated that:

> The teacher is thus evaluating all of the time also. Shall I choose to teach this new or something else? How did this go last time that I taught it? What is the best way to get this idea across? Can I get a better and more enthusiastic response by using something else? Am I reaching the students as completely as I should? These and many other questions flow constantly through the mind of the teacher and help him improve not only the effectiveness of the outcomes of teaching in the lives of students, but also the content and method of his teaching.[5]

Continuous evaluation occurs through one of man's oldest and perhaps most natural methods: observation. Even though it does not yield quantifiable data it still provides a quality of evidence acceptable within scientific circles.[6] Observation has much practical value French stated because:

> Observations may be made of the process of learning as well as of the end results. The method has certain advantages. Frequently it requires no change of conditions and no apparatus. It does not require direct cooperation on the part of the persons being observed. It is particularly useful for determining reactions under customary conditions.[7]

One criterion necessary for valid observation is a high degree of objectivity by the evaluator; therefore, observation as a method of evaluation must be carefully applied. Lawther's several suggestions may serve as practical

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[6] John D. Lawther/Elwood Davis, Successful Teaching in Physical Education (New York, 1948), p. 562.

[7] Esther French/Gladys M. Scott, Measurement and Evaluation in Physical Education (Dubuque, Iowa), p. 103.

guidelines to improve observational skills:

1. It includes more than merely 'looking out,' "gazing," and 'watching;' it also includes the use of all the senses, not just the eyes.

2. Experience in physical education is no guarantee that the teacher will observe the significant 'symptoms,' but the person inexperienced in physical education seldom observes traits of conduct that relate directly to physical education.

3. Even temporary conclusions should be drawn with great caution. One observation of an expressed behavior trait may mean nothing. Several observations of the same 'symptom' under similar circumstances may by indicative. On the other hand, observation of some non-typical behavior may yield a lead to further understandings, to solutions of other problems.

4. We interpret our observations in terms of personal experiences which may be incomplete, inadequate, or of an inappropriate type.

5. We are apt to think we understand behavior merely because we observe expressions of it.

6. The observer should know what he is looking for without 'seeing into the situation' that for which he is looking.

7. Observation always gives way to more valid, accurate methods of collecting information.[8]

Observation confers two additional advantages which aid good evaluation: (1) being a continuous process, it is conventiently integrated within the teaching methodology; and (2) it requires no extraordinary technical knowledge, no special charts, inventories, scales or tables. It reduces the risk of extensive testing and recording in which teaching

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[8]John D. Lawther/Elwood Davis, Successful Teaching in Physical Education (New York, 1948), pp. 564-565.

may be subsumed into a means to serve the end of evaluation. That is, the teacher loses "his ability to see the forest because he has become overly concerned about a single tree."[9]

Finally, the scope of observation is broad enough to act as a legitimate evaluative tool within the systems approach to program development since a systems approach stresses evaluation of all output, even if it must be done subjectively rather than quantitatively. Systematic review and assessment of the product (i.e., student) is carried on as a routine procedure because a systems approach requires commitment to evaluation as continuous process.[10]

Important as observational evaluation is to the instructor, it is not sufficient by itself to meet effectively the total evaluative needs of the guide. The focus of attention must also be direct toward the specifics to determine the extent to which the pupil has grasped the knowledge and skills defined within the objectives of every component of the guide. Therefore, each unit of the systems-developed guide contains sample test items which answer directly to the objective. Whether or not the objective is met is determined by the results of the evaluation. Sample test items are included in lieu of arbitrary

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[9]Oberteuffer, p. 307.

[10]Jack Blendinger, "ABC's of the System Approach," Education, Vol. 90, No. 1 (Sept.-Oct., 1969), pp. 56-58.

test items to encourage the instructor to develop wider latitude in the evaluation process and also to accommodate to the various teaching circumstances.

Failure to implement the specific evaluations defined within each part attachs the risk of obscuring the objectives or developing nebulous procedures of instruction to the extent that viable teaching and learning may be weakened. Within such a context deliberate planning for specific evaluation discourages such outcomes and ensures that:

> The objectives become the identifiable preplanned learnings and/or behavior changes of the pupils which the physical educator strives to attain as a result of the educational experiences for which he is responsible.[11]

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[11]Thomas J. Sheehan, An Introduction to the Evaluation of Measurement Data in Physical Education (Reading, Mass., 1971), p. 19.

CHAPTER VI

SUMMARY AND CONCLUSION

Summary

The purpose of this study was to determine the need for and to develop a rationale for a curriculum guide for an instructional scuba diving program. The basis for the study rested upon John Dewey's philosophy of education which proposed that the quality of organic vigor (viz. a philosophy which lived) is indispensable if it is to prosper and mature with the times. However, it must maintain a firm commitment to the enduring needs of the individual and the society in which one lives.

The general objectives of education and physical education were determined to be harmonious with the philosophy of pragmatism; thereby, permitting the structure for the guide to be built upon solid philosophical ground.

Learning was classified into three domains--cognitive, affective, and psychomotor--to develop more fully the understanding that safe and competent diving instruction far exceeds the simple acquisition of physical skills.

The method of teaching was consistent with the humane and responsible principles; a respect for the rights,

dignity, and worthwhileness of the individual. Such a basis for methodology represented the most practical approach to learning because happy, enthusiastic individuals learn more rapidly than those whose interests have been subdued by an over-authoritarian attitude.

Included in the methodology were the principles of preparation and presentation to be applied through the use of lesson plans and a curriculum guide which contained all the necessary knowledge discretely organized to permit maximum instructional adaptation.

Evaluation was explored from two perspectives: (1) as a continuous process based upon objective and skilled observation which Lawther recommended as a valid evaluative technique and (2) evaluation of the specific objectives within each learning unit.

Curriculum Guide

The outline appearing in the appendix is a simplified sketch of a comprehensive scuba diving curriculum guide. A cursory inspection reveals nothing more than an apparently simple listing of those facts and skills the instructor must impart to the student. A closer study, however, reveals that the outline faithfully records the essential quality of the guide: a carefully integrated system containing all the "bits and pieces" of knowledge and skills necessary for safe and competent diving.

The organization and coordination of information is

consistent with John Dewey's philosophy of pragmatism which viewed education as something greater than merely ingesting knowledge which the student may or may not be able to apply to a reality-centered experience. For example, physics and physiology are considered in terms of their relationship to each other within the diving environment, in order to impress upon the mind, attitudes and actions of the students not only "what" and "how" must be learned but also within what context. This answers the question "why" and serves to give meaning and permanency to the lesson.

Another tenant of the pragmatic philosophy is the conviction that the problem-solving method remains an unchanging condition of life. The nature of scuba diving is a continuous problem-solving process and may be considered from two perspectives: (1) instructional in that the teacher must analyze the kind of students to be taught and develop appropriate instructional and methodological strategies and (2) the student must learn to anticipate problems, how to resolve them, and-or how to avoid them. Within the organization of the outline and within the learning units of the guide are innumerable opportunities which will apply to the problem-solving process.

Finally, "the pragmatist physical educator prefers evaluation to measurement." He believes that growth and problem-solving can be evaluated but they cannot be measured.

Evaluation should be continuous and persistent."[1]

To be consistent with the philosophy of pragmatism every part of the outline-guide is subject to an evaluation process which is determined by the instructor.

A curriculum guide has been completed and will be published with the next year.

Enclosed within Appendix B is an outline of the curriculum guide and a sample of a learning unit.

Conclusion

In recent years scuba diving has enjoyed a remarkable surge of popularity as a recreational sport. However, the instruction must be orderly and complete, not only for the sake of enjoyment but--of infinitely more importance--for the diver's personal safety and well-being. An intensive review of the literature revealed that there was no curriculum guide which would aid the instructor in successfully completing his teaching responsibilities.

The research indicated the need for a curriculum guide developed in a manner (format and style) permitting an almost unlimited adaptability to the innumerable teaching circumstances present in the instructional scuba diving programs. This was accomplished by building upon an educational philosophy which viewed personal experience and learning to be natural components within the patterns of

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[1]James A. Baley and David A. Field. Physical Education and the Physical Educator (Boston, Mass., 1976), p. 238.

learning. The basis of the guide, then, represented an effort to encourage each instructor to capitalize upon his own experience and to include them within his own instructional program. It was intended that each instructor be free to exercise personal options determining, qualitatively and quantitatively, the amount of emphasis to be placed upon each particular aspect of learning. At the same time, nothing critical to effective understanding was to be omitted, whether that "something" was knowledge, skill or attitude.

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APPENDIX A

OUTLINES

SCUBA SKILLS OUTLINE

I. Swimming Test

- A. Swim test
- B. Surface support and propulsion
- C. Sculling
- D. Tread water using legs only

II. Skin Diving Skills

- A. Donning and adjusting equipment
- B. Kicks and strokes
- C. Surface dives
- D. Underwater skills
- E. Water entries
- F. Miscellaneous skin diving skills

III. Scuba Skills I.

- A. Checking equipment
- B. Scuba breathing
- C. Mouth piece clear
- D. Mask clear
- E. Doffing and donning tank in shallow and deep water
- F. Station breathing
- G. Ascent techniques

IV. Scuba Skills II.

- A. Buddy breathing
- B. Ditch and recovery
- C. Bail out
- D. Underwater communication
- E. Miscellaneous scuba skills

V. Diver Rescue

A. Conscious diver rescue

B. Unconscious diver rescue

C. Artificial respiration

D. First aid

VI. Field Trips (open water dives)

A. Entries and exits without equipment

B. Structured dive

C. Checkout dive

D. Independent dive

LECTURE OUTLINE

I. Introduction and Equipment Care

II. Physical Oceanography and Emergency Situations

A. Oceanography

1. Ocean bottoms

2. Thermoclines

3. Topography

4. Waves

5. Currents

a. Ocean

b. Rip

c. Tidal

III. Physics and Physiology - I

A. Characteristics of water

1. Density

2. Buoyancy

3. Viscosity

4. Conductivity

5. Humidity

6. Transparency

7. Visual Acuity

8. Acoustics

B. Pressure

1. Atmosphere

2. Absolute

3. Boyle's Law

4. Pressure and squeezes

5. Reverse block

6. Air embolism

7. Pneumothorax

8. Mediastinal emphysema

9. Subcutaneous emphysema

IV. Physics and Physiology - II

A. Topics

1. Respiratory system

2. Circulatory system

3. Air composition

4. Dalton's Law

5. Nitrogen narcosis

6. Carbon dioxide excess

7. Hyperventilation (Hypocapnia)

8. Shallow water blackout

9. Henry's Law

10. Bends

11. Cold

12. Heat

13. Overexertion and exhaustion

14. Carotid sinus reflex

15. Hyperpnea - exhaustion syndrome

16. Carbon monoxide poisoning

17. Charles Law

V. Decompression and Repetitive Diving

A. Bends (review)

1. Cause

2. Physiological factors affecting

3. Dive tables

4. Navy diving operation with chambers

5. Results of decompression sickness due to improper treatment

B. Terminology for repetitive and decompression diving

1. Repetitive terminology

a. Depth

b. Bottom time

c. Repetitive dive

d. Repetitive group

e. Residual (nitrogen) time

f. No decompression limit

g. Surface interval (time)

h. Ascent rate

2. Decompression diving

a. Decompression

b. Stage decompression

c. Ascent time

d. Recompression

3. Repetitive dive tables, situation, and solutions

a. Tables

b. Situations

1. Find maximum allowed bottom time (BT) on repetitive dive with given surface interval

2. Find minimum surface interval (SI) to allow given bottom time (BT) on repetitive dive

c. Solutions

1. Sample problem(s)
2. Demonstrate use of tables to solve sample problems

4. Decompression diving
   a. Situations
      1. Dive requires decompression
      2. Mistakenly extends bottom time past no decompression limit
   b. Standard air decompression table
   c. Solutions
      1. Sample problem(s)
      2. Demonstrate use of table to solve sample problem(s)
5. Emergency planning and transportation
   a. Location of chamber
   b. Who to contact
   c. Transportation
6. Common problems related to repetitive and decompression diving
   a. Forgetting use of tables after course
   b. Pushing limits of tables - some common sense and realization of how a bends "hot" damages the body
7. Mechanical decompression meters and computers
   a. Most are not multi-tissue meters
   b. Some desaturate in 6 hours rather than 12
   c. Meters cannot compute physiological factors (obesity, ardous dive, etc.)
   d. Require maintenance and calibration

e. Not consistent with tables in repetitive dive situations

8. Freshwater conversion

9. Altitude

a. Diving at altitude

b. Diving and flying

10. Assign take home problems

VI. Repetitive and Decompression Tables and Introduce Basic Scuba Equipment

A. Review work on repetitive and decompression tables

B. Introduce basic scuba equipment

1. Tanks

2. Valves

3. Regulators

4. Underwater pressure gauges

5. Backpacks

VII. Environmental Hazards

A. Physical hazards

B. Fresh water animals

C. Kelp

D. Animals that stab

E. Animals that sting

F. Animals that bite

G. Animals poisonous to eat: Shell fish

VIII. Dive Planning and Dive Safety - I

A. Prerequisites

1. Physical and mental status

2. Conditioning

3. Training

a. Skills

b. Knowledge

4. Attitude - personal safety of members of dive team should not be relegated behind any other considerations

IX. Continuous Safety - II

A. Maintain adequate diving fitness

1. Exercise programs

2. Diving the best activity to maintain fitness for diving

3. Subjective "feel" of aquatic diving environment retained

B. Safe

STANDARD MASK CLEARANCE

I. Objective

A. To clear a flooded standard mask with one exhalation

II. Rationale

A. Re-establish vision

B. Avoid premature surfacing

III. Theory

A. Air rises, fills mask, pushes water out lowest spot

IV. Content

A. Head position

B. Pressure application

C. Exhalation

V. Method

A. Lecture

B. Demonstration

VI. Procedure

A. Dry land

1. Lecture-demonstrate

a. Head tipped up 45° with surface of water

b. Apply pressure at top of mask

c. Exhale gently through nose

VII. Common Problems

A. Mask pulled from face

B. Blowing too hard into mask

C. Tense

D. Blowing out mouth

E. Incorrect head angle

VIII. Drills and Games

A. Place small pellets on bottom of pool. Dive to bottom, pick up as many objects as possible and put in mask one at a time. Clear mask and surface. Point: teaches student how much air he has and how little air is required to clear a mask. Also teaches student that mask need not be pulled out from the face.

B. Try to keep all air exhaled into mask from escaping

C. See how many times the mask can be cleared on one breath

D. Use a steel mirror to watch oneself clear the mask

E. Learn mask clearing on scuba

F. Mask scramble in deep water (Deep water mask recovery)

IX. Evaluation

A. Clear flooded mask with one exhalation

X. References

A. Cramer, J. L., pp. 40, 80.

B. Empleton, B., pp. 126-27.

C. Reseck, J., pp. 40-42.

D. U.S. Navy Diving Manual. Volume 1. 1973. pp. 5-33.

XI. Audio-Visual Aids

A. Cramer, J. L., Filmstrip Number 601.3.

XII. Equipment

A. Standard (non-purge) mask

XIII. Facility

A. Pool, lake, etc.

ACADEMIC LESSON PLAN - SHALLOW WATER BLACKOUT

I. Objective

A. To identify the specific cause of shallow water blackout

II. Rationale

A. Necessary for safe diving

III. Theory

A. CO_2 triggers respiration

IV. Content

A. Defined

B. Causes

C. Symptoms

D. Treatment

E. Prevention

V. Methods

A. Lecture

B. To complement lecture

1. Demonstration-examples

2. Charts-models

3. Handouts

4. Audio-Visual aids

a. Cramer, J. Film Strip No. 601.5. Medical Aspects of Diving.

5. Guest lecturers

6. References for added information

a. Cramer, J. Skin & Scuba Diving. pp. 67.

b. Empleton, B. The New Science of Skin & Scuba Diving. pp. 74-75.

c. Ketels, H. Safe Skin & Scuba Diving. pp. 88.

d. Reseck, J. SCUBA Safe & Simple. pp. 219.

VI. Procedure

A. Lecture

1. Defined

a. Loss of consciousness due to carbon dioxide buildup without sufficient respiratory warning

2. Causes

a. CO_2 buildup in mouthpiece

b. Insufficient sir supply

c. Over hyperventilation

d. Over skip breathing

3. Symptoms

a. None (at times)

b. Headache

c. Urge to breathe

d. Confusion

e. Weakness

f. Anoxia symptoms

4. Treatment

a. Rest

b. Fresh air

c. Oxygen (if available)

d. Artificial respiration (if needed)

5. Prevention

a. Avoid causes

b. Normal breathing

c. Avoid poor air equipment

d. Avoid poor ventilation

e. Rest when needed

f. Stop dive when necessary

VII. Evaluation

A. By test or review be able to explain the meaning of shallow water blackout

B. Sample test items

1. Death is the worst thing that can occur in shallow water blackout

2. The diver can extend diving time by blowing off excess carbon dioxide levels

3. It is carbon dioxide which triggers the respiratory system

4. Oftentimes there are no symptoms to warn the diver of an impending shallow water blackout

APPENDIX B

TAXONOMY OF EDUCATIONAL OBJECTIVES

WITH CHECKLIST

MAJOR CATEGORIES IN THE COGNITIVE DOMAIN OF THE TAXONOMY OF EDUCATIONAL OBJECTIVES

Description of the Major Categories of the Cognitive Domain
1. Knowledge. Knowledge is defined as the remembering of previously learned material. This may involve the recall of a wide range of materials, from specific facts to complete theories, but all that is required is the bringing to mind of the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain.
2. Comprehension. Comprehension is defined as the ability to grasp the meaning of material. This may be shown by translating material from one form to another (words to numbers), by interpreting material (explaining or summarizing), and by estimating future trends (predicting consequences or effects). These learning outcomes go one step beyond the simple remembering of material, and represent the lowest level of understanding.
3. Application. Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories. Learning outcomes in this area require a higher level of understanding than those under comprehension.
4. Analysis. Analysis refers to the ability to break down material into its component part so that its organizational structure may be understood. This may include the identification of the parts, analysis of the relationships between parts, and recognition of the organizational principles involved. Learning outcomes here represent a higher intellectual level than comprehension and application because they require an understanding of both the content and the structural form of the material.
5. Synthesis. Synthesis refers to the ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviors, with major emphasis on the formulation of new patterns or structures.

MAJOR CATEGORIES IN THE COGNITIVE DOMAIN OF THE TAXONOMY OF EDUCATIONAL OBJECTIVES, Continued...

Description of the Major Categories of the Cognitive Domain

6. Evaluation. Evaluation is concerned with the ability to judge the value of material (statement or research report) for a given purpose. The judgments are to be based on definite criteria. These may be internal criteria (organization) or external criteria (relevance to the purpose) and the student may determine the criteria or be given them. Learning outcomes in this area are highest in the cognitive hierarchy because they contain elements of all of the other categories, plus conscious value judgments based on clearly defined criteria.[1]

[1] Gronlund, p. 528.

EXAMPLES OF GENERAL INSTRUCTIONAL OBJECTIVES AND BEHAVIORAL TERMS FOR THE COGNITIVE DOMAIN OF THE TAXONOMY

	Illustrative General Instructional Objectives	Illustrative Behavioral Terms for Stating Specific Learning Outcomes
1.	Knows common terms Knows specific facts Knows methods and procedure Knows basic concepts	1. Defines, described, identifies, labels, lists, matches, names, outlines, reproduces, selects, states
2.	Understands facts and principles Interprets verbal material Interprets charts and graphs Translates verbal material to mathematical formulas Estimates future consequences implied in data Justifies methods and procedures	2. Converts, defends, distinguishes, estimates, explains, defends, extends, generalizes, gives examples, infers, paraphrases, predicts, rewrites, summarizes
3.	Applies concepts and principles to new situations Applies laws and theories to practical situations Solves mathematical problems Constructs charts and graphs Demonstrates correct usage of a method or procedure	3. Changes, computes, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses
4.	Recognizes unstated assumptions Recognizes logical fallacies in reasoning Distinguishes between fact and inference Evaluates the relevancy of data Analyzes the organizational structure of a work (writing)	4. Breaks down, diagrams, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, points out, relates, selects, separates, subdivides
5.	Writes a well organized theme Gives a well organized speech Proposes a plan for an experiment Integrates learning from different areas into a plan for solving a problem Formulates a new scheme for classifying objects (or events or ideas)	5. Categorizes, combines, compiles, composes, creates, devises, designs, explains, generates modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes

EXAMPLES OF GENERAL INSTRUCTIONAL OBJECTIVES AND BEHAVIORAL TERMS FOR THE COGNITIVE DOMAIN OF THE TAXONOMY, Continued..

Illustrative Genreal Instructional Objectives	Illustrative Behavioral Terms for Stating Specific Learning Outcomes
6. Judges the logical consistency of written material Judges the adequacy with which conclusions are supported by data Judges the value of a work by use of internal criteria Judges the value of a work (art, music, writing) by use of external standards of excellence[2]	6. Appraised, compares, concludes, contrasts, criticizes, describes, discriminates, explains, justifies, interprets, relates, summarizes, supports

[2]Ibid., p. 529.

MAJOR CATEGORIES IN THE AFFECTIVE DOMAIN OF THE TAXONOMY OF EDUCATIONAL OBJECTIVES

Descriptions of the Major Categories in the Affective Domain

1. Receiving. Receiving refers to the student's willingness to attent to particular phenomena or stimuli (classroom activities, lab. sessions, etc.). From a teaching standpoint it is concerned with getting, holding and directing the student's attention. Learning outcomes in this area range from the simple awareness that a thing exists to selective attention on the part of the learner. Receiving represents the lowest level of learning outcomes in the affective domain.

2. Responding. Responding refers to active participation on the part of the student. At this level he not only attends to a particular phenomenon but also reacts to it in some way. Learning outcomes in this area may emphasize acquiescence in responding (reads assigned material), willingness to respond (voluntarily beyond assignment), or satisfaction in responding (reads for pleasure or enjoyment). The higher levels of this category include those instructional objestives that are commonly classified under "interests;" that is, those that stress the seeking out and enjoyment of particular activities.

3. Valuing. Valuing is concerned with the worth or value a student attaches to a particular object, phenomenon, or behavior. This ranges in degree from the more simple acceptance of a value (desires to improve group skills) to the more complex level of commitment (assumes responsibility for the effective functioning of the group). Valuing is based on the internalization of a set of specified values, but clues to these values are expressed in the student's overt behavior. Learning outcomes in this area are concerned with behavior that is consistent and stable enough to make the value clearly identifiable. Instructional objectives that are commonly classified under "attitudes" and "appreciation" would fall into this category.

4. Organization. Organization is concerned with bringing together different values, resolving conflicts between them, and beginning the building of an internally consistent value system. Thus the emphasis is on comparing, relating, and synthesizing values. Learning outcomes may be concerned with the conceptualization of a value (recognized the responsibility of each individual for improving human relation) or with the organization of a value system (develops a vocational plan that satisfies his need for both economic security and social service). Instructional objectives relating to the development of a philosophy of life would fall into this category.

MAJOR CATEGORIES IN THE AFFECTIVE DOMAIN OF THE TAXONOMY OF EDUCATIONAL OBJECTIVES, Continued...

Descriptions of the Major Categories in the Affective Domain

5. Characteristics by a Value or Value Complex. At this level of the affective domain, the individual has a value system that has controlled his behavior for a sufficiently long time for him to have developed a characteristic "life style." Thus the behavior is pervasive, consistent, and predictable. Learning outcomes at this level cover a broad range of activities, but the major emphasis is on the fact that the behavior is typical or characteristic of the student. Instructional objectives that are concerned with the student's general patterns of adjustment (personal, social, emotional) would be appropriate here.[3]

[3] Ibid., p. 530.

EXAMPLES OF GENERAL INSTRUCTIONAL OBJECTIVES AND BEHAVIORAL TERMS FOR THE AFFECTIVE DOMAIN OF THE TAXONOMY

	Illustrative General Instructional Objectives	Illustrative Behavioral Terms for Stating Specific Learning Outcomes
1.	Listens attentively Shows awareness of the importance of learning Shows sensitivity to human needs and social problems Accepts differences of race and culture Attends closely to classroom acts	1. Asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits erect, replies, uses.
2.	Completes assigned homework Obeys rules Participates in class discussion Completes laboratory work Volunteers for special tasks Shows interest in the subject Enjoys helping others	2. Answers, assists, complies, conforms, discusses, greets, helps, labels, performe, practices, presents, reads, recites, reports, selects, tells, writes.
3.	Demonstrates belief in the democratic process Appreciates the role of science in everyday life Shows concern for the welfare of others Demonstrates problem-solving attitude Demonstrates commitment to social improvement	3. Completes, describes, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works
4.	Recognizes the need for balance between freedom and responsibility in a democracy Recognizes the role of systematic planning in solving problems Accepts responsibility for his own behavior Understands and accepts his own strengths and limitations Formulates a life plan in harmony with his abilities, interests, and beliefs	4. Adheres, alters, arranges, combines, compares, completes, defends, explains, generalizes, identifies, integrates, modifies, orders organizes, prepares, relates, synthesizes.

EXAMPLES OF GENERAL INSTRUCTIONAL OBJECTIVES AND BEHAVIORAL TERMS FOR THE AFFECTIVE DOMAIN OF THE TAXONOMY, Continued...

Illustrative General Instructional Objectives	Illustrative Behavioral Terms for Stating Specific Learning Outcomes
5. Displays safety consciousness Demonstrates self-reliance in working independently Practices cooperation in group activities Uses objective approach in problem solving Demonstrates industry, punctuality and self-discipline Maintains good health habits[4]	5. Acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, uses, verifies

[4] Ibid., p. 131.

EXAMPLES OF GENERAL INSTRUCTIONAL OBJECTIVES AND BEHAVIORAL TERMS FOR THE PSYCHOMOTOR DOMAIN OF THE TAXONOMY

Taxonomy Categories	Illustrative General Instructional Objectives	Illustrative Behavioral Terms for Stating Specific Learning Outcomes
(Development of categories in this domain is still underway)	Writes smoothly and legibly Draws accurate reproductions of a picture (or map, biology specimen, etc.) Sets up laboratory equipment quickly and correctly Demonstrates correct form in swimming, diving.	Assembles, builds, changes, cleans, connects, corrects, creates, designs, dismantles, fastens, fixes, follows, grips, identifies, locates, manipulates, mends, sews, uses, weighs, wraps.[5]

[5] Ibid., p. 131.

CHECK LIST

Adequacy of the List of General Objectives	Yes	No
1. Does each general instructional objective indicate an appropriate outcome for the instructional unit?	____	____
2. Does the list of general instructional objectives include all logical outcomes of the unit (knowledge, understanding, skills, attitudes)?	____	____
3. Are the general instructional objectives attainable (do they take into account the ability of the students, facilities, time available, etc.)?	____	____
4. Are the general instructional objectives in harmony with the philosophy of the school?	____	____
5. Are the general instructional objectives in harmony with sound principles of learning (i.e., are the outcomes those that are most permanent and transferrable)?	____	____
Statement of General Objectives		
6. Does each general instructional objective begin with a verb (i.e., knows, understands, appreciates, etc.)?	____	____
7. Is each general instructional objective stated in terms of student performance (rather than teacher performance)?	____	____
8. Is each general instructional objective stated as a learning product (rather than in terms of the learning process)?	____	____
9. Is each general instructional objective stated in terms of the student's terminal behavior rather than the subject matter to be covered?	____	____
10. Does each general instructional objective include only one general learning outcome?	____	____
11. Is each general instructional objective stated at the proper level of generality (i.e., is it clear, concise, and readily definable)?	____	____
12. Is each general instructional objective stated so that it is relatively independent (i.e., free from overlap with other objectives)?	____	____

CHECK LIST continued...

Behavioral Definition of General Objectives	Yes	No
13. Is each general instructional objective defined by a list of specific learning outcomes that describes the terminal behavior students are expected to demonstrate?	____	____
14. Does each specific learning outcome begin with a verb that specifies definite, observable behavior (i.e., identifies, describes, lists, etc.)?	____	____
15. Is the behavior in each specific learning outcome relevant to the general instructional objectives it describes?	____	____
16. Is there a sufficient number of specific learning outcomes to adequately describe the behavior of students who have achieved each of the general instructional objectives?[6]	____	____

[6] Ibid., p. 132.

VITA

Douglas Donald Gorrie

Candidate for the Degree of

Doctor of Education

Thesis: A CURRICULUM GUIDE FOR SCUBA DIVING INSTRUCTION

Major Field: Higher Education

Minor Field: Health, Physical Education and Recreation

Biographical:

Personal Data: Born in Olney, Texas, January 24, 1929, the son of Dr. and Mrs. Franklin A. Gorrie.

Education: Graduated from Pasadena High School in January, 1947; attended Pasadena Junior College 1947-1949; received Bachelors of Arts in Physical Education from the University of California at Santa Barbara in June, 1952; received Master of Science in Education from the University of Southern California, Los Angeles, California in 1961; enrolled in doctoral program at Oklahoma State University, 1973-1976; completed requirements for the Doctor of Education degree at Oklahoma State University in July, 1976.

Professional Experience: Supervisor and teacher in physical education for the Los Nietos School District, Los Nietos, California, 1954-1955; Social Science instructor, football and swimming coach for Chaffey High School, Ontario, California, 1955-1956; physical education, mathematics instructor, football, tennis and track coach for Helix High School, La Mesa, California, 1956-1961; physical education instructor, athletic director, physical education chairman and head football coach for Monte Vista High School, Spring Valley, California, 1961-1963; physical education, health education instructor, football and track coach,

department chairman for physical education, health education, and recreation for Santa Ana College, 1964-1976.