THE VALIDATION OF A MODEL OF THE STRUCTURE OF KNOWLEDGE FOR THE FIELD OF PHYSICAL EDUCATION

by

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ABSTRACT

The multi-disciplinary field of physical education lacks a cohesive universally accepted concept with which to bind its many sub-disciplines. Widespread misunderstanding prevails among professionals within the field concerning the structure of knowledge (SOK) for this important area of study. The purpose of this study was to determine the perceived validity, usefulness, and comprehensiveness of a graphical (SOK) model, developed from a review of the related literature, on the SOK for the field of physical education. The 15 research questions and 195 null hypotheses were designed to determine how professional physical educators, as a whole and as sub-groups (according to educational level and sub-disciplines), would rate the SOK Model.

The research methodology for this project relied on epistecybernetic theory. A survey questionnaire that included the general model and its four domains contained questions relating to the identification of the SOK for the field of physical education. The survey was sent to 864 professional physical educators in the spring of 1999. One hundred and seventy-one usable questionnaires were returned for a response rate of 20 percent. Physical educators were asked to rate the general SOK model and its four domains on validity, usefulness, and comprehensiveness.

The survey found that of the 195 null hypotheses, 166 were rejected, 14 were accepted, and 15 could not be analyzed. While response rate was low, there appeared to be a trend by the respondents, as a whole, to accept the SOK Model. Physical educators grouped by educational level

and sub-discipline also appeared to accept the SOK model and its four domains. The greatest discrepancy in perceptions between educational levels tended to occur between those with the bachelors when compared with those with the doctor of philosophy degree, as increased specialization seemed to signal a shift away from a traditionally global understanding of physical education.

Recommendations were made that professional physical education and sport organizations could adopt this SOK Model for use in program development, implementation, and evaluation to see if it will be helpful. Another recommendation suggested that the Model could be used by college and university faculty to evaluate their present programs and to guide, on a pilot basis, future curricular decisions. Finally, recommendations were made that future research should attempt to further validate this SOK model and each of its four domains through additional quantitative and qualitative local, regional, and national studies.

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CHAPTER I

INTRODUCTION

Toffler's (1970) best selling book, Future Shock, described a world where the amount of information available to human beings increased exponentially after the invention of the printing press. Later in another popular book, Megatrends, Naisbitt (1984) supported Toffler's observations with the announcement that because of the enormous and rapid increase in knowledge the age of information had arrived. Drucker (1992) added to the observations of both Toffler and Naisbitt by stating that knowledge is the primary and overarching resource for individuals and for the U.S. economy. As inhabitants of planet Earth enter the twenty-first century, information continues to arrive like an enormous tsunami, overtaking everything in its path. Continuous surges of exponentially increasing waves of information have swept over traditional fields of knowledge to redefine what humans know about the landscape of the world in which they live.

The explosion of information from the mid-1960's in the field of physical education has paralleled the emergence of many sub-disciplines. These new areas of specialized study have gained momentum and have started to compete with the traditional professional orientation of the field of physical education for dominance within the field. Modern physical educators (Coetzee, 1994; Kretchmar, 1990; Newell, 1990; Park, 1991; Thomas, 1987) have observed the development of these sub-disciplines and have reported on the growing state of chaos that has

emerged from the expanding bodies of specialized knowledge within this field of study.

Hensley (1992) believes that if people are to take advantage of the enormous and hard-to-manage waves of new information that are now accessible through state-of-the-art electronic technology, i.e., computers, satellite communications, and the Internet, then original and innovative measures are needed to structure and organize knowledge so that its use can be optimized. One such original and innovative method for structuring and organizing new information can be understood under the concept of "epistecybernetics," a term coined by Hensley in 1990 (Hensley, 1993, p. 2). Hensley (1993) defined epistecybernetics as a new scientific study of the stewardship of knowledge. Epistecybernetics was modeled after systems theory that allowed for natural and man-made phenomena to be understood by investigating the *whole* (Checkland, 1981). The main thrust of epistecybernetics was directed toward improving the efficient use and circulation of knowledge (Hensley, 1997).

The focus of this research was to determine the statistical significance of the validity, usefulness, and comprehensiveness of a model, developed from a review of the literature, of the structure of knowledge (SOK) for the field of physical education. The design of the model followed Hensley's (1997) generic model for structuring knowledge. Statistical acceptance of the model of the SOK for the field of physical education provides help for researchers to find solutions for some of the problems endemic to this complex field of study. Problems regarding the universal identity of the field (Park, 1987), survival

as a field of study (Charles, 1992), and the chaotic conditions that haunt every aspect of this field of knowledge (Coetzee, 1994; Kretchmar, 1990; Newell, 1990; Park, 1991; Thomas, 1987) may be solved once the fundamental knowledge components have been identified and agreed upon.

Purpose Statement

The purpose of this investigation was twofold. The first purpose for this study was to determine the statistical significance of the validity, usefulness, and comprehensiveness of a graphic model, developed from a review of the related literature, of the SOK for the field of physical education. The new model visually demonstrated the structure of knowledge for the field of physical education: the *basic areas of study*, the *modes of inquiry*, the *fundamental processes*, the *dominant technologies*, and the *general model*. This researcher validated the model by soliciting the expert opinions of 864 physical educators. The second purpose was to recommend new policy, practice, and research for the field of physical education based on the results.

Problem Statement

The absence of a universally accepted model of the structure of knowledge for the field of physical education (Brooks, 1981; Greendorfer, 1990; Rarick, 1981; Renson, 1990; Ross, 1978; Trekell, 1992; Ziegler, 1975) was the central reason for this study. Historically known as physical education (Park, 1989; Van Dalen & Bennett, 1971), the study of this discipline has not fulfilled the

expectations of its visionary early leaders (Matthias, 1929; Park, 1989; Thomas, 1987; Wuest & Bucher, 1995). According to Siedentop (1998), the modern profession of physical education, as it is understood today, began in 1885 when William G. Anderson brought together a group of professionals interested in physical activity to form the Association for the Advancement of Physical Education. Park (1989) observed that since its early beginnings, the field of physical education has been embroiled in conflict over its identity. Some recent researchers who have supported this observation (Brooks, 1981; Lumpkin, 1998; Renson, 1990; Ross, 1978) have commented that the field of physical education is both multi-disciplinary and cross-disciplinary.

In the last decade of the nineteenth century, leaders from the disciplines of education, religion, social reform, physiology, anatomy, psychology, history, and philosophy (Park, 1989) were attracted by the prospect that the new profession of physical education would substantially increase the body of knowledge of personal and societal health. Park (1989) stated that it was the multi-disciplinary approach that attracted many professionals to the idea that physical education, as a profession, would provide tremendous benefits to the physical, psychological, and social ills of humankind in the twentieth century. The cumulative effect of including many different disciplines in one field of study of human beings did not produce an integrated discipline (Bain, 1988) with its own terminology and taxonomy (Renson, 1989). The evolution of the profession of physical education has been, since 1885, characterized by confusion concerning the appropriateness

and status of the specific related sub-disciplines within the body of knowledge and disharmony aroused by territorial struggles for control of the field (Harris, 1987; Newell, 1990; Siedentop, 1990).

For several decades physical educators have been embroiled in the controversy concerning the appropriateness of the term "physical education" as a descriptor for the field of study (Cagigal, 1978; Coetzee, 1994; Greendorfer, 1990; Lumpkin, 1998; Newell, 1990; Oberteuffer, Ulrich & Mand, 1970; Renson, 1990; Wuest & Bucher, 1995; Ziegler, 1990). Several new names for the profession (Coetzee, 1994; Renson, 1989) have been offered and have been based on models which have attempted to explain the current status and future goals of physical education (Renson, 1989).

The lofty goals of improved personal health for all citizens and increased nationalism through participation in sports, envisioned by the early leaders in the field, have not been accomplished (Park, 1989; Thomas, 1987). The field of physical education has failed to solve many of the health related problems of our nation through the great variety of fitness and sports programs that have been offered over the last century (U.S. Department of Health and Human Services, 1996). Additionally, some physical educators have doubted that physical education has had a substantial effect on alleviating anti-social behavior through involvement in sports (Wuest & Bucher, 1995). On the contrary, it is very possible that physical education activities through sports participation have encouraged anti-social behavior as the result of spectator tolerance

of bad behavior displayed by many modern sports stars (Michner, 1976; Ogilvie & Tutko, 1971).

Loss of status within the university community (Lawson, 1989) and lack of common purpose (Harris, 1987) has exacerbated the problem that the field of physical education has not accomplished its stated goals. Disharmony in purpose has led some observers of the profession to express a concern for the future of physical education and its place within education (Charles, 1992; Crum, 1992; Park, 1987; Kretchmar, 1990; Thomas, 1987). Without a universally accepted model of the body of knowledge for the field of physical education (Brooks, 1981; Greendorfer, 1990; Rarick, 1981; Renson, 1990; Ross, 1978; Ziegler, 1975), the professional merit of the field remains in doubt among administrators and university faculty from other disciplines (Kretchmar, 1988). However, most importantly, the ability of physical educators to guide our society towards the lofty goals of its original leaders could be diluted (Kretchmar, 1990; U.S. Department of Health and Human Services, 1996) if a universally accepted model is not adopted.

Summary of the Problem

The field of physical education is in a state of chaos (Kretchmar, 1990; Newell, 1990). The body of knowledge for the field of physical education is unclear (Griffey, 1987; Michner, 1976) and fragmented (Thomas, 1987). The professional and disciplinary camps are at odds over the direction of the field (Griffey, 1987; Harris, 1987; Siedentop, 1990) and the traditional name "physical education" is being challenged and replaced by a variety of

new titles (Coetzee, 1994; Renson, 1990). Physical educators have been suffering a loss of professional status within the university community due to disharmony within the field (Lawson, 1989). The 1996 Surgeon General's Report on Physical Activity and Health contains a statement that the Healthy People 2000 goals have not been attained and "are becoming more distant" (U.S. Department of Health and Human Services, 1996, p. 199). Clearly, the field of study traditionally called physical education is in need of basic scientific evaluation. Such basic scientific evaluation can begin by applying the process of epistecybernetics to discover the fundamental components of the structure of knowledge for the field of physical education. (Pages 67-72 present the SOK Model for the Field of Physical Education.)

Thesis Statement

The thesis of the investigator was that there is presently no universally accepted model of the structure of knowledge for physical education (Brooks, 1981; Greendorfer, 1990; Rarick, 1981; Renson, 1990; Ross, 1978; Ziegler, 1975). The absence of a universally accepted model provided an opportunity to test epistecybernetic design for the field of physical education. The epistecybernetic design presented the relationship between the *basic areas of study*, the *modes of inquiry*, the *fundamental processes*, the *dominant technologies*, and the *general model* for the field of physical education. Furthermore, this author believed that the absence of a universally accepted model for the field of physical education (Bain, 1988; Coetzee, 1994; Renson, 1989) has led

to the emergence of sub-disciplines that are competing for dominance of the field of knowledge (Siedentop, 1990). The result has produced a state of chaos within the profession (Fernández-Balboa, 1997). Accordingly, there is widespread disagreement among physical educators within the professional association as to what the body of knowledge should be (Thomas, 1987) and even, after 100 years of existence as a professional organization (Park, 1995), what the profession should be called (Coetzee, 1994; Renson, 1989). Physical educators have not fulfilled the mission to improve the level of health, fitness, and social reform for the American people (U.S. Department of Health and Human Services, 1996), because the profession has not adopted a universally accepted model of the structure of knowledge for the field of physical education (Renson, 1989).

It is this writer's opinion that if a universally accepted model of the structure of knowledge for the field of physical education were established, the field would experience a rise in stature among academicians from other disciplines. Instead of the current degrading status of participation in physical education (U.S. Department of Health and Human Services, 1996; Wuest & Bucher, 1987), there would be a renewed interest in strengthening weakened physical education programs within the multiversity (Lawson, 1989). With the universal acceptance of a model of the structure of knowledge of physical education, professionals within the field would have the opportunity to regain leadership (Newell, 1990) in bringing health, fitness, and social reform through physical activity to the nation.

It was this author's thesis that a model of all the knowledge of the field of physical education could be developed that shows the functional structure of the field. Furthermore, this researcher believed that physical educators would accept the models shown in Figures 2.11 through 2.15 as valid, useful, and comprehensive. This writer also believed that physical education professionals would recognize this new model as a tool for solving contemporary problems in physical education.

Acceptance of the "Model of the Structure of Knowledge for the Field of Physical Education" should enable professional and lay practitioners operating within the field to make a step toward achieving the original goals relating to health, fitness, and social reform that the early pioneers in the field envisioned.

The original goals have eluded reformers due to the lack of congruence on the structure of knowledge in their field (Locke, 1990). Renson (1989) agreed that a universally accepted model of the field does not exist. The new discipline, epistecybernetics, developed by (Hensley, 1993) provided the architecture for building a model of the structure of knowledge for the field of physical education. The development of this graphic model required showing the relationships between *basic areas of study*, *modes of inquiry*, *fundamental processes*, *dominant technologies*, and *general model* of this field of study.

Research Questions and Hypotheses

The following are the author's research questions. Please refer to Table 1.1 (p. 21), 1.2 (p. 22), and 1.3

(p. 23) for a complete presentation of the research hypotheses that are subsumed within the research questions.

Will experts in the profession:

1. Determine the *Basic Areas of Study* domain in the model to be valid, useful, and comprehensive?
2. Determine the *Modes of Inquiry* domain in the model to be valid, useful, and comprehensive?
3. Determine the *Fundamental Processes* domain in the model to be valid, useful, and comprehensive?
4. Determine the *Dominant Technologies* domain in the model to be valid, useful, and comprehensive?
5. Determine the *General Model* to be valid, useful, and comprehensive?
6. Agree statistically among themselves as to the validity, usefulness, and comprehensiveness of the *basic areas of study* domain when sub-grouped by educational degree, i.e., bachelor's, master's, doctor of education, and doctor of philosophy?
7. Agree statistically among themselves as to the validity, usefulness, and comprehensiveness of the *modes of inquiry* domain when sub-grouped by educational degree, i.e., bachelor's, master's, doctor of education, and doctor of philosophy?
8. Agree statistically among themselves as to the validity, usefulness, and comprehensiveness of the *fundamental processes* domain when sub-grouped by educational degree, i.e., bachelor's, master's, doctor of education, and doctor of philosophy?
9. Agree statistically among themselves as to the validity, usefulness, and comprehensiveness of the *dominant technologies* domain when sub-grouped by

educational degree, i.e., bachelor's, master's, doctor education, and doctor of philosophy?

10. Agree statistically among themselves as to the validity, usefulness, and comprehensiveness of the *general model* when sub-grouped by educational degree, i.e., bachelor's, master's, doctor of education, and doctor of philosophy?
11. Agree statistically among themselves as to the validity, usefulness, and comprehensiveness of the *basic areas of study* domain when sub-grouped by disciplinary sub-domains, i.e., pedagogy, humanities, and sciences (social and biological)?
12. Agree statistically among themselves as to the validity, usefulness, and comprehensiveness of the *modes of inquiry* domain when sub-grouped by disciplinary sub-domains, i.e., pedagogy, humanities, and sciences (social and biological)?
13. Agree statistically among themselves as to the validity, usefulness, and comprehensiveness of the *fundamental processes* domain when sub-grouped by disciplinary sub-domains, i.e., pedagogy, humanities, and sciences (social and biological)?
14. Agree statistically among themselves as to the validity, usefulness, and comprehensiveness of the *dominant technologies* domain when sub-grouped by disciplinary sub-domains, i.e., pedagogy, humanities, and sciences (social and biological)?
15. Agree statistically among themselves as to the validity, usefulness, and comprehensiveness of the *general model* when sub-grouped by disciplinary sub-

domains, i.e., pedagogy, humanities, and sciences (social and biological)?

Assumptions

The author's assumptions were:

1. Epistecybernetics is a new science of the stewardship of knowledge. It provides a new set of theoretical principles and generic models that guided this investigation.
2. The SOK of a discipline should improve the categorization of knowledge and provide some standardization for students and teachers selecting knowledge for study. Professionals working within the field need to know the SOK for their discipline. (Fedler, Hensley, Sisler, & Tunstall, 1993).
3. The body of knowledge covered by the umbrella term traditionally referred to, as "physical education" is not currently organized to accomplish the stated goals of its related educational organizations.
4. The SOK for the field of physical education is three-dimensional.
5. The general model, in the shape of the cube, provides the epistecyberneticist with the symbolically least biased architecture for mapping the SOK for the field of physical education.
6. The development of a model of the SOK for the field of physical education is basic research. The resulting model of the SOK for the field of physical education will symbolically represent the structures that are contained within the field of physical education.

This activity is similar to the work a surveyor does when mapping a landform.

7. The structure of knowledge for the field of physical education contains four distinct parts, which may be modeled to reflect its body of knowledge, i.e., the *modes of inquiry, basic areas of study, fundamental processes,* and *the dominant technologies.*
8. The written body of knowledge of physical education is contained in texts, journal articles, newspapers, and electronic media.
9. Validity may be determined for the SOK through peer review.
10. Survey respondents will answer questions truthfully concerning the subject matter.
11. Determination of an expert physical educator is based on having earned the minimum of a bachelor's degree in the field of physical education or one who has worked within the field for a period of at least five years.
12. Scores returned by a respondent are independent of the scores returned by another reviewer.
13. Scores returned by the respondents are normally distributed.
14. Enough respondents will return surveys to make valid conclusions and analyses.

Delimitations

Listed below are the delimitations for this study:

1. Convenience samples were used in the pilot study, i.e., colleagues, professional acquaintances, and physical educators who publish work related to the SOK for the field of physical education.

2. The investigation focused only on physical educators with the minimum of a bachelor's degree or five years experience in the field teaching physical education or coaching. Physical education students, health professionals, and recreation leaders were not included in this study.
3. The study was limited to physical education professionals living and working in the United States of America and its territories.
4. The population sample of physical educators was derived from the National Association of Sport and Physical Educators (N.A.S.P.E.) division of the American Alliance of Health, Physical Education, Recreation, and Dance (A.A.H.P.E.R.D.).

Limitations

Listed below are the limitations for this study and its findings:

1. The response was too low (20%) to be able to accurately generalize to the larger group (21,276) of physical educators.
2. Sub-groups were too small for the researcher to be able to generalize to the larger sub-group populations.
3. No comparison of responses to non-responder responses was made.

Definitions

The following operational terms are provided for clarifying the reader's understanding of this study. A

more complete explanation of terms may be found in the Glossary (Appendix A).

Basic Areas of Study. One of four major domains (faces) used in modeling knowledge as described by Hensley (1995). Included within the domain are the sub-domains: (a) *major knowledge content outcomes*, (b) *common physical skills*, (c) *reflexive body movements*, and (d) the *play-work continuum*.

Cube. The cube is a solid geometrical figure that has six equal square sides. The cube provides a framework with the least amount of hidden symbolism for human movement activities for which to build an epistecybernetic SOK model as compared to other possible shapes.

Discipline. This study accepts Franklin Henry's (1964) definition of a discipline that states:

> An organized body of knowledge collectively embraced in a formal course of learning. The acquisition of such knowledge is assumed an adequate and worthy objective as such, without any demonstration or requirement of practical application. The content is theoretical and scholarly as distinguished from technical and professional. (p. 32)

Domain (face). A domain refers to each of the four individual faces of the model of the SOK for the field of physical education. The four domains for the SOK for the field of physical education are the basic areas of study, the modes of inquiry, the fundamental processes, and the dominant technologies.

Domain Element. A generic term that refers to any fundamental component of a domain that, together with other components, constitute a domain.

Dominant Technologies. One of four major domains used in modeling knowledge as described by Hensley (1997). The dominant technologies face represents the necessary tools for the successful conduct of physical education.

Epistecybernetics. A term coined by Hensley (1993) in 1990 to describe the new scientific study of the stewardship of knowledge. According to Hensley and Fedler (1992, March):

> Epistecybernetics is the science of knowledge that advances investigation into the nature, creation, organization, dissemination, and utilization of knowledge with the practical purpose of improving its efficient dissemination and use. It is derived from the Greek words *episteme* meaning knowledge and *kybernetes* meaning pilot or governor. (p. 5)

Expert. For the purpose of this study an expert is one who has earned the minimum of a bachelor's degree in the field of physical education or who has worked within the field for a period of at least five years.

Face (domain). For the purpose of this study, a face refers to each of the four individual domains of the model of the SOK for the field of physical education. The four faces for the SOK for the field of physical education are the basic areas of study, the modes of inquiry, the fundamental processes, and the dominant technologies.

Field of Study. The field of study is the comprehensive term that includes the many disciplines that make up the multi-disciplinary area of study known as physical education. Examples of such disciplines are kinesiology, exercise physiology, motor control, sport psychology, etc. The term *field* is used in this study to describe the body of knowledge for physical education.

Fundamental Processes. One of four major domains used in modeling knowledge as described by Hensley (1995). The fundamental processes face represents the six perspectives of human nature: (1) physical, (2) mental, (3)emotional, (4) spiritual, (5) social, and (6) cultural.

General Model. The general model of the SOK for the field of physical education is represented on the four sides (faces) of the six-sided cube. The four faces symbolize the domains of the basic areas of study, the modes of inquiry, the fundamental processes, and the dominant technologies.

Instrument. The instrument refers to the survey questionnaire used in collecting data. An example of the survey questionnaire is located in Appendix B.

Model. In this study, the term "model" always designates structure of knowledge (SOK) model. The model as used in this study is a graphical symbolic device for exploring the SOK for the field of physical education.

Modes of Inquiry. One of four major domains used in modeling knowledge as described by Hensley (1995). Modes of inquiry are the ways of thinking used by practitioners of specific sub-disciplines for understanding the field. The modes of inquiry face represents the sixteen sub-disciplines associated with the field of physical education. The sub-disciplines are categorized according to membership in the parent fields of pedagogy, humanities, social sciences, and the biological sciences.

Physical Education. For the purpose of this investigation, physical education is defined according to its most global meaning. Therefore, physical education is the inclusive term for physical activity and studies

involving human beings in motion, at play, and at work, from both the disciplinary and the professional perspectives. The General Model of the Structure of Knowledge for the Field of Physical Education (Figure 2.11) graphically describes the term "physical education" as it is used in this study. (See Scope section for a more complete discussion of this term (pp. 19-20.)

Structure of Knowledge (SOK). Skoog (personal communication, March 29, 2000) states that many educational theorists hold that SOK studies must include specific knowledge elements appropriate for curriculum planning. However, epistecybernetic theory as described by Hensley and Fedler (1992, March), and adopted in this dissertation, allow for the development of a broad framework as the first step in creating a SOK Model. Therefore, Hensley and Fedler's (1992, March) SOK for a discipline may be determined by identifying the *basic areas of study*, the *fundamental processes*, the *dominate technologies*, and the *modes of inquiry*. Furthermore, Oberteuffer, Ulrich, and Mand (1970) describe the SOK of physical education as the "discipline of human movement" (p. 29).

Sub-Disciplines. Siedentop (1998) describes sub-disciplines as "the various areas of scientific and scholarly study of sport and exercise" (p. 388). Sixteen sub-disciplines for the field of physical education are listed on the modes of inquiry face of the SOK model for the field of physical education.

Sub-Domain. For the purpose of this study, a sub-domain refers to the major categories contained within each of the four domains (faces) that create the faces of the SOK model for the field of physical education. The sub-

domains for the *basic areas of study* are the *major knowledge content outcomes, basic physical skills, reflexive body movements, and the play-work continuum.* The sub-domains for the *modes of inquiry* domain are *pedagogy, humanities,* and *sciences (social and biological).* The sub-domains for the *fundamental processes* are *physical, mental, emotional, spiritual, social,* and *cultural.* The sub-domains for the *dominant technologies* are *uniforms, implements, facilities, rules, scoring systems, statistics,* and *strategies.*

Scope and Definition of Physical Education

The scope of this study included the entire field of knowledge of physical education. The domains of physical education are *basic areas of study, modes of inquiry, fundamental processes,* and *dominant technologies.* The basic areas of study domain of the model categorizes human movement into four basic sections of: the play-work continuum, reflexive body movements, basic physical skills fundamental to the major knowledge content outcomes, and the major knowledge content outcomes. The nine major knowledge content outcomes are employment, exercise, physical fitness, spectatorism, athletics, outdoor adventure pursuits, dance, sports, and games. The modes of inquiry domain of the model is divided into three disciplinary sub-domains and includes the sub-disciplines which are teaching methodologies, history, philosophy literature, art, cultural anthropology, sociology, psychology, management, motor control and motor learning, motor development, kinanthropometry, biomechanics, exercise

physiology, adapted physical education, and sports medicine. The six sub-domains of the fundamental processes domain of the model include the physical, mental, emotional, spiritual, social, and cultural facets of human nature. The dominant technologies domain of the model includes uniforms, implements, facilities, rules, scoring systems, strategies, and statistics used in the major knowledge content outcomes.

A sample of experts was used in validating the "Model of the Structure of Knowledge for the Field of Physical Education." An expert physical educator in this study was defined as having at least a bachelor's degree in the field of physical education or had worked within the field for a period of at least five years.

Study Justification Statement

The body of knowledge for the field of physical education lacks an integrated paradigm (Renson, 1990) with which to be organized (Kretchmar, 1990; Newell, 1990). Disharmony concerning the proper name for the field (Coetzee, 1994), concern for low status among academicians and administrators (Lawson, 1989), and an inability to accomplish the Healthy People 2000 goals (U.S. Department of Health and Human Services, 1996) supports an attempt to bring the field into organizational harmony for the twenty-first century.

This concludes the discussion of chapter one of this dissertation. Tables 1.1-1.3 follow (pp. 21-23). The following chapter: (1) presents a brief overview of the history of physical education, (2) reviews graphical models

from the related literature, and (3) develops a graphical model from the related literature.

Table 1.1. Hypotheses for Research Questions 1 - 5.

Experts in the profession will rate the:					
Research Questions 1 - 5	**Basic Areas of Study domain as**	**Modes of Inquiry domain as**	**Fundamental Processes domain as**	**Dominant Technologies domain as**	**General Model as**
Invalid	H_o	H_o	H_o	H_o	H_o
Valid	H_1	H_1	H_1	H_1	H_1
Not Useful	H_o	H_o	H_o	H_o	H_o
Useful	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	H_o	H_o	H_o	H_o	H_o
Comprehensive	H_1	H_1	H_1	H_1	H_1

Table 1.2: Hypotheses for Sub-Groups by Degree (B, bachelor's; M, master's; Ed.D., doctor of education; Ph.D., doctor of philosophy).

There is no significant difference (α = 0.05) among experts' perceptions, grouped by level of education, of the validity, usefulness, and comprehensiveness of the *basic areas of study, modes of inquiry, fundamental processes, dominant technologies*, and *general model*.						
	B vs. M	B vs. Ed.D.	B vs. Ph.D.	M vs. Ed.D.	M vs. Ph.D.	Ed.d. vs. Ph.D.
Basic Areas of Study (Research Question #6)						
Invalid	Ho	Ho	Ho	Ho	Ho	Ho
Valid	H_1	H_1	H_1	H_1	H_1	H_1
Not Useful	Ho	Ho	Ho	Ho	Ho	Ho
Useful	H_1	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	Ho	Ho	Ho	Ho	Ho	Ho
Comprehensive	H_1	H_1	H_1	H_1	H_1	H_1
Modes of Inquiry (Research Question #7)						
Invalid	Ho	Ho	Ho	Ho	Ho	Ho
Valid	H_1	H_1	H_1	H_1	H_1	H_1
Not Useful	Ho	Ho	Ho	Ho	Ho	Ho
Useful	H_1	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	Ho	Ho	Ho	Ho	Ho	Ho
Comprehensive	H_1	H_1	H_1	H_1	H_1	H_1
Fundamental Processes (Research Question #8)						
Invalid	Ho	Ho	Ho	Ho	Ho	Ho
Valid	H_1	H_1	H_1	H_1	H_1	H_1
Not Useful	Ho	Ho	Ho	Ho	Ho	Ho
Useful	H_1	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	Ho	Ho	Ho	Ho	Ho	Ho
Comprehensive	H_1	H_1	H_1	H_1	H_1	H_1
Dominant Technologies (Research Question #9)						
Invalid	Ho	Ho	Ho	Ho	Ho	Ho
Valid	H_1	H_1	H_1	H_1	H_1	H_1
Not Useful	Ho	Ho	Ho	Ho	Ho	Ho
Useful	H_1	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	Ho	Ho	Ho	Ho	Ho	Ho
Comprehensive	H_1	H_1	H_1	H_1	H_1	H_1
General Model (Research Question #10)						
Invalid	Ho	Ho	Ho	Ho	Ho	Ho
Valid	H_1	H_1	H_1	H_1	H_1	H_1
Not Useful	Ho	Ho	Ho	Ho	Ho	Ho
Useful	H_1	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	Ho	Ho	Ho	Ho	Ho	Ho
Comprehensive	H_1	H_1	H_1	H_1	H_1	H_1

Table 1.3: Hypotheses for Sub-Groups by Sub-Discipline (P, pedagogy; H, humanities; SS, social sciences; BS, biological sciences).

There is no significant difference (α = 0.05) among the perceptions of experts', when grouped by sub-discipline, on the validity, usefulness, and comprehensiveness of the *basic areas of study, modes of inquiry, fundamental processes, dominant technologies,* and *general model.*

	P vs. H	P vs. SS	P vs. BS	H vs. SS	H vs. BS	SS vs. BS
Basic Areas of Study (Research Question #11)						
Invalid	Ho	Ho	Ho	Ho	Ho	Ho
Valid	H_1	H_1	H_1	H_1	H_1	H_1
Not Useful	Ho	Ho	Ho	Ho	Ho	Ho
Useful	H_1	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	Ho	Ho	Ho	Ho	Ho	Ho
Comprehensive	H_1	H_1	H_1	H_1	H_1	H_1
Modes of Inquiry (Research Question #12)						
Invalid	Ho	Ho	Ho	Ho	Ho	Ho
Valid	H_1	H_1	H_1	H_1	H_1	H_1
Not Useful	Ho	Ho	Ho	Ho	Ho	Ho
Useful	H_1	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	Ho	Ho	Ho	Ho	Ho	Ho
Comprehensive	H_1	H_1	H_1	H_1	H_1	H_1
Fundamental Processes (Research Question #13)						
Invalid	Ho	Ho	Ho	Ho	Ho	Ho
Valid	H_1	H_1	H_1	H_1	H_1	H_1
Not Useful	Ho	Ho	Ho	Ho	Ho	Ho
Useful	H_1	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	Ho	Ho	Ho	Ho	Ho	Ho
Comprehensive	H_1	H_1	H_1	H_1	H_1	H_1
Dominant Technologies (Research Question #14)						
Invalid	Ho	Ho	Ho	Ho	Ho	Ho
Valid	H_1	H_1	H_1	H_1	H_1	H_1
Not Useful	Ho	Ho	Ho	Ho	Ho	Ho
Useful	H_1	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	Ho	Ho	Ho	Ho	Ho	Ho
Comprehensive	H_1	H_1	H_1	H_1	H_1	H_1
General Model (Research Question #15)						
Invalid	Ho	Ho	Ho	Ho	Ho	Ho
Valid	H_1	H_1	H_1	H_1	H_1	H_1
Not Useful	Ho	Ho	Ho	Ho	Ho	Ho
Useful	H_1	H_1	H_1	H_1	H_1	H_1
Not Comprehensive	Ho	Ho	Ho	Ho	Ho	Ho
Comprehensive	H_1	H_1	H_1	H_1	H_1	H_1

CHAPTER II

RELATED LITERATURE

Introduction

Beginnings

The field of knowledge traditionally known as physical education is shrouded in uncertain origins and unclear meanings. Depending on the source, readers of the structure of knowledge (SOK) for physical education have been led to four different historical time periods for the origin of physical education. Readers of Van Dalen and Bennet (1971), in their comprehensive World History of Physical Education, have learned that such activities as hunting and fishing among primitive tribesmen and training for war among early civilizations were the beginning of physical education. A second camp suggested a more recent period for the origin of the concept of physical education. This second camp points to the Enlightenment where physical education was "put into practice by the eighteenth century pedagogical school of the Philanthropinists" (Renson, 1990, p. 101). Paul (1996) presented a third period, asserting that physical education began with Charles Beck's introduction of German gymnastics at the American Round Hill School in 1823. Finally, a fourth group believes the profession of physical education began in 1885 when William Anderson organized professionals from various areas of study to discuss the benefits of physical activity. Anderson's leadership resulted in the formation of the Association for the Advancement of Physical Education (Park, 1989; Siedentop, 1998). For the purpose of this study, the beginning of physical education will be accepted

in accordance with Van Dalen and Bennet's (1971) presentation of physical education as beginning in our earliest civilizations. It is this researcher's premise that physical education began when human beings applied their knowledge of the environment to the development of physical skills necessary for survival.

Problems

Founded by professionals from many different disciplines (Park, 1989; Siedentop, 1998), the field of physical education has failed to develop a universally accepted central focus of study (Fernández-Balboa, 1997; Newell, 1990). In addition, terms central to the field such as *sport* (Michner, 1976; Davydov, 1978), *athlete* (Copeland, 1976; Leonard, 1975), *physical fitness* (Hoeger, 1989; Siedentop 1998), and even *physical education* (Barrow, 1973; Brooks, 1981; Oberteuffer, Ullrich & Mand, 1970) are not clearly defined. The lack of clarity and agreement about the SOK of the field of physical education has brought the field to a state of chaos concerning its body of knowledge (Brooks, 1981; Greendorfer, 1990; Rarick, 1981; Renson, 1990; Ross, 1978; Ziegler, 1975). This identity crisis is further compounded due to competing names for the field. Umbrella terms such as *kinesiology* (Charles, 1992; Siedentop, 1990), *human movement studies* (Carlisle, 1978), *kinanthropology* (Renson, 1990), and *human kinetics* (Coetzee, 1994), to name a few, have contended for the role of chief descriptor of the field (Newell, 1990). Paul (1996) adds that the term "physical education" is no longer commonly accepted. Exacerbating the confusion, Paul (1996) states that over 200 different titles of university

departmental names have been considered appropriate descriptors for the field of physical education.

The intent of this review of literature was to:

1. present a brief overview of the history of physical education,
2. present a review of models of physical education from the literature, and
3. develop a graphic model of the SOK for the field of physical education from a review of the literature.

The preceding three objectives for the review of literature formed the foundation for the construction of the chapter. The review of literature was organized according to *Historical Overview, Graphical Models, and the Development of the Structure of Knowledge for the Field of Physical Education.* Terms pertinent to the understanding of this investigation are defined and discussed in the Glossary (Appendix A). These three chapter sections of the review of related literature provide a "snapshot" of what scholars of the field of physical education consider the SOK to be. This review presents a new perspective on the understanding of the body of knowledge of the field of study traditionally known as physical education.

Historical Overview

Introduction

The purpose of this section is to present a brief historical overview of physical education as a field of study. Some scholars (Barrow, 1973; McCloy, 1947; Van Dalen & Bennet, 1971; Williams, 1964) have traced the origins of physical education back through the pages of history recounting the warlike ambitions and training

habits of our civilization's predecessors including those of medieval Europe, Rome, Greece, Persia, Assyria, China, and pre-historic tribes. Concomitantly, these scholars (Barrow, 1973; McCloy, 1947; Van Dalen & Bennet, 1971; Williams, 1964) describe how Hellenic culture revered both the mind and the body, allowing for a degree of status for physical activity unknown to other cultures.

For the purpose of this paper, the history of physical education was divided into three major stages by way of educational methodology: the *naturalistic-informal stage*, the *archaic-formal stage*, and the *modern professional-disciplinary stage*. This research assumed that physical education has had a global meaning which relates to all learning that takes place as a result of human movement. There has been a lack of clarity concerning what the field of physical education should be called. Barrow (1973) stated that the term physical education is "unfortunate" and "is a misnomer" (p. 16). Oberteuffer, Ulrich, and Mand (1970) agreed in the sense that they believed the term physical education is "unfortunate" (p. 3). Brooks (1981) stated that the term physical education is ambiguous and leads many people to misunderstand its meaning. Therefore, the term *physical education* has lacked unanimous support from scholars within the field.

Several writers have endeavored to define the field of physical education according to their personal perspective. Just like the ten blind Hindus trying to describe different parts of the elephant, modern physical educators have tried to define different aspects of physical education from their unique academic positions. Therefore, as in the case of the ten blind Hindus, several different conclusions

about the reality of the field of physical education were manifested. An example of the chaos produced by a variety of definitions of physical education is contained in the following lines. Lumpkin (1998) and Barrow (1973) agreed that physical education has been a process where the objective was to develop high level physical fitness and skill in a variety of physical activities, appreciate social interaction in sports and games, and acquire understanding of the wise and creative use of leisure time. Furthermore, Barrow (1973) recognized that in addition to the physical side of physical education there has been a mental, social, and spiritual dimension as well. Rarick (1981) adds that physical education was concerned with the mechanics of human movement, its motor control, psychological factors, physiology of exercise, sports, dance, historical, cultural, and social aspects as well as its spectators and participants. Henry (1964) stated that physical education has been an academic discipline with an organized body of knowledge and that the content was theoretical and scholarly rather than technical and professional. Brooks (1981) agreed with Henry stating that physical education has been an academic discipline that is both interdisciplinary and scholarly. Nigg (1993) offered a definition of physical education as an academic discipline with a professional focus centered on working in jobs affiliated with physical activity and sport.

Rarick (1981), on the other hand, argued that physical education does not have a "clearly defined body of knowledge or scope of inquiry" (p. 19). According to Rarick (1981) "physical education is concerned with exercise, active games, sports, athletics, gymnastics, and

dance" (p. 18). However, Rarick (1981) emphasized that while these activities are centered on human movement, they cannot be easily categorized into a "logical framework within which to develop concepts, hypotheses, theories, and laws" (p. 18). Therefore, the field of physical education, similar to the fable of the ten blind Hindus examining different parts of the elephant, derived its many definitions from the various perspectives of the scholars studying this very large and complex field of study.

For the purpose of this investigation, physical education is defined according to its most global meaning. Physical education is, therefore, the inclusive term for physical activity and studies involving human beings in motion, at play and at work, from both the disciplinary and the professional perspectives. The General Model of the Structure of Knowledge for the Field of Physical Education graphically describes the term "physical education." Support for this writer's definition can be found in the concise definitions of several of the profession's best known leaders. Cassidy (1938) stated "physical education is the sum of the changes in the individual caused by experiences centering in motor activity" (p. 59). Williams (1964) stated "all motor experiences are physically educative" and "physical education is the sum of man's physical activities selected as to kind, and conducted as to outcomes" (p. 13). McCloy (1947) defined physical education as "education through big-muscle, psychomotor experience" (p. 24). Furthermore, McCloy (1947) explained that in the culture of primitive peoples "physical education was the sole form of education" (p. 25). More recently Lumpkin (1998) defined physical education "as a

process through which an individual obtains optimal physical, mental, and social skills and fitness through physical activity" (p. 378). The common thread connecting the previously cited writers' definitions of physical education can be found in the changes that occur as a result of artfully directed physical activity during play and at work.

The following review of literature contains many ambiguous terms, such as the descriptor *physical education* discussed above, that contain the potential to cloud the understanding of studies involving human movement. In order to improve understanding, the Glossary (Appendix A) has been prepared to present discussion and definition of terms that are central to the comprehension of the field of physical education.

The Naturalistic-Informal Stage

During the *naturalistic-informal stage* members of stone age societies learned physical skills from older members of the tribe (Farb, 1968). Skill development in hunting, fishing, and warfare were part of the natural way of life and were not formally taught. Formal educational systems, as practiced today, were not part of stone-age cultures. While not taught in a formal setting, informal training in the physically oriented survival skills of hunting, fishing, gathering techniques, tracking, trapping, swimming, and dancing are among the oldest types of physical education (Siedentop, 1998). In primitive societies, physical skill development is crucial to the survival of the individual and the tribe (Van Dalen & Bennet, 1971). Modern society also allows for informal

physical education. Just as in primitive societies, an older member of the family or member of the social group usually teaches physical skills. Modern *naturalistic-informal* physical education may include such activities as hunting, fishing, bicycle riding, and martial arts.

It is this writer's opinion that the transition from the *naturalistic-informal stage* to the *archaic-formal stage* of physical education occurs gradually in the development of any particular society. In primitive tribes, warrior societies develop naturally when repeated warlike activity is successful. As the population of a warlike tribe grows larger, the warrior society gains more participants, the organization becomes more complex, and this writer assumes, that the physical training becomes more formalized. Examples of the flourishing of warlike societies can be seen among the ancient Persians, Spartans, and the Mesoamericans (Van Dalen & Bennet, 1971).

The Archaic-Formal Stage

The *archaic-formal stage* of physical education encompasses institutionalized training in physical skill development that has been in existence in most highly developed civilizations throughout history. Durant (1954) writes in his monumental The Story of Civilization: Our Oriental Heritage that "the Egyptians were the greatest builders in history" (p. 185). Modern archeologists have speculated that Egyptian construction bosses used formal training methods to coordinate the thousands of laborers required to build the colossal pyramids with raw manpower. Durant (1954) wrote concerning the Egyptians:

> In Khufu's pyramid there are two and a half million blocks, some of them weighting one hundred and fifty tons, all of them averaging two and a half tons; they cover half a million square feet, and rise 481 feet into the air. And the mass is solid; only a few blocks were omitted, to leave a secret passage way for the carcass of the King. (pp. 148-149)

The organization required to operate primitive pulleys and levers so giant stones could be elevated several hundred feet into the air was certainly an extreme challenge in physical education. In Persia, King Cyrus used formal training in the art of warfare, his army was able to conquer a large part of the known civilized world by 529 BC (Wuest & Bucher, 1995). The Greeks elevated physical education to the greatest status it has ever known by celebrating the human body in athletic competition and art (Van Dalen & Bennet, 1971). Athletes trained hard at *palaestras* (the first gymnasiums for athletic development) with the aid of professional instructors, *paidotribes*, to earn the right to compete in Hellenic games (Van Dalen & Bennet, 1971). The Romans advanced the Greek appreciation of athletic competition (physical education) to its logical conclusion by perfecting a highly organized military state. For the most part, formal physical education activities were focused on developing skills for physical combat (Van Dalen & Bennet, 1971).

Most *archaic-formal* physical education was directed toward the goal of success in military combat. However, as the dawn of the Age of Enlightenment began to glow on the Europeans of the eighteenth century, the theory of physical

education activities for improved health began to take shape. At first Rabelais (1495-1593), then Montaigne (1533-1592) and Rousseau (1712-1778) extolled the virtues of challenging physical activity for a vigorous and healthy body (Hutchins, 1952; Rousseau, 1974; Van Dalen & Bennet, 1971). Following the teachings of Rabelais, Montaigne, and Rousseau, a German schoolmaster, Johann Basedow (1723-1790), initiated the first school, the *Philanthropinum* (1774), that included physical education as an important part of its curriculum (Van Dalen & Bennet, 1971).

Modern physical education would find its' roots in the *naturalistic-informal stage* and the *archaic-formal stage* of physical activity as described above. The first aboriginal who picked-up a stick to strike a blow, or found a rock to throw, or savored the joy of hitting the mark with the bow and arrow shares a common experience with the modern physical education student. Both primitive and modern learn similar skills and share similar feelings through the medium of physical activity (physical education) in work or play.

The Modern Professional-Disciplinary Stage

The final stage or *modern professional-disciplinary stage,* according to Paul (1996), may be sub-divided into three periods. Paul's (1996) three periods of physical education are the *"foreign gymnastic or formal era"* (1820s to 1900), the *"natural movement"* (1900 to the 1960s), and the *"discipline movement"* that began in the 1960s and continues to the present (p. 532).

The Foreign Gymnastic-Formal Era (1814-1900)

Paul (1996) traced the early beginnings of modern physical education to the Round Hill School in Northhampton, Massachusetts in the 1820s. Siedentop (1998) added that in 1825 Charles Beck (1798-1866) introduced German gymnastics and that Beck is now recognized as the first teacher of physical education in the United States. According to Paul (1996), physical education remained in an "embryonic period" (p. 532) until its birth as a profession in 1885 when William Anderson brought together a group of professionals from various areas of study that were interested in physical training. The meeting occurred at the Adelphi Academy in Brooklyn, New York and marked the birth of physical education as a profession (Siedentop, 1998).

During the formal era of European gymnastics, several systems of physical education sprang independently into being and promoted either nationalism, education, exercise, or scientific inquiry and competed for dominance (Siedentop, 1998). Siedentop (1998) discussed six systems that battled for dominance during this era (1885-1900) of European gymnastics: the German system, the Swedish system, the Beecher system, the Dio Lewis system, the Hitchcock system, and the Sargent system.

The German system, begun in 1816, started as a club, the *turnverein*, to develop pride in German heritage and consisted of the athletic exercises associated with outdoor gymnastics and running. The program was balanced with academic education and physical education and the objective was to build nationalism (Siedentop, 1998).

The Swedish system, begun in 1814, was nationalistic, promoted health and grace of movement, and included physical therapy (Lumpkin, 1998; Siedentop, 1998). Exercises were not as heavy as in the German system but much emphasis was given to the beauty of graceful movement as a means to health (Siedentop, 1998).

The Beecher system, begun in 1824, used calisthenics modified for women and rhythmic activities to music (Siedentop, 1998). Lessons in physiology, calisthenics, and female activities in archery, swimming, and horseback riding were performed to promote health and grace of motion (Siedentop, 1998).

The Dio Lewis system, begun in 1860, involved light gymnastics for health with the goal of attaining graceful movement (Siedentop, 1998). The exercises were performed to music and incorporated scientific methodology (Siedentop, 1998). The Dio Lewis system was one of the first American systems to combine elements from other systems (Siedentop, 1998). Siedentop (1998) stated that Lewis' journal, the Gymnastics Monthly and Journal of Physical Culture (1861) "can be considered the first American physical education journal" (p. 33).

The Hitchcock system, begun in 1861, was concerned with physical development and health (Siedentop, 1998). According to Siedentop (1998), Hitchcock at Amherst College developed the first truly American program. Hitchcock's exercises were marching, unison calisthenics, and exercise on both light and heavy gymnastic apparatus. Siedentop (1998) added that Hitchcock was one of the early pioneers in the development of anthropometrics.

The Sargent system, begun in 1879 at Harvard, combined elements from all other systems (first to be truly American) but relied primarily on gymnastics and medicine (Siedentop, 1998). According to Siedentop (1998), Sargent's system included medical and anthropometric testing and exercise prescription, exercise on German and Swedish gymnastic apparatus, and use of specialized exercise machines Sargent developed for specific conditions.

It is interesting to note that the above mentioned systems of physical training were collectively referred to by Paul (1996) as the first historical period of "physical education" (p. 532). It would seem natural to this writer, then, that during this time some practitioners of physical training might be tempted to define the totality of the field by one or more of the physical activities familiar to them. For example, the systems of German or Swedish gymnastics might define the body of knowledge for physical education. Alternatively, calisthenics, health, rhythmic exercise, anthropometry, or physical therapy might separately or collectively define the body of knowledge for physical education. Therefore, this writer believes that the practice of using physical education as a convenient umbrella term, without establishing a universally accepted central mission, has created a state of confusion about the body of knowledge for the field of physical education. In confirmation of the above statement, Drucker (1992) contends that the modern organization, composed of specialists, must have a crystal clear mission or its members will become confused and they "will follow their

own specialty rather than apply it to the common task" (p. 8).

The Era of Natural Movement (1900-1960)

Paul (1996) identified the second important period of change in the evolution of physical education as the era of *"natural movement."* Lumpkin (1998) adds that in the first half of the twentieth century, the new profession of physical education expanded to include such activities as "sports, games, aquatics, and outdoor activities with educational outcomes foremost" (pp. 202-203). In addition, Siedentop (1998) adds that the emphasis in physical education was moving toward recreation, the playground movement, and dance. In contrast to the formal gymnastic systems of the nineteenth century, the early part of the twentieth century was characterized by a shift away from militaristic nationalism through athletic exercises toward sports and games (Lumpkin, 1998; Paul, 1996; Siedentop, 1998; Van Dalen & Bennet, 1971).

In 1893, Thomas Wood pronounced his vision for the role of physical activity in education thereby starting the movement called the *new physical education* (Lumpkin, 1998). Contrary to the health and strength orientation of the *Foreign Gymnastic-Formal Era* (Paul, 1996), Wood (in Lumpkin, 1998) announced the new physical education would focus "on developing the whole individual through participation in play, sports, games, and natural, outdoor activities" (p. 203). The term, the new physical education, would become the recognizable theme for Paul's (1996) second era or "natural period." Accordingly, Thomas

Wood was credited with beginning the shift in emphasis of physical activity away from formal gymnastics and exercise drills to programs focusing on the whole person through sports, play, games, dance, and outdoor activities (Siedentop, 1998).

The new objectives of physical education were aimed at developing neuromuscular skills, character building, organic efficiency, and knowledge of physical activity, as opposed to the nineteenth century goals which were directed toward physical training and the attainment of vigorous health obtained through strength exercises and military discipline (Paul, 1996). The new physical education was centered on the development of the whole person (Paul, 1996). Physical education programs were to become more enjoyable and students were to be schooled in the "worthy use of leisure time" (Paul, 1996, p. 537).

Two opposing concepts competed for dominance within the profession during the *era of natural movement*: education through the physical and education of the physical (Lumpkin, 1998). Cassidy (1938) and Williams (1964) were strong advocates of education through the physical which promoted physical education "as the field that could uniquely contribute to the education of the whole person through physical activities" (Lumpkin, 1998, p. 204). In addition Williams, reasoned that the value of physical education was in its ability to educate "a child to live in a democratic society, through social and intellectual interactions within physical education" (Lumpkin, 1998, p. 205). McCloy, on the other hand, was a strong advocate for education of the physical (DePauw, 1997). Lumpkin (1998) reported that McCloy believed

"organic and psychomotor development was the most important objective for physical education" (p. 210). However, according to McCloy (1947), physical education "should be organized as a laboratory course of natural big-muscle activities" (p. 26) with the result being "abounding health and organic vigor" (p. 26) and the development of "traits and characteristics essential to well-rounded character and personality" (p. 26).

To conclude the *Era of Natural Movement*, Paul (1996) states that remnants of the old formalist methods from the nineteenth century continued to survive into the early part of the twentieth century. In addition, Paul (1996) contends that there was as much dissention about the body of knowledge in the field in the 1930s as there had been in the 1890s during the "Battle of the Systems." Looking for clarity, Paul (1996) states that several leaders such as Ruth Abernathy, Eleanor Metheny, Elizabeth Haley, and Camille Brown "called for an identification of the body of knowledge" (p. 538).

The Discipline Period (1960 to the present)

The third era of change, *the discipline period*, began in the 1960s following Henry's speech at the National Association for Physical Education in Higher Education (NAPEHE), where he posed the question as to whether physical education was a profession or a discipline (Paul, 1996). Although several sub-disciplines existed within the field from the nineteenth century, new sub-disciplines began to develop with the increase in knowledge, especially following Henry's famous address in 1964 where he

questioned the existence of physical education as a profession or a discipline (Paul, 1996). Without a clearly stated central mission (Bain, 1988; Coetzee, 1994; Renson, 1989; Thomas, 1987), the field was open to "splintering" (Paul, 1996, p. 539), as the sub-disciplines threatened to become independent of the larger profession. Likewise, Paul (1996) suggests that the emergence of various elitist sport studies had "no applied movement focus" (p. 540) (i.e., sport history, sport sociology, sport philosophy, and sport administration). The development of "elite sport studies," according to Paul (1996) resulted in the loss of the central mission of physical education which was to "develop a physically educated populace" (p. 540).

The following is a summary of what Paul (1996) lists as four "absolutes" (p. 541) that account for the change and the conflict within the field:

1. human movement through physical activity is central to what physical educators teach and study,
2. physical activity does not have the same academic status as other educational subjects,
3. leaders, from generation to generation and during the same time period, have always disagreed about the purpose of the field of physical education,
4. the field of physical education is constantly evolving, allowing for the focus to shift from one area of study to another (p. 541).

Paul (1996) admonishes her readers that the only hope for a solution of the difficulties within the field will come from the same kind of "revolutionary" (p. 541) thinking that allowed for the shift from the *formal period* to the *natural period* at the end of the nineteenth century.

To summarize, the body of knowledge of physical education has been in a continual state of upheaval and transformation since its beginning as a profession in 1885. In the pre-professional association years of *formal foreign-gymnastics,* the *basic areas of study* was physical training and the *battle of the systems* was the hallmark of the era. However, in the following *natural period,* the *basic areas of study* changed from physical training to sport, recreation, aquatics, and outdoor education. The opposing ideologies of education *through* and *of* the physical defined the era. Lastly, the *discipline period* defined a time where many new sub-disciplines, competing for dominance within the field, emerged to combat the traditional concept of professionalism and contributed to the splintering of the field of physical education. Currently, several scholars (Brooks, 1981; Greendorfer, 1990; Rarick, 1981; Renson, 1990; Ross, 1978; Ziegler, 1975) have reported that a condition of chaos regarding mission and knowledge organization reigns within the field of physical education.

The following section reviews selected graphical models related to the field of physical education.

Graphical Models

As pictures add understanding, so too can graphical models lend clarity to a complex situation. In this section, the author will present several graphical models for the field of physical education that have been offered by scholars within this complex field of study. The reader is advised that similarities exist between models produced by other writers and this author's Model of the Structure

of Knowledge for the Field of Physical Education. However, this writer's model is not merely a simplistic composite of individual elements presented in models by other writers. The model, as presented in this study, graphically represents a synthesis of selected ideas presented by other writers, reorganized to illustrate a graphical presentation of what constitutes the global definition of the structure of knowledge for the field of physical education as defined in this study.

Luther Gulick, early leader in the new physical education movement, was the first to present a holistic symbol representing the field of physical education when he created the emblem for the Young Men's Christian Association (YMCA) in 1887 (Lumpkin, 1998). The inverted triangle (Figure 2.1, p. 58) symbolized the "all-around man" (Lumpkin, 1998, p. 204) and represented unity in the development of mind, body, and spirit. Using epistecybernetic modeling, it can be observed that the three concepts in the Gulick model are included within the fundamental processes domain of the general model created for this study (Figure 2.11, p. 68; for Chapter II figures see pp. 58-72).

Wuest and Bucher (1995) presented a graphical model (Figure 2.2, p. 59) which attempts to present "physical education and sport" (p. 12) as part of human movement phenomena. The authors' model depicts human movement phenomena as a star shaped series of "physical education thrusts" (Wuest & Bucher, 1995, p. 13). In the overview of the model, human movement phenomena is presented as a discipline surrounded by nine disciplinary thrusts: human ecology, dance, educational athletics, physical therapy,

professional athletics, recreation, physical medicine, physical education, and human engineering. An expanded view, representing physical education as a personal and societal life experience, divides human movement phenomena into ten segments. The ten physical education segments are grouped as to atypical, semi-skilled, women, skilled, elderly, children, unskilled, men, adults, and typical. Using epistecybernetic modeling, selected elements of Wuest and Bucher's (1995) model concepts are included within the basic areas of study and modes of inquiry domains of the general model developed for this research (Figure 2.11, p. 68).

Charles (1996) presents a model, Figure 2.3 (p. 60), symbolizing the connectedness of kinesiology (physical education) as a field of study. According to Charles (1996), the fabric of the umbrella shaped design demonstrates the "knowledge foundations of kinesiology" (p. 155). Charles (1996) further explains that the knowledge foundations are "supported by the learning skills which will be acquired during the process of studying human movement phenomena" (p. 155). Using epistecybernetic modeling, selected conceptual elements represented by the segments of the fabric of Charles' (1996) umbrella-model are in general contained within the modes of inquiry domain of the general model proposed later (Figure 2.11, p. 68). Charles' (1996) article was directed towards and limited to the connectedness of the modes of inquiry. Charles (1996) offered no information concerning the content of the "The Study of Human Movement Phenomena" shaft that supports and is covered by the overarching umbrella of knowledge.

In addition to Charles' model of the connectedness described in the preceding paragraph, Charles (1996) presents (Figure 2.4, p. 61) an integrated model of kinesiology (physical education) that attempts to "cover the broad realms of all forms of human movement and the full range of scholarship" (p. 156) within the field. Charles' integrated model of kinesiology is divided into five categories that describe kinesiology (physical education). Although they are reworded and organized in another way, these five categories may be found within the Model for the SOK of the Field of Physical Education (Figures 2.11-2.15, pp. 68-72). The upper diamond symbolizes descriptive and prescriptive studies of human movement. The descriptive study represents the sub-disciplines of physical education that are also represented by the *modes of inquiry domain* in the *general model* (Figures 2.11 & 2.13, pp. 68 and 70, respectively). The prescriptive study of human movement refers to the application of teaching scholarship that is included within the *pedagogy sub-domain* of the *modes of inquiry domain* (Fig. 2.13, p. 70). The bottom diamond of Charles' integrated model subdivides human movement into three areas of study: sportive, symbolic, and supportive categories. Sportive movement focuses on the skill-related aspects of athletic activity that is also categorized within the *basic areas of study domain* (Fig. 2.12, p. 69). Symbolic movement refers to an appreciation of the aesthetic quality of movement and is subsumed within the *philosophy sub-domain* of the *modes of inquiry domain* (Fig. 2.13, p. 70). Supportive movement is the health-related aspect of physical activity that provides for improved efficiency of

movement and well being in daily living and is categorized throughout the six sub-domains of the *fundamental processes domain* (Fig. 2.14, p. 71).

Renson (1990) proposes a fully integrated model (Figure 2.5, p. 62) for the field of physical education and suggests that the name for this integrated field of study be *kinanthropology*, "a holistic, integrated, cross-disciplinary science of humans in movement" (p. 108). Renson's holistic approach integrates the "physical-organic, the motor, and the behavioral components" ... "that form the fundamental subject matter of the science of humans in movement" (p. 108). Renson's (1990) model for the field of physical education (kinanthropology) includes five different areas of specialization. The first, *developmental kinanthropology* studies the human being from the integrated perspective of physical and social growth and development. The second, *differential kinanthropology* studies the differences between groups in the "structure of physical, motor, and behavioral characteristics" (p. 108). The third, *social-cultural kinanthropology* studies the impact of cultural and social determinants on the physical, motor, and behavioral sides of human movement. The fourth, *clinical kinanthropology* is involved with the application of various therapies to the interrelated areas of physical, motor, and behavioral disorder. The fifth, *agogical kinanthropology*, "studies the educational process in the interrelated areas of physical/health education, movement/safety education, and sport/dance/outdoor education" (p. 108). Renson (1989) asserts that his integrated model for the field of kinanthropology provides

a paradigm for understanding humans in movement within the context of the five areas of specialization listed above.

Following the idea of "*homo movens*" (p. 102), the study of man in the context of movement, Renson (1990) suggested another graphical model for understanding physical education (Figure 2.6, p. 63). Renson's concept of the Homo Movens model consists of three elements from the *basic areas of study domain* (physical exercise, sport, and games) and one element (physical culture) from the *fundamental processes domain (cultural sub-domain)* as overlapping ovals of movement activities. The play-work continuum is also presented as fundamental to physical activity. With the exception of "physical culture" (p. 102), Renson's model was subsumed within the *basic areas of study domain* of the proposed new model (Figure 2.12, p. 69).

Holt-Hale (1993) developed a model depicting the basic physical skills of human movement (Figure 2.7, p. 64). The model was created in the form of a wheel within a wheel. The central axis of the inner wheel was divided into three equal parts and represented *manipulative, nonmanipulative,* and *locomotor* physical skills. Specific examples of each of three categories of basic skills were included on the outer radius of the inner wheel. The outer wheel included the categories of space awareness, effort, and relative relationships between people and objects. The design of the wheels indicate that the outer wheel may be rotated around the inner wheel so that the dimensions of space, effort, and relative positions can articulate with any particular basic physical skill. The Holt-Hale model of the wheel may be subsumed under the *basic physical skills*

sub-domain of the *basic areas of study domain* of the new SOK for the field of physical education (Figure 2.13, p. 70).

Several scholars (Coetzee, 1994; Lumpkin, 1998; Saunders, 1994; Ziegler, 1979) have presented graphical models of the sub-disciplines (modes of inquiry) for the field of physical education. A comparative analysis of the sub-disciplines (Table 2.1, p. 58) presented by each author demonstrates what each believes the sub-disciplines to be within the SOK for the field of physical education. Table 2.1 contains a summary of the comparative occurrence of the sub-disciplines that are identified by Coetzee (1994), Lumpkin (1998), Saunders (1994), and Ziegler (1979).

It is of special interest to note that Saunders' (1994) graphical model of the SOK of physical activity and sport not only presents the sub-disciplines of the field but also diagrams the interrelationship of the sub-disciplines to the parent disciplines (Figure 2.8, p. 65). Three categories are presented by Saunders (1994) for the study of physical activity and sport, i.e., sport science, sport pedagogy, and sport studies. While not all sub-disciplines are represented in the model, the idea of a balanced interrelated model for the study of the field of physical education is presented.

Allen (1964) interpreted the impact of physical education to be upon the "whole man" (p. 40) and presented the circle to symbolically represent all six aspects of the human being (Figure 2.9, p. 66). The six aspects of the whole man as depicted by Allen are the physical, mental, emotional, spiritual, social, and cultural. These six aspects of the human being are presented on the *fundamental*

processes domain (Figure 2.14, p. 71) of the SOK for physical education.

This section has presented an overview of a representative sample, from a review of the related literature, of graphical models of the SOK for the field of physical education. In the following section, the writer will present a composite model developed along epistemological lines and from the review of the related literature.

Development of the Structure of Knowledge Model For the Field of Physical Education

The Basic Model

The basic model (Figure 2.10, p. 67) is presented in the form of mirror images of a cube. The cube was selected to represent the structure of knowledge (SOK) for the field of physical education for three reasons. The first reason is that the cube is an excellent generic structure of knowledge model for the new science of epistecybernetics, and, as such, this writer believes should work for any discipline or field of knowledge. It is also this writer's opinion that the cube possesses the least amount of emotional baggage when presented to physical educators as compared to other shapes or designs symbolizing familiar sports equipment. The second reason is that the cube does a good job of presenting a relatively easily understood graphic that shows the general model and the four major components: *basic areas of study, modes of inquiry, fundamental processes*, and *dominant technologies* of structure of knowledge theory (Hensley, 1995). The third reason is that the cube is a three dimensional shape that

suggests the interrelated quality (Bain, 1988; Cagigal, 1978; Coetzee, 1994; Renson, 1989) of physical education as a field of study. Multi-disciplinary and interdisciplinary (Renson, 1989) approaches to the understanding of the SOK for the field of physical education may also be considered with the aid of the many domains of the cube. It is this writer's belief that an improvement in the growth of the understanding, organization, and utilization of physical education knowledge will occur as a result of this study.

The General Model

The General Model (Figure 2.11, p. 68) of the Structure of Knowledge for the Field of Physical Education developed in this article is a detailed graphical description of the Basic Model (Figure 2.10, p. 67) presented above. Each of the four domains of the cube display the four basic components which are the basic areas of study, modes of inquiry, fundamental processes, and dominant technologies, of Hensley's (1995) structured knowledge theory. The *basic areas of study domain* (Figure 2.12, p. 69) is grouped according to the four sections of physical activity. Reading from the bottom to the top are the sections of: (D) the play-work continuum, (C) reflexive body movements, (B) the basic physical skills, and (A) the major knowledge content outcomes. The *modes of inquiry domain* (Figure 2.13, p. 70) on the left side of the cube represents the sixteen sub-disciplines used in the classification of physical education that are categorized according to three sub-domains of knowledge stewardship: pedagogy, the humanities, and the social and biological sciences. The third component, *fundamental processes*

domain (Figure 2.14, p. 71), is located on the top face of the cube and demonstrates the process of physical education as physical activity experienced through and of the physical, mental, emotional, spiritual, social, and cultural aspects of life. The right face of the cube represents the *dominant technologies domain* (Figure 2.15, p. 72), these are the tools and aids that make the processes of physical education possible. The dominant technologies make use of uniforms, implements, facilities, rules, scoring systems, statistics, and strategies.

The volume of the cube between the four domains represents a symbolic area of an infinite locus of points. Lines drawn from the elements on the domains can intersect at various junctions where unique, interrelated knowledge situations can be manifested and studied. The interior volume is the space where the synergistic relationship of all the basic elements of the body of knowledge of physical education may be represented. This writer believes that this three dimensional space is the conceptual place where the original physical educators hoped the multi-disciplinary and cross-disciplinary nature of physical education would be manifested so that the utopian goals to solve problems relating to health, fitness, and social reform could be realized.

The Basic Areas of Study

The *basic areas of study domain* of the model (Figure 2.12, p. 69) refers to the four basic subdivisions of physical activities that are fundamental to all human movement activities. The model illustrates an interrelated and somewhat hierarchical structure of the fundamental

activities of human movement. Starting at the bottom is the play-work continuum. According to Ellis (1973), play and work are basic to human movement activity. Here play and work are represented along a continuum as shifting attitudes toward activity determine the perception of the degree of work or play occurring during a particular activity. At the next higher level is the reflexive body movements section. Basic movements that involve both physical and organic reflexes are located at this level. Reflexive body movements as a section of the basic areas of study section are placed above the play-work continuum because they require the least amount of cognitive involvement of the other physical activities. Kanouse (1993-1996) has defined "reflex" as an "involuntary response to a stimulus by the animal organism." The third most complex sub-division involves the common physical skills of locomotion, axial movement, position, etc. that are fundamental to involvement in all physical activity but are basic skills and are subsumed under the next, more complex, section of major knowledge content outcomes. The major knowledge content outcome section is organized into nine domains of knowledge outcomes in which complex physical activity can be organized: employment, exercise, physical fitness, spectatorism, athletics, outdoor adventure pursuits, dance, sports, and games.

The Modes of Inquiry

The *primary modes of inquiry domain* (Figure 2.13, p. 70) is divided by general category as to pedagogy, humanities, and education that are used to investigate the social and biological sciences. The sub-disciplines of

physical phenomena of human movement provide an opportunity for a holistic and integrated approach to study within the field. The sub-disciplines are teaching methodologies, history, philosophy, literature, art, cultural anthropology, sociology, psychology, management, motor control and motor learning, motor development, kinanthropometry, biomechanics, exercise physiology, adapted physical education, and sports medicine. It is because of this diverse assembly of disciplines within the field that physical education is considered interrelated, multi-disciplinary, and cross-disciplinary (Renson, 1989). Specialists within the field come from these diverse disciplines to study human movement under the banner of physical education (Bunker, 1994), kinesiology (Estes, 1994; Charles, 1996), kinanthropology (Renson, 1989), any of a myriad of the sciences of human movement descriptors (Coetzee, 1994). Many of these disciplinarians are housed together in university physical education departments but, nevertheless, maintain allegiance to their mother discipline and only share the phenomena of human movement with other similarly minded specialists (Thomas, 1987). Nevertheless, the field of study of physical education has owed the expansion of its body of knowledge to scientists working within the many sub-disciplines of the field of physical education (Estes, 1994).

The Fundamental Processes

There are six *fundamental processes* sub-domains (Figure 2.14, p. 71) for the field of physical education. The physical sub-domain refers to the organic and neuromuscular systems of the human body (Wuest & Bucher,

1995). The mental sub-domain is concerned with the six methods of learning: knowledge, comprehension, application, analysis, synthesis, and evaluation of physical activity (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956). The emotional sub-domain is that zone where feelings, moods, and temperaments are associated with physical activity (Goleman, 1995). The spiritual sub-domain of physical activity is expressed through religion, symbolism, mysticism, and metaphysics (MacAloon, 1978). The social sub-domain focuses on interaction of people in physical activity through social relationships, organizations, behaviors, and processes (Coakley, 1986). The cultural sub-domain relates to rules, codes, and laws as established by the customs, mores, and folkways of the culture (Barrow, 1973). These six fundamental process sub-domains leave students of physical education in a large labyrinth of research questions pertaining to the totality of the human being. Researchers who have studied human movement (Renson, 1989) from detached discipline oriented perspectives are left without the whole, leaving their research incomplete.

The Dominant Technologies

According to Hensley (1995), the *dominant technologies* (Figure 2.15, p. 72) are the tools that are used in a field of study. The dominant technologies for physical education are the tools, which make the major knowledge content outcomes possible and provide an easily recognizable identity or symbol for the activity. For physical education, there are seven categories for the dominant technologies. (1) *Uniforms* are designed to allow a certain

kind of physical activity, that is soccer players wear lightweight jerseys designed specifically for ease of identification and body heat transfer. American football players wear equipment designed to protect the player from the violent contact that is part of the sport. (2) Each physical activity uses *implements* designed to specifically meet the needs of the activity. Throwers in the sport of track and field throw the javelin, the discus, or hammer. However, each implement has its own unique method for successful throwing. Implements may be as small and as simple as a golf tee or have a larger and more technically complex design such as fitness equipment used in testing cardio-respiratory parameters. (3) Each physical activity requires a *facility* for the appropriate activity. Whether they are indoor or outdoor, provided by nature or manufactured by man, facilities are those places where physical activities take place both for the conduct of the activity and for the spectator. (4) *Rules* govern the conduct of the physical activity. Rules are the agents by which desired behavior is maintained; it is the etiquette of physical activity (Huizinga, 1955). (5) *Systems* for keeping score are the technologies used for specific events such as score boards, panels of experts, systems and tables of scoring, and methods for tabulating scores. (6) *Statistics* are the records of achievement and standings that are kept to describe and compare various major knowledge content outcomes. (7) *Strategies* are the methodologies for winning competitive physical activities and for improving the level of performance of the activity.

Summary

The new general model of the SOK is presented in the shape of a cube because it allows the observer to view easily the multi-dimensional and interrelated nature of the field of physical education. The four domains: *basic areas of study, modes of inquiry, fundamental processes*, and *dominant technologies* represent the multi-disciplinary and interdisciplinary approach to the study of the field of physical education. The interrelated aspect of the structure of knowledge for the field of physical education is symbolized by the space within the cube. Lines emanating from the four faces intersect at various places within the cube to indicate and describe the complexity of the SOK for the field of physical education.

Using the four domains of the model will remind researchers that the study of physical education or any of its fundamental elements is not limited to a study of just the physical body, but that mental, emotional, social, cultural, and spiritual components are also factors influencing function in physical activities. This writer believes that the cube will be used to help researchers remember to keep in mind the interrelated nature of physical education for the edification of this unique and important field of study.

The model will help investigators be cognizant of the multi-dimensional and interrelated nature of study within the field of physical education.

Conclusion

The field of study, historically referred to as physical education, has never had unanimous and universal

agreement concerning its central focus, its name, or even its body of knowledge, for it is constantly evolving to meet new physical education needs. Terms central to the understanding of the diverse nature of physical education are unclear. From time to time, on the national level, philosophical battles erupt over what the field should be called and what the central focus of the field should be. It is this writer's hope that the reader has gained some understanding of the complexity of purpose that is the legacy of this important field of study.

This generic epistecybernetic Model of the SOK for the Field of Physical Education is an attempt to present, in an eclectic model, the essential elements of knowledge for the field, without special regard to hierarchical relationships. Three of the four domains of the general model are well documented in the literature. Outside of a few minor elements, the general model should prove to be non-controversial. Elements within the basic areas of study domain are well cataloged in the literature with the exception of *spectatorism* and *employment*. The modes of inquiry domain should pose little controversy concerning the sub-disciplines listed as they are well represented within the body of literature. Only the fundamental processes domain possesses the potential to be very controversial because of the inclusion of *spiritual* as a domain element. However, test results show very little exception to the use of *spiritual* as a domain element. The dominant technologies domain contains a number of elements that are not usually considered to belong to the field of physical education within mainstream physical education. Perhaps conducting this study will increase the awareness

of certain technologies that have been overlooked as significant to the field of physical education.

The following pages (58-72) contain Table 2.1 (p. 58), summarizing different writer's lists of sub-disciplines within the field of physical education, graphical models (Figures 2.1-2.9, pp. 58-66) discussed in the review of literature, and the Model of the Structure of Knowledge for the Field of Physical Education developed from this review of literature (Figures 2.10-2.15, pp. 67-72).

This concludes Chapter II of this dissertation. The following chapter contains a presentation of the methodologies and procedures used in this study.

Table 2.1. Comparative occurrence of sub-disciplines of the SOK of physical education.

Sport or movement sub-disciplines	**Ziegler's (1979) Sport studies**	**Coetzee's (1994) Human Movement Science**	**Saunders' (1994) Physical activity and sport**	**Lumpkin's (1998) Physical education and sport**
Applied		X		
Awareness		X		
Biomechanics	X	X	X	X
History	X	X	X	X
Injuries		X		X
Management		X		X
Medicine				X
Motor Development		X		X
Motor Learning		X		X
Pedagogy		X	X	X
Philosophy	X	X		X
Physiology	X	X	X	X
Psychology	X	X	X	X
Recreation		X		
Research Methodology		X	X	
Sociology	X	X	X	X

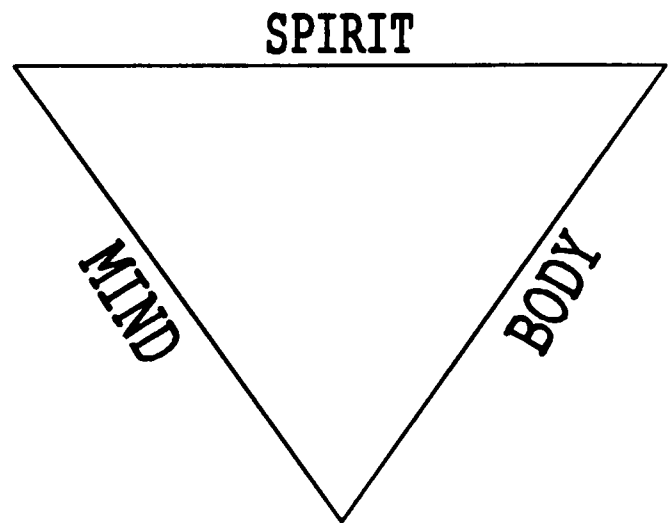


Figure 2.1. Symbol for YMCA.

Source: Excerpted from A. Lumpkin, Physical Education and Sport, 1998, p. 204.)

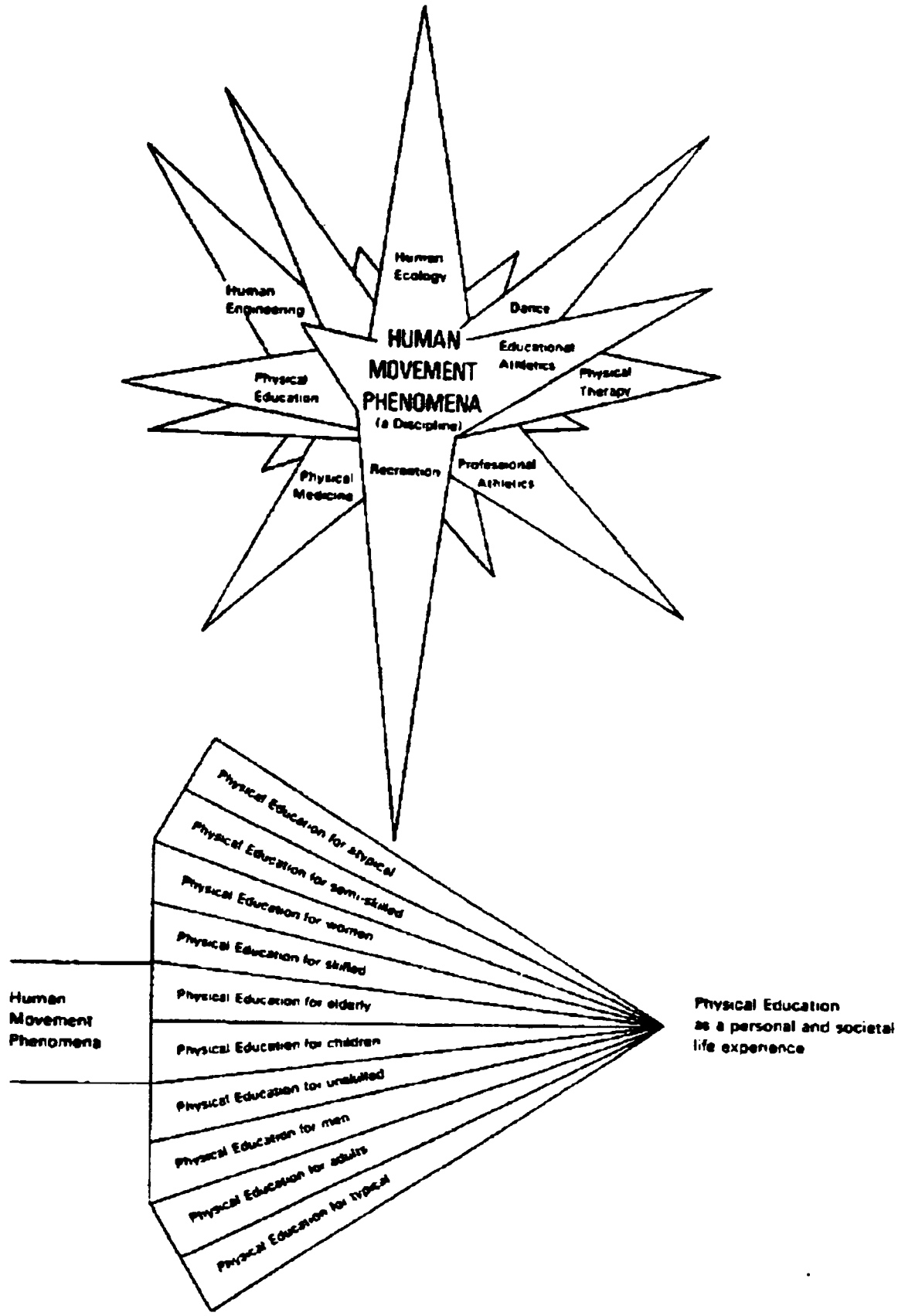


Figure 2.2. Model of Human Movement Phenomena.

Source: Excerpted from D. A. Wuest and C. A. Bucher, Foundations of Physical Education and Sport, 1995, p. 13.

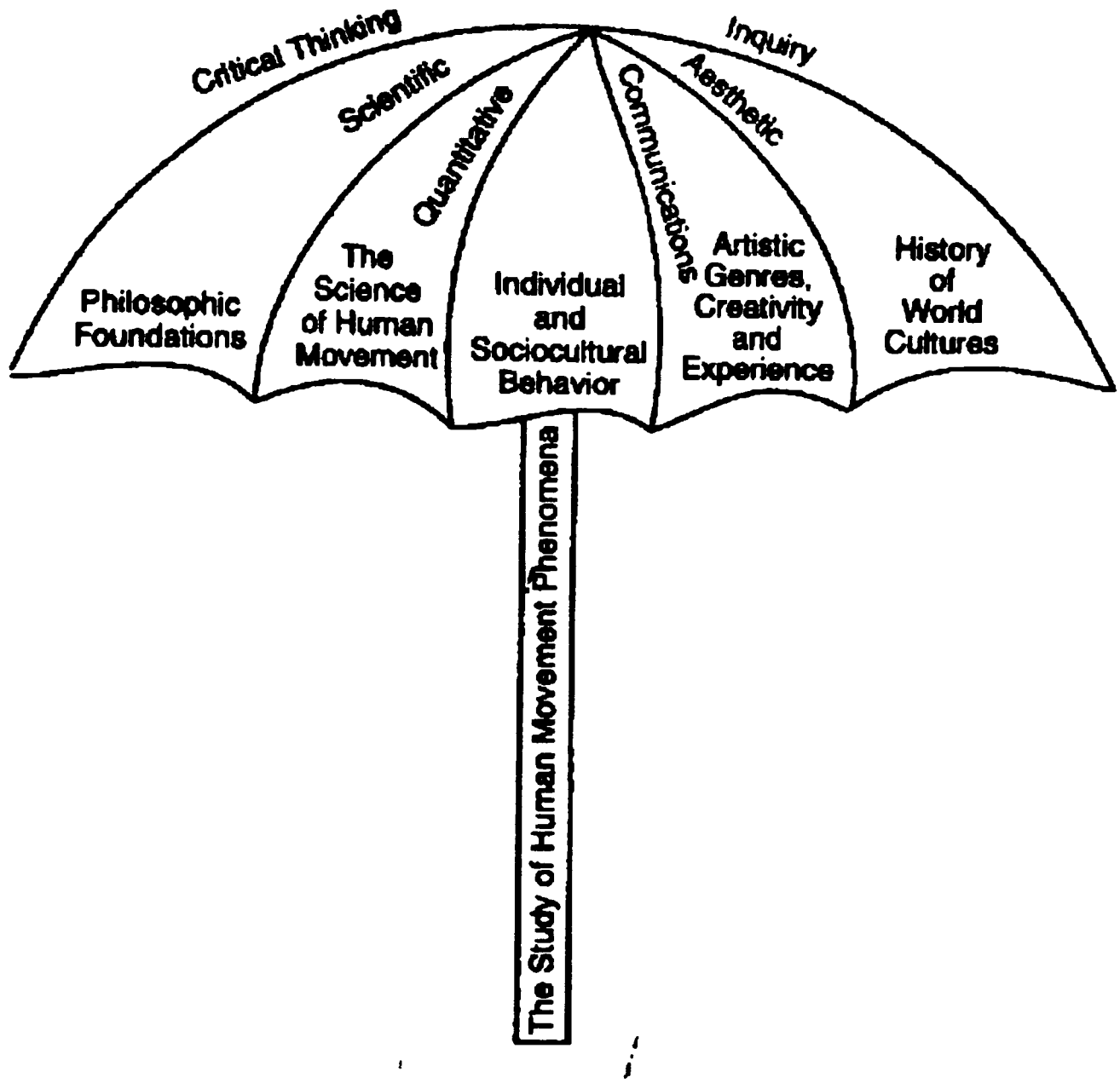


Figure 2.3. Model of Connectedness of Kinesiology.

Source: Excerpted from J. M. Charles, "Scholarship Reconceptualized: The Connectedness of Kinesiology," 1996, p. 155.

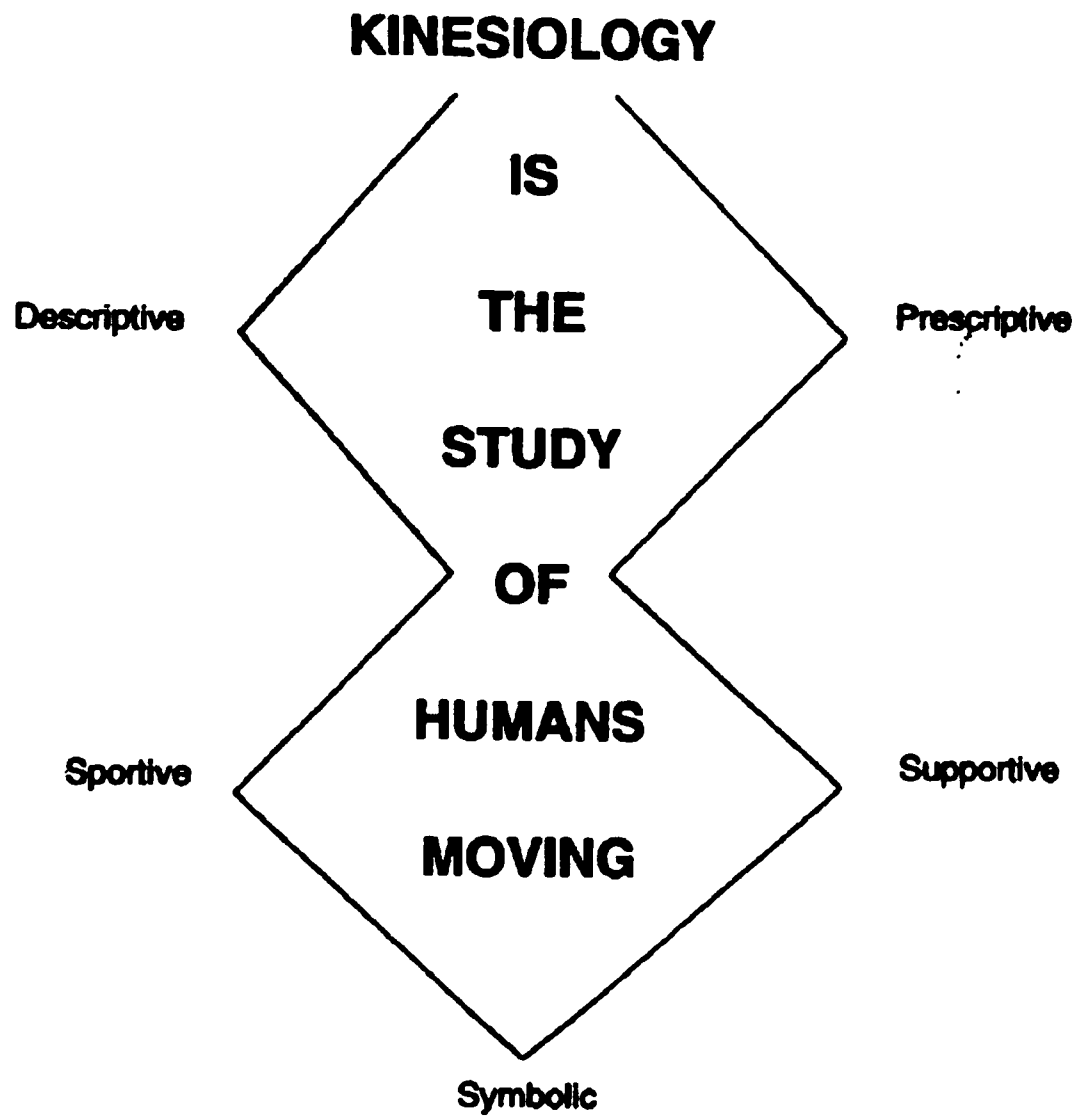


Figure 2.4. The Integrated Model of Kinesiology.

Source: Excerpted from J. M. Charles, "Scholarship Reconceptualized: The Connectedness of Kinesiology," 1996, p. 156.

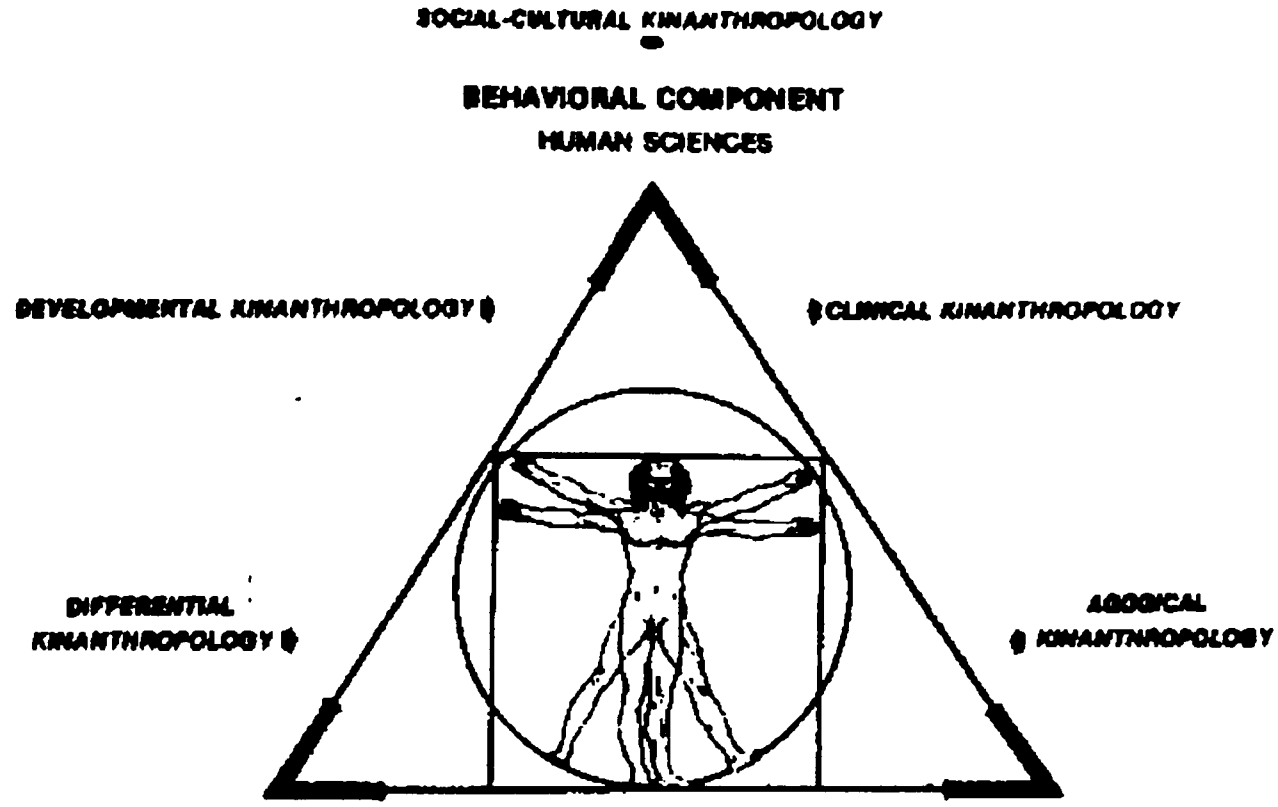


Figure 2.5. The Integrated Model for Kinanthropology.

Source: Excerpted from R. Renson, "From Physical Education to Kinanthropology: A Quest for Academic and Professional Identity," 1989, p. 249.

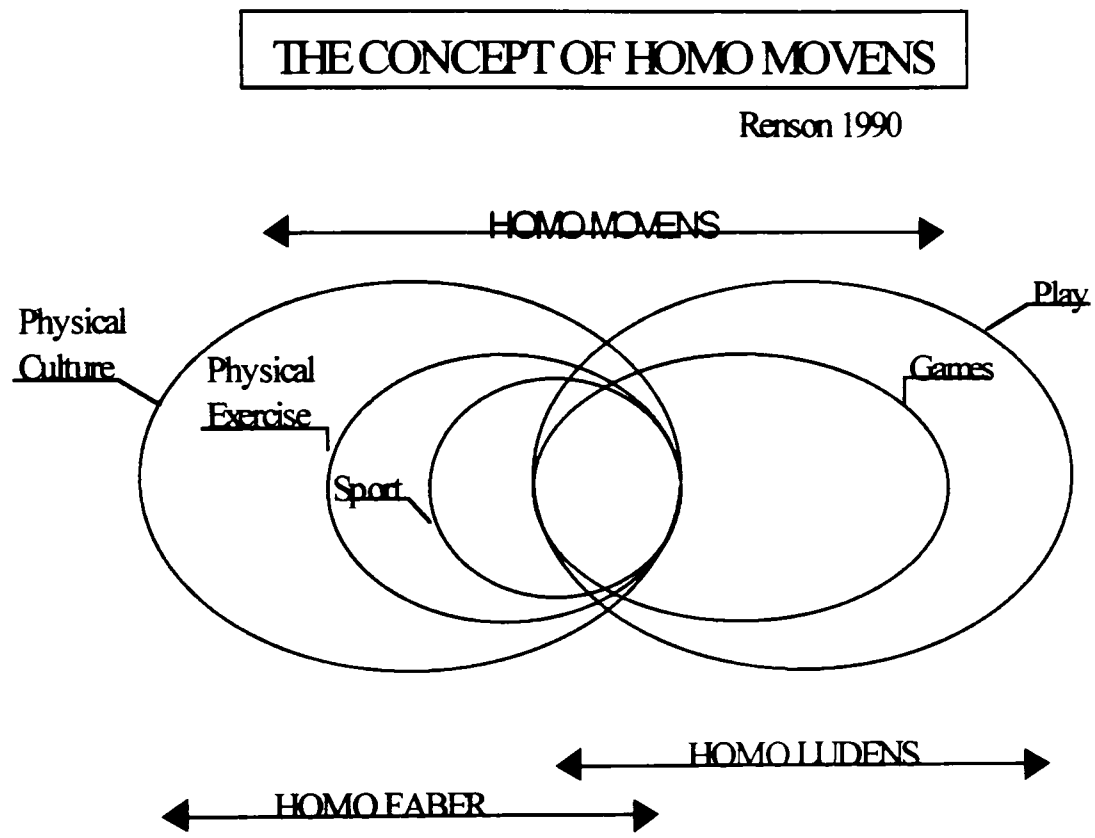


Figure 2.6. Model for the Concept of Homo Movens.

Source: Excerpted from R. Renson, "Homo Movens: In Search of Paradigms for the Study of Humans in Motion," 1990, p. 102.

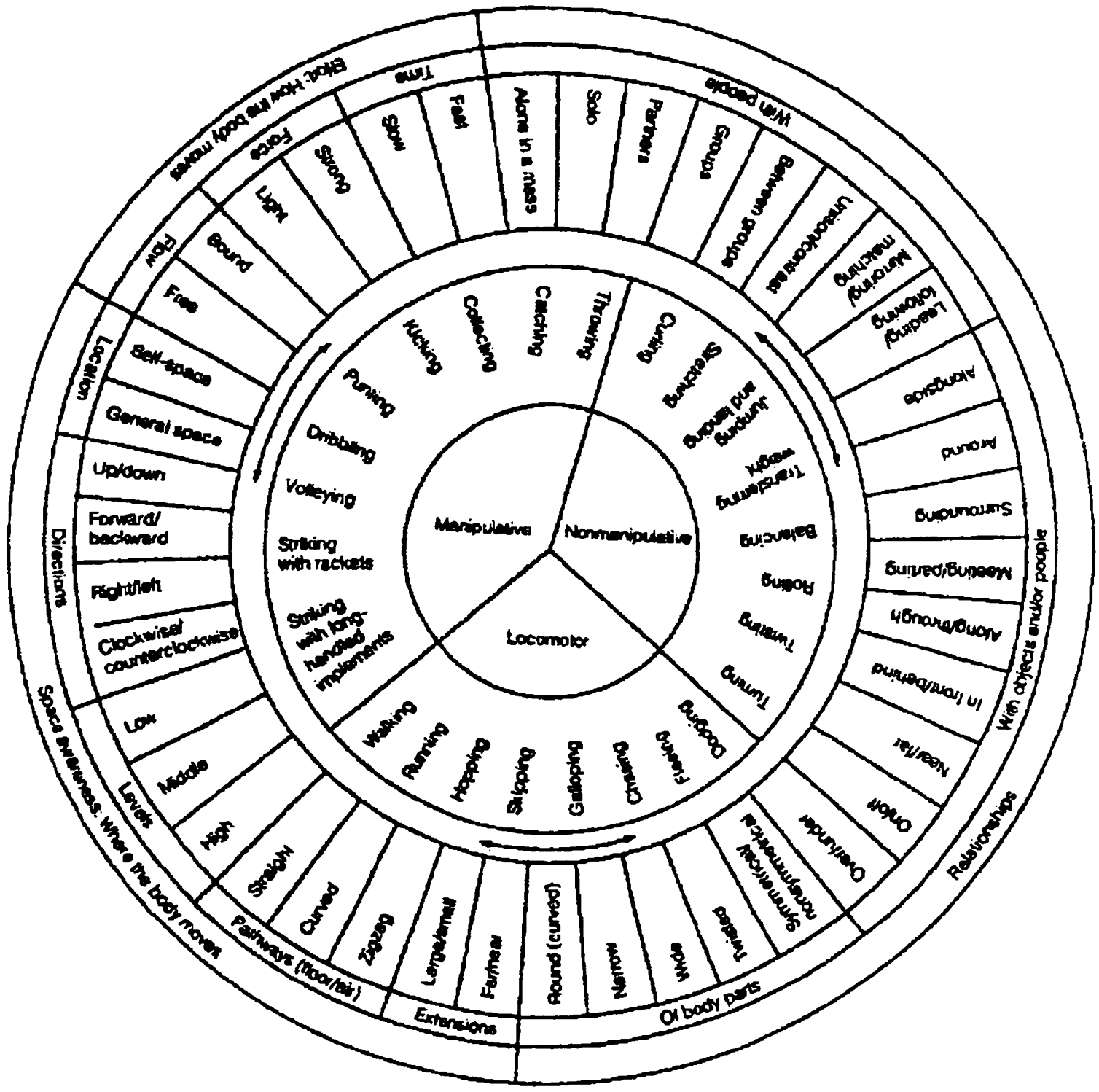


Figure 2.7. Wheel Model of Basic Physical Skills.

Source: Excerpted from S. A. Holt-Hale, On the Move, 1993.

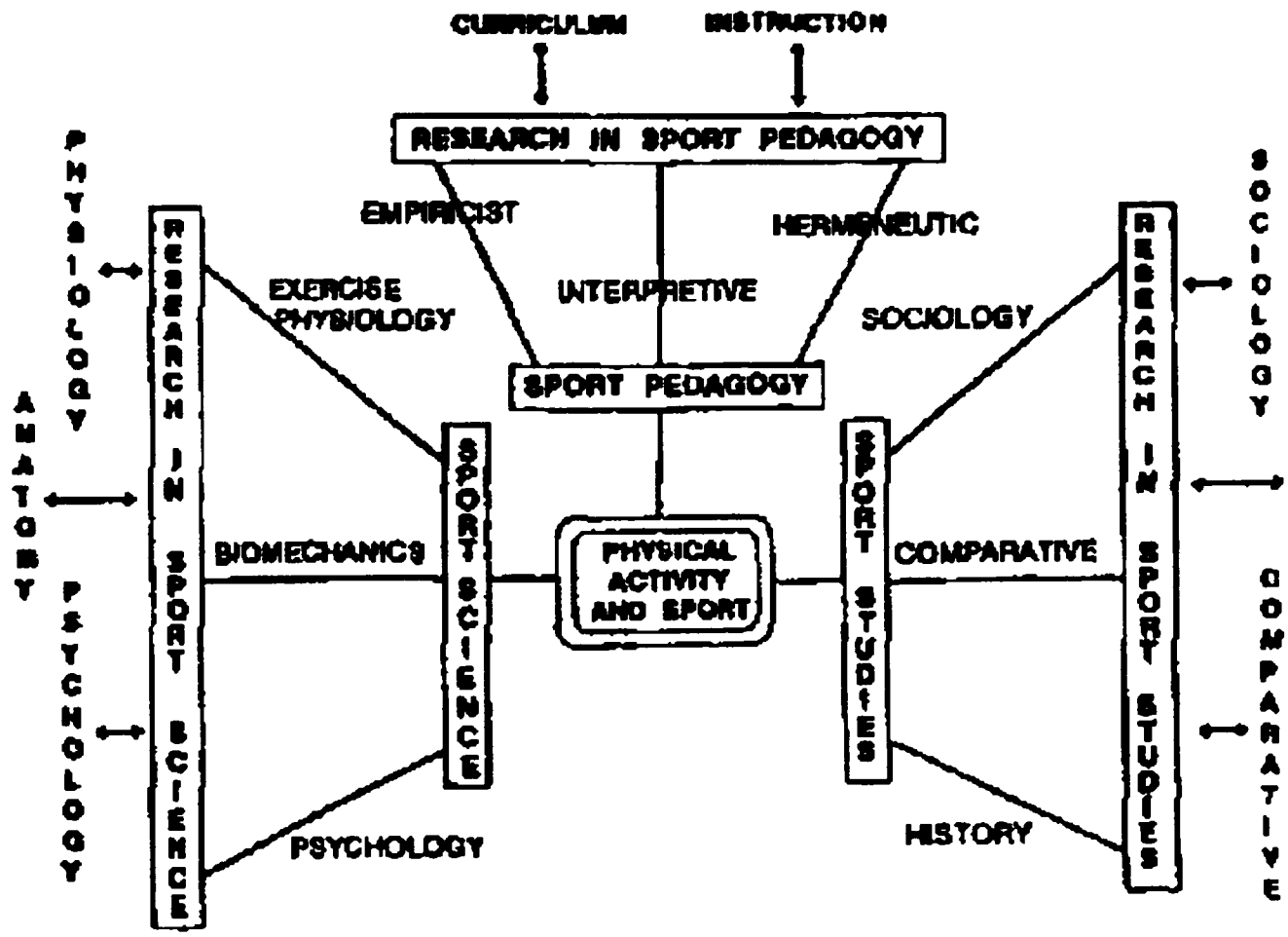


Figure 2.8. Sub-disciplines Model for Physical Activity and Sport.

Source: Excerpted from J. E. Saunders, "Time for Change?: Models for Curriculum Design in Physical Education Teacher Education," 1994, p.23.

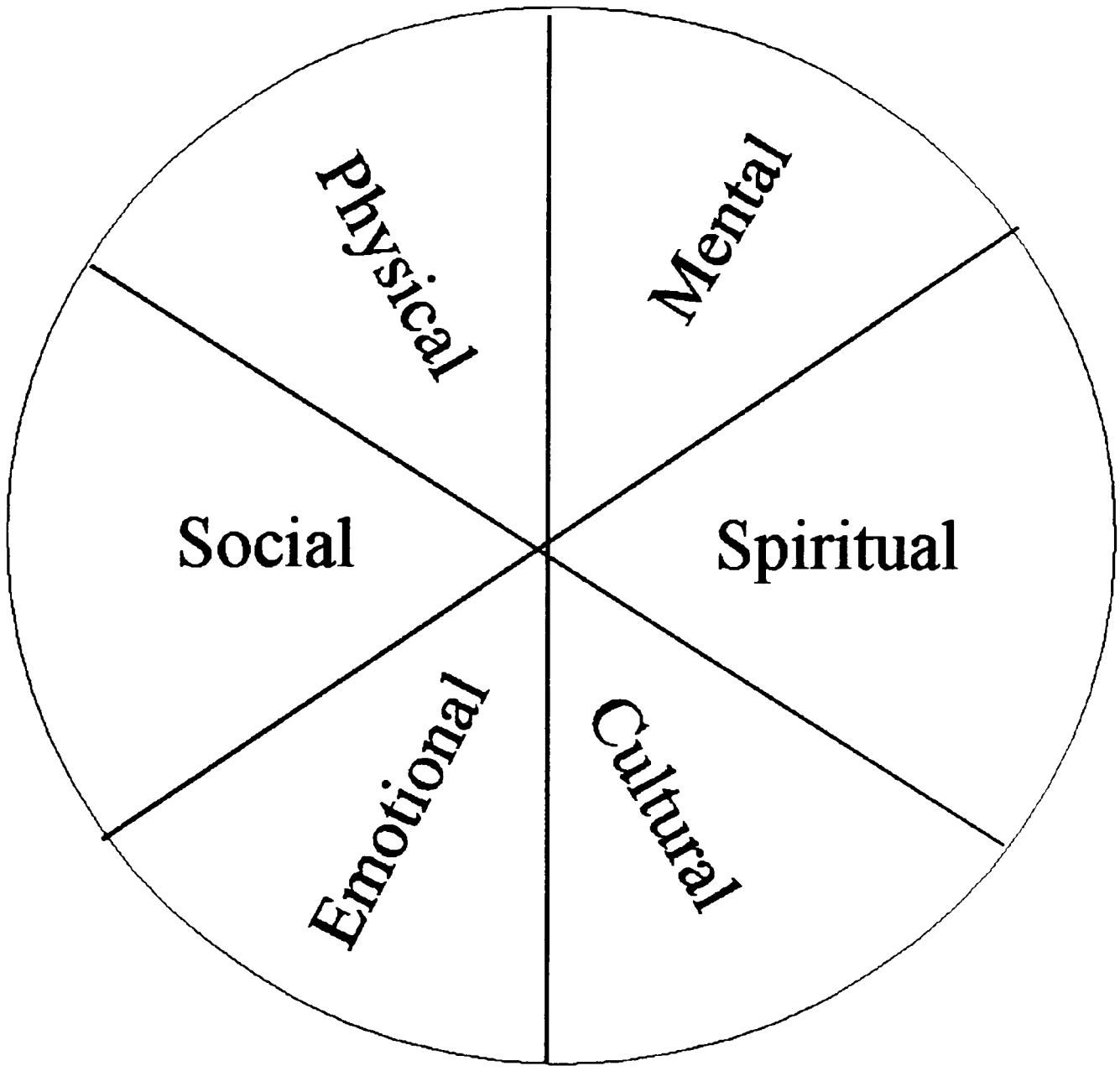
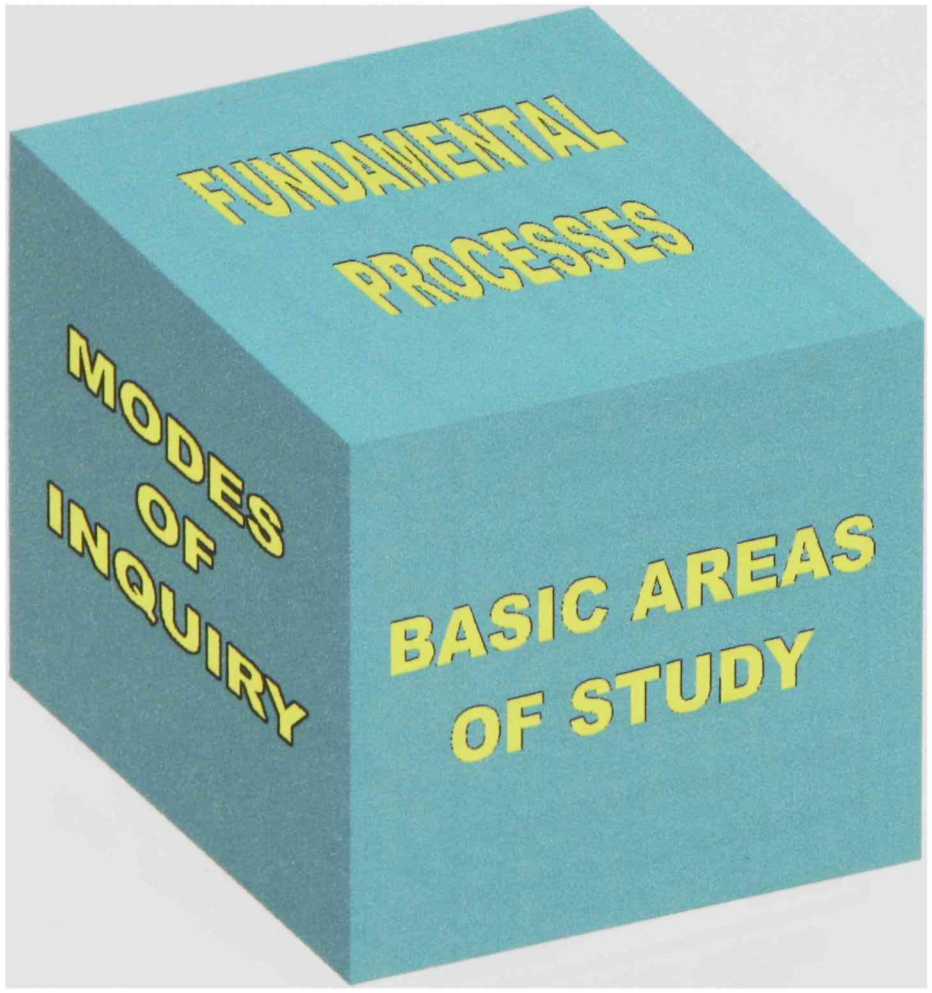


Figure 2.9. Model for the Six Aspects of the Whole Person.

Source: Excerpted from C. L. Allen, "This is the Year," 1964, p. 40.



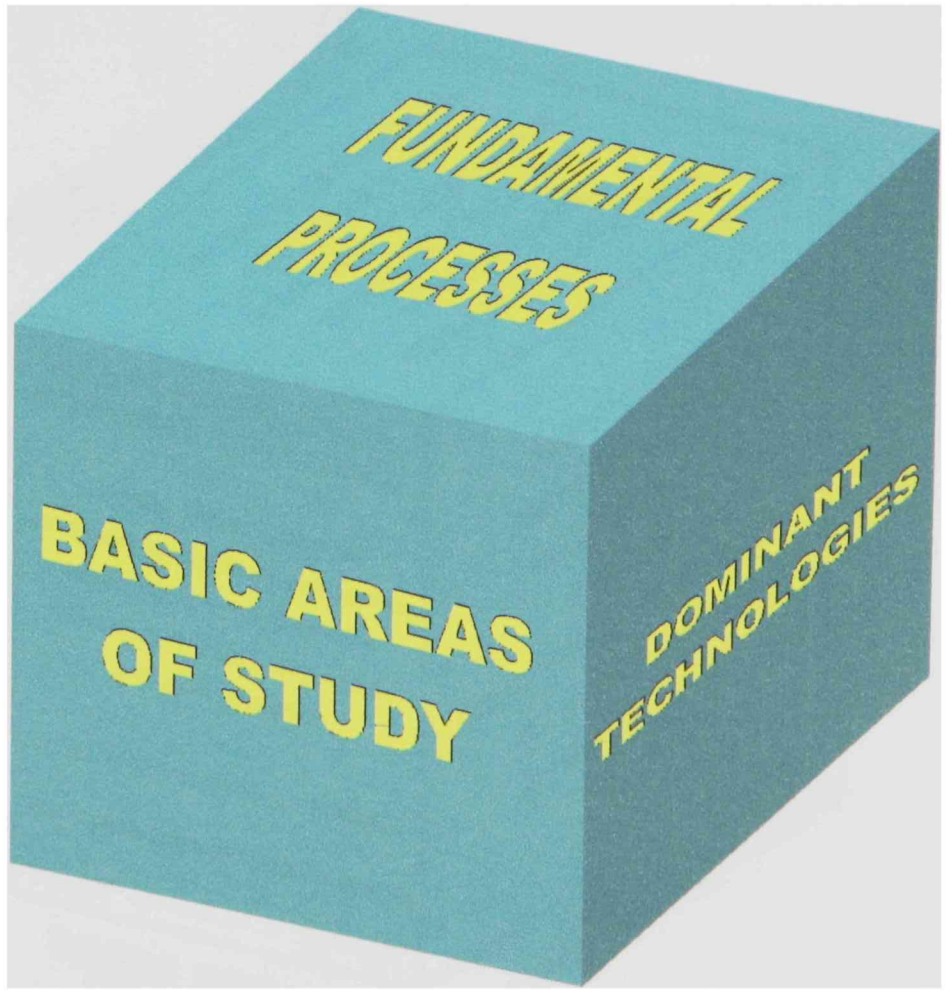


Figure 2.10. The Basic Structure of Knowledge Model for the Field of Physical Education.

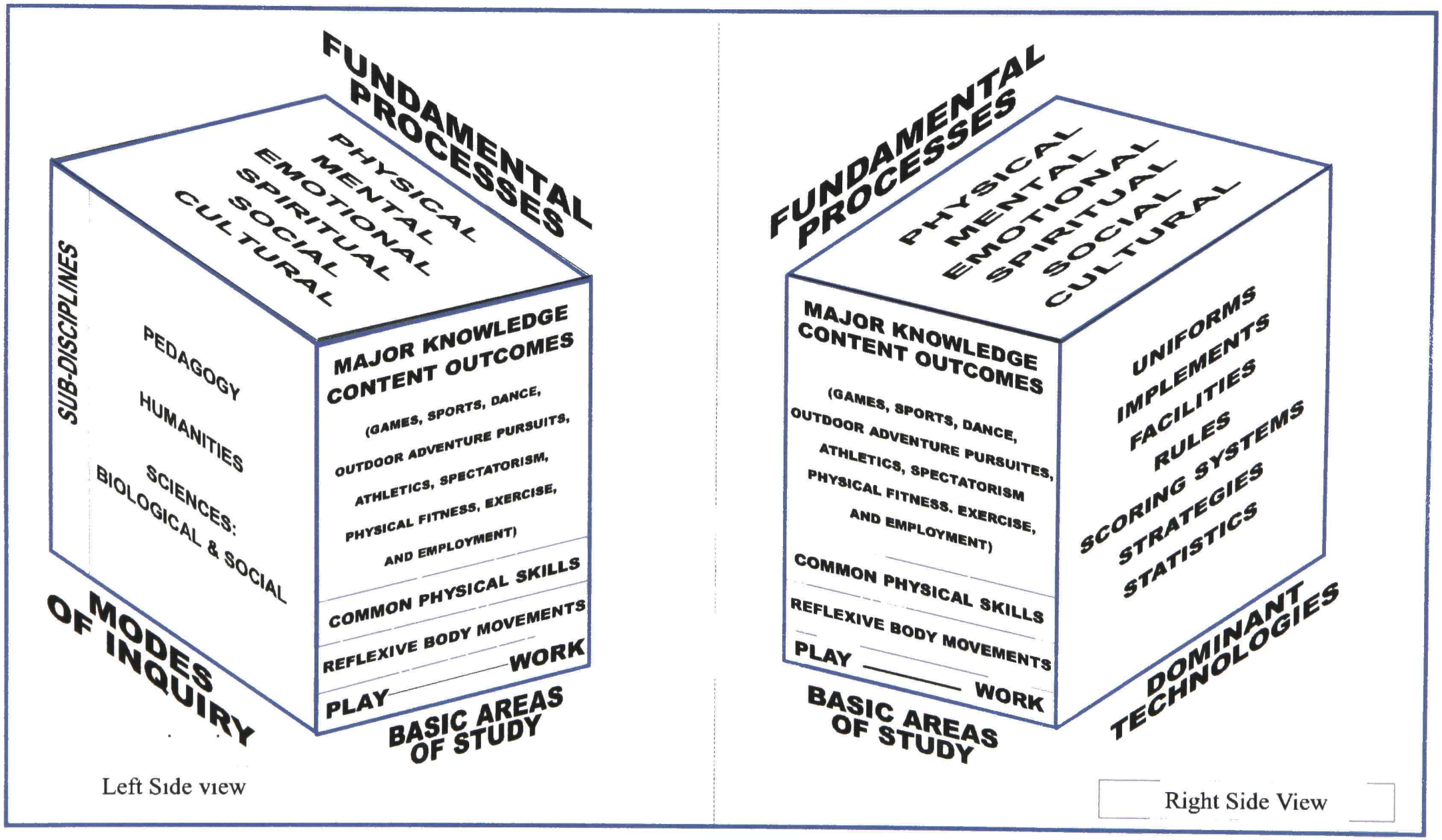


Figure 2.11. The General Model of the Structure of Knowledge for the Field of Physical Education.

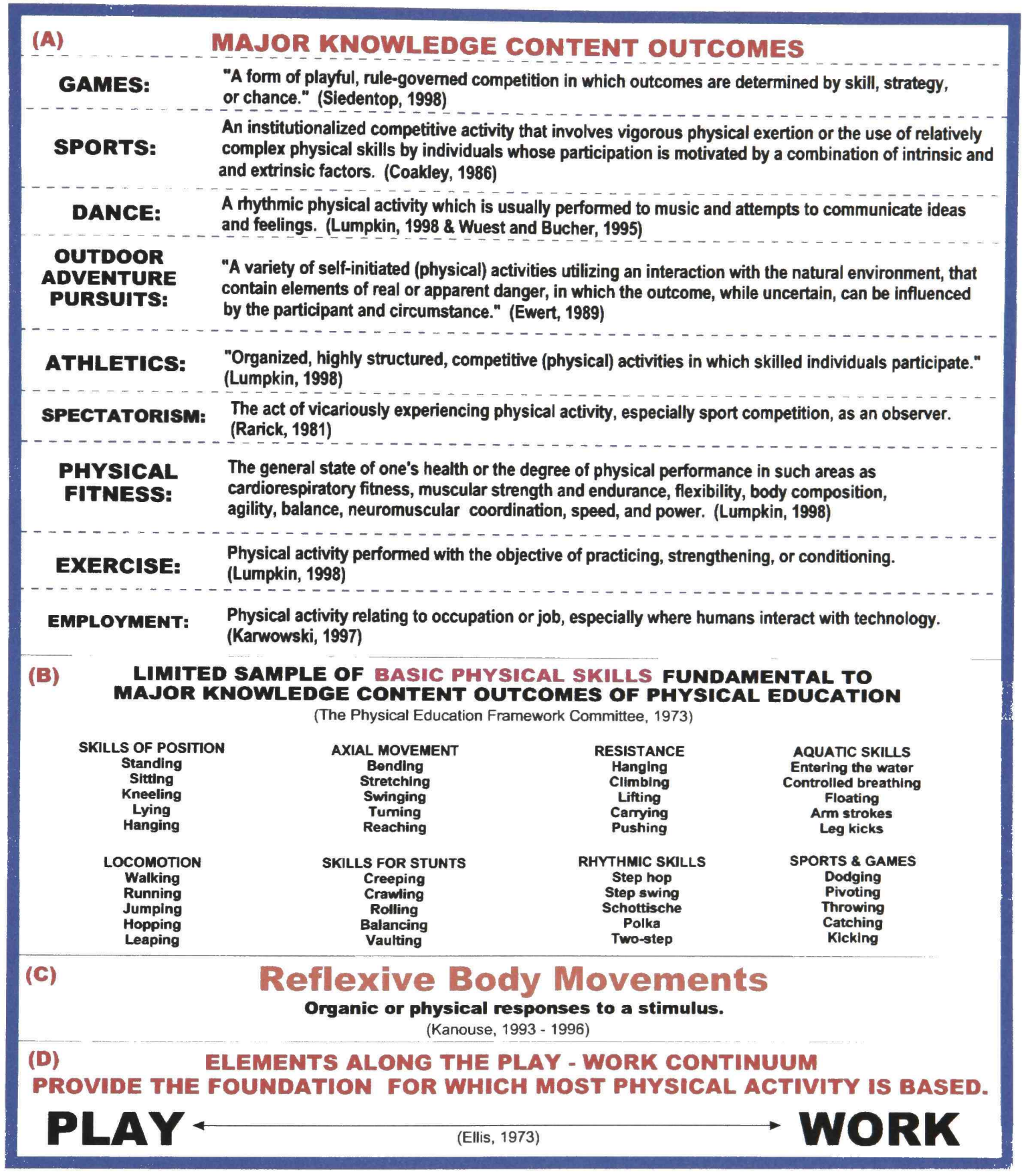


Figure 2.12. The Basic Areas of Study Model of the Structure of Knowledge for the Field of Physical Education.

SUB-DISCIPLINES

(Harris, 1993; Lumpkin, 1998; Park, 1987; Siedentop, 1998)

Exercise Physiology (Lumpkin, 1998)	Adapted Physical Education (Lumpkin, 1998)	Sports Medicine (Lumpkin, 1998)	BIOLOGICAL SCIENCES (Harris, 1993)
Motor Development (Schmidt, 1988)	Kinanthropometry (Day, 1986)	Biomechanics (Harris, 1993)	
Motor Control and Motor Learning (Schmidt, 1988)			SOCIAL (Harris, 1993)
Management (Harris, 1993)			
Psychology (Lumpkin, 1998)	Sociology (Harris, 1993)	Cultural Anthropology (Henry, 1964)	
History (Estes, 1994)	Philosophy (Estes, 1994)	Literature (Estes, 1994)	Art (Kunst, 1989)	HUMANITIES (Estes, 1994)
Teaching Methodologies (Harris, 1993)			PEDAGOGY (Estes, 1994)

Figure 2.13. The Modes of Inquiry Model of the Structure of Knowledge for the Field of Physical Education.

PHYSICAL:	Includes the organic and neuromuscular systems of the body. (Wuest & Bucher, 1995)
MENTAL:	Involves the six methods of learning: knowledge, comprehension, application, analysis, synthesis, and evaluation of physical activity. (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956)
EMOTIONAL:	The feelings, moods, and temperament associated with physical activity such as fear, anger, sadness, and enjoyment. (Goleman, 1995)
SPIRITUAL:	The spiritual dimension of physical activity expressed through religion, symbolism, mysticism, and metaphysics. (MacAloon, 1978)
SOCIAL:	The social interaction of people in physical activity through their social relationships, organizations, behaviors, and processes. (Coakley, 1986)
CULTURAL:	The participation in physical activity relative to the rules, codes, and laws as established by the customs, mores, and folkways of the culture. An example might include the playing of lacrosse among native Americans. (Barrow, 1973)

Figure 2.14. The Fundamental Processes Model of the Structure of Knowledge for the Field of Physical Education.

UNIFORMS:	Specific attire worn (or not worn) by all participants. To include colors, designs, and materials relative to the execution of the participant's specific area of involvement.
IMPLEMENTS:	Necessary tools required for the execution of the physical activity such as ball, racquet, calipers, gas analyzer, computer, footwear, etc..
FACILITIES:	Specific places, natural or man made, used to conduct the desired physical activity.
RULES:	Specific or general agreements, standards, and intent used to conduct the desired physical activity. Rules may also include the acceptance of no rules by the participants.
SCORING SYSTEMS:	Technolgies used in keeping score for specific events such as score boards, panels of experts, systems and tabels of scoring, and methods for tabulating scores.
STATISTICS:	Record of highest level of achievement, standings, and related notations. (Vanderswaag, 1978)
STRATEGIES:	Methodologies for winning competitive physical activities and for improving level of performance.

Figure 2.15. The Dominant Technologies Model of the Structure of Knowledge for the Field of Physical Education.

CHAPTER III

METHODS AND PROCEDURES

Introduction

The purpose of this study was to determine the acceptance of a generic model, developed from the related literature, of the structure of knowledge (SOK) for the field of physical education. This chapter contains a review of the: (a) research design, (b) population characteristics, (c) sampling technique, (d) development of the survey instrument, (e) procedures for gathering data, and (f) statistical methods used in the study.

Research Design

The methodology used to determine the SOK for the field of physical education follows the method of epistecybernetics as introduced by Hensley (1997) and the general systems mode of inquiry proposed by Bertalanffy (1968), Checkland (1981), Harmon, Maus, and Morrissey (1988), and Hensley and Cooper (1992). According to Hensley (1993), epistecybernetics is a new science of knowledge stewardship. Hensley (1993) drew on systems theory concepts to establish "epistecybernetics" (p. 2), a term he coined in 1990. Systems theory attempts to demonstrate the complexity of certain man-made or natural phenomena by studying the interaction between the properties of elements that make a *whole*, also known as a *system* (Checkland, 1981). The use of systems theory is appropriate for determining the SOK for the field of physical education because it uses the interrelationships between all elements that affect the education of the whole

person. Bertalanffy (1968) states that systems theory has become a dominant force in expanding knowledge in many fields of endeavor such as "industrial enterprise and armaments to esoteric topics of pure science" (p. 3). Conceptual model building is central to systems methodology. Checkland (1981) describes the methodology of systems theory as requiring conceptual models that are "simply the structured set of activities which logic requires in a notional system which is to be that defined in the root definition" (p. 170). In this study, the researcher selected Hensley's (1997) nine-stage Schematic of the Processes for Validating System Models (Figure 3.1, p. 92) to develop an epistecybernetic model of the SOK for the field of physical education. The Hensley (1997) model became the basis for developing the questionnaire and validating the SOK model for the field of physical education.

The Nine-Stage Model

In Epistecybernetics: A Revolution In Thinking, Hensley (1997) demonstrates how an expert within a discipline can create a graphical representation of the discipline for the purpose of having other experts within the discipline validate it. Hensley (1995, 1997) provides a nine-stage model for designing and validating a SOK model for a discipline.

In stage 1, Hensley (1997) asks the question, "Can a model of the structure of knowledge be created" (p. 18)? The answer to this basic question for the field of physical education is obvious once one has conducted a review of the related literature. Several models of the SOK for the

Field of Physical Education exist within the literature (Allen, 1964; Charles, 1996; Holt-Hale, 1993; Lumpkin, 1998; Renson, 1989; Renson, 1990; Saunders, 1994; Wuest & Bucher, 1995). These models, however, are the products of the personal perceptions and independently created manifestations of what leaders within the field believe the SOK of physical education to be.

Apart from independent personal perceptions contained within the literature, epistecybernetic modeling requires the adoption of Hensley's (1997) nine-stage modeling process (see Figure 3.1, p. 92).

According to Hensley (1995), Stage 1 in his modeling process requires a separation of the discipline into "four major dimensions" (p. 2) (or domains as used in this study). The knowledge elements that belong to the four major domains (*basic areas of study, modes of inquiry, fundamental processes*, and *dominant technologies*) are identified, allowing for the creation of a generic epistecybernetic model.

For this dissertation, the researcher took almost four years (1991-1994) attempting to map the field of physical education so that it could be separated into the four major domains described by Hensley (1995).

Shell creation is the main objective of Stage 2 in Hensley's modeling process. The researcher must follow the epistecybernetic path in order to construct a generic model. Hensley (1995) states that "some type of image showing clearly the four basic knowledge dimensions" (p. 5) is necessary.

This researcher proposed a modification to Hensley's (1995) requirement, stated above, that "some type of image"

(p. 5) depicting the four major domains be used in model construction. This researcher believed that if the very generic quality of model making was to be maintained, then the *cube* should become the epistecybernetic model of choice for first generation models. It is this researcher's opinion that the *cube,* first presented in Tunstall (1993), represents the least amount of hidden symbolism for human movement activities as compared to other possible shapes.

Hensley (1995) states that four assumptions are necessary for Stage 2 development:

1. The researcher approaches the discipline as a general system.
2. The researcher has enough professional knowledge to begin to establish the conceptual framework for the study, the mental model and the graphic shell of the structure of knowledge of their particular discipline.
3. The researcher has the ability to draw a shell of the general model for the SOK of the discipline.
4. The researcher has the ability to draft the prospectus that provides the plan for research project development. (p. 5)

Hensley (1995) further stipulates the planning necessary for completion of Stage 2. There should be a *shell model* (a three dimensional model or a paper drawing) showing the knowledge domains, a prospectus describing the investigation, and a rough outline for the instrument to be used in the validation of the SOK for the field of physical education.

This researcher completed the shell construction, prospectus, and the initial outline of the proposed SOK model from a review of the literature in January 1994.

Scanning the discipline occurs in Stage 3. According to Hensley (1995), the purpose for scanning the discipline

is to ascertain the elements of knowledge that belong within the model, collect information about other models, and to find experts who can critique a new or revised model. At this stage in the development of the model, knowledge elements should be grouped "according to their common purpose" (p. 11).

Since the acceptance by this writer's doctoral dissertation committee of the prospectus, an extensive review of the literature was conducted that resulted in a subsequent improvement in SOK shell design. The review of the literature produced a variety of SOK and curricular models by other researchers that aided in the understanding of the field of physical education. Colleagues were consulted for the purpose of improving the efficacy of the model.

In Stage 4, model infrastructure identification occurs. At this stage, the investigator completes an outline that helps in the identification of the model infrastructure. Hensley (1995) states that *activities, sub-areas, archetypes,* and *schools of thought* are arranged within the appropriate four domains as the researcher gains a greater understanding of the model. In this stage, Hensley (1997) advises that between "two hundred and sixteen hundred hours work" (p. 20) can be spent over several months on this endeavor.

This investigator found the fourth stage to be very challenging. The SOK for the field of physical education has defied a concise and unified understanding by researchers since its origin as a profession in 1885 (Park, 1989). This investigator anticipated that many experts in the field of physical education would find a new SOK model

threatening to their metaphysical perceptions of the reality of the SOK for their field.

Stage 5 marks the transition from the theoretical to the practical. The prototype is the first draft of the complete model of a structure of knowledge placed within a proposal. This researcher first obtained critiques of his model of the SOK for the field of physical education from his doctoral dissertation committee members.

A pilot test, conducted in Stage 6 and consisting of 142 experts in the field of physical education, provided the researcher with comments about the prototype SOK model. The resulting collected data gave selected consultants an opportunity to provide advice about the model and validation instrument. This researcher received comments from consultants and noted potential weak areas during the pilot study (see Table 3.1, p. 90).

Hensley (1997) stated that at Stage 7, the researcher determines if the validation instrument (questionnaire) is "reliable, suitable for the objectives, and effective in administration . . . and has a detailed narrative of the model's components" (p. 21). To this end, experts in the field of physical education were given the chance to respond to questions, on a six-point Likert scale, concerning the validity, usefulness, and comprehensiveness of the four domains and the general model. The responses were collected and statistically analyzed for SOK content.

Of the 302 physical educators surveyed in the pilot study, 142 (47%) returned surveys. The pilot survey group consisted of physical educators who were personally known to this writer, who published in leading journals, and who were coaches teaching at middle schools in Missouri and

Kansas. The pilot study yielded results that suggested a high level of acceptance for the validity, usefulness, and comprehensiveness of the Model of the Structure of Knowledge for the Field of Physical Education. A mean rating, obtained from a six-point Likert scale (0-5) and greater than the mid-point 2.50, was used to indicate a general acceptance of the model and its four domains. The means of the rankings for the validity, usefulness, and comprehensiveness for each of the four model domains and the general model generated a range of mean ratings. The mean low rating in the pilot study was of 3.64 and a mean high of 4.41 (see Figure C.1 in Appendix C).

Hensley (1997) explained that Stage 8 involved the validation of the model that "represents the functional organization of knowledge within the discipline" (p. 21). Experts within the field of physical education were the agents that validated the model.

For the final study, this researcher then surveyed 864 (of the 997 surveys mailed 133 were returned not deliverable) experts within the field of physical education and obtained 171 responses (20%) for review. Preliminary analysis, reported in Chapter IV, indicated that experts within the field of physical education would accept the model as valid, useful, and comprehensive.

Stage 9 is the final stage of the development for epistecybernetic models and concerns its maintenance and enhancement. This stage provides for the stewardship for revising the model in order to keep up with a growing information base and changing times.

In the future, this investigator intends to continue the validation process for this model by surveying more

experts with respect to the accuracy and completeness of the four domains of the model. Chapter V contains implications from the results of this investigation to improve studies and programs within the field of physical education.

Development of the Survey Instrument

Several researchers (Checkland, 1981; Harmon, Maus, & Morrissey, 1988; Hensley & Tunstall, 1994) have presented plans for the development of conceptual SOK models. Harmon, Maus, and Morrissey (1988) explored knowledge modeling in expert systems. Checkland (1981) and Hensley and Tunstall (1994) proposed designs for general systems models. These designs have several common elements, such as forming research questions, prototype construction, field testing, and implementation or adoption of the model. The researcher followed Hensley's (1997) diagram of the Processes for Validating System Models (Figure 3.1, p. 92) as the blueprint for developing the Model of the SOK for the Field of Physical Education which, in turn, provided the foundation for developing the survey instrument.

Responding to the first stage, which asks if a model can be created, the researcher was challenged to consider the development of a model of the SOK for the phenomena in question. In order to create the model of the SOK for the field of physical education, the researcher considered the research questions to be asked. For example, this researcher identified and organized the common elements of the field of physical education from the epistecybernetic outline offered by Hensley (1997): (1) *modes of inquiry*,

(2) *basic areas of study*, (3) *fundamental processes*, and (4) *dominant technologies*.

In the second stage, the researcher created a shell model that described the discipline graphically. This researcher selected the cube as the appropriate generic model for espistecybernetic research because the cube represented the least amount of hidden symbolism for human movement activities as compared to other possible shapes. For example, a circle may symbolize a ball (anyone of many different kinds of balls) that may elicit subconscious biases toward the model among certain physical educators. The cube, as used by Tunstall (1993) in his study of the SOK of mathematics, appears to be the least symbolically loaded graphic available.

Scanning the discipline comprised the third stage in the validation of the systems model. In this stage, the researcher reviewed the literature concerning the SOK for the field of physical education. In the fourth stage, the researcher began to create the model infrastructure and to identify the various components for the model. Stages five and six required the construction of the prototype model and the pilot testing of it. The researcher began development of the survey instrument in the fall semester of 1990 during a research course. The professor and students in the class analyzed the survey instrument and provided comments to the researcher. In stage seven, during the spring of 1998, members of the researcher's dissertation committee made suggestions for improving the instrument. In addition, a pilot study conducted in the spring of 1998 provided further information regarding improved placement of the modes of inquiry face within the

instrument. Stage eight provided for the final validation of the Survey of the Structure of Knowledge for the Field of Physical Education by experts within the field of physical education who responded to the questionnaires. Stage nine provided for the adoption and enhancement of the model through statistical observation and enhancements made by physical educators as they reviewed the results.

Population Characteristics

This study relied on the opinions of experts in the field of physical education to validate the model as it was described in the survey questionnaire. For the purpose of this study, experts were defined as those professionals who had earned university degrees within the field of physical education or had worked within the field for a period of at least five years. A list of names and addresses was obtained from a random sample of 997 professional physical educators from Marketing General Incorporated Lists (MGI) Company. MGI produces random samples by selecting every n^{th} name in their database. In private consultation (October 1998), Hensley suggested a survey sample population of about 1000 as appropriate for epistecybernetic research. This investigator also considered different sample sizes presented by other researchers. Gay (1981) suggested that an appropriate sample size should be 10 percent of the population. Krejcie and Morgan (1970) presented a table that gave a sample size of 325. Sudman stated in Borg and Gall (1989) that when sub-groups are desired an N of at least 100 is required to allow for the necessary 20 to 50 cases in each category. Cohen (1988), on the other hand, emphasized the beauty of small numbers when he stated that

an N of 48 is sufficient when using power analysis. However, Hensley's sample size of about 1000 was accepted as appropriate for this study because of his experience with the new science of epistecybernetic research and the inherent difficulty in receiving large returns from the complex epistecybernetic surveys. Table 3.1 (p. 90) contains a description of the population returning surveys. Respondents were divided into two sub-groups (see Tables 3.2 and 3.3, p. 91) according to educational level and area of sub-disciplinary emphasis.

Table 3.1 (p. 90) graphically shows the number of surveys sent to the sample population and the number that responded to the mail out. The table represents the two major focus groups: the pilot study and the random study. Pilot study "A" consisted of 82 experts personally known to the writer and to authors who publish nationally on the SOK of physical education. Pilot study "A" produced a return of 38 respondents (46%). Pilot study "B" consisted of coaches from middle schools in Missouri and Kansas attending a coaching clinic. Of the 220 coaches in attendance, 104 (47%) responded. Combining the two pilot study groups (PS-Combined) produced a total sample of 302 physical educators with 142 returning surveys (47%). Also included in Table 3.1 (p. 90) is the result of the random survey of physical education experts in the final study. Of the 864 surveys mailed in January 1999, 171 (20%) were returned by physical educators who were then grouped by educational level (Table 3.2, p. 91) and sub-discipline (Table 3.3, p. 91).

Tables 3.2 and 3.3 (p. 91) show the number of respondents by sub-groups according to educational level

and sub-disciplines respectively. In Table 3.2 (p. 91), the reader can find the number of respondents for the two pilot studies and the final study, when separated by the educational level sub-groups, i.e., bachelor's, master's, doctor of education, and doctor of philosophy. Similarly, Table 3.3 (p. 91) gives the number of respondents for the pilot studies and the final study, when separated by the sub-discipline sub-groups.

Purchase of the addresses of 997 physical educators was made possible through the Marketing General Inc. (MGI) List Company (November 1998). The 997 (4.7%) subjects were randomly drawn (every n^{th} name) from the 21,276 members of the National Association of Sport and Physical Education (N.A.S.P.E.) division of the American Alliance of Health, Physical Education, Recreation, and Dance (A.A.H.P.E.R.D.). A.A.H.P.E.R.D. is the largest organization of physical education professionals within the United States.

Sampling Technique

According to Krejcie and Morgan (1970), a sample size of 325 is appropriate for the population of 21,276 physical educators. Hensley (personal communication, March 18, 1998) advised that due to the complexity of epistecybernetic research, a small response number is expected. Therefore, Hensley (personal communication, March 18, 1998) suggested a sample size of 1000 (almost three times the number recommended by Krejcie and Morgan, 1970) to represent American physical educators in the hope that the response number would reach 325. Borg and Gall (1989) recommended that large sample sizes are more likely to be representative of the population mean and standard

deviation. Therefore, this writer's goal was to obtain a response number of 325 from 997 physical educators.

For this study, MGI List Company randomly generated a list of 997 physical education educators. MGI creates randomly generated lists by selecting every n^{th} name from their database. As explained in the previous section, a sample population of 997 was accepted as the appropriate sample population for this epistecybernetic research. This writer assumed that physical educators belonging to the N.A.S.P.E. division of A.A.H.P.E.R.D. would have similar beliefs about the SOK of physical education as those physical educators not belonging to the professional organization. If such an assumption were correct, 325 responses gained from this study could be generalized to the population of American physical educators as a whole. In support of larger sample sizes, Cates (1985) advises that a researcher should always follow the general rule that one should "always use the largest sample [one] can afford and obtain" (p. 62). Furthermore, Cates (1985) affirms that "increased sample size leads to increased normality and increased conformance to population values" (p. 62). Considering the above, this researcher accepted the larger sample size of 997, recommended by Hensley (personal communication, March 18, 1998), as most appropriate for this epistecybernetic research. In addition, this investigator hopped that the larger sample size would yield the greatest N possible with which to generalize to the total population's views of the validity, usefulness, and comprehensiveness of the SOK of physical education. However, Smith (personal communication, December 19, 1999) cautioned that such number manipulation

limits a study, where the ability to generalize to the general population is limited as a result of a relatively low response rate.

This researcher conducted pilot studies "A" and "B" in the spring of 1998 (see Figure 3.1, p. 92). For pilot study "A", 82 surveys were mailed or handed out to selected physical educators who had demonstrated an interest in the SOK for the field of physical education through personal acquaintance or who had published in professional journals. Pilot study "A" yielded 38 (46%) responses from the 82 that were mailed-out. Pilot study "B" was administered at a high school all-sport coach's clinic on the Pittsburg State University campus, (in Pittsburg, Kansas) in June of 1998. Out of two hundred and twenty coaches that were in attendance, pilot study "B" yielded 104 useable responses from the 143 surveys that the coaches returned (47%).

Procedures for Gathering Data

The survey instrument, A Survey of the Structure of Knowledge for the Field of Physical Education, was used to obtain the information for this study (see Appendix B). Surveys were mailed to the study population that was composed of 864 randomly selected physical educators. The MGI List Company prepared the random list (every n^{th} name) of the 997 physical educators from the N.A.S.P.E. division of the A.A.H.P.E.R.D. membership. A self-addressed, stamped envelope was provided for each respondent to return the questionnaire. A follow-up mailing was sent out two weeks after the initial mailing to those who did not respond to the first mailing. Each survey was numbered to identify the respondent so as not to send more than one

questionnaire to one who had responded. Results from this mailing were reported in Chapter IV. The mailing of the 997 instruments was conducted in January 1999, after approval of the proposal. The random survey response was 20% (171 surveys returned out of the 864 surveys that reached their destination).

The data were collected, organized, and tabulated by means of a spreadsheet on this writer's personal computer. Furthermore, the data were divided into sub-groups according to educational level and sub-disciplines for statistical analysis.

Data Analysis

The research questions included in this study produced a total of 390 hypotheses (195 of which were null hypotheses). The fifteen research questions were classified into three parts according to how physical education experts rated various aspects of the model. The first five research questions produced 30 hypotheses (15 of which were null hypotheses) designed to test the validity, usefulness, and comprehensiveness of the four domains and the general model from a sample of 171 physical education experts. Research questions six through ten produced 180 hypotheses (90 were null hypotheses) designed to test the validity, usefulness, and comprehensiveness of the four domains and the general model according to the respondent responses divided by educational level: bachelor's, master's, doctor of education, and doctor of philosophy degrees. Research questions eleven through fifteen produced another 180 hypotheses (90 were null hypotheses) designed to test the validity, usefulness, and

comprehensiveness of the four domains and the general model according to respondent responses divided by sub-discipline: pedagogy, humanities, social sciences, and biological sciences.

Responses to research questions one through five were analyzed on this writer's personal computer using the Student's t-test to determine statistical significance (α = 0.05). All calculations were performed with GraphPad InStat version 3.00 for Windows 95 (GraphPad, 1998). The group and sub-group mean responses for the hypotheses questions were compared against the mid-point (2.50) of the six-point Likert scale (0-5) for validity, usefulness, and comprehensiveness of the basic areas of study, methods of inquiry, fundamental processes, dominant technologies, and general model. Determination of the statistical significance (α = 0.05) of the research questions six through ten and eleven through fifteen for comparing sub-groups mean responses by educational level and sub-disciplines respectively was calculated by way of one-way ANOVA with F-test.

The investigator expected analysis of the responses from the 171 randomly chosen physical educators to lead to a rejection of the null hypotheses (H_o, α = 0.05) for research questions one through five. Research questions stated that physical educators *will* find the general model and the four domains to be invalid.

Comparisons of the data responses obtained from the 171 randomly selected physical educators was made between the sub-groups according to their educational levels and sub-disciplinary emphases. This investigator expected that no significant difference (H_o, α =.05), using one-way ANOVA

with an F-test on the responses, would be found between sub-groups divided by educational level (bachelor's, master's, doctor of education, and doctor of philosophy degrees) or by sub-discipline (pedagogy, humanities, social sciences, and biological sciences).

Sub-group N criteria was established by Sudman in Borg and Gall (1989) who offered that sub-groups should have a at least 20 to 50 respondents. Williamson, Karp, Dalphin, and Gray (1982) suggested a similar standard, stating that sub-groups should contain a minimum of 35 to 40 to be adequate for most research samples.

Summary

In this chapter, the author has presented the (a) research design; (b) population characteristics; (c) sampling technique; (d) development of the survey instrument; (e) procedures for gathering data; and (f) a description of the proposed data analysis. The research design is modeled primarily after Hensley's (1997) nine-stage process for validating system models. In the population characteristics section, the pilot studies "A" and "B" are described and the final study is discussed. The sampling technique section contains a discussion of methods used in selecting the final sample population and the criteria used in selecting experts for the two pilot studies, "A" and "B". In the development of the survey instrument section, references were made as to how Hensley's (1997) nine-stage process was used to validate the proposed SOK model. In the procedures for gathering data section, a description of data gathering was presented along with criteria for validating the SOK model in this

investigation. In the analysis of data section, the writer described the statistical methods used to answer the research questions and to test the related hypotheses.

This concludes the discussion of Chapter III. Tables 3.1-3.2 and Figure 3.1 follow on pages 90-92. Chapter IV contains a presentation of the findings of this study.

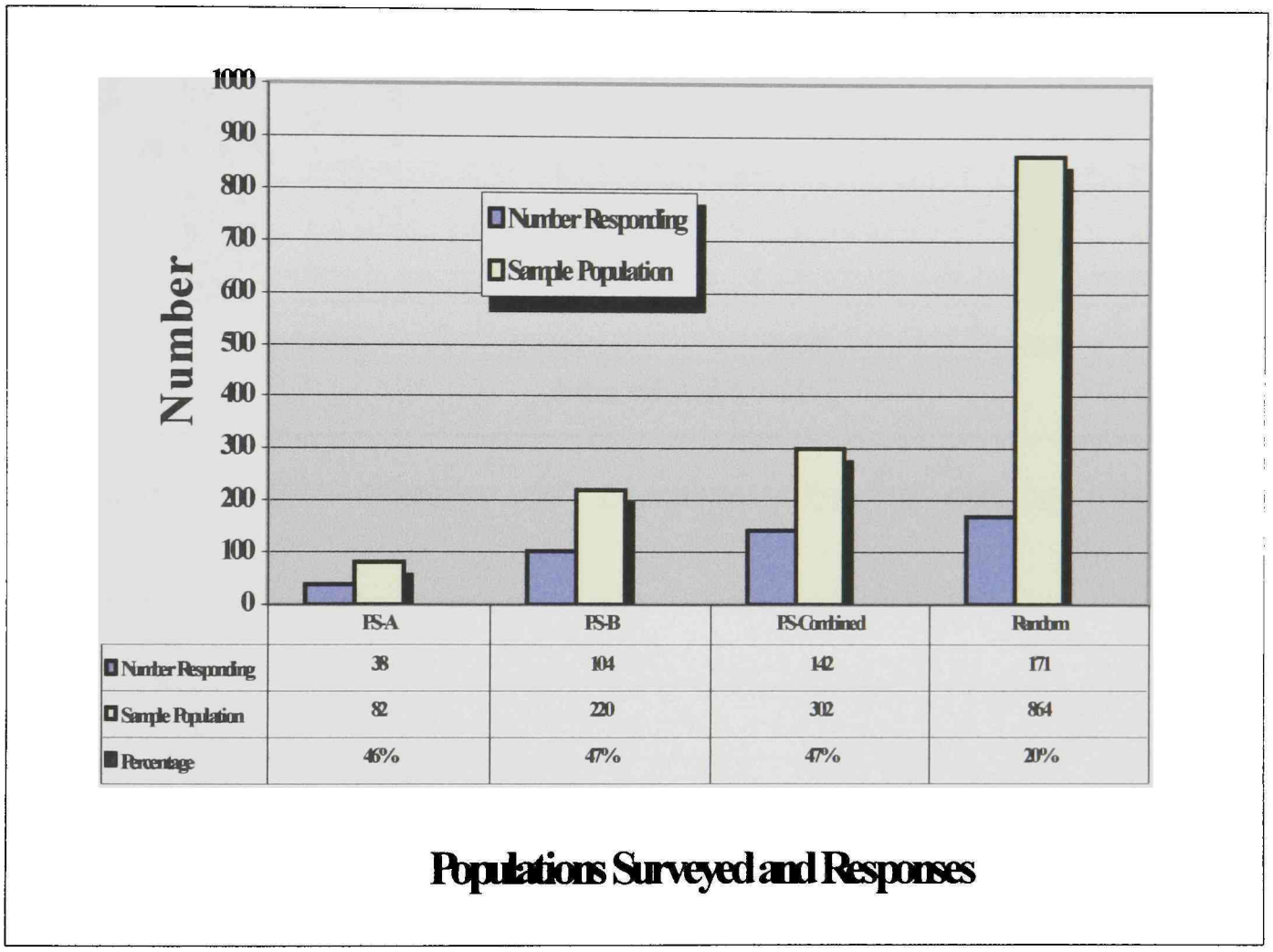


Figure 3.1. Number of surveys mailed and returned for each target group.

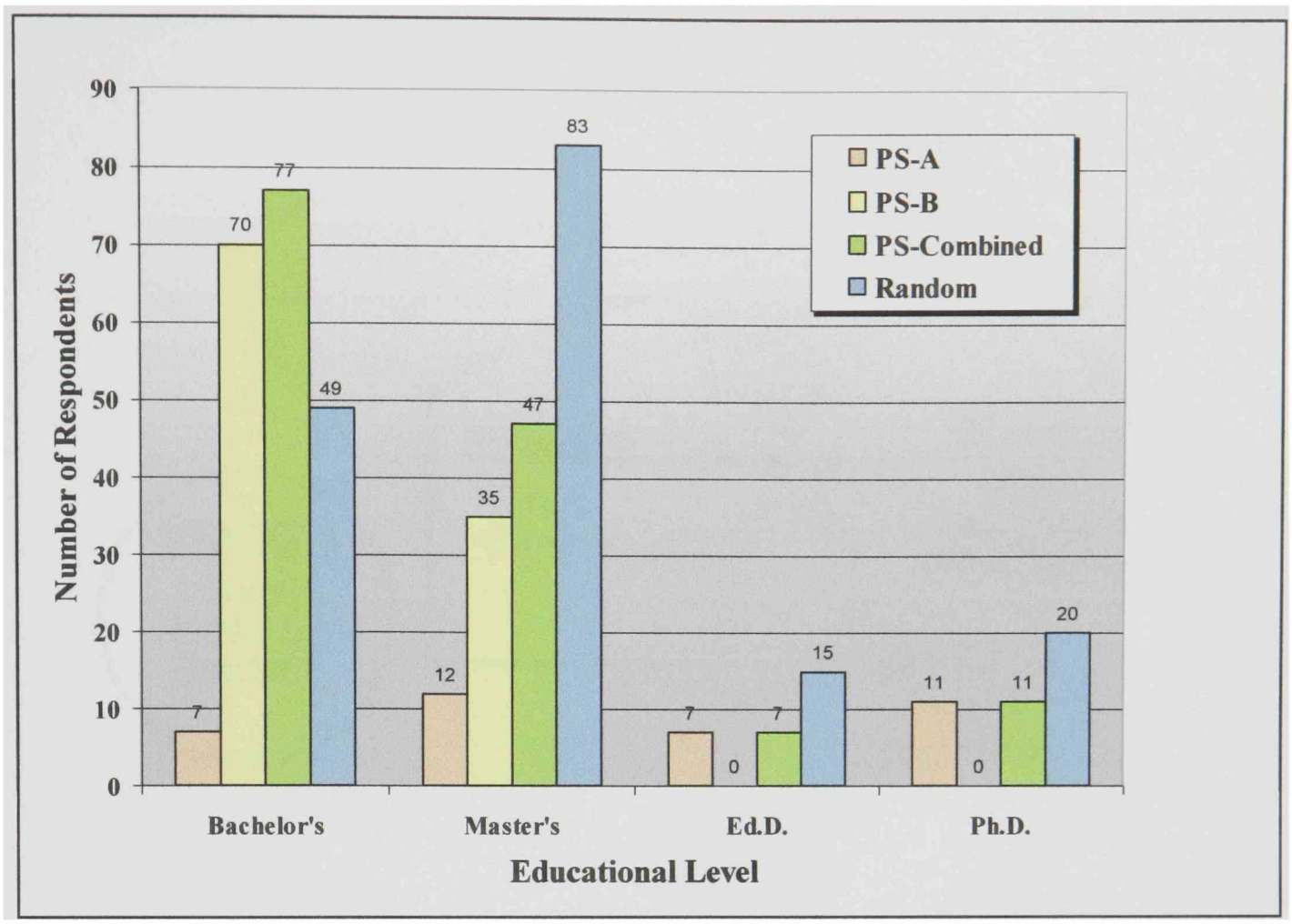


Figure 3.2. Number of respondents by educational level.

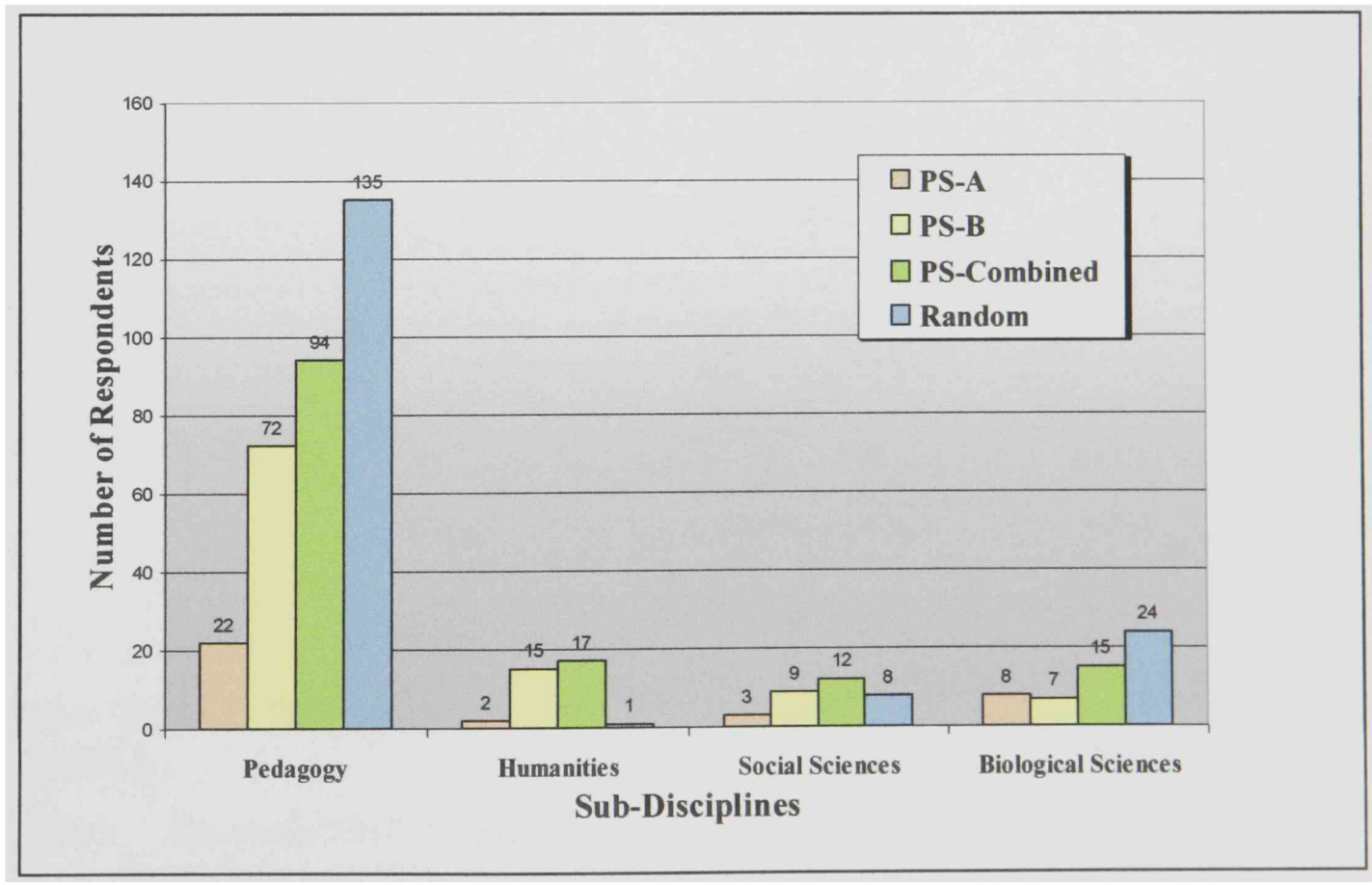


Figure 3.3. Number of respondents by sub-discipline.

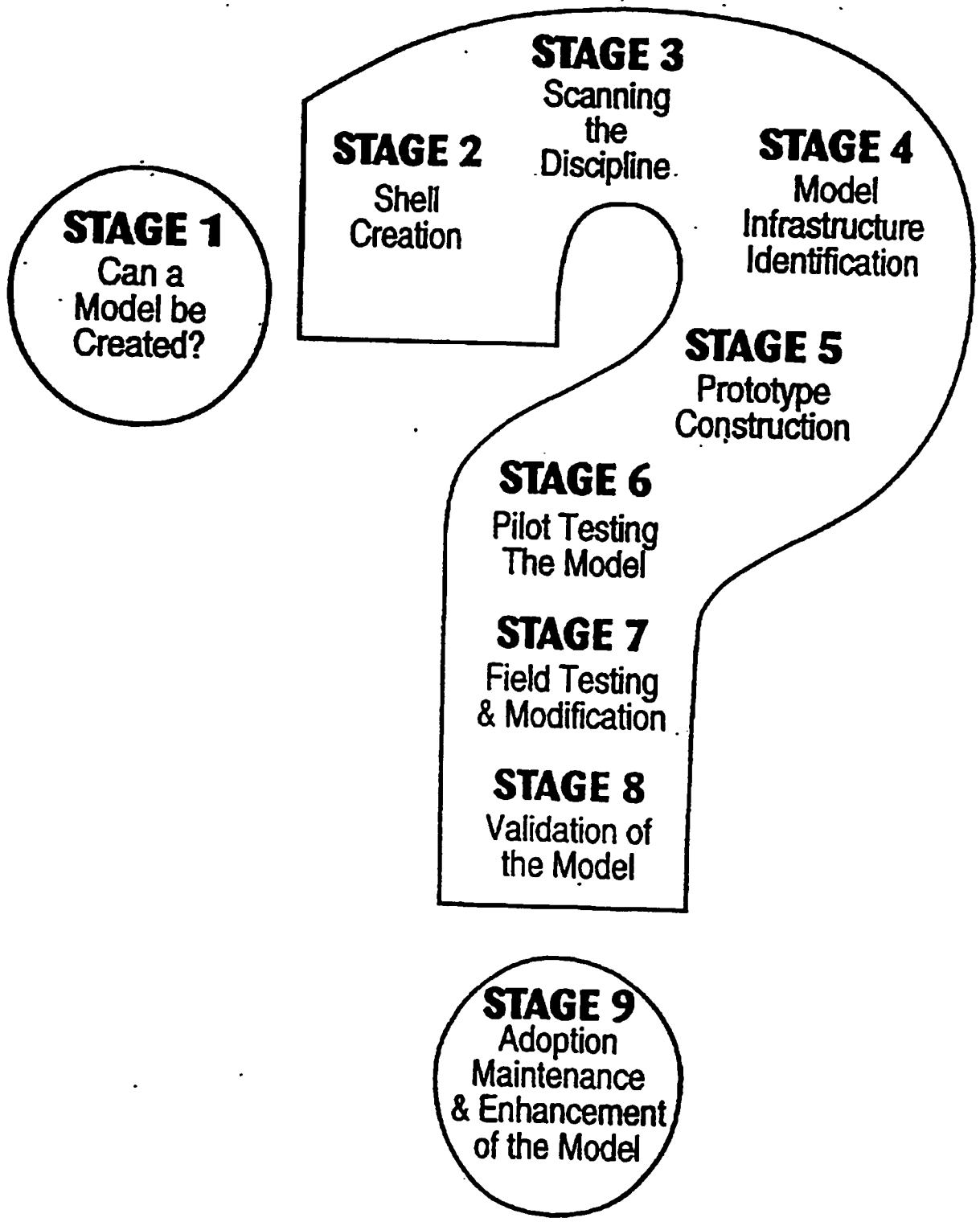


Figure 3.4. Schematic of the Process for Validating System Models.

Source: Excerpted from O. D. Hensley, "Epistecybernetics: A Revolution in Thinking About Knowledge," 1992, p. 20. Used with permission of Dr. O. D. Hensley.

CHAPTER IV

RESULTS

Introduction

The purpose of this study was to investigate what professional physical educators believe the structure of knowledge (SOK) of the field of physical education to be. In Chapter IV, the researcher presents the results obtained from the descriptive and statistical analysis of thinking regarding the composition of the field of physical education.

Profile of Physical Educators Surveyed

Data obtained from a national survey of professional physical educators were presented. The survey population was composed of two pilot study groups and a randomly selected group (Table 4.1, p. 111). The pilot study was divided into two groups: group "A" and group "B". Pilot study "A" (PS-A) included 82 personally selected physical educators and pilot study "B" (PS-B) contained 220 middle school coaches and physical educators. The two pilot studies produced a combined return of 142 responses (38 or 46.3%) from PS-A and 104 or 47.3% from PS-B). The randomly (final) sampled group of 997 (133 surveys were returned undeliverable leaving a sample population of 864) physical educators, drawn from the Marketing General Incorporated Lists (MGI) Company, produced 171 responses (20%).
The returned surveys were further divided into two sub-groups by educational level (bachelor's, master's, doctor of education, and doctor of philosophy) and by sub-discipline (pedagogy, humanities, social sciences, and

biological sciences). Tables 4.2 and 4.3 (p. 112) show the number of respondents by degree and sub-discipline respectively. Within the educational level sub-group of the random sample, physical educators having either a bachelor's or master's degree greatly outnumbered those responding with doctor of education and doctor of philosophy degrees. Within the sub-discipline sub-group of the random sample, the 135 pedagogues outnumbered the other 33 physical educators representing the humanities, social sciences, and biological sciences by slightly more than a factor of four to one.

The mean "perception responses" of the random sample were analyzed to determine the validity, usefulness, and comprehensiveness of the general model and each of its four domains using the Student's t-test. A hypothetical mean of 2.50 was selected to represent the halfway point between responses labeled incrementally, by a factor of one, from zero to five, for the general model and the four domains. One-way ANOVA with F-test was used to determine the statistical significance (α = .05) of the validity, usefulness, and comprehensiveness of the general model and each of its four domains for the two sub-groups: educational level (hypotheses 6-10) and sub-disciplines (hypotheses 11-15). The Student's t-test and ANOVA (Tukey-Kramer Multiple Comparison test) with F-test were performed using GraphPad InStat version 3.00 for Windows 95 (Graph Pad Software, 1998).

Findings

Descriptive Summary of Findings Related to Research Questions 1-5

Research questions one through five asked the experts in the profession to rank the *basic areas of study, modes of inquiry, fundamental processes, dominant technologies,* and *general model* as to their validity, usefulness, and comprehensiveness. The 15 null hypotheses related to research questions 1-5 were tested using the Student's t-test, comparing the mean perception response rankings on the validity, usefulness, and comprehensiveness of each domain and the general model against the hypothetical mid-point (2.50) of the questionnaire's ranking scale (0-5). Table 4.4 (p. 113) presents the results of this analysis for research questions 1-5. The mean perception responses (N = 170) ranged from a low of 3.64 for the usefulness ranking of the modes of inquiry domain and a high of 4.30 for the validity ranking of the fundamental processes domain. Results of the t-test on the null hypotheses indicated that there were significant differences (α = .05) between the participant's mean perception response rankings and the response mid-point established for this study at 2.50 for each of the four domains and the *general model* on validity, usefulness, and comprehensiveness.

Of the 15 null hypotheses related to questions 1-5, all were rejected. Statistically significant differences were found between the mean responses of the educators and the 2.50 mid-point on the ranking response scale and all aspects of the model were ranked significantly higher than 2.50. All of the responses received positive rankings well above 2.50. Therefore, comparisons between the

hypothetical mid-point of 2.50 and the means of perception rankings by physical educators indicates that experts accepted the SOK for the field of physical education as described by the four domains and the general model.

The following section provides a descriptive summary of the findings related to research questions 6-10.

Summary of Findings Related to Research Questions 6-10

Descriptive Findings (Research Questions 6-10)

Although the study was limited by a low response rate of 20% and a low response N for certain sub-groups, some insight can be gleaned about the perceptions of the respondents when sub-grouped by educational level.

Research questions six through ten (Table 1.2, p. 22) contained 90 null hypotheses to determine if the perceptions of 171 experts within the profession of physical education would agree as to the validity, usefulness, and comprehensiveness of the *general model* (Figure 2.11, p. 68), *basic areas of study* (Figure 2.12, p. 69), *modes of inquiry* (Figure 2.13, p. 70), *fundamental processes* (Figure 2.14, p. 71), and *dominant technologies* (Figure 2.15, p. 72) when their mean responses were compared by educational levels (bachelor's vs. master's, bachelor's vs. Ed.D., bachelor's vs. Ph.D., master's vs. Ed.D., master's vs. Ph.D., and Ed.D. vs. Ph.D.). In the interest of clarity and brevity, the writer chose to include descriptive tables for research questions six through ten in Appendix D (Tables D.1-D.5). However, an abbreviated account of the mean responses of perceptions

and data analysis is presented on page 114 as a way for the reader to more easily identify minimum and maximum mean responses, standard deviations, and confidence intervals (Table 4.5, p. 114).

Tables 4.5 (p. 114) and D.1-D.5 provide selective descriptive data responses to three of the four domains in terms of the number (N) of respondents; range of mean responses and standard deviations; and the lower and upper limits of the 95% confidence interval for selected mean responses. Inspection of N, according to educational level, shows that the four sub-groups were not equal. The sub-group range of N included a minimum of 15 doctor of education to a maximum of 83 with the master's degree (Tables D.16-D.20). Although the respondent's N of 15 for the doctor of education did not reach Sudman's (in Borg & Gall, 1989) criteria of a minimum of 20, nevertheless, statistical calculations were carried forward in order to gain some insight about the nature of the SOK for the field of physical education. The means for Tables D.1-D.5 varied from a minimum of 3.05 for those with the doctor of philosophy degree ranking perceptions of validity for the dominant technologies domain (Table D.4) and a maximum of 4.49 for bachelor's ranking of perceived validity for the fundamental processes domain (Table D.3). The standard deviation, indicating degree of scatter in a column, varied from a low of 0.62 for those responding with a master's degree on perceived validity for the basic areas of study domain (Table D.1) to a high of 1.58 for those with the doctor of education degree ranking the perceived validity of the dominant technologies domain.

The confidence interval represented the range of values for the mean two standard errors above and below the sample mean. Computation of the confidence interval allowed for an interval that included the true mean of the population 95% of the time. The lowest lower limit of the 95% confidence intervals for the mean was 2.30 for those with the doctor of education degree ranking the perceived validity of the dominant technologies domain (Table D.4) and the highest upper limit was 4.79 by those with the doctor of education degree ranking the perceived usefulness of the fundamental processes domain (Table D.3).

Uniformly high ratings (when compared to the mid-point of 2.50) were observed in the rankings by all the educational sub-groups for the four domains (Tables D.1-D.4) and the general model (Table D.5) for perceptions of validity, usefulness, and comprehensiveness. All standard deviations were below 1.00 in the fundamental processes domain (Table D.3) indicating a relatively tight scatter among ranked means. For Tables D.1-D.5, only two lower limits of the 95% confidence interval were noted that were below 2.50 and 10 were observed above the 4.00 level. No mean rankings from the upper limit of the 95% confidence interval from Tables D.1 to D.5 were below 2.50 but 55 out of 90 of the mean rankings from the upper limit of the 95% confidence interval were above 4.00. In light of study limitations, small standard deviations and high confidence levels, nevertheless, suggest that there may be a tendency by physical educators to accept the four domains and the general model.

The following section discusses ANOVA findings for research questions 6-10.

ANOVA Findings (Research Questions 6-10)

Research questions 6-10 were directed at discovering if a statistically significant difference (α = .05) existed among the perceptions of experts, when sub-grouped by educational level, on the validity, usefulness, and comprehensiveness of the, *basic areas of study, modes of inquiry, fundamental processes, dominant technologies* domains, and the *general model*. Data were analyzed with one-way ANOVA using the Tukey-Kramer Multiple Comparisons test. Displaying these findings posed some difficulty due to the volume and complexity of the organizational presentation of the data. Therefore, it was determined that the clearest method of exhibiting the findings would occur by using only composite tables (Tables 4.6 and 4.7, pp. 115 and 116) in this chapter. These composite tables display only those findings that contain statistical significance (α = 0.05). For a more complete presentation of the findings for research questions six through ten, the reader is referred to Tables D.6-D.10 in Appendix D. Tables D.6-D.10 contain a complete presentation of the findings from the one-way ANOVA data comparisons between sub-groups based on educational degree.

Comparison between educational degrees for the ranking of validity, usefulness, and comprehensiveness of the four domains (Tables D.6-D.9) and the general model (Table D.10) indicated that statistically significant differences (α = 0.05) between sub-groups by educational level occurred in relationship to some of the domains and the general model.

In Tables 4.6 (p. 115) and D.6, the *basic areas of study* domain, statistically significant differences (α =

0.05) were observed for the perception of validity mean rankings between bachelor's ($\bar{X}$ = 4.46) versus doctor of education ($\bar{X}$ = 3.77) and bachelor's ($\bar{X}$ = 4.46) versus doctor of philosophy ($\bar{X}$ = 3.80) respondents. For perceptions of usefulness, statistical significance was also observed between bachelor's ($\bar{X}$ = 4.31) versus doctor of philosophy ($\bar{X}$ = 3.65) respondents. No statistically significant differences were observed between educational levels for physical educator's perceptions of the basic areas of study comprehensiveness rankings.

In the *modes of inquiry* domain (Table D.7), no statistically significant differences (α = .05) were observed for the sub-groups' perceptions of validity, usefulness, and comprehensiveness rankings. In Table 4.6 (p. 115) and D.8, the *fundamental processes* domain, statistically significant differences (α = 0.05) were observed for perceptions of validity between bachelor's ($\bar{X}$ = 4.49) versus doctor of philosophy degrees ($\bar{X}$ = 3.85) respondents. For perceptions of usefulness, statistical significance was also observed between bachelor's ($\bar{X}$ = 4.35) versus doctor of philosophy ($\bar{X}$ = 3.70) respondents. No statistically significant differences in perceptions were observed between educational levels for the fundamental processes comprehensiveness rankings.

In Table 4.7 (p. 116) and D.9, the *dominant technologies* domain, statistically significant differences (α = 0.05) were observed for perceptions on validity between the bachelor's ($\bar{X}$ = 4.18) versus doctor of education ($\bar{X}$ = 3.21) respondents and bachelor's ($\bar{X}$ = 4.18) versus

doctor of philosophy ($\bar{X}$ = 3.30) respondents. In addition, perceptions of statistical significance were observed (α = 0.05) for validity between both the master's ($\bar{X}$ = 4.02) versus doctor of education ($\bar{X}$ = 3.21) respondents and master's ($\bar{X}$ = 4.02) versus doctor of philosophy ($\bar{X}$ = 3.30) respondents. For perceptions of usefulness, statistical significance (α = 0.05) were observed between bachelor's ($\bar{X}$ = 4.18) versus doctor of philosophy ($\bar{X}$ = 3.30) respondents and master's ($\bar{X}$ = 4.02) versus doctor of philosophy ($\bar{X}$ = 3.30) respondents. For perceptions of comprehensiveness, statistical significance (α = 0.05) was observed between bachelor's ($\bar{X}$ = 4.26) versus doctor of philosophy ($\bar{X}$ = 3.35) respondents and master's ($\bar{X}$ = 4.07) versus doctor of philosophy ($\bar{X}$ = 3.35) respondents.

In Table 4.7 (p. 116) and D.10, the *general model* perceptions of statistically significant differences (α = 0.05) were only observed for usefulness between bachelor's ($\bar{X}$ = 4.10) versus doctor of philosophy degree ($\bar{X}$ = 3.45) respondents. No statistically significant differences (α = 0.05) were observed between educational levels for the general model for perceptions of usefulness and comprehensiveness rankings.

Although they were not significant to this writer's analysis, one-way ANOVA intermediate calculations were included in Appendix D. Calculations of degrees of freedom, sum of squares, mean square, and F-values for the validity, usefulness, and comprehensiveness for the four domains and the general model are included in Appendix D (Tables D.11-D.15).

Summary of Findings (Research Questions 6-10)

The number of statistically significant differences (α = .05) in mean rankings were not equal throughout the domains and general model according to the respondent's levels of education. Statistically significant differences in rankings of perceptions of validity, usefulness, and comprehensiveness of the four domains and the general model did not occur when comparing rankings from those with bachelor's versus master's degrees and when making comparisons between doctor of education versus doctor of philosophy degree rankings. Statistically significant differences were found in the mean rankings between those with the bachelor's versus doctor of education degree on two occasions and between those with the bachelor's versus the doctor of philosophy degree on eight occasions. Statistically significant differences were found on three occasions in the mean rankings between those with the master's versus the doctor of philosophy degree. On one occasion, statistical significance was observed between perceived mean rankings for those with the master's versus the doctor of education degree.

The data gleaned from the above paragraph suggests that there is a trend in the perceptions of validity, usefulness, and comprehensiveness when comparing those with proximal degrees (bachelor's vs. master's) and those with distal degrees (bachelor's vs. the doctorate). Those physical educators with proximal degrees tend to be closer in perceptions concerning the validity, usefulness, and comprehensiveness of the four domains and the general model. However, those physical educators with distal

degrees tend to be farther apart in the perceptions of the validity, usefulness, and comprehensiveness of the four domains and the general model. Perhaps the greater difference in scores between those with distal degrees comes from the greater amount of specialization one receives in post-graduate education directed at obtaining a terminal degree.

There were no instances of statistically significant differences in mean rankings observed for the modes of inquiry domain. The greatest number of statistically significant perceptions of mean response differences occurred within the dominant technologies domain where statistical significance (α = .05) was observed on eight out of eighteen comparisons of mean rankings between sub-groups.

Of the 180 hypotheses derived from research questions six through ten (90 H_0 and 90 H_1), the null hypothesis (H_0) was accepted on fourteen occasions. Relatively minor acceptance of the null hypotheses suggests that physical educators, when grouped by educational level, tend to disagree across educational levels about the validity, usefulness, and comprehensiveness of the four domains and the general model. Conversely, however, acceptance of the alternate hypothesis by 76 of the physical educators, when grouped by educational level, tends to indicate that there is general agreement across educational levels for the validity, usefulness, and comprehensiveness of the four domains and the general model.

The following section discusses findings related to research questions 11-15.

Summary of Findings Related to Research Questions 11-15

Descriptive Findings (Research Questions 11-15)

Research questions eleven through fifteen (Table 1.3, p. 23) contained 180 hypotheses (90 H_0 and 90 H_1) to determine if the experts within the profession of physical education would agree statistically ($\alpha = .05$) as to the validity, usefulness, and comprehensiveness of the *general model* (Figure 2.11, p. 68), *basic areas of study* (Figure 2.12, p. 69), *modes of inquiry* (Figure 2.13, p. 70), *fundamental processes* (Figure 2.14, p. 71), and *dominant technologies* (Figure 2.15, p. 72) between sub-disciplines. The sub-discipline responses were compared for six groups: pedagogues versus the humanities, pedagogues versus social sciences, pedagogues versus biological sciences, the humanities versus social sciences, the humanities versus biological sciences, and social sciences versus biological sciences. Tables D.16 through D.20 in Appendix D contain a description of the condition of the four domains and the general model as they relate to number (N) of respondents, range of mean responses, standard deviations, and the lower and upper limits at the 95% confidence interval for selected mean responses.

Tables 4.8 (p. 117) and D.16-D.20 (located in Appendix D) provide descriptive data regarding the four domains and the general model as they relate to number (N) of respondents, range of mean responses, standard deviations, and the lower and upper limits at the 95% confidence interval for selected mean responses.

Inspection of N according to sub-discipline shows that the four groups were not equal in number of respondents (D.16). A maximum of 137 pedagogues responded but there was only one respondent representing the humanities sub-group. Nine respondents returned surveys from social sciences and twenty-four from the biological sciences sub-groups (D.16-D.20), which further limited this study. The lowest mean for Tables D.16-D.20 was 3.44 for respondents from the social sciences, ranking the perceived usefulness of the dominant technologies domain (Table 4.8, p. 117 and Table D.19). The greatest mean was 4.44 for respondents from the social sciences, ranking the perception of comprehensiveness for the fundamental processes domain (Table 4.8, p. 117 and Table D.18). The standard deviation, indicating degree of scatter in a column, was lowest at 0.53 for the rankings from the social science respondents on perceptions of comprehensiveness for the fundamental processes domain (Table 4.8, p. 117 and Table D.18). Furthermore, the standard deviation was greatest at 1.23 for the rankings of respondents of the social sciences on their perception of comprehensiveness of the dominant technologies domain (Table 4.8, p. 117 and Table D.18). The confidence interval represented the range of values for the mean, i.e., two standard errors above and below the sample mean. Computation of the confidence interval allowed for an interval that included the true mean response of the population 95% of the time. The minimum lower limit of the 95% confidence intervals for the means was ranked 2.58, representing the respondents of the social sciences on the usefulness for the dominant technologies domain (Table 4.8, p. 117 and Table D.19). The maximum

mean ranking for the upper limit was 4.92, representing respondents of the social sciences on their perception of comprehensiveness for ranking the general model (Table 4.8, p. 117 and Table D.20).

Uniformly high mean rankings (when compared to the hypothetical mid-point of 2.50) were observed for the sub-discipline groups for the four domains (Tables D.16-D.20) and the general model (Table D.20) for validity, usefulness, and comprehensiveness. All measures of standard deviation were below 1.00 in the fundamental processes domain (Table D.18) indicating a relatively tight scatter among mean responses. For Tables D.16-D.20, five out of 45 mean rankings of the lower limit of the 95% confidence intervals were noted that were below 3.00, but none were observed below the hypothetical mid-point of 2.50. Eight out of 45 mean rankings were observed above the 4.00 level for the upper limit of the 95% confidence interval. No mean rankings below 3.00 were observed for the upper limit of the 95% confidence interval from Tables D.16-D.20, but 44 out of 45 of the mean rankings from the upper limit of the 95% confidence interval were above 4.00.

ANOVA Findings (Research Questions 11-15)

Research questions 11-15 were directed at discovering if a statistically significant difference (α = .05) existed among the rankings of experts, when grouped by sub-discipline, on the validity, usefulness, and comprehensiveness of the, *basic areas of study, modes of inquiry, fundamental processes, dominant technologies* domains, and the *general model*. Statistical significance

(α = .05) was calculated through use of one-way ANOVA with the F-test. The Tukey-Kramer Multiple Comparisons test was selected to accept or reject the null hypothesis for each group compared.

Calculations by ANOVA between sub-disciplines arranged by sub-groups for the ranking of validity, usefulness, and comprehensiveness of the four domains and the general model (Tables D.21-D.25 in Appendix D), indicated that there were no statistically significant differences (α = .05) found between mean rankings of sub-groups for any of the four domains or the general model. Statistical significance between group mean rankings by sub-discipline was not calculated because the p values were greater than 0.05 for all comparisons.

Summary of Findings (Research Questions 11-15)

Although the study was limited by a low response rate of 20% and a low response N for certain sub-groups, some insight can be gleaned about the perceptions of the respondents when sub-grouped by sub-discipline.

Mean response scores were relatively high when compared to the hypothetical mid-point of 2.50 (lowest was 3.44, highest was 4.44, and the mean of the means for all respondents was 4.05) suggesting that respondents grouped by sub-disciplines tended to receive the four domains and the general model favorably. Additional support for the positive acceptance of the four domains and the general model by the respondents was observed in data from the pilot study results (combined 'A' and 'B' pilot studies). The pilot study (yielded a total response N of 142 with

sub-group response numbers of 95 for pedagogy, 19 for the humanities, 6 for social sciences, and 22 for biological sciences. Mean scores for the pilot study mirrored the high mean scores found in the random (final) study. The highest mean was 4.68 from the 19 humanities respondents ranking the comprehensiveness of the general model. The lowest mean was 3.33 posted by the six social science respondents ranking the usefulness of the basic areas of study domain, the modes of inquiry domain, and the general model. The mean of the means for all of the responses for the pilot study sub-groups arranged by sub-discipline was equivalently as large as the random sample at 4.05. Although one cannot make a strong case for acceptance of the four domains and the general model among professional physical educators, one can, at least, recognize the tendency to accept the four domains and the general model by physical educators grouped by sub-discipline.

Small standard deviation scores (low of 0.53 and high of 1.23) presented evidence that there was a general unity of agreement by those responding to the survey.

Concerning confidence interval scores, respondents from the social sciences displayed the greatest range of perceived responses with a low of 2.58 for the extreme lower limit and a high of 4.92 for the extreme upper limit. High confidence interval scores indicated a tendency by the respondents to accept the four domains and the general model as perceived by the respondents.

In light of the limitations (low response rate of 20% and small sub-group numbers) of this survey, it is doubtful that any substantial conclusions can be drawn from the data. However, it should be noted that the data, limited

by this poor response rate, clearly contain extremely high scores for the means, standard deviation, and confidence intervals. Consideration of such high scores suggests that the four domains and general model should be the focus for future investigations into the SOK for the field of physical education.

Although they were not significant to this writer's analysis, one-way ANOVA intermediate calculations were included in Appendix D. Calculations of degrees of freedom, sum of squares, mean square, and F-values for the validity, usefulness, and comprehensiveness for the four domains and the general model are included in Appendix D (Tables D.21-D.25).

Summary

This study attempted to determine the current composition of the SOK for the field of physical education through the declaration of 390 hypotheses (195 H_0 and 195 H_1). The 195 null hypotheses were categorized through 15 research questions. The 15 research questions were further divided into three categorical areas in which physical educators responded by ranking questions on the four domains and the general model on a scale from 0-5 in increments of one. Research questions 1-5 (15 null hypotheses) were designed to describe level of acceptance or rejection of the perceptions of respondents on the four domains and general model. Research questions 6-10 (90 null hypotheses) were focused on comparing perceptions of sub-groups arranged by educational level on the four domains and general model. Research questions 11-15 (90 null hypotheses) were directed toward comparing perceptions

of sub-groups arranged by sub-disciplines on the four domains and general model.

Of the total 195 null hypotheses, the respondents accepted 14 null hypotheses, rejected 166 null hypotheses, and could not analyze 15 null hypotheses due to insufficient sub-group N. For research questions 6-10, 14 null hypotheses were accepted and 76 null hypotheses were rejected. Overwhelming rejection of the null for research questions 6-10 demonstrates a general agreement of perceptions of the respondents by sub-groups according to educational level. For research questions 11-15, no null hypotheses were accepted and 75 null hypotheses were rejected (15 null hypotheses for the humanities could not be analyzed due to an insufficient N).

Among research questions 6-10, the modes of inquiry domain and the general model showed the greatest amount of agreement of perceptions by respondents between sub-groups arranged by educational level. The dominant technologies domain reflected the greatest amount of controversy with eight null hypotheses accepted and 10 rejected. A possible reason for such controversy over the dominant technologies domain may stem from the recent development and inclusion of computers and electronic equipment into the field of physical education. Not all physical education departments at public and private institutions are equal in resources or aligned towards similar goals, making many technologies more important within one group as compared to another. In addition, the conceptual organization of technology as presented in the dominant technologies domain is original in this new Model and not part of mainstream thinking in the field of physical education.

This concludes the discussion of Chapter IV of this dissertation. Tables 4.1-4.8 are presented on pages 111-119. The following chapter contains: (a) a discussion of the findings; (b) recommendations for policy, practice, and future research; and (c) conclusions.

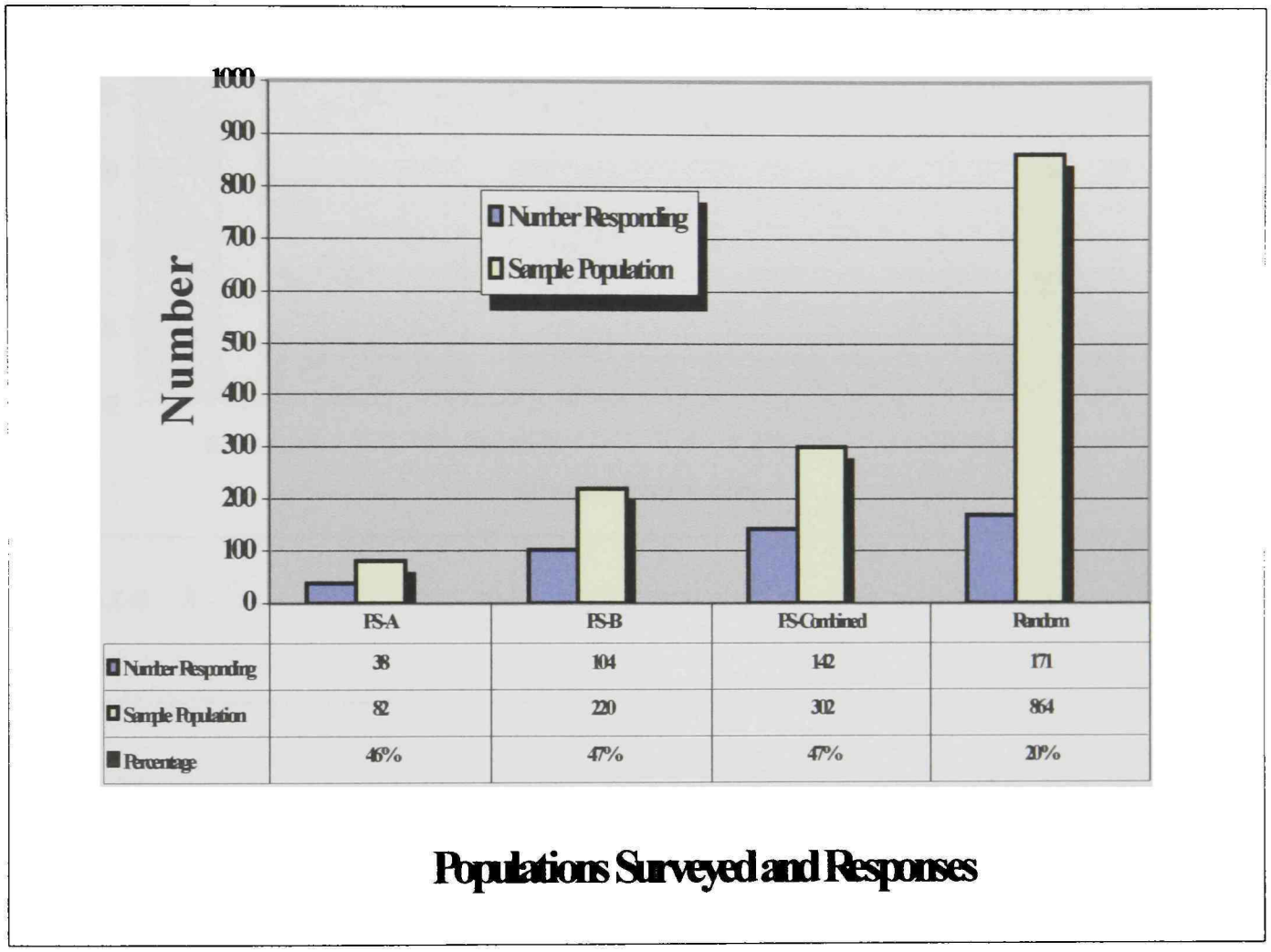


Figure 4.1. Number of surveys mailed and returned for each target group.

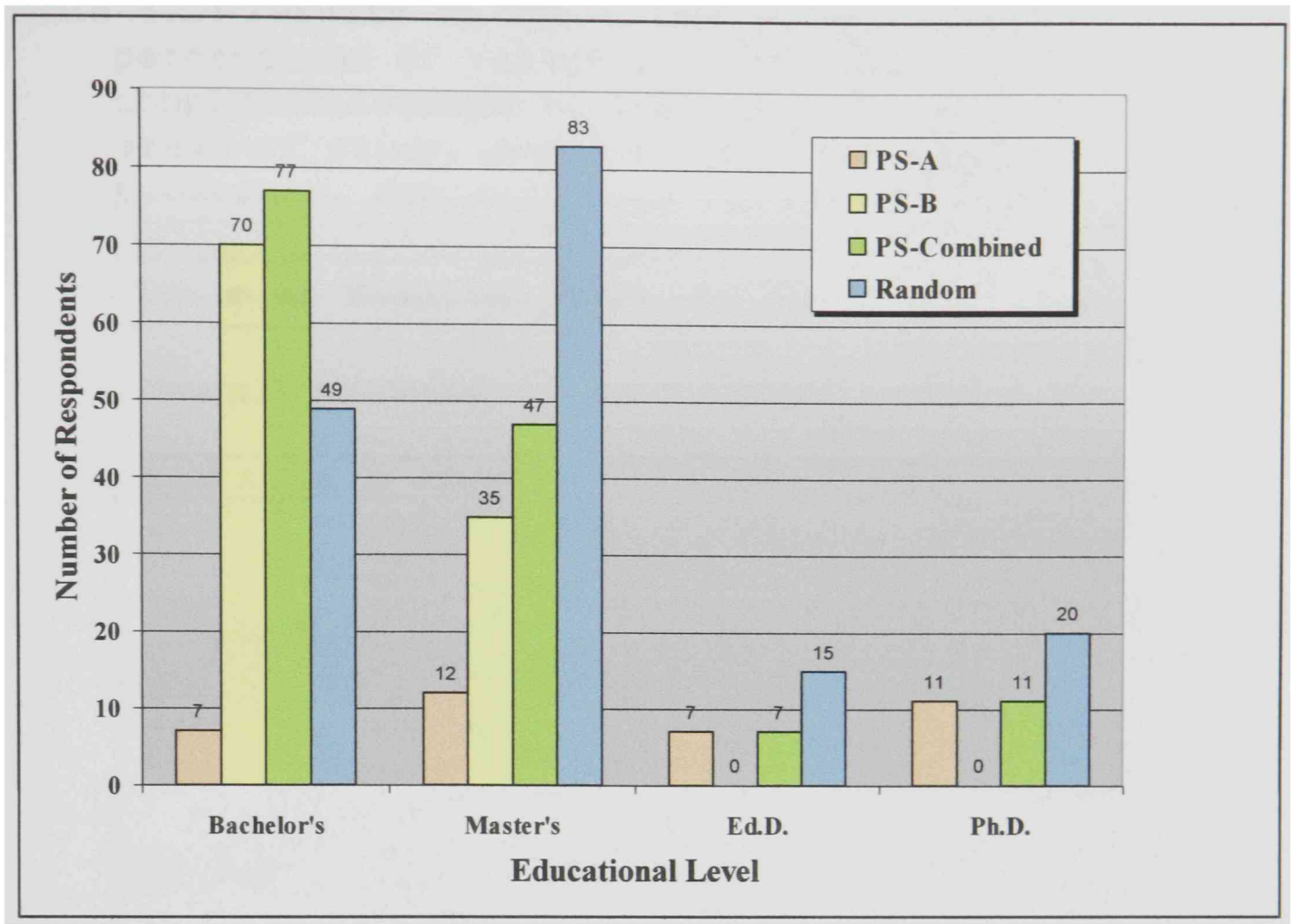


Figure 3.2. Number of respondents by educational level.

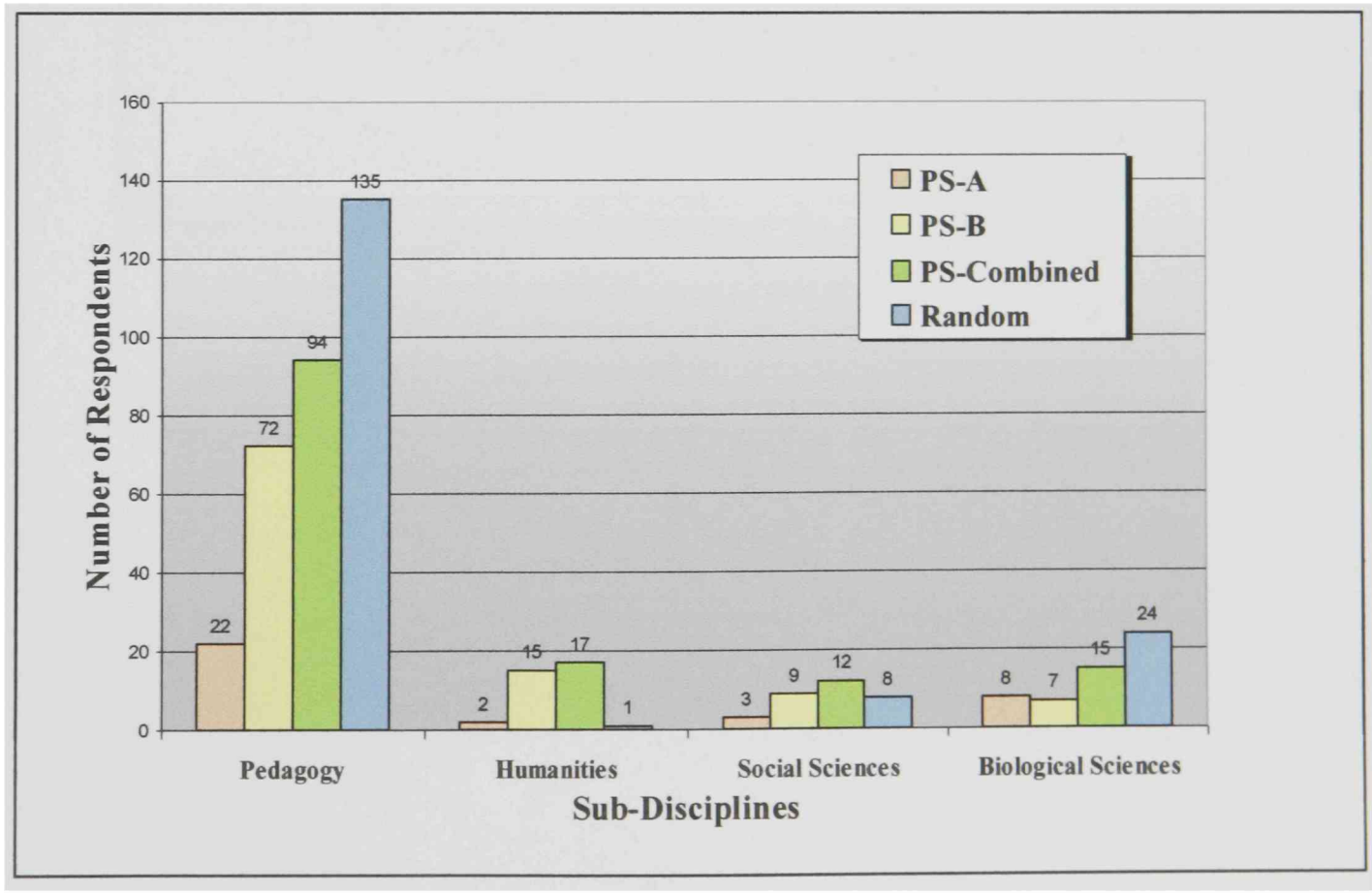


Figure 3.3. Number of respondents by sub-discipline.

Table 4.1: Results of the t-test when comparing the mean perceptions of validity, usefulness, and comprehensiveness ratings to $\mu = 2.50$ for the *basic areas of study, modes of inquiry, fundamental processes, dominant technologies,* and *general model.*

Table of Results: Research Questions #1-5.				
Overall Attribute	**N**	**MEAN**	**SD**	**p**
BASIC AREAS OF STUDY (Research Question #1)				
Validity	170	4.20	0.75	<0.0001
Usefulness	170	4.04	0.91	<0.0001
Comprehensiveness	170	4.06	0.94	<0.0001
MODES OF INQUIRY (Research Question #2)				
Validity	170	3.92	0.97	<0.0001
Usefulness	170	3.64	1.01	<0.0001
Comprehensiveness	169	3.90	1.00	<0.0001
FUNDAMENTAL PROCESSES (Research Question #3)				
Validity	169	4.30	0.77	<0.0001
Usefulness	169	4.14	0.80	<0.0001
Comprehensiveness	169	4.30	0.77	<0.0001
DOMINANT TECHNOLOGIES (Research Question #4)				
Validity	170	3.94	1.05	<0.0001
Usefulness	169	3.82	1.01	<0.0001
Comprehensiveness	169	4.01	1.04	<0.0001
GENERAL MODEL (Research Question #5)				
Validity	171	4.06	0.85	<0.0001
Usefulness	171	3.85	0.95	<0.0001
Comprehensiveness	171	4.06	0.86	<0.0001

Table 4.2: Composite table showing maximum and minimum findings of Tables D.1-D.5. Please see Tables D.1-D.5 for complete data entries. References to text entries are underlined.

Descriptive Composite Table for Research Questions 6 - 10.						
	Educational Level	N	Mean	Standard Deviation	95% Confidence Interval for Mean	
					Lower	Upper
Validity	**Basic Areas of Study (From Table D.1)**					
	Master's	83	4.21	0.62	4.07	4.34
Validity	**Fundamental Processes (From Table D.3)**					
	Bachelor's	49	4.49	0.55	4.33	4.65
Usefulness	Ed.D.	15	4.36	0.75	3.93	4.79
Validity	**Dominant Technologies (From Table D.4)**					
	Ed.D.	15	3.21	1.58	2.30	4.13
Usefulness	Ph.D.	20	3.05	1.23	2.47	3.63

Table 4.3: Post hoc comparison of validity, usefulness, and comprehensiveness ratings between educational levels in the domains of (1) *basic areas of study* and (2) *fundamental processes*.

COMPOSITE COMPARISONS BY EDUCATIONAL LEVEL FOR BASIC AREAS OF STUDY AND FUNDAMENTAL PROCESSES DOMAINS (From D.6 & D.8)				
	Comparison Groups	**Mean Difference**	**q^1**	**P**
BASIC AREAS OF STUDY	**VALIDITY**			
	Bachelor's versus Ed.D.	0.69	4.59	**
	Bachelor's versus Ph.D.	0.66	4.86	**
	USEFULNESS			
	Bachelor's versus Ph.D.	0.66	3.95	*
FUNDAMENTAL PROCESSES	**VALIDITY**			
	Bachelor's versus Ph.D.	0.64	4.52	**
	USEFULNESS			
	Bachelor's versus Ph.D.	0.65	4.41	*

[1]When q is greater than 3.68, P is less than .05.
*Significant at the .05 level.
**Significant at the .01 level.

Table 4.4: Post hoc comparison of validity, usefulness, and comprehensiveness ratings between educational levels in the (1) *dominant technologies* domain and (2) the *general model*.

COMPOSITE COMPARISONS BY EDUCATIONAL LEVEL FOR DOMINANT TECHNOLOGIES AND THE GENERAL MODEL DOMAINS (From D.9 & D.10)				
	Comparison Groups	**Mean Difference**	**q^1**	**P**
DOMINANT TECHNOLOGIES	**VALIDITY**			
	Bachelor's versus Ed.D.	0.97	4.50	**
	Bachelor's versus Ph.D.	0.88	4.69	**
	Master's versus Ed.D.	-0.81	3.94	*
	Master's versus Ph.D.	0.72	4.09	*
	USEFULNESS			
	Bachelor's versus Ph.D.	1.03	5.70	***
	Master's versus Ph.D.	0.82	4.80	**
	COMPREHENSIVENESS			
	Bachelor's versus Ph.D.	0.91	4.78	**
	Master's versus Ph.D.	0.72	4.07	*
GENERAL MODEL	**USEFULNESS**			
	Bachelor's versus Ph.D.	0.65	3.72	*

[1]When q is greater than 3.68, P is less than .05.
*Significant at .05 level.
**Significant at .01 level.
***Significant at .001 level.

Table 4.5: Composite table showing maximum and minimum findings of Tables D.16-D.20. Please see Tables D.16-D.20 for complete findings. References to text entries are underlined.

Descriptive Composite Table for Research Questions 11 - 15.						
	Sub-Discipline	N	Mean	Standard Deviation	95% Confidence Interval for Mean	
					Lower	Upper
Comprehensiveness	**Fundamental Processes (From Table D.18)**					
	Social Sciences	9	4.44	0.53	4.04	4.85
	Dominant Technologies (From Table D.19)					
Usefulness	Social Sciences	9	3.44	1.13	2.58	4.31
Comprehensiveness	Social Sciences	9	3.67	1.23	2.73	4.61
	General Model (From Table D.20)					
Comprehensiveness	Social Sciences	9	4.1	1.05	3.30	4.92

CHAPTER V

SUMMARY, MAJOR FINDINGS AND DISCUSSION, OTHER RECOMMENDATIONS, AND CONCLUSIONS

Summary

The field of knowledge known as physical education lacks a universally accepted and cohesive concept with which to bind its many parts. The absence of common purpose is not new but has shadowed the field since its founding as a profession over 100 years ago. Professionals representing every scientific field of endeavor were originally attracted to the prospect of solving the modern health problems associated with inadequate physical activity and impoverished social conditions. The problem addressed in this study focuses on the state of chaos that developed out of the multi-disciplinary origins of the field of physical education that continue to limit the fulfillment of the profession's stated goals to develop a healthier nation.

The first purpose for this epistecybernetic study was to determine the statistical significance of the validity, usefulness, and comprehensiveness of a graphic model, developed from a review of the related literature, of the structure of knowledge (SOK) for the field of physical education. The model developed in Figure 5.1 visually demonstrates the structure of knowledge for the field of physical education: the *basic areas of study*, the *modes of inquiry*, the *fundamental processes*, the *dominant technologies*, and *general model*. This researcher intended to validate the model by soliciting the expert opinions of 864 physical educators. The second purpose was to

recommend new policy, practice, and research for the field of physical education based on the results of this study. This investigator concluded from this study that a Model of the SOK for the field of physical education can be developed that will represent the *basic areas of study, modes of inquiry, fundamental processes, dominant technologies*, and *general model.* In addition, this researcher found physical educators responding to this survey, at all educational levels and within all sub-disciplines, rated the general model and its complete infrastructure as valid, useful, and comprehensive.

Of the 864 surveys (see Appendix B) mailed in January 1999 to physical educators from a random list (every n^{th} name) prepared by the MGI List Company, 171 or 20% completed surveys were returned. The data was observed and analyzed as to the perceived validity, usefulness, and comprehensiveness of the *general model* and the four domains of *the basic areas of study, modes of inquiry, fundamental processes*, and *dominant technologies* (see Figure 5.1). Further analysis of data included dividing the 171 respondents into two sub-groups to compare perceptions of physical educators of the Model according to educational level and by sub-disciplines. A ranking scale ranging from 0-5 was used to describe the experts perception in the validity, usefulness, and comprehensiveness of the model. The Student's t-test was used to determine differences between the hypothetical mid-point (2.50) of the ranking scale and the mean responses of the physical educators to research questions 1-5. ANOVA with an F-test was used to determine differences of rankings among the sub-groups:

educational levels (research questions 6-10) and sub-disciplines (research questions 11-15).

In the following section, the major findings related to research questions 1-15 will be presented and discussed.

Major Findings and Discussion

Basic Areas of Study Domain (Research Question #1)

The respondents ranked the Model's basic areas of study domain (Figure 2.12) for perceptions of validity, usefulness, and comprehensiveness. Of these three measured aspects of the mean, validity had the highest mean ranking (4.20) and usefulness had the lowest mean ranking (4.04).

The apparent acceptance of the basic areas of study domain was most likely due to the all-inclusive nature of the elements presented within the domain. According to the review of literature performed for this study, all of the listed basic areas of study elements usually identified within the field of physical education were included in the domain graphic. The two domain elements, *employment* and *spectatorism*, that are not commonly considered part of the field of physical education were included because they were supported by Karwowski (1997) and Rarick (1981), respectively, in the review of literature.

The hypotheses that the basic areas of study domain is valid, useful, and comprehensive were accepted at the 95 percent level of significance ($\alpha = .05$). The Basic Areas of Study Domain of the Model of the SOK for the Field of Physical Education appears, at this point, to be valid, useful, and comprehensive.

Modes of Inquiry Domain
(Research Question #2)

The respondents ranked the Model's modes of inquiry domain (Figure 2.13) for perception of validity, usefulness, and comprehensiveness. Of these three measured aspects of the mean, validity received the highest mean ranking (3.92), while usefulness had the lowest (3.64). The usefulness ranking of 3.64, the lowest ranking given by the respondents to the general model and its four domains, was significantly higher than the hypothetical mid-point (2.50) of the ranking scale.

It is interesting to note that the perceived mean rankings for the modes of inquiry, assumed by this researcher to be a non-controversial domain, were slightly lower for validity, usefulness, and comprehensiveness than they were for the basic areas of study domain, fundamental processes domain, and general model. Although validity, usefulness, and comprehensiveness mean rankings represented an apparent acceptance of the modes of inquiry, the relatively lower mean rankings, as compared to other domains, suggested that the inclusion of some domain elements were in doubt. Perhaps some domain elements are considered as more truly representative of physical education today than other domain elements? Future studies to validate the individual elements within each of the four domains should clarify the validity, usefulness, and comprehensiveness of each domain element.

The hypotheses that the modes of inquiry domain is valid, useful, and comprehensive were accepted at the 95 percent level of significance (α = .05). The Modes of Inquiry Domain of the Model of the SOK for the Field of

Physical Education appears, at this point, to be valid, useful, and comprehensive.

Fundamental Processes Domain (Research Question #3)

The respondents ranked the Model's fundamental processes domain (Figure 2.14) for perception of validity, usefulness, and comprehensiveness. Of these three measured aspects of the mean, validity received the highest mean ranking (4.30), while usefulness had the lowest (4.14). The mean validity ranking of 4.30 was the highest ranking among all mean rankings of the general model and the four domains.

This researcher was surprised to see the perceived mean validity rankings for the fundamental processes domain had the highest mean rankings among the perceived mean validity rankings. Inclusion of *spiritual* as a domain element could be regarded as controversial and would increase the potential for rejection of this domain. However, the widespread use of wellness models that usually include spiritual as a central domain element may have caused wider acceptance among the limited group of physical educators answering this survey.

The hypotheses that the fundamental processes domain is valid, useful, and comprehensive were accepted at the 95 percent level of significance ($\alpha = .05$). The Fundamental Processes Domain of the Structure of Knowledge for the Field of Physical Education appears, at this point, to be valid, useful, and comprehensive.

Dominant Technologies Domain
(Research Question #4)

The respondents ranked the Model's dominant technologies domain (Figure 2.15) for perceptions of validity, usefulness, and comprehensiveness. Of these three measured aspects of the mean, comprehensiveness had the highest mean ranking (4.01), while usefulness had the lowest (3.82).

Mean rankings of validity, usefulness, and comprehensiveness for the dominant technologies domain were slightly lower than the perceived mean rankings of the basic areas of study domain, fundamental processes domain, and the general model. Slightly lower mean rankings for the dominant technologies suggested that some domain elements were in doubt relative to the domains previously mentioned above. Domain element technologies were organized in a non-traditional fashion that is new to mainstream physical education thinking. The inclusion of these elements, though seemingly accepted, will, no doubt, become the focus of further research regarding the dominant technologies domain within the field of physical education.

The hypotheses that the dominant technologies domain are valid, useful, and comprehensive were accepted at the 95 percent level of significance (α = .05). The Dominant Technologies Domain of the Structure of Knowledge for the Field of Physical Education appears, at this point, to be valid, useful, and comprehensive.

The General Model
(Research Question #5)

The respondents ranked the general model (Figure 2.11) for perceptions of validity, usefulness, and comprehensiveness. Of these three measured aspects of the mean, comprehensiveness had the highest mean ranking (4.06), while usefulness had the lowest (3.85).

The apparent acceptance of the general model was most likely due to the all-inclusive nature of the four domains and their individual content elements. According to the review of literature performed for this study, all elements associated with physical education were included within the general model graphic. While there will be some disagreement as to the inclusion and placement of certain elements, the general model does represent all of the domain elements included within this study's review of literature.

The hypotheses that the general model is valid, useful, and comprehensive were accepted at the 95 percent level of significance (α = .05). The General Model of the Structure of Knowledge for the Field of Physical Education, at this point, appears to be valid, useful, and comprehensive.

Statistical Comparison of Perceptions by Educational Degree Groups for the Basic Areas of Study Domain
(Research Question #6)

The respondents were separated into four sub-groups by educational degree (bachelor's, master's, doctor of education, and doctor of philosophy). Comparisons of the means of the Model's rankings by educational degree groups

were made through analysis of variance (ANOVA) for the six educational sub-groups for validity, usefulness, and comprehensiveness. Although all sub-groups provided significantly higher than chance rankings for all measures of the Model, some sub-groups ranked certain measures of the Model higher than other sub-groups. Of the eighteen measures, three comparisons between the four sub-groups of respondents were found to be significantly different (α = 0.05). For mean validity rankings, very significant differences (α = 0.01) were observed between those with bachelor's and doctor of education and those with bachelor's and doctor of philosophy degrees. Comparisons between educational sub-groups' rankings for usefulness yielded one significant difference (α = 0.05) between respondents with the bachelor's and those with the doctor of philosophy degree. No significant differences were obtained in the comparisons of sub-groups' rankings for comprehensiveness. Of the eighteen specific hypotheses which stated that sub-groups, separated by educational level, would have similar rankings on the validity, usefulness, and comprehensive of the basic areas of study domain, fifteen instances were in agreement at the 95 percent level of significance (α = .05).

While statistical differences in magnitude of the rankings was found between those with the bachelor's and those with the doctorate in education and philosophy degrees, ranking agreement among groups between educational sub-groups was very prevalent. While this study reflected a low response rate of 20% that resulted in small sub-group numbers, comparisons, nonetheless, between educational level sub-groups provide some insight into the comparisons

between sub-groups. The large number of comparisons (15 out of 18) producing no significant differences (α = 0.05) among physical educators' groups appears to support the hypotheses that physical educators, separated by educational levels, agree on the validity, usefulness, and comprehensiveness of the basic areas of study domain in this new Model.

Statistical Comparison of Perceptions by Educational Degree Groups for the Modes of Inquiry Domain (Research Question #7)

The respondents were divided into four sub-groups by educational degree (bachelor's, master's, doctor of education, and doctor of philosophy degrees). Comparison of the means of the rankings by educational degree groups were made through analysis of variance (ANOVA) for the six educational sub-groups for validity, usefulness, and comprehensiveness. None of the eighteen comparisons between educational level group perceptions produced statistically significant differences in the responses (α = 0.05) between the sub-groups. All of the eighteen specific hypotheses related to agreement between the sub-groups separated by educational level on their perceptions of the validity, usefulness, and comprehensive of the modes of inquiry domain were accepted at the 95 percent level of significance (α = .05). While this study reflected a low response rate of 20% that resulted in small sub-group numbers, comparisons, nonetheless, between educational level sub-groups provide some insight into the comparisons between sub-groups. The observed statistical agreement (α = 0.05) between all eighteen comparisons among sub-groups

by their educational level appears to support the hypotheses that physical educators, at all levels of education agree on the validity, usefulness, and comprehensiveness of the modes of inquiry domain of this new Model.

Statistical Comparison of Perceptions by Educational Degree Groups for the Fundamental Processes Domain (Research Question #8)

The respondents were separated into four sub-groups by educational degree (bachelor's, master's, doctor of education, and doctor of philosophy). Comparison of the means of the rankings by educational degree groups were made through analysis of variance (ANOVA) for the six educational sub-groups for perceptions of validity, usefulness, and comprehensiveness. Although all sub-groups provided significantly higher than chance rankings for all the aspects this domain of the Model, some sub-groups ranked certain aspects of this domain, i.e., validity, usefulness, and comprehensiveness higher than other sub-groups. While this study reflected a low response rate of 20% that resulted in small sub-group numbers, comparisons, nonetheless, between educational level sub-groups provide some insight into the comparisons between sub-groups. Of the eighteen measures, two comparisons between respondents' mean responses were found to be significantly different (α = 0.05). For mean rankings, as to the validity of this domain, very significant differences (α = 0.01) in perceptions were observed between those with bachelor's and doctor of philosophy degrees. Comparisons between educational sub-groups' perceptions of the usefulness of

this domain yielded one significant difference (α = 0.05) between respondents with the bachelor's and those with the doctor of philosophy degree. No significant differences in perceptions were obtained from comparisons of the sub-groups with respect to domain comprehensiveness. Of the eighteen specific hypotheses that sub-groups, separated by educational level, could agree on the validity, usefulness, and comprehensive of the fundamental processes domain, sixteen instances of agreement were found at the 95 percent level of significance (α = .05).

While two mean rankings of this domain were statistically different between those with the bachelor's and those with the doctorate in philosophy degrees, ranking agreements between educational sub-groups appears to be prevalent. At this point, the number of comparisons (16 out of 18) producing no significant differences (α = 0.05) among physical educators' perceptions support the hypotheses that physical educators, when separated by educational levels, tend to agree on the validity, usefulness, and comprehensiveness of the fundamental processes domain of this new Model.

Statistical Comparison of Perceptions by Educational Degree Groups for the Dominant Technologies Domain (Research Question #9)

The respondents were separated into four sub-groups by educational degree (bachelor's, master's, doctor of education, and doctor of philosophy). Comparison of the means of the rankings by educational degree sub-groups were made through analysis of variance (ANOVA) for the six educational sub-groups with respect to validity,

usefulness, and comprehensiveness of the dominant technologies domain. Although all sub-groups provided significantly higher than chance rankings for all the validity, usefulness, and comprehensiveness of the dominant technologies domain, some sub-groups ranked these three characteristics higher than other sub-groups. While this study reflected a low response rate of 20% that resulted in small sub-group numbers, comparisons, nonetheless, between educational level sub-groups provide some insight into the comparisons between sub-groups. Of the eighteen measures, eight comparisons between respondents were found to be significantly different (α = 0.05). For mean validity rankings, significant differences (α = 0.01) were observed between: (1) the perceptions of those with bachelor's and those with doctor of education degrees, (2) the perceptions of those with the bachelor's and doctor of philosophy degrees. Significant statistical differences (α = 0.05) in perceptions were also found with respect to validity between those respondents with master's and doctor of education and those with master's and doctor of philosophy degrees. Comparisons between educational sub-groups' perceptions of usefulness yielded two statistically significant differences: (1) significant differences (α = 0.001) between respondents with the bachelor's and those with the doctor of philosophy degree and (2) (α = 0.01) between those with the master's and those with the doctor of philosophy degree. Two statistically significant differences were found in the comparisons of sub-groups' rankings for comprehensiveness: (1) significant (α = 0.01) differences were obtained between those with the bachelor's and those with the doctor of philosophy degrees and (2)

statistically significant differences (α = 0.05) were observed between those with the master's and those with the doctor of philosophy degrees. Of the eighteen specific hypotheses which stated that sub-groups, separated by educational level, would agree on the validity, usefulness, and comprehensive of the dominant technologies domain, ten instances were accepted at the 95 percent level of significance (α = .05).

Dissimilar rankings were found between those with bachelor's degrees and those with the doctorate in education or the doctor of philosophy degree. Other dissimilar rankings were discovered between those with the master's degree and those with the doctor of education or doctor of philosophy degree. At this point, the findings that a number of comparisons (10 out of 18) produced no significant differences (α = 0.05) among physical educators appears to give partial credence to the hypotheses that physical educators, separated by educational sub-groups, will have similar rankings on the validity, usefulness, and comprehensiveness of the dominant technologies domain of this new model.

Statistical Comparison of Perceptions by Educational Degree Groups for the General Model (Research Question #10)

The respondents were separated into four sub-groups by educational degree (bachelor's, master's, doctor of education, and doctor of philosophy degrees). Comparisons of the means of the rankings of the Model by educational degree sub-groups were made through analysis of variance (ANOVA) for the six educational sub-groups perceptions on

validity, usefulness, and comprehensiveness. Although all sub-groups provided significantly higher than chance rankings for all aspects of the Model, some sub-groups ranked certain components of the Model higher than did other sub-groups. While this study reflected a low response rate of 20% that resulted in small sub-group numbers, comparisons, nonetheless, between educational level sub-groups provide some insight into the comparisons between sub-groups. For mean validity rankings, no significant differences (α = 0.05) were observed. Comparisons between educational sub-groups as to the perception of usefulness of the general model yielded one statistically significant difference (α = 0.05) between respondents with the bachelor's degree and those with the doctor of philosophy degree. No statistically significant differences were obtained from the comparisons of the sub-groups' rankings for comprehensiveness. Of the eighteen specific hypotheses that sub-groups separated by educational level would have similar rankings on the validity, usefulness, and comprehensive of the general model, seventeen instances were accepted at the 95 percent level of significance (α = .05). If such a trend in the acceptance of the 17 hypotheses is indicative of physical educator's perceptions of the general model, then it appears that there is agreement across educational sub-groups as to the content of the general model.

While one case of statistical difference in magnitude of the rankings was found between the mean responses of those with the bachelor degrees and those with the doctor of philosophy degree, ranking agreement among educational sub-groups appeared to prevail. At this point, the greater

number of comparisons (17 out of 18) produced no statistically significant differences (α = 0.05) among physical educator groups, thus supporting the hypotheses that physical educators, separated by educational levels, appear to agree on the validity, usefulness, and comprehensiveness of the general model.

Statistical Comparison of Perceptions by Sub-Discipline Groups for the Four Domains and the General Model (Research Questions #11-15)

The 171 respondents were separated into four sub-groups by their sub-disciplines (pedagogy, humanities, social sciences, and biological sciences). Since the humanities sub-discipline had only one respondent, there was not enough data to provide descriptive statistical calculations for that sub-group. Comparisons between the means of the rankings by sub-discipline groups were made using analysis of variance (ANOVA) for the remaining three sub-discipline groups for the validity, usefulness, and comprehensiveness of the four domains and the general model. None of these comparisons between the sub-discipline groups produced statistically significant differences (α = 0.05). Statistical analysis comparing the perceptions of the three sub-disciplinary groups were made between pedagogues and social sciences, pedagogues and biological sciences, and social sciences and biological sciences. Posttests were not calculated because all p values were greater than 0.05.

At this point, statistical comparisons (α = 0.05) of sub-group perceptions between the sub-disciplines for each of the four domains and the general model support the

hypotheses that physical educators, grouped by sub-disciplines, appear to agree on the validity, usefulness, and comprehensiveness of the Model of the Structure of Knowledge for the Field of Physical Education.

Review of the results for the first five research questions reveal a general tendency to accept the four domains and the general model. Mean rankings were grouped together toward the high end of the ranking scale with 4.30 being the highest (validity of the fundamental processes domain) and 3.64 being the lowest (usefulness of the modes of inquiry domain). The mean of all the mean validity, usefulness, and comprehensiveness rankings for research questions 1-5 was 4.02. The mean of all the mean validity rankings for research questions 1-5 was 4.08, the mean of all the mean usefulness rankings was 3.90, and the mean of all the mean comprehensiveness rankings was 4.07. The mean rankings of usefulness for research questions 1-5 indicated less acceptance in perceptions of usefulness as compared to the mean rankings of perceived validity and comprehensiveness. The findings showing a slight dip in mean usefulness rankings, as compared to the mean rankings of validity and comprehensiveness, most likely, result from respondents who are unfamiliar with the basic research nature of epistecybernetic modeling. Since basic research is, by definition, very theoretical, it is expected that the practical nature inherent in usefulness measures would be low. Epistecybernetics is not applied research. Another possible reason for lower mean usefulness rankings as compared to mean validity and comprehensiveness rankings could be from an inability of physical educators to be open to the use of new information outside of their comfort zone

of professional experience. This researcher believes that as awareness of epistecybernetic modeling increases and as educational programs begin to use epistecybernetic knowledge in curriculum planning, practitioners from the field of physical education will be better prepared to evaluate and use information gained from these epistecybernetic models.

Results of research questions 6-10 were concerned with comparing mean rankings among educational degree sub-groups to determine if they agreed or disagreed as to the validity, usefulness, and comprehensiveness of the four domains and the general model. Agreement of 76 out of 90 comparisons between bachelor's, master's, doctor of education, and doctor of philosophy degrees indicated that respondents from all educational degrees tend to agree that the general model and the four domains are valid, useful, and comprehensive with some exceptions. Of the 14 instances of disagreement, only one was found between the more closely related master's degree and the doctor of education degree and only two were found between the bachelor's and the doctor of education degree. However, among the more widely separated degree levels, bachelor's degree to doctor of philosophy degrees, eight of the other disagreements were found to occur. Another three disagreements occurred between those with the more closely related master's degree and those with the doctor of philosophy degree. In general, these findings can be explained by the fact that increased specialization resulting from the attainment of research oriented degrees may, in some cases, produce a discrepancy in the

understanding of the SOK for the field of physical education between educational levels.

Among research questions 11-15, no disagreements occurred between sub-groups divided by sub-discipline, indicating that the Model was accepted by the responding physical educators when divided by pedagogy, social sciences, and biological sciences sub-groups according to area of specialization.

The acceptance of 76 out of 90 comparisons of mean rankings on the validity, usefulness, and comprehensiveness of the Model by physical educators indicate that respondents accepted the general model and the four domains when separated by educational degree. The area of greatest disagreement occurred in the assessment of the dominant technologies domain. Disagreement was limited to comparisons between those with bachelor's and the doctorate and those with the master's and the doctorate. However, no statistically significant differences were noted between doctor of education and doctor of philosophy or between bachelor's and master's. These findings indicate that educational degree levels of relative proximity appear to share similar ideas of what constitutes the SOK for the field of physical education. Educational levels of greater distance appear to produce wider differences in understanding the SOK for the field of physical education. These trends indicate that physical educators with bachelor's and master's degrees tend to view physical education in the global sense as a very broad field of study. Whereas, those with the doctor of education and the doctor of philosophy degrees, reflecting more specialized training, tend to view the SOK of physical education in

accordance with their areas of expertise. In this respect, those with bachelor's and master's tend to view physical education similarly and, likewise, those with the doctor of education and the doctor of philosophy tend to have equivalent views of the field. Nevertheless, those with the bachelor's and master's degrees tend to view the field differently from those with doctoral degrees. These findings are due to the fact that the educational preparation of those with the bachelor's and master's degrees tends to be broader and than those with doctoral degrees. Those with the doctorate have educational preparation that is more narrowly specialized.

Final assessment of this survey indicates an acceptance of the general model and the four domains with some limitations. Interpretation of results must be conservative because of the low response rate and small sub-groups numbers that limit generalizing to the larger population of physical educators. Statistical analysis of respondents' surveys indicated that physical educators, as a group and when divided into sub-groups according to educational level and sub-discipline, appeared to accept the general model and the four domains of the Model of the SOK for the Field of Physical Education as valid, useful, and comprehensive.

Summary of Written Comments

Respondents were encouraged to make written comments on the survey, either in the space provided at the back of the survey or on any of the faces of the model or on the general model itself. The written comments from the

returned surveys were collected and organized so that the following summary could be presented and discussed.

Of the 171 surveys returned, 79 (46%) contained written comments. When separated by educational level, these written comments came from 23 respondents with the bachelor's degrees, 35 with master's degrees, 8 with the Ed.D. degree, 11 with the Ph.D., one non-specified doctorate, and 2 education specialists. The written comments ranged from two very involved rewritings of the model to many short two word statements. For the most part, the comments were directed at pointing out new elements that the respondents felt should be represented in the model. In a few cases, respondents expressed concern or dislike for the model. Among those respondents expressing negative concerns for the model, three disliked the geometric appearance of the model, five thought the model was either too wordy or too difficult to follow, seven asked about the purpose of the model, and three suggested that the knowledge content was not appropriate for validation. However, many of the respondents gave written support of the model and its content. Of the 79 written comments from the respondents, 23 (29%) wrote a variety of comments referring to the quality, ease of comprehension, thoughtfulness, usefulness, comprehensiveness, and validity of the study. Another two of these respondents appreciated the use of the cube for visualizing the structure of knowledge for the field of physical education.

The means of the ranking responses by the various educational levels with written responses were calculated to lend further insight as to how physical educators

perceived the model. The mean response for the 23 respondents with the bachelor degrees returning surveys with written comments was 4.07. The mean for the 35 respondents with the master's degree returning surveys with written responses was 4.10. The mean for the eight respondents with the doctor of education degree returning surveys with written responses was 3.52. The mean for the 11 respondents with the doctor of philosophy degree returning surveys with written responses was 3.22. The mean of all 79 respondents returning surveys with written responses was 3.93. All educational levels had responses that exceeded the hypothetical mid-point (2.50) ranking scale.

It is interesting to note from the quantification of the written responses in the paragraph above that there is a general decrease in the value of mean rankings of the general model when means are compared by respondents' educational level as there was with mean ranking from the 171 surveys. As the respondent's educational level increases from the bachelor's to the doctor of philosophy degree, the mean rankings for the model decrease. This finding can be explained by the fact that this inverse relationship is caused by the increased amount of specialization within sub-disciplinary areas that occurs when physical educators pursue a higher degree. Specialization may lead physical educators away from a global understanding of the SOK of the field as graphically demonstrated by the Model. Therefore, physical educators with the doctor of philosophy degree are more likely to have specialized knowledge of a narrow area of the field of physical education and appear to be more likely to reject a

model designed to represent an all-inclusive understanding of the field.

In general, comments in reference to the individual faces of the Model of the SOK for the Field of Physical Education were mainly focused on the inclusion or exclusion of specific elements.

For the basic areas of study in the model, five respondents disagreed with the use of *spectatorism*, three thought *cooperative activities* should be included, four thought *lifetime sports* should be added, and two thought *aquatics* was necessary for the basic areas of study. Until more sub-groups can be studied, one cannot determine the actual strengths of these concerns in the total population.

For the modes of inquiry, three respondents thought *motor control and motor learning* were improperly included under social sciences. Another criticism of the modes of inquiry involved two respondents who questioned the inclusion of *management* and two who asked what *teaching methodologies* were being used. Two respondents thought that *adapted physical education* was placed incorrectly. (One suggested that it be placed in pedagogy and the other wanted it placed in biomechanics.)

For the fundamental processes, only one respondent commented that the *spiritual* dimension should not be included. Three respondents suggested that the term "stress" should be included in the definition of the *emotional* dimension.

For the dominant technologies, four respondents thought that the model was biased towards *athletics*. Six respondents disagreed with the inclusion of the *uniforms* dimension. Four thought that *assessments* needed to be

included as a dimension and two respondents thought that *safety* needed to be included in one of the definitions.

Finally, the written comments represented nearly half of all the surveys returned. Of the 79 surveys with written comments out of 171 total surveys, agreement between respondents about deficiencies within the model did not occur more than six times (as was the case for the response that *uniforms* should not be included in dominant technologies). This summary of written comments included only those comments that were in agreement with at least one other comment from another survey respondent. There were several written comments that were listed in the surveys that were not reported here because they were not observed more than once. Comparison of the means of the 15 mean rankings of those respondents that included written comments on their surveys against the use of a hypothetical mid-point value of 2.50 for the t-tests produced a p value < 0.0001, considered extremely significant and suggesting the strength of the feelings of these few individuals.

The results of the written comments mentioned above are consistent with the review of literature for this study and with this writer's experience as a physical educator for over 25 years. There seems to be little unanimity concerning knowledge content from physical educators over the SOK of the field of physical education. If a universal model existed within the profession, even implicitly, this writer assumes that consistent criticisms would be continue to come forward when evaluating any model for the field of physical education. Another point is that a very high percentage of respondents (46%) returned their surveys with

written comments indicating that physical educators are concerned about the SOK for their profession.

The Model of the SOK for the Field of Physical Education seems, at this point, to possess the potential to meet the needs of professionals who are in need of a clearer definition of the SOK for their field of study.

Other Recommendations

Since the results of the survey appear to reflect a general acceptance of the Model for the SOK of the Field of Physical Education by one small group of physical educators, a new openness regarding the knowledge content, role, scope, and implementation of human movement studies can be developed. However, wider presentation of the model must occur to determine its validity, usefulness, and comprehensiveness. Further introduction of this SOK model will probably not occur without creating some controversy within the field. "Reinventing the wheel" is not such a bad idea, however, when the new wheel is an improved version. Nevertheless, change is always (and should always be) met with some skepticism. Since this study, to the best of this writer's knowledge, is the first of its kind to statistically analyze physical educator perceptions regarding a new SOK for the field of physical education, it is expected that many physical educators will have difficulty accepting the model. However, if the much larger general population of physical educators respond in a manner similar to this study's respondents, the field of physical education may begin to accept and adopt this model as they see it to be valid, useful, and comprehensive. While negative criticisms concerning the model were very

limited in this research, this writer assumes that these criticisms will be magnified many times when the model is introduced on a much broader basis to the community of physical educators in the United States and abroad. Nevertheless, the acceptance of the validity of the model and the high ratio of positive written responses to negative written responses suggests that physical educators may favor the Model of the SOK for the Field of Physical Education. However, additional studies with more acceptable response rates than this one will be needed before the level of acceptance of this model can be determined.

The generic Model of the SOK for the Field of Physical Education, depicted as a cube, has been shown here to have achieved some acceptance among a small group of physical educators. Perhaps physical educators will give this new Model, for the disciplinary organization of knowledge, a chance to show how it can be used by physical educators to improve the field of knowledge for physical education. Based on the results of the study, the following policies, procedures, and research are recommended once this model has been further researched and adopted at the local, regional, national or international levels.

Recommendations for Policy

It is recommended that:

1. Elementary and secondary school physical education programs will teach or use all aspects of the Model in curricular development, implementation, and evaluation.

2. Elementary and secondary school counseling programs will advise students in all aspects of the Model regarding career counseling and advisement.
3. College and university physical education programs will teach or use all aspects of the Model in curricular development, implementation, and evaluation.
4. Local, regional, and national amateur sports organizations will adopt all aspects of the Model in program development, implementation, and evaluation.
5. Professional sports organizations will adopt all aspects of the Model in program development, implementation, and evaluation.
6. National organizations representing the sub-disciplines within the Model will adopt the Model and its infrastructure as the SOK for physical educators.
7. Faculty will adopt stewardship over the Model in order to maintain the state-of-the-art thinking among physical educators.

Recommendations for Practice

It is recommended that:

1. Elementary and secondary schools will hire faculty so that all areas of Model content can be provided for or taught.
2. College and university physical education departments will hire faculty so that all areas of Model content can be taught.
3. Secondary, college, and university athletic and sports programs will hire staff so that all areas of Model content may be included in programming.

4. Local, regional, and national organizations will be organized around the topics within the Model.

Recommendations for Future Research

It is recommended that:

1. Conduct a quantitative study to validate the Basic Areas of Study Domain of the Model.
2. Conduct a quantitative study to validate the Modes of Inquiry Domain of the Model.
3. Conduct a quantitative study to validate the Fundamental Processes Domain of the Model.
4. Conduct a quantitative study to validate the Dominant Technologies Domain of the Model.
5. Conduct a qualitative study using 25 educators to give their personal opinion and assessments of the Model.
6. Conduct a case study to present the Model to a college faculty to see if they could restructure their program around the Model.
7. Conduct a qualitative study of nine professional organizations to see what their executive leadership thinks about the Model.
8. Conduct a quantitative survey to see what students think of the Model and its components.

Conclusion

This concludes the investigation into The Validation of a Model of the Structure of Knowledge for the Field of Physical Education. In this study, the author has followed a new epistecybernetic methodology (Hensley, 1997) for determining the structure of knowledge for the field of physical education. Analysis of the survey data and

written comments has led this researcher to conclude that a small but widely dispersed group of experts within the field of physical education appear to accept the Model of the Structure of Knowledge for the Field of Physical Education as valid, useful, and comprehensive.

Concern for the chaotic conditions (Kretchmar, 1990; Newell, 1990) that permeate the field of physical education today provided the initial impetus to tackle this study. The era of specialization has blessed some sub-disciplines of physical education with abundant academic prestige and credibility but has been a bane to the generalist who continues to try to find unifying threads to hold the profession of physical education together. Perhaps this Model of the Structure of Knowledge for the Field of Physical Education will provide a way for the great field of human studies, variously named physical education, kinesiology, human kinetics, human movement studies, kinanthropology, sports, and athletics, to eventually adopt a universally acceptable model for curricular development.

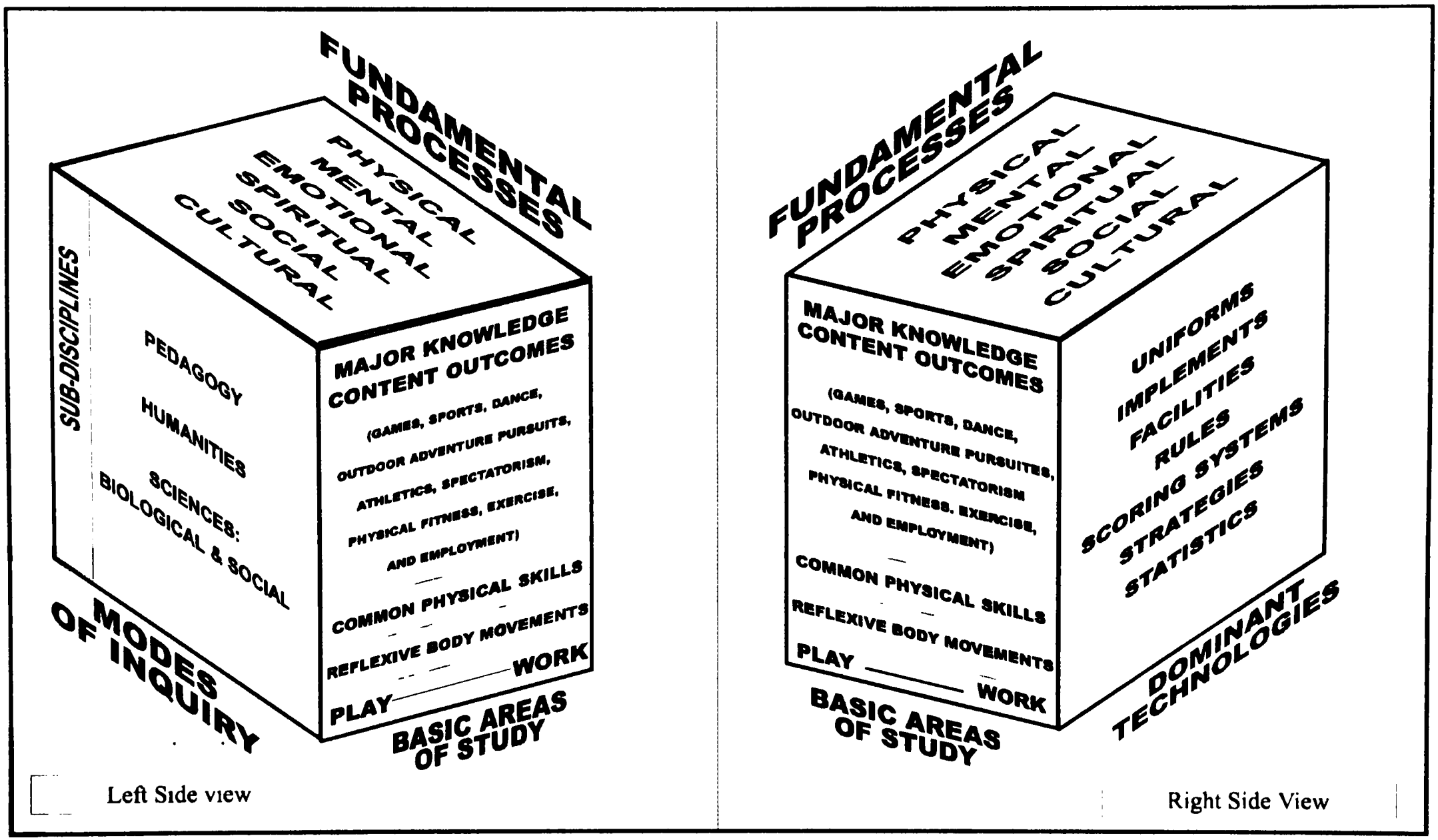


Figure 5.1. The General Model of the Structure of Knowledge for the Field of Physical Education.

REFERENCES

Allen, C. L. (1964). This is the year. Journal of Health, Physical Education, Recreation, 35(7), 38-40.

Bain, L. L. (1988). Beginning the journey: Agenda for 2001. Quest, 40(2), 96-106.

Barrow, H. M. (1973). Man and his movement: Principles of his physical education. Philadelphia: Lea & Febiger.

Bertalanffy, L. von. (1968). General systems theory: Foundations, development, applications. New York: George Braziller.

Bloom, B. S., Englehart, M. B., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). Taxonomy of educational objectives. The classification of educational goals. Handbook I: Cognitive domain. New York: Longman Green.

Borg, W. R. & Gall, M. D. (1989). Educational research: An introduction. New York: Longman.

Brooks, G. A. (1981). What is the discipline of physical education? In G. A. Brooks (Ed.), Perspectives on the academic discipline of physical education. (pp. 3-9). Champaign, IL: Human Kinetics.

Bunker, L. K. (1994). Virtual reality: Movement's centrality. Quest, 46(4), 456-474.

Cagigal, J. M. (1978). Theoretical elements for a diagnosis of sport. In F. Landry & W. A. R. Orban (Eds.), Philosophy, Theology and History of Sport and of Physical Activity (pp. 59-85). Miami: Symposia Specialists, Inc.

Carlisle, R. (1978). Human movement as a field of study. In F. Landry & W. A. R. Orban (Eds.), Philosophy, Theology and History of Sport and of Physical Activity (pp. 111-118). Miami: Symposia Specialists, Inc.

Carnegie Foundation for the Advancement of Teaching. (1977). Missions of the college curriculum. San Francisco: Jossey-Bass.

Cassidy, R. (1938). New directions in physical education for the adolescent girls in high school and college: A guide for teachers in cooperative curriculum revision. New York: A.S. Barnes and Company.

Cates, W. M. (1985). A practical guide to educational research. Englewood Cliffs, NJ: Prentice-Hall.

Charles, J. M. (1992). Kinesiology in the liberal arts. Quest, 44(1), 122-126.

Charles, J. M. (1996). Scholarship reconceptualized: The connectedness of kinesiology. Quest, 48(2), 152-164.

Checkland, P. (1981). Systems thinking, systems practice. Chichester, England: John Wiley & Sons.

Coakley, J. J. (1986). Sport in society: Issues and controversies. St. Louis: Times Mirror/Mosby.

Coetzee, N. A. J. (1994). In search of a founded epistemology for human movement science. International Journal of Physical Education, 31(1), 8-12.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences. Hillsdale, NJ: Lawrence Erlbaum.

Copeland, R. (Ed.). (1976). Webster's sports dictionary. Springfield, MA: Merriam.

Corbin, C. B. (1990). Of dreams and dinosaurs: The president's address. In R. J. Park & H. M. Eckert (Eds.), American Academy Papers: New possibilities, new paradigms? (No. 24, pp. 162-166). Champaign, IL: Human Kinetics.

Crum, B. (1992). The critical-constructive movement socialization concept: Its rational and its practical consequences. International Journal of Physical Education, 29(1), 9-16.

Davydov, V. V. (1978). On the elaboration of a general theory regarding sports activities. In F. Landry & W. A. R. Orban (Eds.), Philosophy, Theology and History of Sport and of Physical activity. (pp. 119-123) Miami: Symposia Specialists, Inc.

Day, J. A. (Ed.). (1986). Perspectives in kinanthropometry: The 1984 olympic scientific congress proceedings. (Vol. 1). Champaign, IL: Human Kinetics.

DePauw, K. P. (1997). The (in)visibility of disability: Cultural contexts and "sporting bodies." Quest, 49(4), 416-430.

Drucker, P. F. (1992). The new society of organizations. Harvard Business Review [On-line], Available URL:http://www.hbsp.harvard.edu/hbsp/prod_detail.asp?92503.html.

Durant, W. (1954). The story of civilization: Our Oriental Heritage. New York: Simon and Schuster.

Ellis, M. J. (1973). Why people play. Englewood Cliffs, NJ: Prentice-Hall.

Estes, S. (1994). Knowledge and kinesiology. Quest, 46(4), 392-409.

Ewert, A. W. (1989). Outdoor adventure pursuits: Foundations, models, and theories. Columbus, OH: Publishing Horizons.

Fahey, T. D., Insel, P. M., & Roth, W. T. (1997). Fit and well: Core concepts and labs in physical fitness and wellness. Mountain View, CA: Mayfield Publishing.

Farb, P. (1968). Man's rise to civilization as shown by the indians of north america from primeval times to the coming of the industrial state. New York: Dutton.

Fedler, C. B., Hensley, O. D., Sisler, P. & Tunstall, P. M. (1993, April 1-2). Epistecybernetics: A new approach to restructuring the engineering curriculum. Proceedings of the Gulf-Southwest Section of ASEE. Austin, TX.

Fernández-Balboa, J. (1997). Knowledge base in physical education teacher education: A proposal for a new era. Quest, 49(2), 161-181.

Gay, L. R. (1981). Educational research: Competencies for analysis and application. Columbus, OH: Merrill.

Goleman, D. (1995). Emotional intelligence. New York: Bantam.

GraphPad Software. (1998). InStat guide to choosing and interpreting statistical tests. San Diego: GraphPad Software, Inc.

Greendorfer, S. L. (1990). New directions or the same old problem. In R. J. Park & H. M. Eckert (Eds.), American Academy Papers: New possibilities, new paradigms? (No. 24, pp. 48-55). Champaign, IL: Human Kinetics.

Griffey, D. C. (1987). The future of graduate study in teacher preparation in physical education. Quest, 39(2), 174-178.

Harmon, P., Maus, R., & Morrissey W. (1988). Expert systems tools and applications. New York: John Wiley & Sons, Inc.

Harris, J. C. (1987). Social contexts, scholarly inquiry, and physical education. Quest, 39(3), 282-294.

Harris, J. C. (1993). Using kinesiology: A comparison of applied veins in the subdisciplines. Quest, 45(4), 389-412.

Henry, F. M. (1964). Physical education: An academic discipline. Journal of Health, Physical Education, Recreation, 35(7), 32-33, 69.

Hensley, O. D. (1992). Epistecybernetics: A revolution in thinking. Unpublished manuscript.

Hensley, O. D. (1993, October). Epistecybernetics: A revolution in thinking. Paper presented at the meeting of the International Society for Epistecybernetics, Lubbock, TX.

Hensley, O. D. (1995). An epistecybernetic research design for validating system models. Unpublished manuscript.

Hensley, O. D. (1997). Epistecybernetics: A revolution in thinking about knowledge. In O. D. Hensley, C. B. Fedler, & D. J. Bagert (Eds.), Epistecybernetics: A new approach to knowledge stewardship (pp. 1-24). Lubbock, TX: International Society of Epistecybernetics.

Hensley, O. D. (March 18, 1998). Personal communication. Pittsburg State University, Pittsburg, KS.

Hensley, O. D. & Cooper, P. A. (1992). The historical foundations for strategic planning for university research. In O. D. Hensley (ed.) Strategic planning for university research. (pp. 91-148). Lubbock, TX: Texas Tech University Press.

Hensley, O. D. and Fedler, C. B. (1992, March). Restructuring engineering education at levels more precise than degrees and courses. Paper presented at the Proceeding of Gulf-Southwest Section Annual Meeting of American Society for Engineering. Albuquerque, NM: The University of New Mexico, College of Engineering March 15-17.

Hensley, O. D. and Tunstall, P. M. (1994). An epistecybernetic research design for validating system model in higher education. Unpublished manuscript. Lubbock, TX: Texas Tech University.

Hoeger, W. K. (1989). Lifetime physical fitness and wellness: A personalized program. Englewood, CO: Morton.

Horgan, J. (1996). The end of science: Facing the limits of knowledge in the twilight of the scientific age. New York: Broadway Books.

Holt-Hale, S. A. (1993). On the move. Mountain View, CA: Mayfield.

Huizinga, J. (1955). Homo ludens: A study of the play element in culture. Boston: Beacon Press.

Hutchins, R. M. (Ed.). (1952). Great books of the western world: Rabelais. (Vols. 1 - 54). Chicago: Encyclopaedia Britannica.

Kanouse, D. (1993-1996). Reflex [CD-ROM]. In Microsoft® Encarta® 97 encyclopedia. Redmond, WA: Microsoft Encarta.

Karwowski, W. (1997, March). International ergonomics association. Available e-mail: w0karw03@ulkyvm.louisville.edu. IEA Press: Louisville, KY.

Krejcie, R. V. & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30(3), 607-610.

Kretchmar, R. S. (1988). Toward a stronger position for physical education in higher education: Three recommendations. Quest, 40(1), 47-57.

Kretchmar, S. R. (1990). Commentary: Riding the juggernaut. Quest, 42(3), 330-334.

Künst, P. (1989). Sport as reflected in art from the renaissance to impressionism. Quest, 41(2), 89-98.

Lawson, H. A. (1989). The multiversity and issues of discipline, profession, and centrality. Quest, 41(1), 68-80.

Leonard, G. (1975). The ultimate athlete: Re-visioning sports, physical education and the body. New York: Viking Press.

Locke, L. F. (1990). Commentary: Conjuring kinesiology and other political parlor tricks. Quest, 42(3), 323-329.

Lumpkin, A. (1998). Physical education and sport (4th ed.) Boston: McGraw-Hill.

MacAloon, J. J. (1978). Religious themes and structures in the olympic movement and the olympic games. In F.Landry & W. A. R. Orban (Eds.), Philosophy, Theology and History of Sport and of Physical Activity (pp. 161-169). Miami: Symposia Specialists, Inc.

Matthias, E. (1929). The deeper meaning of physical education (C. L. Schrader, Trans.). New York: Barnes.

Marketing General Incorporated. (1998, September). American alliance for health, physical education, recreation and dance. Available URL:http://www.mgi-net.com.

McCloy, C. H. (1947). Philosophical bases for physical education. New York: F. S. Crofts & Co.

McKechnie, J. L. (Ed.) (1974). Webster's New Twentieth Century Dictionary of the English Language. Cleveland: World Publishing.

Michener, J. A. (1976). Sports in America. New York: Random House.

Miller, D. L. (1978). Alienation, liberation and sport. In F. Landry & W. A. R. Orban (Eds.), Philosophy, Theology and History of Sport and of Physical Activity (pp. 153-159). Miami: Symposia Specialists, Inc.

Mish, F. C. (Ed.). (1984). Webster's ninth new collegiate dictionary. Springfield, MA: Merriam-Webster.

Naisbitt, J. (1984). Megatrends. New York: Warner Books.

Newell, K. M. (1990). Physical education in higher education: Chaos out of order. Quest, 42(3), 227-242.

Nigg, B. M. (1993). Sports science in the twenty-first century. Journal of Sports Sciences, 11, 343-242.

Oberteuffer, D., Ulrich, C. and Mand, C. L. (1970). Physical education: A textbook of principles for professional students (4th ed.). New York: Harper & Row.

Ogilvie, B. C. & Tutko, T. A. (1971). If you want to build character, try something else. Psychology Today, 5, 61-63.

Park, R. J. (1987). The future of graduate education in the sociocultural foundations: History. Quest, 39(2), 191-200.

Park, R. J. (1989). The second 100 years: Or, can physical education become the renaissance field of the 21st century? Quest, 41(1), 2-27.

Park, R. J. (1991). On tilting at windmills while facing armageddon. Quest, 43(3), 247-259.

Park, R. J. (1995). History of research on physical activity and health: Selected topics, 1867 to the 1950's. Quest, 47(3), 274-287.

Paul, J. (1996). Centuries of change: Movement's many faces. Quest, 48(4), 531-545.

Pelto, P. J. (1993-1996). Anthropology [CD-ROM]. In Microsoft® Encarta® 97 encyclopedia. Redmond, WA: Microsoft Encarta.

Phillips, D. (1998, September). Kinesiology. Available URL:http://lausd.k12.ca.us/~dphillip/kinesiology.html.

Physical Education Framework committee. (1973). Physical education framework for California public schools: Kindergarten through grade twelve. Bureau of Publications, California State Department of Education. Sacramento, California.

Rarick, G. L. (1981). The domain of physical education. In G. A. Brooks (Ed.), Perspectives on the academic discipline of physical education. (pp. 16-19). Champaign, IL: Human Kinetics.

Renson, R. (1989). From physical education to kinanthropology: A quest for academic and professional identity. Quest, 41(3), 235-256.

Renson, R. (1990). Homo movens: In search of paradigms for the study of humans in motion. In R. J. Park & H. M. Eckert (Eds.), American Academy Papers: New possibilities, new paradigms? (No. 24, pp. 100-114). Champaign, IL: Human Kinetics.

Ross, S. (1978). Physical education: A prediscipline in search of a paradigm. In F. Landry & W. A. R. Orban (Eds.), Philosophy, Theology and History of Sport and of Physical Activity (pp. 97-109). Miami: Symposia Specialists, Inc.

Rousseau, J. J. (1974). Émile. (B. Foxley, Trans.). London: J. M. Dent & Sons. (Original work published 1762).

Sage, G. H. (1990). Paradigms, paradoxes, and progress: Reflections and prophecy. In R. J. Park & H. M. Eckert (Eds.), American Academy Papers: New possibilities, new paradigms? (No. 24, pp. 154-161). Champaign, IL: Human Kinetics.

Saunders, J. E. (1994). Time for change?: Models for curriculum design in physical education teacher education. International Journal of Physical Education, 31(1), 19-25.

Schmidt, R. A. (1988). Motor control and learning: A behavioral emphasis. Champaign, IL: Human Kinetics.

Schultheis, R. (1986). Bone games: One man's search for the ultimate athletic high. New York: Fromm International.

Siedentop, D. (1990). Commentary: The world according to Newell. Quest, 42(3), 315-322.

Siedentop, D. (1998). Introduction to physical education, fitness, and sport (3rd ed.). Mountain View, CA: Mayfield.

Skoog, G. (March 29, 2000). Personal communication. Texas Tech University, Lubbock, TX.

Smith, A. B. (December 19, 1999). Personal communication. Texas Tech University, Lubbock, TX.

Stammers, R. B., Edworthy, J., & Tipton, M. J. (1997). Ergonomics. Available URL:http://www.tandf.co.uk/jnls/erg.htm

Thomas, J. R. (1987). Are we already in pieces, or just falling apart? Quest, 39(1), 114-121.

Toffler. A. (1970). Future shock. New York: Random House.

Trekell, M. (1992). Umbrellas: Which way is the wind blowing? Quest, 44(1), 127-134.

Tunstall, P. M. (1993). The structure of knowledge for mathematics. Unpublished doctoral dissertation, Texas Tech University, Lubbock, Texas.

U.S. Department of Health and Human Services. (1996). Physical activity and health: a report of the surgeon general. [On-line]. Available: http://www.cdc.gov/nccdphp/sgr/sgr.htm.

Van Dalen, D. B. & Bennett, B. L. (1971). A world history of physical education: Cultural, philosophical, comparative (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Vanderzwaag, H. J. (1978). Limitations of amateurism as a meaningful concept in sport. In F. Landry & W. Carlisle. A. R. Orban (Eds.), Philosophy, theology and history of sport and of physical activity (pp.35-47). Miami: Symposia Specialists, Inc.

Williams, J. F. (1930). Education through the physical. The Journal of Higher Education. 1, 1-5.

Williams, J. F. (1964). The principles of physical education. Philadelphia: W. B. Saunders.

Williamson, J., Karp, D., Dalphin, J., & Gray, P. (1982). The research craft: An introduction to social research methods. Boston: Little, Brown & Company.

Wuest, D. A. & Bucher, C. A. (1995). Foundations of physical education and sport. St. Louis: Mosby.

Ziegler, E. F. (1975). Personalizing physical education and sport philosophy. Champaign, IL: Stipes Pub. Co.

Ziegler, E. (1979). Issues in north american sport and physical education. Washington, DC: AAHPER.

Ziegler, E. F. (1990). Sport and physical education: Past, present, future. Champaign, IL: Stipes Pub. Co.

APPENDIX A

GLOSSARY OF

PHYSICAL EDUCATION TERMS

Physical Education Terms

Adapted physical education. A "program for exceptional students who are so different in mental, physical, emotional, or behavioral characteristics that, in the interest of quality educational opportunity for all students, special provisions must be made for their proper education" (Lumpkin, 1998, p. 339).

Art. One of four sub-disciplines in the humanities sub-domain on the *modes of inquiry* face (domain) of the SOK model for the field of physical education. Mish (1984) in Webster's Ninth New Collegiate Dictionary defines art as "the conscious use of skill and creative imagination especially in the production of aesthetic objects" (p. 105) such as paintings and sculptures. For the purpose of this investigation, art in physical education refers to the creation of situations or objects relating to the aesthetics of humans moving.

Athlete. This term is confusing concerning its meaning. Leonard (1975) provides a broad definition of an athlete as "one who plays a game" (p. 154). On the other hand, the secondary definition in Webster's Sports Dictionary (Copeland, 1976) states that the British use the term more narrowly to indicate one who competes in the sport of track and field. But the term athlete as it is used in this paper is taken from the primary definition in Webster's Sports Dictionary (Copeland, 1976) as "someone who is trained to compete in exercises, sports, or games requiring physical strength, agility, or stamina" (p. 11).

Athletics. Michner (1976) describes athletics as a "most imprecise word" (p. 10). According to Webster's Sports Dictionary (Copeland, 1976) athletics is the term used for track and field among the British. However, Leonard (1975) simply indicates that anyone who plays a game may be called an athlete. This research agrees with professional physical educators Lumpkin (1998) and Wuest and Bucher (1995) who define athletics are competitive activities (games or sports) that are organized and highly structured and are participated in by highly skilled individuals. Wuest and Bucher (1995) add that athletics are only one aspect of the physical education program.

Basic Areas of Study. One of four major domains (faces) used in modeling knowledge as described by Hensley (1995). For the purpose of this paper, the *basic areas of study* are the areas where the understanding of human involvement in physical activity are cataloged according to the following areas: 1) *major knowledge content outcomes*, 2) *common physical skills*, 3) *reflexive body movements*, and 4) the *play-work continuum*. Wuest and Bucher (1995) categorize work and play as fundamental components to all physical activity. Wuest and Bucher (1995) argue that a person's perception of the degree of play or work in an activity is determined by the fundamental motivation behind the participation.

Biological Sciences. One of three sub-domains on the modes of inquiry face of the SOK model for the field of physical education. Biological sciences refer to those sub-disciplines that are directly concerned with the organic and physical aspects of humans in motion. Harris (1993) refers to this area as the "biophysical domain" (p. 390) and includes the sub-disciplines of exercise physiology, biomechanics, sport/exercise psychology, motor development, and motor learning/control. For the purpose of this study, the sub-disciplines of the biological sciences include: 1) sports medicine, 2) adapted physical education, 3) exercise physiology, 4) biomechanics, 5) kinanthropometry, and 6) motor development.

Biomechanics. A sub-discipline of the biological science sub-domain from the modes of inquiry face. Lumpkin's (1998) definition of sport biomechanics as "the study of the effects of natural laws and forces on the body through the science and mechanics of movement" (p. 58) is accepted for the purpose of this research.

Calisthenics. For the purpose of this study, calisthenics is the term used describe a program of general exercises designed to promote health, beauty, and strength. The term originated with Catharine Beecher's program of exercises in the 1800s (Lumpkin, 1998).

Common Physical Skills. The sub-domain of the basic areas of study face where common physical skills are listed according to various movement categories (Physical Education Framework Committee, 1973).

Cross-disciplinary. According to Brooks (1981) a cross-disciplinary approach to inquiry within the field of physical education involves a variety of "courses within the field which focus on various aspects of physical education as a discipline (e.g., exercise physiology, motor learning, sport psychology, motor development)" (p. 5). Renson (1990) states that while a cross-disciplinary science borrows "certain portions from traditional disciplines, a unifying concept exists that generates its thematically integrated subject matter" (p. 105). For the purpose of this research, the term *cross-disciplinary* refers to the method of inquiry where several disciplines are used to study a particular phenomena, such as physical education, but lack a unifying conceptual focus to the field of study.

Cultural. One of the six sub-domains of the fundamental processes face of the SOK model for physical education. This study accepts Renson's (1990) view of culture which states that it is one of four different subsystems along with society, the personality, and the behavioral organism that both command and shape sport behavior. Furthermore, Renson (1990) contends that culture is the mechanism by which homo sapiens continues the life process. It is the mechanism for providing man with subsistence, protection, aggression and defense, social regulation, spiritual balance, and recreation.

Cultural Anthropology. One of four sub-disciplines within the sub-domain of social science on the modes of inquiry face of the SOK model for physical education. Cultural anthropology is concerned with the ways in which people live in a particular culture and how their language and customs develop (Pelto, 1993-1996). For the purpose of this research, cultural anthropology refers to the study of humans in physical activity from a cultural anthropological perspective.

Dance. One of nine types of physical activity that humans do as classified under the major knowledge content outcomes sub-domain on the basic areas of study face of the SOK model for physical education. This study accepts Lumpkin's (1998) and Wuest and Bucher's (1995) definitions of dance. Lumpkin (1998) describes dance as "bodily movements of a rhythmic and patterned succession usually executed to the accompaniment of music" (p. 339). Wuest

and Bucher (1995) add that dance is considered a performing art and normally intends to use creative skills to communicate ideas and feelings.

Discipline. This study accepts the following collective definitions by Henry (1964), Lumpkin (1998), and Ziegler (1990) as an appropriate explanation of the term. Franklin Henry's (1964) definition of a discipline states that it is "an organized body of knowledge collectively embraced in a formal course of learning. The acquisition of such knowledge is assumed an adequate and worthy objective as such, without any demonstration or requirement of practical application. The content is theoretical and scholarly as distinguished from technical and professional" (p. 32). Lumpkin (1998) adds that the components of a discipline are composed of "1) a body of knowledge, 2) a conceptual framework, 3) scholarly procedures and methods of inquiry, and 4) both the process of discovery and the end result" (p. 51). Ziegler (1990) contributes another perspective to the definition that states a discipline must "offer a professional service to the public" (p. 5).

Domain (face). For the purpose of this study, a domain refers to each of the four individual faces of the model of the SOK for the field of physical education. The four domains for the SOK for the field of physical education are the basic areas of study, the modes of inquiry, the fundamental processes, and the dominant technologies. The sub-domains are the major separate sections within each domain.

Domain Element. A generic term that refers to any fundamental component of a domain that, together with other components, constitute a domain.

Dominant Technologies. One of four major domains used in modeling knowledge as described by Hensley (1997). Those participating in physical activity for the purpose of conducting the activity use the technologies. Technologies may provide identification and protection (uniforms), tools (implements) for conducting the activity, a location (facilities) to participate, a method for controlling behavior (rules), a method for tabulating scores (scoring systems), a means for maintaining comparisons (statistics), or methods for optimizing the objectives (strategies) of the activity.

Education. Barrow (1973) defines education as the process of adjusting to one's culture while providing the impetus to improve that culture. Furthermore, Barrow (1973) states that education is a process which implies change and is traditionally focused on the intellectual area of the knowledge content areas without regard for the other five areas of kinesthetic, emotional, social, cultural, and spiritual development. A historical-anthropological view of education is offered my Van Dalen and Bennett (1971) who states that in a primitive society where survival is of paramount importance, general education is physical education. For the purpose of this investigation, the term *education* refers to the process of gaining knowledge about one's environment with the intent to enhance the ability to survive and to become an enlightened member and contributor to society.

Education of the Physical. A popular twentieth century view for the role of physical education, which states that the principal goal is the development of a strong musculoskeletal system (Williams, 1930).

Education through the Physical. A "dominant twentieth century philosophy in which physical activity is used to reach goals in fitness, skill, knowledge, and character" (Siedentop, 1998, p. 386).

Emotional. One of six sub-domains of *fundamental processes* within the SOK model for the field of physical education. Goleman (1995) states, that the definition of the term emotion has been "quibbled over" (p. 289) for more than a century. This investigation accepts Goleman's (1995) description of the term *emotion*. Goleman (1995) defines emotion as "a feeling and its distinctive thoughts, psychological and biological states, and range of propensities to act" (p. 289). Furthermore, Goleman (1995) classifies emotions into feelings, moods, and temperaments and he states that there are "hundreds of emotions, along with their blends, variations, mutations, and nuances" (p. 289).

Employment. One of nine types of physical activity that humans do as classified under the major knowledge content outcomes sub-domain on the basic areas of study face of the SOK model for physical education. For the

purpose of this study employment (work) as defined in Webster's Ninth New Collegiate Dictionary (Mish, 1984) is the physical activity in which one is engaged for making a living. The discipline that is directed towards optimizing the psychological and physiological performance of humans at work is ergonomics (Stammers, Edworthy, and Tipton, 1997).

Epistecybernetics. A term coined by Hensley (1993) in 1990 to describe the new scientific study of the stewardship of knowledge. According to Hensley and Fedler (1992, March) "epistecybernetics is the science of knowledge that advances investigation into the nature, creation, organization, dissemination, and utilization of knowledge with the practical purpose of improving its efficient dissemination and use. It is derived from the Greek words *episteme* meaning knowledge and *kybernetes* meaning pilot or governor" (p. 5).

Ergonomics (motor development). One of six sub-disciplines within the sub-domain of biological science on the *modes of inquiry* face of the SOK model for physical education. Karwowski (1997) defines "ergonomics, also called human factors, as the scientific discipline concerned with the interaction between humans and technology" (p. 1).

Exercise. One of nine types of physical activity that humans do as classified under the major knowledge content outcomes sub-domain on the basic areas of study face of the SOK model for physical education. Lumpkin (1998) defines exercise as the practice one does "to strengthen, or to condition through physical activity" (p. 340).

Exercise Physiology. The study of the bodily functions under the stress of muscular activity (Lumpkin, 1998).

Expert. According to Hensley (1995) an expert "implies that the person has been professionally trained in the field, that they have had successful work experience in the field, and that they are current with the developments in the field. They have had advanced graduate training in their professional field" (p. 3). For the purpose of this study an expert is one who has earned the minimum of a bachelor's degree in the field of physical education or who

has worked within the field for a period of at least five years.

Face (domain). For the purpose of this study, a face refers to each of the four individual domains of the model of the SOK for the field of physical education. The four faces for the SOK for the field of physical education are the basic areas of study, the modes of inquiry, the fundamental processes, and the dominant technologies.

Facilities. One of seven kinds of technologies that humans use for the purpose of conducting physical activity as classified under the *dominant technologies* face of the SOK cube for physical education. For the purpose of this study, *facilities* will refer to those places, natural or manmade, used to conduct the desired physical activity.

Field of Study. Corbin (1990) defines *field* as "a comprehensive term to include the discipline of kinesiology, professions of physical education, and any other disciplines that are basic to these professions" (p. 164). In Corbin's (1990) address, Of Dreams and Dinosaurs, he uses the term *field* to describe the body of knowledge of physical education.

Fundamental Processes. One of four major domains used in modeling knowledge as described by Hensley (1995). According to Hensley (1997), the "*fundamental processes* are those general actions which are basic to the performance of work and play activities. Process is the doing of something. Process is the verb portions of describing generic work" (p. 4). For the purpose of this paper, physical education may be understood in light of six processes that lead to basic areas of study of physical education. The six fundamental processes are the physical, mental, emotional, spiritual, social, and cultural aspects of human beings.

Games. Michener (1976) states that the term games have many possible definitions. This research accepts the definition of the term *games* as provided by Lumpkin (1998). Lumpkin (1998) defines *games* as an event which "usually implies winners and losers and can range from simple diversions to competitions with significant outcomes governed by rules" (p. 6). But adding to the complexity, Huizinga (1955) adds dimension to Lumpkin's (1998)

definition of *games* by describing a game as being bound by time; having its own reality, and the performance of which is an end unto itself. Furthermore, says Huizinga (1955), games are self-perpetuating because they are pleasurable and provide relaxation from the strains of ordinary life. Finally, Huizinga (1955) explains that "until quite recently war was conceived as a noble game -- the sport of kings -- and that the absolutely binding character of its rules rested on, and still retained, some of the formal play-elements we found in full flower in archaic warfare" (p. 208).

Health. For the purpose of this research Lumpkin's (1998) definition of health is accepted as "soundness of body, mind, and soul, or one's general well being" (p. 340). Health is not included in the basic areas of the study face because it is considered an allied profession to physical education (Wuest and Bucher, 1995).

History. One of four sub-disciplines in the humanities sub-domain on the modes of inquiry face of the SOK model for the field of physical education. Webster's Ninth New Collegiate Dictionary (Mish, 1984) defines history as a "branch of knowledge that records and explains past events of a particular subject matter" (p. 573). For the purpose of this study, the history of physical education focuses on the recording and explanation of events relating to the global involvement of human beings in physical activity.

Human Movement Phenomena. A term proposed by Wuest and Bucher (1995) that "seeks to describe the theoretical structure of physical education as an area of scholarly study" (p. 12). Wuest and Bucher (1995) offer Human Movement Phenomena as an alternative umbrella term for physical education.

Human Movement Studies (HMS). Carlisle (1978) describes HMS as an umbrella term for physical education. The term, Human Movement Studies as a field of study, gained popular acceptance in the United Kingdom during the 1970's.

Humanities. One of three sub-domains on the *modes of inquiry* face of the SOK model for the field of physical education. Lumpkin (1998) describes the humanities as the

"area of study which encompasses the areas of art, literature, and music" (p. 67). The humanities involve the aesthetic expression and appreciation of humans moving.

Implements. One of seven types of technologies that humans use for the purpose of conducting physical activity as classified under the dominant technologies face of the SOK model for physical education. Webster's Ninth New Collegiate Dictionary defines implement as a tool for work (Mish, 1984, p. 604). For the purpose of this study implements are those necessary tools required for the execution of physical education. Examples of such implements are computers, gas analyzers, treadmills, balls, saddles, ropes, and athletic footwear, etc.

Interdisciplinary. A composite "discipline (that) is based upon knowledge supplied by several other disciplines (e.g. anatomy, physiology, psychology)" (Brooks, 1981, p. 5).

Kinanthropology. First introduced as an improved umbrella term for the field of physical education in 1967 by the Canadian, Roch Meynard. From the Greek: *kinein* (to move) + *anthropos* (human) + *logos* (science) = *the science of humans in movement*. Kinanthropology "represents ... the holistic approach to the physical education tradition" (Renson, 1990, p. 108). Renson (1989) provides a further explanation of the term *kinanthropology* as "the science of humans in movement in the context of sport, play, dance, physical exercise, work, or rehabilitation" (p. 108). Renson's (1990) holistic perspective of physical education integrates the "physical-organic, the motor, and the behavioral components" (p. 108) of the study of humans in movement.

Kinanthropometry. One of six sub-disciplines under the biological science sub-domain located on the *modes of inquiry* face of the SOK model for the field of physical education. Day (1986) credits Bill Ross for the first use of the present connotation of the term kinanthropometry in 1972 in the Belgian journal Kinanthropologie. According to Day (1986) kinanthropometry is "the study of human size, shape, proportion, composition, maturation, and gross function, in order to understand growth, exercise, performance, and nutrition" (p. xv).

Kinesiology. The term was first proposed by Baron Nils Posse in 1886 as the "most appropriate title for gymnastics" (Paul, 1996, p. 534). Although the term kinesiology is being widely accepted as a new umbrella term to replace the study of physical education as a discipline (Sage, 1990), it is an imprecise term. Webster's New Twentieth Century Dictionary (McKechnie, 1974) defines kinesiology as the "science of study of human muscular movements, especially as applied within physical education" (p. 1002). However, a look at the root components of the term from Phillips (1998) reveals that the term is composed of *kinein* (to move) and *logus* (to discourse or the study of) which implies the study of movement in the very general sense of the word. However, the term kinesiology, does not indicate human involvement. It is a general term. This broader interpretation of the term could lead to a study of all things that move, from atoms and machines to animals such as worms or ostriches. Sage (1990), nevertheless, states that the actions taken at the 1988 Big Ten Leadership Conference and the 1989 Academy meetings led to a general acceptance of the term kinesiology for the field and was the result of 25 years of paradigm shifting.

Knowledge. Hensley (1992) defines knowledge from the epistecybernetic perspective as "the acceptance of a generic solution into a repertoire of problem-solving devices" (p. 14).

Leisure. Lumpkin (1998) defines leisure as "freedom from work or responsibilities...may or may not include physical activity" (p. 340). Leisure (recreation) is not included in the basic areas of study face because it is considered an allied profession to physical education (Wuest and Bucher, 1995).

Liberal Education. This paper accepts the following two definitions of the term *liberal education* as appropriate for this field of study. The Carnegie Foundation for the Advancement of Teaching (1977) defines liberal education as one that focuses mainly on the humanities and is based on the cultural heritage. Barrow (1973) adds that formal education has been limited to the cultural perspective of "verbalization and the fine arts" (p. 15) but adds that liberal education should be holistic and not limited to one area of the total human experience.

Lifetime sports. Siedentop (1998) defines lifetime sports as "those sport activities for which ample recreational outlets are available in the culture" (p. 387).

Literature. One of four sub-disciplines in the humanities sub-domain on the *modes of inquiry face* of the SOK model for the field of physical education. Webster's Ninth New Collegiate Dictionary (Mish, 1984) defines literature as "writing in prose or verse" (p. 698". For the purpose of this study, literature in physical education specializes in writing of prose or verse relating to the involvement of humans in physical activity.

Mental. One of the six sub-domains of the *fundamental processes* face from the SOK model for physical education. The mental sub-domain focuses primarily on the way information is learned through the taxonomy of educational objectives (Bloom, Englehart, Furst, Hill and Krathwohl, 1956): knowledge, comprehension, application, analysis, synthesis, and evaluation.

Management. One of four sub-disciplines within the sub-domain of social science on the *modes of inquiry* face of the SOK model for physical education. According to Webster's Ninth New Collegiate Dictionary (Mish, 1984) management is the "act or art of supervising of something (p. 722). For the purpose of this study, management refers to the study of humans in physical activity from the perspective of managing physical activities.

Modes of Inquiry. One of four major domains used in modeling knowledge as described by Hensley (1995). *Modes of inquiry* are the ways of thinking used by practitioners of specific sub-disciplines for understanding the field. For the field of physical education, the *modes of inquiry* are divided into three general sub-domains of inquiry: the *sciences (biological and social)*, the *humanities*, and *pedagogical* studies. Sub-disciplines within the biological sciences sub-domain are sports medicine, adapted physical education, exercise physiology, biomechanics, kinanthropometry, and motor development. Sub-disciplines within the social science sub-domain are motor control and motor learning, management, anthropology, sociology, and psychology. Sub-disciplines within the humanities sub-domain are history, philosophy, literature, and art. Sub-

disciplines within the pedagogical studies are teaching methodologies.

Motor Control and Motor Learning. One of five sub-disciplines within the sub-domain of social science on the *modes of inquiry* face of the SOK model for the field of physical education. Schmidt (1988) defines motor control as the "study of the control of movements in humans and animals and motor learning as the "study of how movements are made" (p. 4).

Motor Development (also ergonomics). One of six sub-disciplines within the sub-domain of *biological science* on the *modes of inquiry* face of the SOK model for the field of physical education. Schmidt (1988) defines motor development as the study of physical skills as they relate to the enhancement of efficiency of human movement in work and leisure.

Multi-disciplinary. The multidisciplinary method for scientific inquiry uses the approach where the object of investigation is studied from separate disciplinary perspectives, without a unifying concept. Knowledge gained from this multi-disciplinary approach is then applied to the practical problems of the greater field of study. As in the case where methods of investigation are taken from psychology or physiology and are applied to solve problems related to physical education (Renson, 1990).

Outdoor Adventure Pursuits. Ewert (1989) defines outdoor adventure pursuits as "a variety of self-initiated activities using an interaction with the natural environment, that contain elements of real or apparent danger, in which the outcome, while uncertain, can be influenced by the participant and circumstance" (p. 6). Outdoor pursuits tend to be non-competitive and include such physical activities as hunting, fishing, mountain climbing, skiing, canoeing, and the like.

Paradigm. According to Thomas Kuhn (in Horgan, 1996), a paradigm is "the term to refer to a collection of procedures or ideas that instruct scientists, implicitly, what to believe and how to work" (p. 43). More recently, however, Gutting and Ritzer (in Sage, 1990) have defined a paradigm more broadly as a "fundamental image of the subject matter within a discipline that involves

methodological rules, values, and/or a distinctive way of operating within the domain of the discipline" (p. 154).

Pedagogy. One of three sub-domains on the *modes of inquiry* face of the SOK model for the field of physical education. Lumpkin (1998) defines pedagogy as the field of study that seeks to enhance the learning process. For the purpose of this research, pedagogy refers to the study of the enhancement of the learning process relative to the field of physical education.

Philosophy. One of four sub-disciplines within the humanities sub-domain on the *modes of inquiry* face of the SOK model for the field of physical education. Webster's Ninth Collegiate Dictionary (Mish, 1984) defines philosophy as a "discipline comprising as its core logic, aesthetics, ethics, metaphysics, and epistemology" (p. 883). For the purpose of this research, philosophy refers to the study of logic, aesthetics, ethics, metaphysics, and epistemology as they relate to physical education.

Physical. One of the six sub-domains of the *fundamental processes* face from the SOK model for physical education. The physical sub-domain includes organic and neuromuscular systems of the body (Wuest and Bucher, 1995).

Physical Activity. Coakley's umbrella term for athletics, fitness, exercise, dance, games, outdoor pursuits, and sports (Coakley, 1986).

Physical Culture. The umbrella term used in countries with Marxist ideologies for physical education. Physical culture suggests a study of humans "performing physical exercises during work, rehabilitation, or leisure" (Renson, 1990, p. 102).

Physical Education. Please see pages 19 - 20 for a complete discussion of the term physical education.

Physical Fitness. One of nine types of physical activity that humans do and which is classified under the *major knowledge content outcomes* sub-domain on the *basic areas of study face* of the SOK model for physical education. Physical fitness is yet another term within the model of the SOK for the field of physical education that has had many definitions applied to it. Hoeger (1989) and

Siedentop (1998) agree that there are three major kinds of physical fitness: they are health-related fitness, motor-performance fitness, and cosmetic fitness. This investigation accepts the following definitions by Hoeger and Lumpkin. Hoeger (1989) argues that physical fitness is the ability to "meet the ordinary as well as the unusual demands of daily life safely and effectively without being overly fatigued, and still have energy left for leisure and recreational activities" (p. 3). Lumpkin (1998) adds another perspective stating that physical fitness is a "combination of cardiorespiratory endurance, muscular strength and endurance, flexibility, body composition, agility, balance, neuromuscular coordination, speed, and power" (p. 341).

Physical Training. Oberteuffer, Ulrich and Mand (1970) define physical training "as an obsolete term used by the armed forces and certain educational institutions to describe the training of the physical components of the body without any necessary reference to purposes" (p. 19) which are significant in modern education. The term physical training should not be confused with the term physical education.

Play. Play is located at one end of the *play-work continuum* sub-domain within the *basic areas of study* face of the SOK model for the field of physical education. Lumpkin (1998) defines play succinctly, if not completely, as "amusements engaged in freely, for fun, and devoid of constraints" (p. 341). Huizinga (1955) provides a complete discussion concerning the concept known as play. Huizinga (1955) describes "play as a voluntary activity or occupation executed within certain fixed limits of time and place, according to rules freely accepted but absolutely binding, having its aim in itself and accompanied by a feeling of tension, joy and the consciousness that it is *different* from *ordinary life*" (p. 28). Furthermore, Huizinga (1955) states that "play ... is one of the most fundamental (categories) in life" (p. 28). Huizinga (1955) emphasizes that play must be spontaneous and careless which is the characteristic that separates play from professional sport. Huizinga (1955) elaborates on his understanding of play by stating that in order "to play, a man must play as a child" (p. 199). And that "war and everything we do with it remains fast in the daemonic and magical bonds of play" (Huizinga, 1955, 209). Furthermore, Huizinga (1955)

asserts that "civilization is rooted in noble play and that, if it is to unfold in full dignity and style, it cannot afford to neglect the play-element. Once (play-rules) are broken, society falls into barbarism and chaos (p. 210).

Psychology. One of six sub-disciplines within the social sciences sub-domain on the *modes of inquiry* face of the SOK model for the field of physical education. Lumpkin (1998) defines sport psychology as the "study of mental processes as they relate to human sports performance. Theories and laws of learning, the importance of reinforcement, and the linking of perceptual abilities with motor performance contribute to this body of knowledge" (p. 63). For the purpose of this study, the sub-discipline of psychology will refer to the study of mental processes as they relate to physical education.

Recreation. Lumpkin (1998) states that "recreation ... refreshes or renews one's strength and spirit after toil, with or without activity" (p. 6). However, Siedentop (1998) defines recreation as an "activity done for personal growth or pleasure during leisure time" (p.358). Recreation is not included in the basic areas of study face because it is considered as an allied profession to physical education (Wuest and Bucher, 1995).

Reflexive Body Movements. The most fundamental sub-domain of the *basic areas of study* face of the SOK model for the field of physical education. According the Kanouse (1993-1996) a reflexive movement is an "involuntary response to a stimulus by the animal organism" (p. 1).

Rules. One of seven kinds of sub-domain technologies that humans use for the purpose of conducting physical activity as classified under the *dominant technologies* face of the SOK model for physical education. For the purpose of this study, rules are specific or general agreements, standards, and intents used to conduct the chosen physical activity. Rules may also include the acceptance of no rules by the participants.

Scoring Systems. One of seven kinds of sub-domain technologies that humans use for the purpose of conducting physical activity as classified under the *dominant technologies* face of the SOK model for physical education.

For the purpose of this study scoring systems are those technologies used in keeping score for specific events such as score boards, panels of experts, systems and tables of scoring, and methods for tabulating scores.

Social. One of the six sub-domains of the *fundamental processes* face located on the SOK model for the field of physical education. The social sub-domain refers to the human dynamics created through interpersonal relationships between people involved in physical activity.

Social Sciences. One of three sub-domains on the *modes of inquiry* face of the SOK model for the field of physical education. The social science sub-domain subsumes those sub-disciplines that are directly concerned with human behavior from sociological, psychological, and anthropological perspectives. Harris (1993) defines this area as the "behavioral/sociolcultural domain" and includes the sub-disciplines of "sport/exercise psychology, motor development, motor learning/control, sport sociology, and sport management" (p. 397). For the purpose of this study, the sub-disciplines of the social sciences include: (1) cultural anthropology, (2) sociology, (3) psychology, (4) management, (5) motor control and motor learning.

Sociology. One of six sub-disciplines within the social sciences sub-domain on the *modes of inquiry* face of the SOK for the field of physical education. Coakley (1986) defines the sociology of sport as a "sub-discipline of sociology that focuses on the relationship between sport and society" (p. 4). For the purpose of this study, sociology as a subdiscipline of physical education will focus on human relationships within the societal context.

Spectatorism. One of nine types of physical activity that humans do as classified under the *major knowledge content outcomes* sub-domain on the *basic areas of study* face of the SOK model for physical education. Cagigal (1978) divides the sports experience into two categories: the spectator and the participant. Cagigal (1978) makes the point that sport is made up "mainly of people who are not active" (p. 67). That these non-active people are to be considered to belong to sport because "they participate in and support sport in our time; they experience sport, and sport also belongs to them" (Cagigal, 1978, p. 67).

Spiritual. One of the six sub-domains of the *fundamental processes* face located on the structure of knowledge model for physical education. Webster's New Twentieth Century Dictionary (Mckechnie, 1974, p. 1751) defines spiritual as of the spirit or the soul, often in a religious or moral aspect, as distinguished from the body. Miller (1978) asserts that sport is religion. MacAloon (1978) adds, "the lexicon of the modern Olympic movement is full with religious terminology" (p. 161). Furthermore, MacAloon (1978) adds that Pierre de Coubertin (1863 - 1937), the founder of the modern Olympics, regarded the Olympics as a religious phenomenon and described them as a "philosophico-religious doctrine" (p. 161), containing ethics, world-view, metaphysics, and mythology. De Coubertin refers to Olympism as "the religion of sport, the "religio athletae" (MacAloon, 1978, p. 161). It is MacAloon's (1978) judgement that "modern athletics is a religion, a cult, an impassioned soaring, capable of going from *play to heroism"* (p. 161). Schultheis (1986) adds to MacAloon's (1978) observations of the religious nature of sport by claiming that outdoor pursuits can provide a pathway for a connection with the supernatural.

Sports. One of nine types of physical activity that humans do as classified under the *major knowledge content outcomes* sub-domain on the *basic areas of study* face of the SOK model for physical education. "Sport is an institutionalized competitive activity that involves vigorous physical exertion or the use of relatively complex physical skills by individuals whose participation is motivated by a combination of intrinsic and extrinsic factors (Coakley, 1986, p. 17). Huizinga (1955) adds that "sport is alongside and apart from the cultural process...it is profane, 'unholy'" (p. 3). Davydov (1978) asserts that "no all-embracing theory yet exists about the concept of sports as a special social phenomenon" (p. 119).

Sports Medicine. One of six sub-disciplines under the *biological science* sub-domain located on the *modes of inquiry* face of the SOK model for the field of physical education. Lumpkin (1998) defines sports medicine as the practice of medicine by trained medical technicians and professionals within the sphere of athletics and sports. For the purpose of this study, sports medicine refers to the practice of medicine by trained medical technicians and professionals within the wider arena of physical education.

Statistics. One of seven types of sub-domain technologies that humans use for the purpose of conducting physical education as classified under the *dominant technologies* face of the SOK model for physical education. Vanderzwaag (1978) states that there are two kinds of records kept in sport: the first records the highest level of achievement, and the second lists standings and related notations. Furthermore, Vanderzwaag (1978) notes that record keeping has a qualitative affect on motivating athletes to greater achievement. For the purpose of this research, statistics refer to the record of the highest level of achievement, standings, and related notations.

Strategies. One of seven types of sub-domain technologies that humans use for the purpose of conducting physical activity as classified under the *dominant technologies* face of the SOK model for physical education. For the purpose of this study, strategies are the methodologies employed for achieving high level performance in physical education activities.

Structure of Knowledge. According to epistecybernetic theory as described by Hensley and Fedler (1992, March), the structure of knowledge for a discipline may be determined by identifying the *basic areas of study*, the *fundamental processes*, the *dominate technologies*, and the *modes of inquiry*. However, Skoog (personal communication, March 29, 2000) states that many educational theorists contend that SOK theory must include specific knowledge elements appropriate for curriculum planning and that without such knowledge elements, the SOK theory is more closely related to a "structure of programming." Furthermore, Oberteuffer, Ulrich, and Mand (1970) state that the SOK of human movement can be "construed to embrace the concept of movement as a discipline" (p. 28) and that "in its most all-encompassing sense, physical education is the discipline of human movement" (p. 29).

Sub-disciplines. Siedentop (1998) describes sub-disciplines as "the various areas of scientific and scholarly study of sport and exercise" (p. 388). Sixteen sub-disciplines for the field of physical education are listed on the *modes of inquiry* face of the SOK model for the field of physical education.

Sub-domain. For the purpose of this study, a sub-domain refers to the major categories contained within each of the four domains (faces) that create the faces of the SOK model for the field of physical education. The sub-domains for the *basic areas of study* are the *major knowledge content outcomes, basic physical skills, reflexive body movements, and the play-work continuum.* The sub-domains for the *modes of inquiry* domain are *pedagogy, humanities,* and *sciences (social and biological).* The sub-domains for the *fundamental processes* are *physical, mental, emotional, spiritual, social,* and *cultural.* The sub-domains for the *dominant technologies* are *uniforms, implements, facilities, rules, scoring systems, statistics,* and *strategies.*

Teaching Methodologies. The sub-discipline that is located under the pedagogy sub-domain of the modes of inquiry face of the SOK model for the field of physical education. For the purpose of this study, teaching methodologies refer to the various methods and styles of teaching that are used as appropriate for teaching a wide spectrum of physical activities such as lecturing, mentoring, and coaching.

Uniforms. One of seven sub-domains of technology that humans use for the purpose of conducting physical activity as classified under the *dominant technologies* face of the SOK model for physical education. For the purpose of this study, the sub-domain *uniforms* refers to specific attire worn (or not worn) by all participants. Uniforms are designed for color, style, material, and protective devices relative to the execution of the participant's specific area of involvement.

Wellness. A proactive view of life that pursues high-level health resulting in optimizing physical, mental, emotional, spiritual, cultural, and social well-being (Fahey, Insel, & Roth, 1997). While wellness embodies a holistic view of health, it is not included in the model because it is more closely associated with the allied profession of health than with physical education.

Work. Along with play, work is a very fundamental category on the basic areas of study face. Work and play are fundamental to all physical activity (Ellis, 1973). Ziegler (1979) demonstrates how play and work exist along a

continuum. However, Huizinga (1955) asserts that work is differentiated from play by perception: that play is done spontaneously and with free will but work is done as "labor, task, or duty that is one's accustomed means of livelihood" (Mish, 1984, p. 1358).

APPENDIX B

SURVEY LETTER AND QUESTIONNAIRE

LETTER OF INTRODUCTION TO QUESTIONNAIRE

January 15, 1999

Dear ,

What are the fundamental components of the field traditionally known as physical education[1]?

As a teacher and coach in the field of human movement studies, I continually find myself struggling with our profession's problem of identity. Are we kinesiologists, sport and exercise scientists, physical educators, movement educators or what? Many of us share this problem of identity and have other concerns associated with low academic status and the inability of our profession to meet national fitness goals. These issues seem to stem from the lack of a universally agreed upon model of the structure of knowledge for our hugely complex field of study of humans in motion.

To date a universally accepted and comprehensive model that includes the fundamental components constituting the field of physical education does not exist within the literature.

The enclosed survey is a first generation attempt to determine the structure of knowledge for the field of physical education. The survey contains fifteen questions relating to four general categories applicable to physical education. Please take the next few minutes to look over the survey and answer the questions as best you can. Then return the questionnaire in the stamped envelope provided.

One thousand professionals in the field of physical education are being asked to participate in this survey. In light of the controversial nature of this study, the responses should be very interesting so I am anxiously looking forward to the return of your survey.

If you wish a copy of the executive summary, please indicate so on the last page of the survey.

Thank you for your time and cooperation.

Rick Beelby

Rick Beelby
Ed.D. Candidate at Texas Tech University
Assistant Professor and Head Coach for Track & Field at Wayland Baptist University

[1] There is no attempt by this writer to promote the term "physical education" over other umbrella terms currently vying for dominance within the field i.e., kinesiology, human kinetics, sport and exercise sciences, etc. The term "physical education" was chosen because it is the historically accepted umbrella term for the field. This writer has no special preference as to what term best conveys the overarching identity for the field of study of human movement.

_____ Code No.

A SURVEY OF THE STRUCTURE OF KNOWLEDGE FOR THE FIELD OF PHYSICAL EDUCATION[1]

DEMOGRAPHIC DATA

Please fill-in the following questions. The data will be used to establish research sub-groups for data analysis.

1. Highest academic degree earned: _____.
2. Year of degree: _____.
3. Area of expertise (biomechanics, exercise physiology, philosophy, history, administration, intramurals, athletics, physical education, generalist, etc.): _____.
4. Status of appointment: (teaching, research, service, coaching, or other): _____.
5. Years in service: (K - 6) _____,
   (7 - 12) _____,
   (Junior College) _____,
   (Undergraduate - 4 year) _____,
   (Graduate): _____.

ASSUMPTIONS

The following are the two underlying assumptions that guide this study:

(1) The field of physical education will be defined in its most global sense as stated by Cassidy as "the sum of the changes in the individual caused by experiences centering in motor activity." This overarching definition allows for all physical activity, or movement - random or undirected, to be collected and organized within the shadow of the term "physical education." (Note: the term "physical education" is used in this study because of its historical role in human movement studies. There is no intention by this writer to promote "physical education" as the preferred umbrella term for the field.)

(2) The new method of study known as *epistecybernetics* (the study of the stewardship of knowledge) will be used to organize the structure of knowledge for the field of physical education.

(over)

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[1] This survey has been reformatted for inclusion into this dissertation.

THE MODEL

The basic structure of the model of the Structure of Knowledge for the Field of Physical Education is graphically displayed on four faces of a six-sided cube. For the epistecyberneticist, the cube represents a generic and non-hierarchical representation of the structure of knowledge for a given field. (Right and left sides of the cube are shown for visual clarity.)

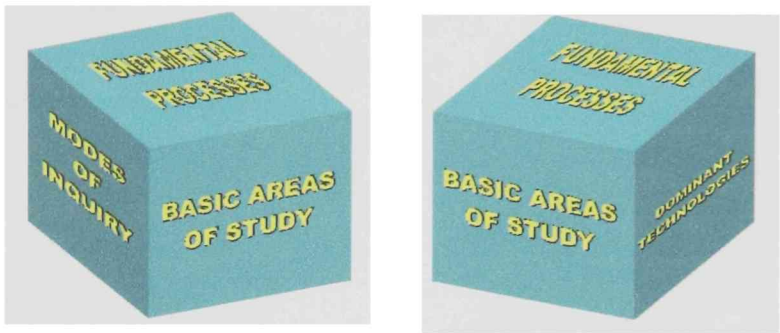


Figure 1.1: Model of the Structure of Knowledge for the Field of Physical Education: ***The Basic Structure.***

On the following pages, the model of the Structure of Knowledge for the Field of Physical Education is presented.

Included within this questionnaire are five additional figures describing the ideas and concepts included on the faces of the model. These examples are not exclusive but serve as clarification of the type of concepts that are subsumed in the model.

Please scan the figures and answer the corresponding questions concerning the validity, usefulness, and comprehensiveness of these models as they relate to the global understanding of the field of physical education.

RANKING THE MODEL

In the following questions, you are asked to assess the *validity, usefulness*, and *comprehensiveness* of the components depicted in the models. The following definitions should be used when responding to the questions.

VALIDITY: *Logically correct. The state of being appropriate for the field of physical education.*

USEFULNESS: *Being of service to the field of physical education; of practical use.*

COMPREHENSIVENESS: *Completeness of the model to explain the totality of activities within the field of physical education.*

Feel free to make any comments or changes by writing them directly on the questionnaire.

The next page contains an explanation of the General Model. Please read this section before answering the questions on pages 4 - 8.

THE GENERAL MODEL

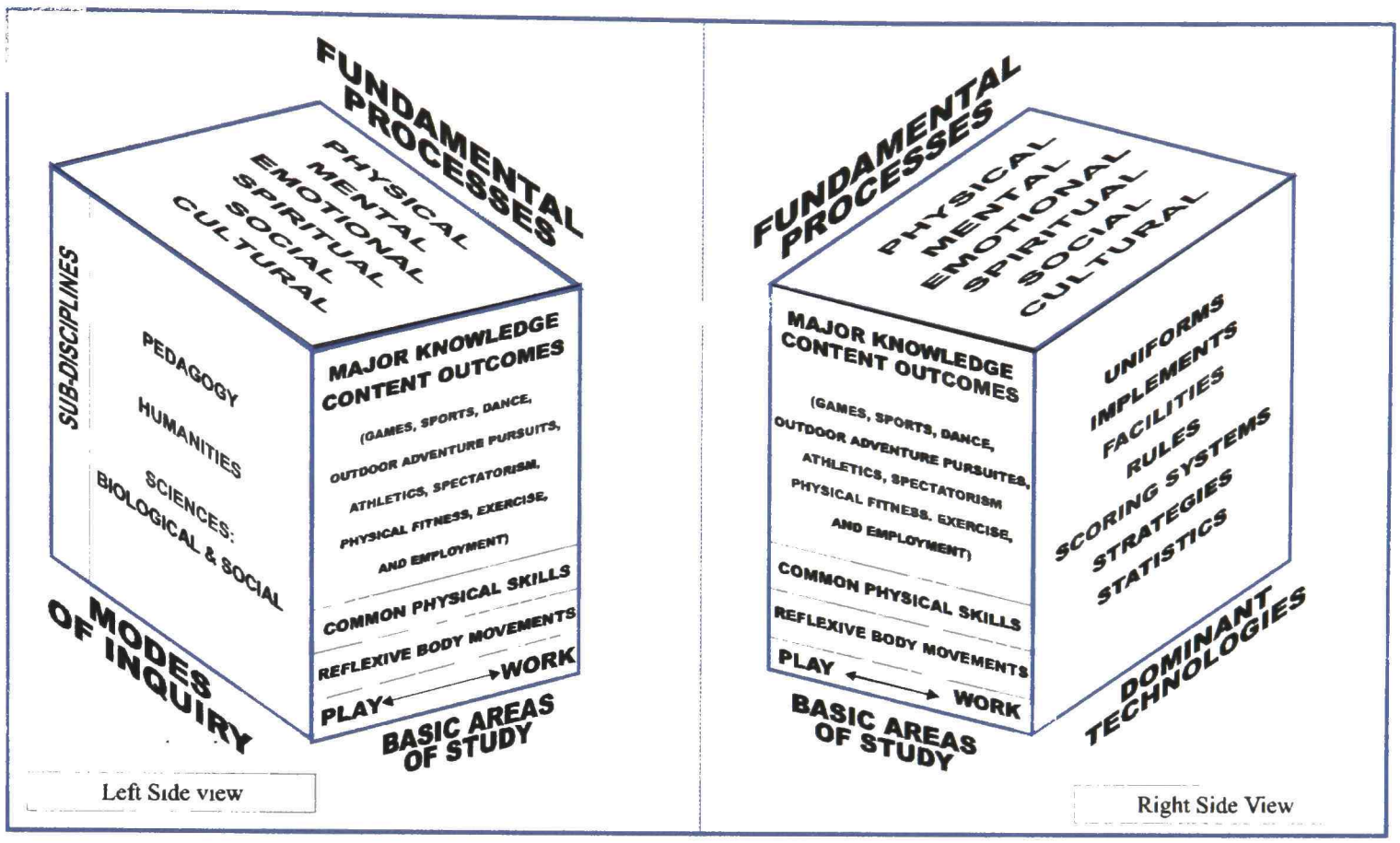


Figure 1.2: Model of the Structure of Knowledge for the Field of Physical Education: ***The General Model.***

EXPLANATION OF THE GENERAL MODEL

The **General Model** of the Structure of Knowledge for the Field of Physical Education is presented on four faces of a six sided cube. Right and left views are shown for clarity.

The **Basic Areas of Study** face (Fig. 1.3) represents areas of human involvement where physical activity is cataloged. Physical activity is divided into four general sections by complexity. The *Major Knowledge Content Outcomes* are the nine areas of complex human movement pursuits. These pursuits share overlapping elements but also have elements which are distinctive and independent. The *Basic Physical Skills* section represents a limited sample of elementary physical skills which are fundamental to the more complex *Major Knowledge Content Outcomes*. The *Reflexive Body Movements* represents organic or motor responses to a stimulus. The *Play - Work Continuum* symbolizes the idea that elements of play or work are essential to the understanding of physical activity.

The **Modes of Inquiry** face (Fig. 1.4) represents the sixteen sub-disciplines associated with the field of physical education. These sub-disciplines are categorized according to membership in the parent fields of pedagogy, humanities, social sciences, and the biological sciences.

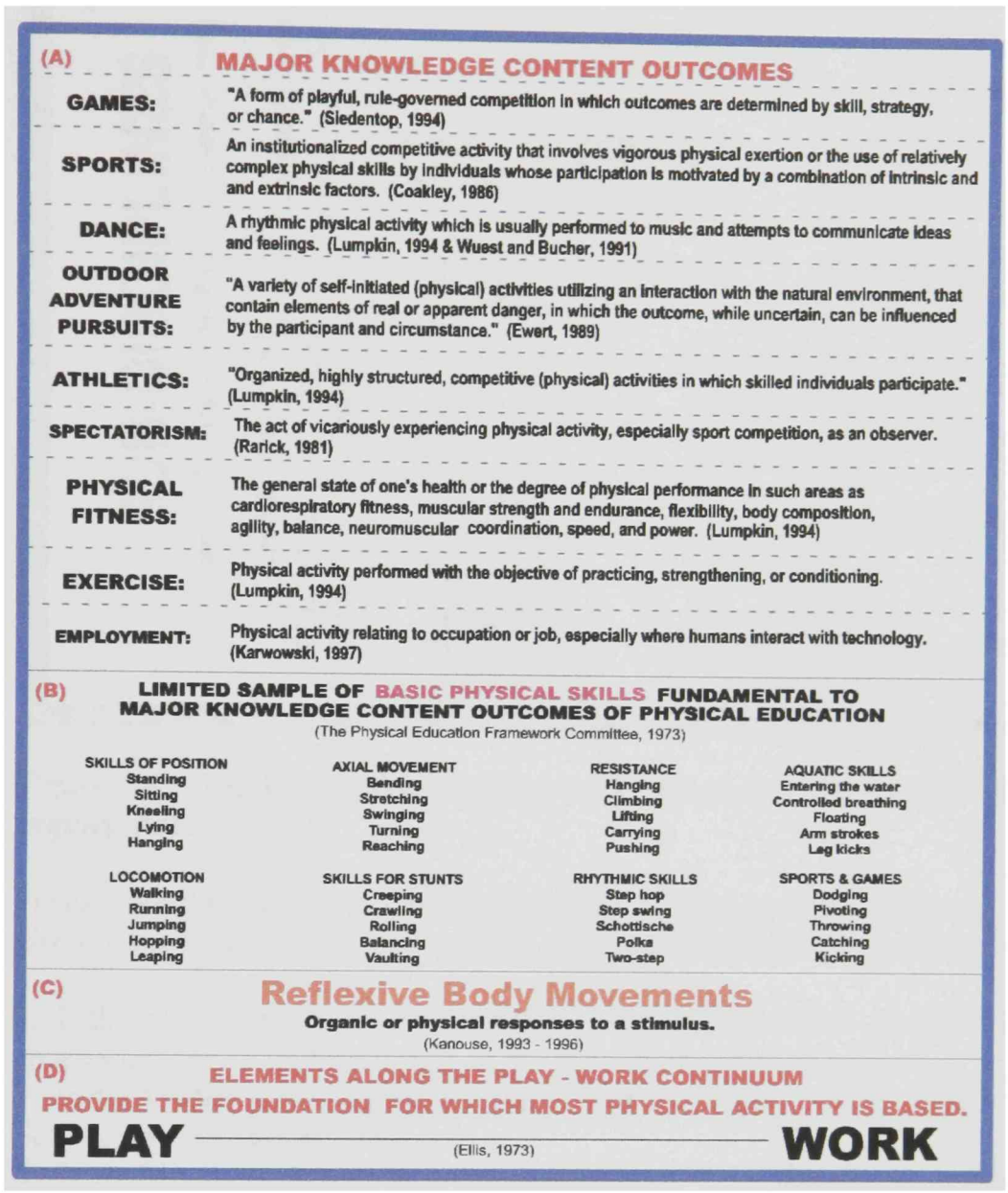
The **Fundamental Processes** face (Fig. 1.5) represents the six perspectives that are studied for a holistic understanding of humans in motion.

The **Dominant Technologies** face (Fig. 1.6) represents the necessary tools for the successful conduct of physical education.

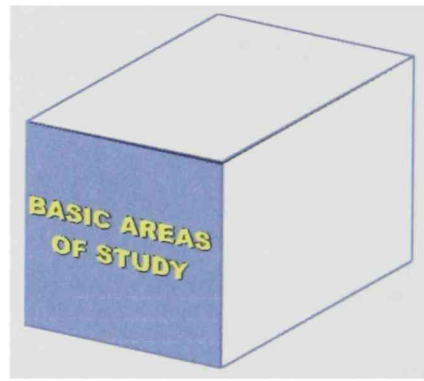
(over)

BASIC AREAS OF STUDY

Figure 1.3: The Model of the Structure of Knowledge for the Field of Physical Education: ***Basic Areas of Study Face.***



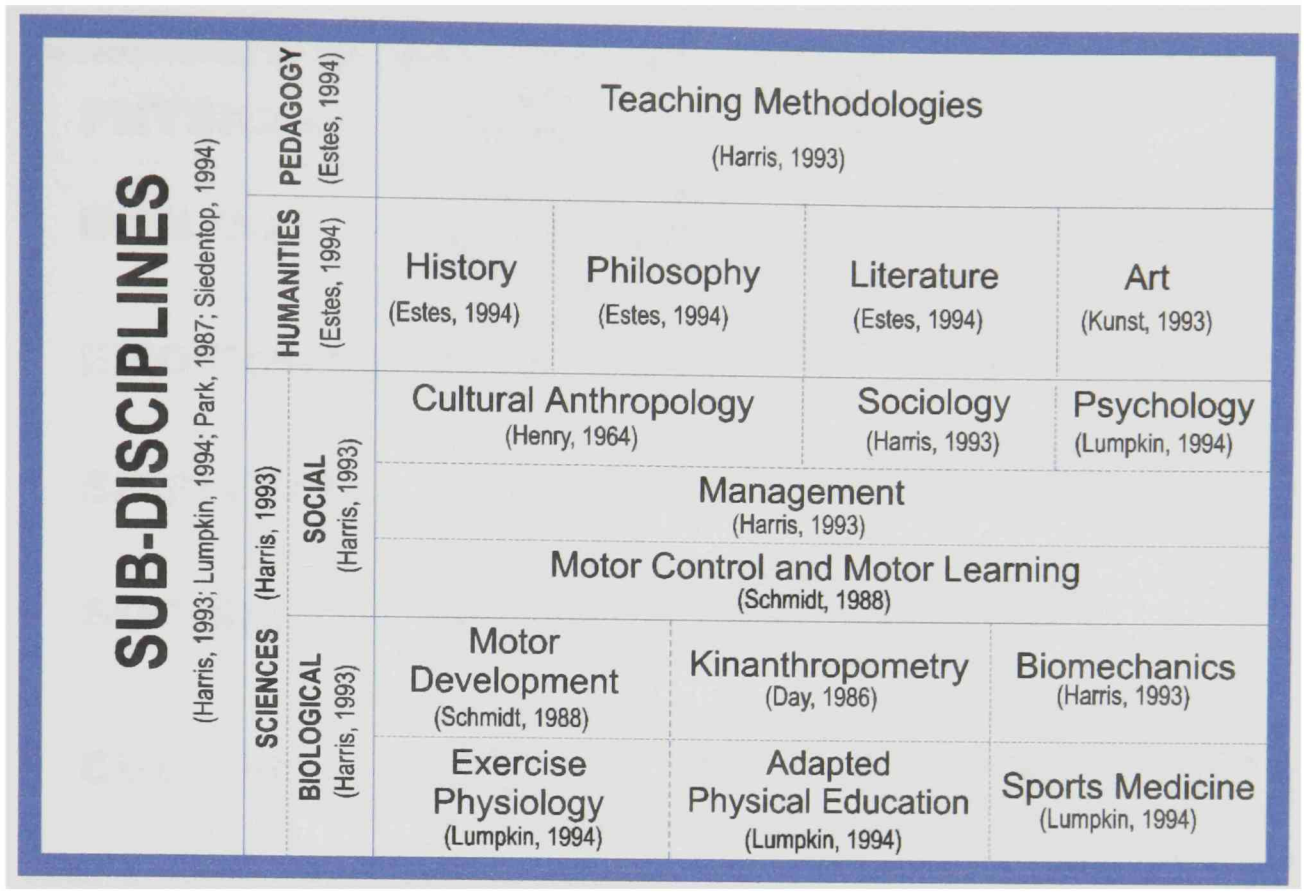
Please rank the ***validity, usefulness, and comprehensiveness*** of Figure 1.3, the **Basic Areas of Study**, by ***circling*** the appropriate number in the ranking table relative to the questions below.



1. Is the Basic Areas of Study face **valid**? Is it logically correct? Are the Basic Areas of Study appropriate for an understanding of the field of physical education?
2. Is the Basic Areas of Study face **useful**? Does the Basic Areas of Study face provide a practical service for the field of physical education?
3. Is the Basic Areas of Study face **comprehensive**? Does the Basic Areas of Study face explain the totality of activities within the field of physical education?

Rank the Basic Areas of Study	**VERY HIGH**	**HIGH**	**AVERAGE**	**LOW**	**VERY LOW**	**NO T VALID**
1. validity	5	4	3	2	1	0
2. usefulness	5	4	3	2	1	0
3. comprehensiveness	5	4	3	2	1	0

MODES OF INQUIRY



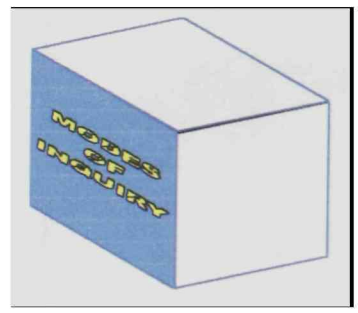


Figure 1.4: The Model of the Structure of Knowledge for the Field of Physical Education: ***Modes of Inquiry Face.***

Please rank the ***validity, usefulness, and comprehensiveness*** of Figure 1.4, the **Modes of Inquiry**, by ***circling*** the appropriate number in the ranking table relative to the questions below.

4. Is the Modes of Inquiry face **valid**? Is it logically correct? Are the Modes of Inquiry, sub-disciplines, appropriate for an understanding of the field of physical education?
5. Is the Modes of Inquiry face **useful**? Does the Modes of Inquiry face provide a practical service for the field of physical education?
6. Is the Modes of Inquiry face **comprehensive**? Does the Modes of Inquiry face explain the totality of sub-disciplines within the field of physical education?

Rank the Modes of Inquiry	VERY HIGH	HIGH	AVERAGE	LOW	VERY LOW	NO T VALID
4. validity	5	4	3	2	1	0
5. usefulness	5	4	3	2	1	0
6. comprehensiveness	5	4	3	2	1	0

(over)

FUNDAMENTAL PROCESSES

PHYSICAL:	Includes the organic and neuromuscular systems of the body. (Wuest & Bucher, 1995)
MENTAL:	Involves the six methods of learning: knowledge, comprehension, application, analysis, synthesis, and evaluation of physical activity. (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956)
EMOTIONAL:	The feelings, moods, and temperament associated with physical activity such as fear, anger, sadness, and enjoyment. (Goleman, 1995)
SPIRITUAL:	The spiritual dimension of physical activity expressed through religion, symbolism, mysticism, and metaphysics. (MacAloon, 1978)
SOCIAL:	The social interaction of people in physical activity through their social relationships, organizations, behaviors, and processes. (Coakley, 1986)
CULTURAL:	The participation in physical activity relative to the rules, codes, and laws as established by the customs, mores, and folkways of the culture. An example might include the playing of lacrosse among native Americans. (Barrow, 1973)

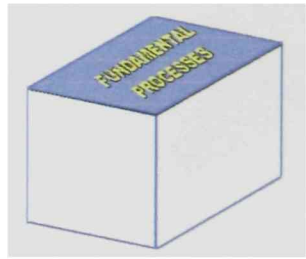


Figure 1.5: The Model of the Structure of Knowledge for the Field of Physical Education: ***The Fundamental Processes Face.***

Please rank the ***validity, usefulness, and comprehensiveness*** of Figure 1.5, the **Fundamental Processes**, by ***circling*** the appropriate number in the ranking table relative to the questions below.

7. Is the Fundamental Processes face **valid**? Is it logically correct? Are the Fundamental Processes appropriate for an understanding of the field of physical education?
8. Is the Fundamental Processes face **useful**? Does the Fundamental Processes face provide a practical service for the field of physical education?
9. Is the Fundamental Processes face **comprehensive**? Does the Fundamental Processes face explain the totality of fundamental processes within the field of physical education?

Rank the Fundamental Processes	VERY HIGH	HIGH	AVERAGE	LOW	VERY LOW	NO T VALID
7. validity	5	4	3	2	1	0
8. usefulness	5	4	3	2	1	0
9. comprehensiveness	5	4	3	2	1	0

DOMINANT TECHNOLOGIES

UNIFORMS:	Specific attire worn (or not worn) by all participants. To include colors, designs, and materials relative to the execution of the participant's specific area of involvement.
IMPLEMENTS:	Necessary tools required for the execution of the physical activity such as ball, racquet, calipers, gas analyzer, computer, footwear, etc..
FACILITIES:	Specific places, natural or man made, used to conduct the desired physical activity.
RULES:	Specific or general agreements, standards, and intent used to conduct the desired physical activity. Rules may also include the acceptance of no rules by the participants.
SCORING SYSTEMS:	Technolgies used in keeping score for specific events such as score boards, panels of experts, systems and tabels of scoring, and methods for tabulating scores.
STATISTICS:	Record of highest level of achievement, standings, and related notations. (Vanderswaag, 1978)
STRATEGIES:	Methodologies for winning competitive physical activities and for improving level of performance.

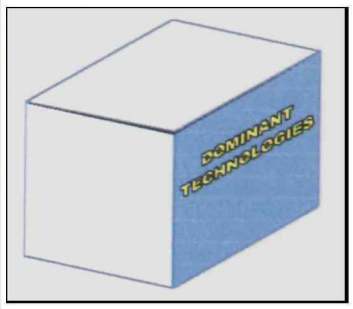


Figure 1.6: The Model of the Structure of Knowledge for the Field of Physical Education: ***The Dominant Technologies Face.***

Please rank the ***validity, usefulness, and comprehensiveness*** of Figure 1.6, the **Dominant Technologies**, by ***circling*** the appropriate number in the ranking table relative to the questions below.

10. Is the Dominant Technologies face **valid**? Is it logically correct? Are the Dominant Technologies appropriate for an understanding of the field of physical education?
11. Is the Dominant Technologies face **useful**? Does the Dominant Technologies face provide a practical service for the field of physical education?
12. Is the Dominant Technologies face **comprehensive**? Does the Dominant Technologies face explain the totality of technologies within the field of physical education?

Rank the Dominant Technologies	VERY HIGH	HIGH	AVERAGE	LOW	VERY LOW	NO T VALID
10. validity	5	4	3	2	1	0
11. usefulness	5	4	3	2	1	0
12. comprehensiveness	5	4	3	2	1	0

(over)

THE GENERAL MODEL

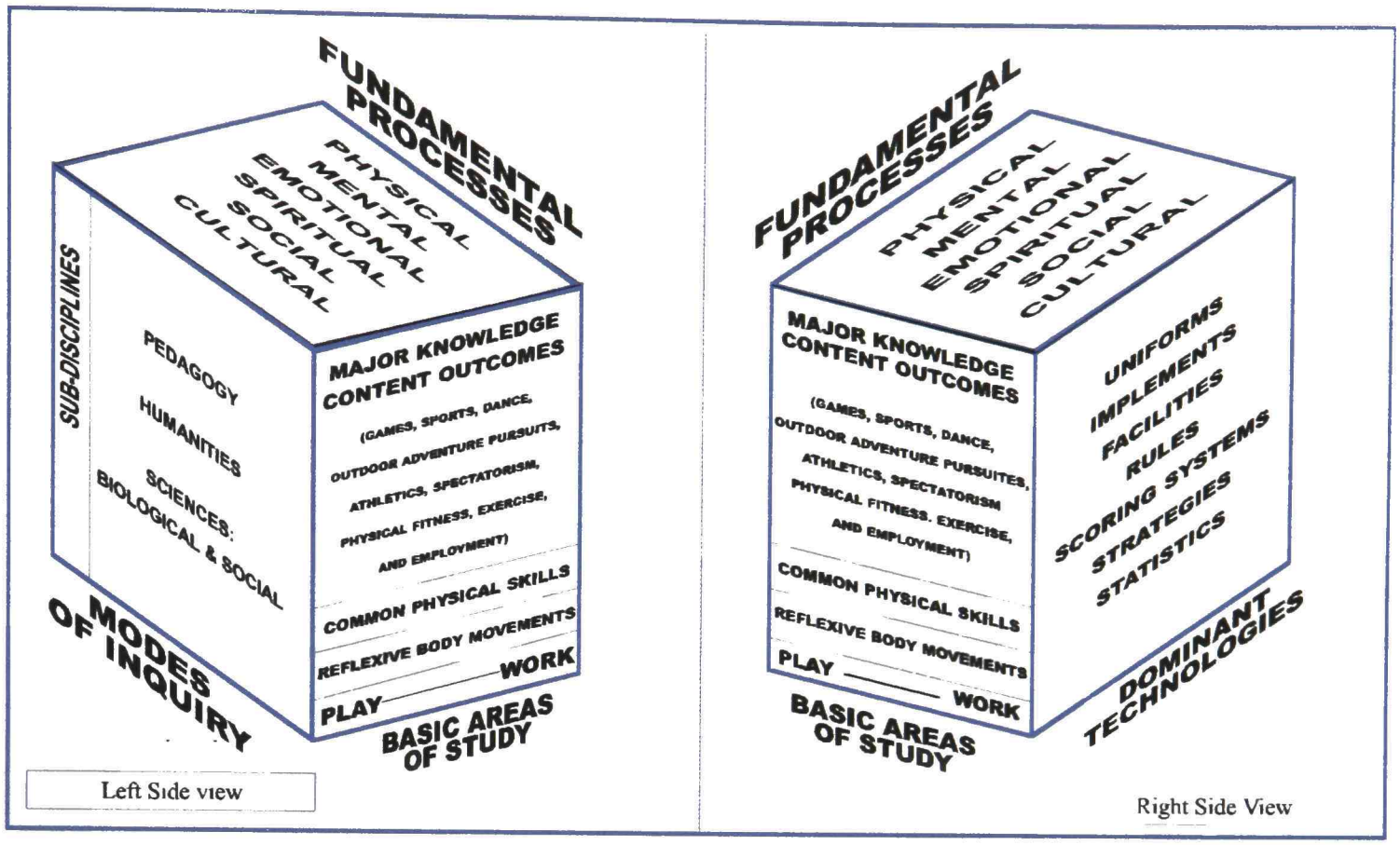


Figure 1.7: Model of the Structure of Knowledge for the Field of Physical Education: ***The General Model.***

Please rank the ***validity, usefulness, and comprehensiveness*** of Figure 1.7, the General Model, by ***circling*** the appropriate number in the ranking table relative to the questions below.

13. Is the General Model **valid**? Is it logically correct? Is the General Model appropriate for an understanding of the field of physical education?
14. Is the General Model **useful**? Does the General Model provide a practical service for the field of physical education?
15. Is the General Model **comprehensive**? Does the General Model explain the totality of activities within the field of physical education?

Rank the General Model	VERY HIGH	HIGH	AVERAGE	LOW	VERY LOW	NO T VALID
13. validity	5	4	3	2	1	0
14. usefulness	5	4	3	2	1	0
15. comprehensiveness	5	4	3	2	1	0

Thank you for your assistance.

Please feel free to add any additional comments on this page and return in the pre-addressed stamped envelope provided to:

Rick Beelby
Division of Physical Education
Wayland Baptist University
1900 W. 7th Street
Plainview, TX 79072

or feel free to call or e-mail with any questions or concerns:
phone: (806) 296-4739
e-mail: beelbyr@mail.wbu.edu

Comments?

☐

If you wish a copy of the executive summary to be sent to you, please check the box above and fill in your name and mailing address below.

name: _____

address: _____

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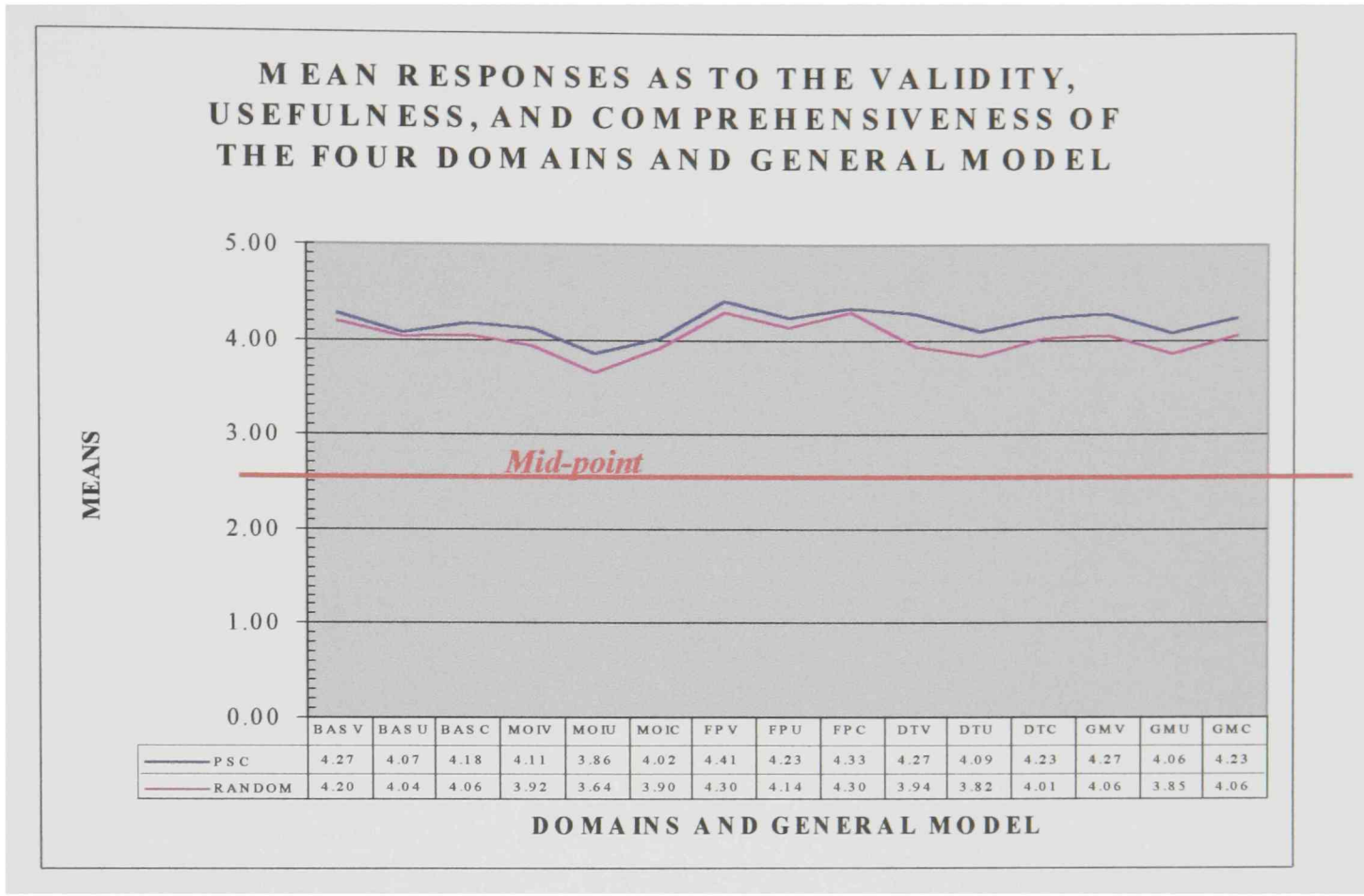
APPENDIX C

FIGURE OF MEAN RESPONSES FOR PILOT STUDIES AND FINAL STUDY



	BAS V	BAS U	BAS C	MOI V	MOI U	MOI C	FP V	FP U	FP C	DT V	DT U	DT C	GM V	GM U	GM C
PSC	4.27	4.07	4.18	4.11	3.86	4.02	4.41	4.23	4.33	4.27	4.09	4.23	4.27	4.06	4.23
RANDOM	4.20	4.04	4.06	3.92	3.64	3.90	4.30	4.14	4.30	3.94	3.82	4.01	4.06	3.85	4.06

BASV - Basic Areas of Study Validity
BASU - Basic Areas of Study Usefulness
BASC - Basic Areas of Study Comprehensiveness
MOIV - Modes of Inquiry Validity
MOIU - Modes of Inquiry Usefulness
MOIC - Modes of Inquiry Comprehensiveness
FPV - Fundamental Processes Validity
FPU - Fundamental Processes Usefulness
FPC - Fundamental Processes Comprehensiveness
DTV - Dominant Technologies Validity
DTU - Dominant Technologies Usefulness
DTC - Dominant Technologies Comprehensiveness
GMV - General Model Validity
GMU - General Model Usefulness
GMC - General Model Comprehensiveness

Figure C.1: Description of the means of the respondent's rankings from pilot studies 'A' and 'B', combined (PSC), and the random study (Random). The mean ratings of the *Basic Areas of Study* (BAS), *Modes of Inquiry* (MOI), *Fundamental Processes* (FP), *Dominant Technologies* (DT), and *General Model* (GM) *are shown* for the validity (V), usefulness (U), and comprehensiveness (C) for the two groups.

APPENDIX D

TABLES

Table D.1: Post hoc descriptive results by educational degree for the validity, usefulness, and comprehensiveness of the *Basic Areas of Study Domain* (Bachelor's, Master's, Ed.D., and Ph.D.).

BASIC AREAS OF STUDY (Research Question #6)						
	Educational Degree	N	Mean	Standard Deviation	95% Confidence Interval for Mean	
					Lower	Upper
Validity	Bachelor's	48	4.46	0.65	4.27	4.65
	Master's	83	4.21	0.62	4.07	4.34
	Ed.D.	15	3.77	0.90	3.27	4.27
	Ph.D.	20	3.80	1.06	3.31	4.29
Usefulness	Bachelor's	48	4.31	0.72	4.10	4.52
	Master's	83	4.00	0.83	3.82	4.18
	Ed.D.	15	3.70	1.07	3.11	4.29
	Ph.D.	20	3.65	1.31	3.04	4.26
Comprehensiveness	Bachelor's	48	4.17	0.91	3.90	4.43
	Master's	83	4.08	0.90	3.89	4.28
	Ed.D.	15	3.80	1.01	3.24	4.36
	Ph.D.	20	3.75	1.12	3.23	4.27

Table D.2: Post hoc descriptive results by educational degree for the validity, usefulness, and comprehensiveness of the *Modes of Inquiry Domain* (Bachelor's, Master's, Ed.D., and Ph.D.).

MODES OF INQUIRY (Research Question #7)						
	Educational Degree	N	Mean	Standard Deviation	95% Confidence Interval for Mean	
					Lower	Upper
Validity	Bachelor's	48	4.10	0.75	3.89	4.32
	Master's	83	3.94	0.97	3.73	4.15
	Ed.D.	15	3.60	1.06	3.02	4.19
	Ph.D.	20	3.60	1.31	3.00	4.22
Usefulness	Bachelor's	48	3.76	0.95	3.48	4.04
	Master's	83	3.64	1.02	3.42	3.86
	Ed.D.	15	3.67	1.11	3.05	4.29
	Ph.D.	20	3.40	1.05	2.91	3.89
Comprehensiveness	Bachelor's	48	3.73	1.01	3.44	4.02
	Master's	83	3.98	0.97	3.77	4.19
	Ed.D.	14	4.00	0.88	3.49	4.51
	Ph.D.	20	3.95	1.19	3.39	4.51

Table D.3: Post hoc descriptive results by educational degree for the validity, usefulness, and comprehensiveness of the *Fundamental Processes Domain* (Bachelor's, Master's, Ed.D., and Ph.D.).

FUNDAMENTAL PROCESSES (Research Question #8)						
	Educational Degree	N	Mean	Standard Deviation	95% Confidence Interval for Mean	
					Lower	Upper
Validity	Bachelor's	49	4.49	0.55	4.33	4.65
	Master's	82	4.27	0.85	4.08	4.46
	Ed.D.	14	4.29	0.73	3.87	4.71
	Ph.D.	20	3.85	0.81	3.47	4.23
Usefulness	Bachelor's	49	4.35	0.69	4.15	4.55
	Master's	82	4.05	0.82	3.87	4.23
	Ed.D.	14	4.36	0.75	3.93	4.79
	Ph.D.	20	3.70	0.87	3.30	4.11
Comprehensiveness	Bachelor's	49	4.37	0.67	4.18	4.56
	Master's	82	4.31	0.78	4.13	4.48
	Ed.D.	14	4.14	0.86	3.64	4.62
	Ph.D.	20	4.05	0.89	3.64	4.47

Table D.4: Post hoc descriptive results by educational degree for the validity, usefulness, and comprehensiveness of the *Dominant Technologies Domain* (Bachelor's, Master's, Ed.D., and Ph.D.).

DOMINANT TECHNOLOGIES (Research Question #9)						
	Educational Degree	N	Mean	Standard Deviation	95% Confidence Interval for Mean	
					Lower	Upper
Validity	Bachelor's	49	4.18	0.78	3.96	4.41
	Master's	83	4.02	0.91	3.83	4.22
	Ed.D.	14	3.21	1.58	2.30	4.13
	Ph.D.	20	3.30	1.34	2.67	3.93
Usefulness	Bachelor's	49	4.08	0.76	3.86	4.30
	Master's	82	3.87	0.94	3.66	4.07
	Ed.D.	14	3.50	1.29	2.76	4.24
	Ph.D.	20	3.05	1.23	2.47	3.63
Comprehensiveness	Bachelor's	49	4.26	0.82	4.02	4.49
	Master's	82	4.07	0.95	3.86	4.28
	Ed.D.	14	3.50	1.29	2.76	4.24
	Ph.D.	20	3.35	1.39	2.70	4.00

Table D.5: Post hoc descriptive results by educational degree for the validity, usefulness, and comprehensiveness of the *General Model* (Bachelor's, Master's, Ed.D., and Ph.D.).

GENERAL MODEL (Research Question #10)						
	Educational Degree	N	Mean	Std. Deviation	95% Confidence Interval for Mean	
					Lower	Upper
Validity	Bachelor's	49	4.22	0.85	3.98	4.47
	Master's	83	4.05	0.78	3.88	4.22
	Ed.D.	15	3.87	0.99	3.32	4.42
	Ph.D.	20	3.75	1.02	3.27	4.23
Usefulness	Bachelor's	49	4.10	0.80	3.87	4.33
	Master's	83	3.81	0.85	3.62	3.99
	Ed.D.	15	3.63	1.32	2.91	4.36
	Ph.D.	20	3.45	1.23	2.87	4.03
Comprehensiveness	Bachelor's	49	4.24	0.73	4.03	4.44
	Master's	83	4.05	0.80	3.87	4.22
	Ed.D.	15	3.80	1.01	3.24	4.36
	Ph.D.	20	3.80	1.20	3.24	4.36

Table D.6: Results of ANOVA with validity, usefulness, and comprehensiveness mean ratings as the dependent variables and educational degree as the independent variable for the *Basic areas of Study* domain.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
VALIDITY					
Among *E.D.	3	9.21	3.07	5.91	0.0007
Within E.D.	162	84.07	0.52		
Total	165	93.27			
USEFULLNESS					
Among E.D.	3	8.41	2.81	3.53	0.0163
Within E.D.	162	128.76	0.80		
Total	165	137.18			
COMPREHENSIVENESS					
Among E.D.	3	3.48	1.16	1.31	0.2725
Within E.D.	162	143.23	0.88		
Total	165	146.70			

*E.D. is the abbreviated form of educational degree.

Table D.7: Results of ANOVA with validity, usefulness, and comprehensiveness mean ratings as the dependent variables and educational degree as the independent variable for the *Modes of Inquiry* domain.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
VALIDITY					
Among *E.D.	3	5.24	1.75	1.87	0.1372
Within E.D.	162	151.58	0.94		
Total	165	156.82			
USEFULLNESS					
Among E.D.	3	1.85	0.62	0.60	0.6144
Within E.D.	162	165.78	1.02		
Total	165	167.63			
COMPREHENSIVENESS					
Among E.D.	3	2.14	0.71	0.71	0.5467
Within E.D.	161	161.65	1.00		
Total	164	163.79			

*E.D. is the abbreviated form of educational degrees.

Table D.8: Results of ANOVA with validity, usefulness, and comprehensiveness mean ratings as the dependent variables and educational degree as the independent variable for the *Fundamental Processes* domain.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
VALIDITY					
Among *E.D.	3	5.86	1.95	3.43	0.0185
Within E.D.	161	91.75	0.57		
Total	164	97.61			
USEFULLNESS					
Among E.D.	3	7.25	2.42	3.96	0.0093
Within E.D.	161	98.32	0.61		
Total	164	105.58			
COMPREHENSIVENESS					
Among E.D.	3	1.75	0.58	0.98	0.4029
Within E.D.	161	95.43	0.59		
Total	164	97.18			

*E.D. is the abbreviated form of educational degrees.

Table D.9: Results of ANOVA with validity, usefulness, and comprehensiveness mean ratings as the dependent variables and educational degree as the independent variable for the *Dominant Technologies* domain.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
VALIDITY					
Among *E.D.	3	18.96	6.32	6.25	0.0005
Within E.D.	162	163.86	1.01		
Total	165	182.82			
USEFULLNESS					
Among E.D.	3	16.75	5.58	6.01	0.0007
Within E.D.	161	149.65	0.93		
Total	164	166.40			
COMPREHENSIVENESS					
Among E.D.	3	15.56	5.19	5.10	0.0021
Within E.D.	161	163.67	1.02		
Total	164	179.24			

*E.D. is the abbreviated form of educational degrees.

Table D.10: Results of ANOVA with validity, usefulness, and comprehensiveness mean ratings as the dependent variables and educational degree as the independent variable for the *General Model*.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
VALIDITY					
Among E.D.	3	3.80	1.27	1.75	0.1588
Within E.D.	163	117.82	0.72		
Total	166	121.62			
USEFULLNESS					
Among E.D.	3	7.13	2.38	2.72	0.0464
Within E.D.	163	142.59	0.88		
Total	166	149.72			
COMPREHENSIVENESS					
Among E.D.	3	3.86	1.29	1.76	0.1564
Within E.D.	163	118.96	0.73		
Total	166	122.82			

*E.D. is the abbreviated form of educational degrees.

Table D.11: Post hoc comparison ratings of validity, usefulness, and comprehensiveness between educational degrees in the *Basic Areas of Study Domain*.

COMPARISONS BY EDUCATIONAL DEGREE FOR BASIC AREAS OF STUDY (Research Question #6)				
	Comparison Groups	**Mean Difference**	**q^1**	**P**
BASIC AREAS OF STUDY	**VALIDITY**			
	Bachelor's vs. Master's	0.25	2.75	ns
	Bachelor's vs. Ed.D.	0.69	4.59	**
	Bachelor's vs. Ph.D.	0.66	4.86	**
	Master's vs. Ed.D.	-0.44	3.07	ns
	Master's vs. Ph.D.	0.41	3.19	ns
	Ed.D. vs. Ph.D.	-0.03	0.19	ns
	USEFULNESS			
	Bachelor's vs. Master's	0.31	2.73	ns
	Bachelor's vs. Ed.D.	0.61	3.29	ns
	Bachelor's vs. Ph.D.	0.66	3.95	*
	Master's vs. Ed.D.	-0.30	1.70	ns
	Master's vs. Ph.D.	0.35	2.23	ns
	Ed.D. vs. Ph.D.	0.05	0.23	ns
	COMPREHENSIVENESS			
	Bachelor's vs. Master's	0.08	0.68	ns
	Bachelor's vs. Ed.D.	0.37	1.86	ns
	Bachelor's vs. Ph.D.	0.42	2.36	ns
	Master's vs. Ed.D.	-0.28	1.52	ns
	Master's vs. Ph.D.	0.33	2.02	ns
	Ed.D. vs. Ph.D.	0.05	0.22	ns

[1]When q is greater than 3.68, p is less than .05.
*Significant at the .05 level.
**Significant at the .01 level.

Table D.12: Post hoc comparison ratings of validity, usefulness, and comprehensiveness between educational degrees in the *Modes of Inquiry Domain*.

COMPARISONS BY EDUCATIONAL DEGREE FOR MODES OF INQUIRY (Research Question #7)				
	Comparison Groups	**Mean Difference**	**q^1**	**P**
MODES OF INQUIRY	**VALIDITY**			
	Bachelor's vs. Master's	0.16	1.33	ns
	Bachelor's vs. Ed.D.	0.50	2.49	ns
	Bachelor's vs. Ph.D.	0.50	2.77	ns
	Master's vs. Ed.D.	-0.34	1.77	ns
	Master's vs. Ph.D.	0.34	1.99	ns
	Ed.D. vs. Ph.D.	0.00	0.00	ns
	USEFULNESS			
	Bachelor's vs. Master's	0.12	0.94	ns
	Bachelor's vs. Ed.D.	0.09	0.44	ns
	Bachelor's vs. Ph.D.	0.36	1.89	ns
	Master's vs. Ed.D.	0.03	0.14	ns
	Master's vs. Ph.D.	0.24	1.34	ns
	Ed.D. vs. Ph.D.	0.27	1.09	ns
	COMPREHENSIVENESS			
	Bachelor's vs. Master's	-0.25	1.97	ns
	Bachelor's vs. Ed.D.	-0.27	1.26	ns
	Bachelor's vs. Ph.D.	-0.22	1.17	ns
	Master's vs. Ed.D.	0.02	0.09	ns
	Master's vs. Ph.D.	0.03	0.18	ns
	Ed.D. vs. Ph.D.	0.05	0.20	ns

[1] When q is greater than 3.68, p is less than .05.

Table D.13: Post hoc comparison ratings of validity, usefulness, and comprehensiveness between educational degrees in the *Fundamental Processes Domain*.

COMPARISONS BY EDUCATIONAL LEVELS FOR FUNDAMENTAL PROCESSES (Research Question #8)				
	Comparison Groups	**Mean Difference**	**q^1**	**P**
FUNDAMENTAL PROCESSES	**VALIDITY**			
	Bachelor's vs. Master's	0.22	2.30	ns
	Bachelor's vs. Ed.D.	0.20	1.26	ns
	Bachelor's vs. Ph.D.	0.64	4.52	**
	Master's vs. Ed.D.	0.02	0.11	ns
	Master's vs. Ph.D.	0.42	3.14	ns
	Ed.D. vs. Ph.D.	0.44	2.34	ns
	USEFULNESS			
	Bachelor's vs. Master's	0.30	2.99	ns
	Bachelor's vs. Ed.D.	-0.01	0.06	ns
	Bachelor's vs. Ph.D.	0.65	4.41	*
	Master's vs. Ed.D.	0.31	1.93	ns
	Master's vs. Ph.D.	0.35	2.53	ns
	Ed.D. vs. Ph.D.	0.66	3.41	ns
	COMPREHENSIVENESS			
	Bachelor's vs. Master's	0.06	0.64	ns
	Bachelor's vs. Ed.D.	0.23	1.36	ns
	Bachelor's vs. Ph.D.	0.32	2.20	ns
	Master's vs. Ed.D.	-0.16	1.03	ns
	Master's vs. Ph.D.	0.26	1.88	ns
	Ed.D. vs. Ph.D.	0.09	0.49	ns

[1] When q is greater than 3.68, p is less than .05.
* Significant at the .05 level.
** Significant at the .01 level.

Table D.14: Post hoc comparison ratings of validity, usefulness, and comprehensiveness between educational degrees in the *Dominant Technologies Domain*.

COMPARISONS BY EDUCATIONAL DEGREE FOR DOMINANT TECHNOLOGIES (Research Question #9)				
	Comparison Groups	**Mean Difference**	**q^1**	**P**
DOMINANT TECHNOLOGIES	**VALIDITY**			
	Bachelor's vs. Master's	0.16	1.25	ns
	Bachelor's vs. Ed.D.	0.97	4.50	**
	Bachelor's vs. Ph.D.	0.88	4.69	**
	Master's vs. Ed.D.	-0.81	3.94	*
	Master's vs. Ph.D.	0.72	4.09	*
	Ed.D. vs. Ph.D.	-0.09	0.35	ns
	USEFULNESS			
	Bachelor's vs. Master's	0.22	1.75	ns
	Bachelor's vs. Ed.D.	0.58	2.82	ns
	Bachelor's vs. Ph.D.	1.03	5.70	***
	Master's vs. Ed.D.	-0.37	1.86	ns
	Master's vs. Ph.D.	0.82	4.80	**
	Ed.D. vs. Ph.D.	0.45	1.89	ns
	COMPREHENSIVENESS			
	Bachelor's vs. Master's	0.18	1.41	ns
	Bachelor's vs. Ed.D.	0.76	3.50	ns
	Bachelor's vs. Ph.D.	0.91	4.78	**
	Master's vs. Ed.D.	-0.57	2.78	ns
	Master's vs. Ph.D.	0.72	4.07	*
	Ed.D. vs. Ph.D.	0.15	0.60	ns

[1] When q is greater than 3.68, p is less than .05.
* Significant at the .05 level.
** Significant at the .01 level.
*** Significant at the .001 level.

Table D.15: Post hoc comparison ratings of validity, usefulness, and comprehensiveness between educational degrees in the *General Model*.

COMPARISONS BY EDUCATIONAL DEGREE FOR THE GENERAL MODEL (Research Question #10)				
	Comparison Groups	**Mean Difference**	**q[1]**	**P**
GENERAL MODEL	**VALIDITY**			
	Bachelor's vs. Master's	0.18	1.63	ns
	Bachelor's vs. Ed.D.	0.36	2.02	ns
	Bachelor's vs. Ph.D.	0.48	2.97	ns
	Master's vs. Ed.D.	-0.18	1.08	ns
	Master's vs. Ph.D.	0.30	1.99	ns
	Ed.D. vs. Ph.D.	0.12	0.57	ns
	USEFULNESS			
	Bachelor's vs. Master's	0.30	2.47	ns
	Bachelor's vs. Ed.D.	0.47	2.40	ns
	Bachelor's vs. Ph.D.	0.65	3.72	*
	Master's vs. Ed.D.	-0.17	0.94	ns
	Master's vs. Ph.D.	0.36	2.17	ns
	Ed.D. vs. Ph.D.	0.18	0.81	ns
	COMPREHENSIVENESS			
	Bachelor's vs. Master's	0.19	1.71	ns
	Bachelor's vs. Ed.D.	0.44	2.44	ns
	Bachelor's vs. Ph.D.	0.44	2.71	ns
	Master's vs. Ed.D.	-0.25	1.46	ns
	Master's vs. Ph.D.	0.25	1.65	ns
	Ed.D. vs. Ph.D.	0.00	0.00	ns

[1] When q is greater than 3.68, p is less than .05.
* Significant at the .05 level.

Table D.16: Post hoc descriptive results by sub-discipline for the validity, usefulness, and comprehensiveness of the *Basic Areas of Study Domain.*

BASIC AREAS OF STUDY (Research Question #11)						
	Sub-Discipline	N	Mean	Standard Deviation	95% Confidence Interval for Mean	
					Lower	Upper
Validity	Pedagogy	136	4.22	.76	4.10	4.35
	Humanities	1	*	*	*	*
	Social Sciences	9	4.00	.71	3.46	4.54
	Biological Sciences	24	4.17	0.76	3.85	4.49
Usefulness	Pedagogy	136	4.05	0.90	3.90	4.20
	Humanities	1	*	*	*	*
	Social Sciences	9	4.11	0.78	3.51	4.71
	Biological Sciences	24	3.96	1.04	3.52	4.40
Comprehensiveness	Pedagogy	136	4.07	0.90	3.92	4.23
	Humanities	1	*	*	*	*
	Social Sciences	9	4.00	1.00	3.23	4.77
	Biological Sciences	24	4.04	1.16	3.55	4.53

*Insufficient data for statistical calculations.

Table D.17: Post hoc descriptive results by sub-discipline for the validity, usefulness, and comprehensiveness of the *Modes of Inquiry Domain*.

MODES OF INQUIRY (Research Question #12)						
	Sub-Discipline	N	Mean	Standard Deviation	95% Confidence Interval for Mean	
					Lower	Upper
Validity	Pedagogy	136	3.90	1.00	3.74	4.07
	Humanities	*	*	*	*	*
	Social Sciences	9	3.89	0.60	3.43	4.35
	Biological Sciences	24	4.00	0.98	3.59	4.41
Usefulness	Pedagogy	136	3.63	1.01	3.46	3.80
	Humanities	*	*	*	*	*
	Social Sciences	9	3.67	1.00	2.90	4.44
	Biological Sciences	24	3.69	1.00	3.27	4.11
Comprehensiveness	Pedagogy	135	3.89	1.01	3.72	4.06
	Humanities	*	*	*	*	*
	Social Sciences	9	3.89	0.93	3.18	4.60
	Biological Sciences	24	4.00	1.02	3.57	4.43

*Insufficient data for statistical calculations.

Table D.18: Post hoc descriptive results by sub-discipline for the validity, usefulness, and comprehensiveness of the *Fundamental Processes Domain.*

FUNDAMENTAL PROCESSES (Research Question #13)						
	Sub-Discipline	**N**	**Mean**	**Standard Deviation**	**95% Confidence Interval for Mean**	
					Lower	**Upper**
Validity	Pedagogy	135	4.30	0.77	4.18	4.438
	Humanities	*	*	*	*	*
	Social Sciences	9	4.33	0.50	3.95	4.72
	Biological Sciences	24	4.25	0.90	3.87	4.63
Usefulness	Pedagogy	135	4.14	0.81	4.00	4.28
	Humanities	*	*	*	*	*
	Social Sciences	9	4.22	0.67	3.71	4.74
	Biological Sciences	24	4.08	0.83	3.73	4.43
Comprehensiveness	Pedagogy	135	4.30	0.75	4.17	4.42
	Humanities	*	*	*	*	*
	Social Sciences	9	4.44	0.53	4.04	4.85
	Biological Sciences	24	4.25	0.940	3.85	4.65

*Insufficient data for statistical calculations.

Table D.19: Post hoc descriptive results by sub-discipline for the validity, usefulness, and comprehensiveness of the *Dominant Technologies Domain*.

DOMINANT TECHNOLOGIES (Research Question #14)						
	Sub-Discipline	**N**	**Mean**	**Standard Deviation**	**95% Confidence Interval for Mean**	
					Lower	**Upper**
Validity	Pedagogy	136	3.97	1.04	3.80	4.15
	Humanities	*	*	*	*	*
	Social Sciences	9	3.56	1.01	2.78	4.34
	Biological Sciences	24	3.88	1.15	3.39	4.36
Usefulness	Pedagogy	135	3.88	0.96	3.72	4.04
	Humanities	*	*	*	*	*
	Social Sciences	9	3.44	1.13	2.58	4.31
	Biological Sciences	24	3.63	1.21	3.11	4.14
Comprehensiveness	Pedagogy	135	4.07	0.97	3.90	4.23
	Humanities	*	*	*	*	*
	Social Sciences	9	3.67	1.23	2.73	4.61
	Biological Sciences	24	3.81	1.34	3.25	4.38

*Insufficient data for statistical calculations.

Table D.20: Post hoc descriptive results by sub-discipline for the validity, usefulness, and comprehensiveness of the *General Model*.

GENERAL MODEL (Research Question #15)						
	Sub-Discipline	**N**	**Mean**	**Standard Deviation**	**95% Confidence Interval for Mean**	
					Lower	**Upper**
Validity	Pedagogy	137	4.07	0.85	3.93	4.22
	Humanities	*	*	*	*	*
	Social Sciences	9	4.00	0.71	3.46	4.54
	Biological Sciences	24	3.96	0.91	3.58	4.34
Usefulness	Pedagogy	137	3.89	0.92	3.73	4.04
	Humanities	*	*	*	*	*
	Social Sciences	9	3.78	1.09	2.94	4.62
	Biological Sciences	24	3.67	1.09	3.21	4.13
Comprehensiveness	Pedagogy	137	4.11	0.82	3.97	4.24
	Humanities	*	*	*	*	*
	Social Sciences	9	4.11	1.05	3.30	4.92
	Biological Sciences	24	3.79	0.98	3.38	4.20

*Insufficient data for statistical calculations.

Table D.21: Results of ANOVA with validity, usefulness, and comprehensiveness mean ratings as the dependent variables and sub-discipline (S-D) as the independent variable for the *Basic Areas of Study Domain*.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
VALIDITY					
Between *S-D	2	0.46	0.23	0.41	0.6667
Within S-D	166	94.74	0.57		
Total	168	95.21			
USEFULNESS					
Between S-D	2	0.21	0.11	0.13	0.8811
Within S-D	166	139.79	0.84		
Total	168	140.00			
COMPREHENSIVENESS					
Between S-D	2	0.06	0.03	0.03	0.9664
Within S-D	166	148.22	0.89		
Total	168	148.28			

*S-D is the abbreviated form of sub-discipline.

Table D.22: Results of ANOVA with validity, usefulness, and comprehensiveness mean ratings as the dependent variables and sub-discipline (S-D) as the independent variable for the *Modes of Inquiry Domain*.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
VALIDITY					
Between *S-D	2	0.19	0.10	0.10	0.9035
Within S-D	166	158.65	0.96		
Total	168	158.84			
USEFULNESS					
Between S-D	2	0.09	0.04	0.04	0.9574
Within S-D	166	168.78	1.02		
Total	168	168.87			
COMPREHENSIVENESS					
Between S-D	2	0.27	0.14	0.13	0.8747
Within S-D	165	166.36	1.01		
Total	167	166.63			

* S-D is the abbreviated form of sub-discipline.

Table D.23: Results of ANOVA with validity, usefulness, and comprehensiveness mean ratings as the dependent variables and sub-discipline (S-D) as the independent variable for the *Fundamental Processes Domain*.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
VALIDITY					
Between *S-D	2	0.07	0.04	0.06	0.9427
Within S-D	165	99.05	0.60		
Total	167	99.12			
USEFULNESS					
Between S-D	2	0.14	0.07	0.11	0.9009
Within S-D	165	107.71	0.65		
Total	167	107.85			
COMPREHENSIVENESS					
Between S-D	2	0.25	0.12	0.21	0.8128
Within S-D	165	98.87	0.60		
Total	167	99.12			

* S-D is the abbreviated form of sub-discipline.

Table D.24: Results of ANOVA with validity, usefulness, and comprehensiveness mean ratings as the dependent variables and sub-discipline (S-D) as the independent variable for the *Dominant Technologies Domain*.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
VALIDITY					
Between *S-D	2	1.56	0.78	0.70	0.4988
Within S-D	166	184.73	1.11		
Total	168	186.28			
USEFULNESS					
Between S-D	2	2.69	1.35	1.32	0.2693
Within S-D	165	167.95	1.02		
Total	167	170.64			
COMPREHENSIVENESS					
Between S-D	2	2.43	1.22	1.12	0.3303
Within S-D	165	179.81	1.09		
Total	167	182.24			

* S-D is the abbreviated form of sub-discipline.

Table D.25: Results of ANOVA with validity, usefulness, and comprehensiveness mean ratings as the dependent variables and sub-discipline (S-D) as the independent variable for the *General Model*.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
VALIDITY					
Between *S-D	2	0.30	0.15	0.20	0.8176
Within S-D	167	122.23	0.73		
Total	169	122.52			
USEFULNESS					
Between S-D	2	1.04	0.52	0.58	0.5647
Within S-D	167	151.39	0.91		
Total	169	152.42			
COMPREHENSIVENESS					
Between S-D	2	2.04	1.02	1.39	0.2522
Within S-D	167	122.56	0.73		
Total	169	124.60			

*S-D is the abbreviated form of sub-discipline.