

SIXTH
EDITION



Measurement for Evaluation

**IN Physical
Education
AND Exercise
Science**

Ted A.
BAUMGARTNER

Andrew S.
JACKSON

S I X T H
E D I T I O N

Measurement for Evaluation

**IN Physical
Education
AND Exercise
Science**

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**MEASUREMENT FOR EVALUATION IN PHYSICAL EDUCATION
AND EXERCISE SCIENCE, SIXTH EDITION**

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Preface

In previous editions we responded to changes in the field by adding information for students seeking careers in areas other than teaching, expanding the application of microcomputers, and reorganizing the book. The result was a book that contained a solid foundation of the information needed by students in physical education or exercise science curriculums.

In preparing this sixth edition, the book was revised based on suggestions from successful professionals in the field and from our own expertise. We recognize that students using this text come from many backgrounds and with a great variety of interest areas (health, elementary or secondary physical education, fitness, adapted physical education, pre-physical therapy, athletic training, gerontology, exercise science, specialization areas, etc.). Sometimes we have roughly classified all students using the book as being in either physical education or exercise science. Thus, we have presented information that is important in most of the interest areas. Instructors should select from the information presented and supplement the book when necessary.

Changes to This Edition

Chapter 2, “The Use of Computers in Physical Education,” from the fifth edition, has been deleted. Students taking this course noted that they are already very familiar with the information in this chapter. Information on computer applications that is still relevant to this text has been moved into appropriate chapters throughout the book.

Chapter 1, “Measurement and Evaluation in a Changing Society,” has increased its focus on computer literacy for measurement and evaluation to include software, the World Wide Web, and computing power.

Chapter 2, “Statistical Tools in Evaluation,” has been upgraded, with all computer analysis examples

developed using the SPSS package of programs. Brief instructions for using the SPSS programs referenced are in the appendix.

Information on selecting a criterion score has been moved to Chapter 3, “Reliability and Objectivity,” and its coverage expanded (more considerations are given for multiple trial data).

Chapter 5, “Evaluating Achievement,” has been revised so that there is less emphasis on grading and more emphasis on setting evaluation standards. A section on authentic assessment has been added.

Chapter 6, “The Nature of Tests and Their Administration: With Applications to Individuals with Disabilities,” includes new information on testing challenges for individuals with disabilities, selecting a method of performance measurement for individuals with disabilities, and more coverage for individuals in nonteaching roles.

Chapter 7, “Measuring Physical Abilities,” includes new sections on back injuries in relation to the theory of basic abilities, pass-fail tests and continuously scored tests in relation to setting cut scores, absolute versus relative strength, male/female differences in absolute and relative strength, and the concept of strength testing and its link to rehabilitation (closed vs. open chain).

Chapter 8, “Evaluating Aerobic Fitness,” includes a new discussion of the role of aerobic fitness in lifetime health, more information on nonexercise tests, and descriptions of new maximal distance run/walk tests (field tests) used to estimate aerobic fitness.

Chapter 9, “Evaluating Body Composition,” includes a number of new graphs indicating the relationship between diseases/mortality and body composition.

Chapter 10, “Evaluating Youth Fitness,” now includes a comparison of criterion-referenced standards and a historical view of youth fitness testing.

Chapter 11, "Aging and Adult Fitness," is an entirely new chapter with information devoted to our aging population. The chapter discusses evaluating adult fitness, the methods used to study fitness associated with aging, identifies the types of tests used to evaluate adult fitness, the general age-related decline in health-related fitness, and the computer programs available for use in adult fitness programs.

Chapter 12, "Evaluating Skill Achievement," has been shortened by removing old tests and tests seldom administered. The emphasis is now on developing tests.

Chapter 13, "Evaluating Knowledge," has been revised so that there is less emphasis on knowledge tests for teachers and more emphasis on knowledge testing for all people in physical education and exercise science. The section on questionnaires has been expanded.

Chapter 14, "Exercise Psychological Measurement" (new title), contains a new section on eating disorders that includes discussion of the nature of these diseases and of eating disorder scales.

Pedagogy

Key words. The key terms that are defined in every chapter are highlighted at the beginning of each chapter and boldfaced in the text. The definitions can also be found in the end-of-text glossary.

Objectives. The objectives at the opening of each chapter focus the students' attention on the key concepts that will be discussed in the chapter.

Formulas. Important formulas are now numbered throughout the text to provide easy and quick reference to those used frequently in the course and in students' professional lives.

Tables and figures. Many of the graphics have been updated in this edition to give students a visual representation of the concepts discussed in the text.

Summary. The end-of-chapter summaries provide a brief overview of what was discussed within the chapter.

Formative evaluation of objectives. This section at the close of each chapter helps to determine if the students have mastered the objectives set forth at the beginning of the chapter.

Additional learning activities. These activities provide students with a way to gain more experience with the concepts presented within the chapter.

Ancillaries

The sixth edition of *Measurement for Evaluation in Physical Education and Exercise Science* also features a solid ancillary package. Elements include:

1. **Instructor's Manual and Test Bank.** A complete Instructor's Manual features a course introduction, a list of changes to the new edition, a discussion of course format, and multiple-choice test questions for each chapter. This manual is free to adopters of the text.
2. **Computerized Test Bank.** Available to qualified adopters, a computerized test bank allows the instructor to select, edit, delete, or add questions, as well as construct and print tests and answer keys. It is available in IBM Windows or Macintosh formats.
3. **Student SPSS.** McGraw-Hill is very pleased to be able to offer this package with our text. This comprehensive statistics package can perform any of the procedures discussed in the text. Available with this book for a nominal fee is the CD-Rom version that is compatible with Windows 95 systems. More information on the specifics of this program is provided in the appendix. Feel free to contact your McGraw-Hill sales representative for further information regarding other versions of this software that may be available.

We have tried to present measurement in physical education and exercise science from a sound theoretical standpoint. We feel that physical educators and exercise scientists will be better able to apply the theory of measurement and evaluation if they first understand it. We hope that this book prepares students to cope with any problems of measurement and evaluation that they may encounter once they are on the job.

Acknowledgments

We would like to express our gratitude to the many people who reviewed previous editions of this book or manuscripts and offered excellent suggestions for improvements. They include professors Andrew Proctor, Stephen Langendorfer, Dale Mood, Antoinette Tiburzi, George McGlynn, Harry Duvall, Ronald Deitrick, Joy L. Hendrick, Emma S. Gibbons, Martin W. Johnson,

Lloyd L. Laubach, Marilyn A. Looney, Patricia Patterson, Robert Sonstroem, Alex Waigandt, and Charles W. Jackson.

In addition, we would like to extend a special thanks to the reviewers of this edition. Because of the extensive changes in the field of exercise science, these comments were especially useful. They are professors Kathleen M. Knutzen, Western Washington University; Mary Jo Campbell, University of New Mexico; Jane A. Beougher, Capital University; William G. Jennings, Saint Joseph College; James W. Coburn, California State University, Fullerton.

We would also like to thank Dr. Jessie Jones and Dr. Roberta Rikli from California State University, Fullerton for graciously sharing their pre-publication

information of their LifeSpan project. We believe that their work will have a major impact on fitness testing of elderly.

Finally we would like to thank our wives for their patience and consideration during the preparation of the manuscript, as this always comes out of family time. Finally, we would like to express our thanks to former teachers, who contributed to our knowledge of measurement techniques, as well as to our former students, who forced us to bridge the gap between theory and practice.

T.A.B.

A.S.J.

To the Student

The major goal of this text is to help you apply the principles of measurement and evaluation to your job. Often evaluation is viewed as a necessary evil, not directly related to the real purpose of the job. This text was designed to help you learn how to use evaluation as an essential part of the total process.

We developed the text with two purposes in mind. First, we want to help you master the essential content, principles, and concepts needed to become an effective evaluator. We tried to provide the practical aspects, the “how” and the “why” of evaluation. We want this text to help you build a foundation based on theoretical concepts so that you can then apply these concepts in developing, using, and evaluating various tests.

Second, we designed the text to provide the practical skills and materials that you will need. We provide a wide assortment of tests, administrative instructions, and norms. We selected the tests, which provide the “how” of evaluation, either for their application to the job setting or for their value for teaching basic concepts discussed in the text.

A practical tool for you to use now and later is the computer. Practical computer applications are provided, by examples, with standard microcomputer programs. As mentioned in the preface, an excellent microcomputer program is available with the book (Student SPSS). Learn to use the computer and programs such as SPSS as a student while help is available, and it will be easier to use whatever computer support is available once you are on the job.

The approach we use in the text follows a teaching method that is basically an outgrowth of Benjamin Bloom’s ideas on “mastery learning.” The method stresses letting the student know what is to be learned, providing the material to accomplish the learning, and

furnishing evaluation procedures to determine whether the learning has been achieved.

This approach, formative evaluation, is an essential feature of mastery learning. Psychologists maintain that feedback is one of the most important factors in learning. Formative evaluation is designed to provide that feedback. It enables you to diagnose weaknesses, and lets you know the content you have mastered, so that you can put more effort into problem areas.

Instructional objectives at the beginning of each chapter enable you to focus your attention on the concepts to be learned. The **text**—supplemented with class lectures, discussions, projects, and laboratory experiments—provides the information you need to help you achieve the objectives. The **evaluation of objectives** at the end of each chapter help you determine whether you have mastered the skills set forth.

The formative evaluation in this text offers two types of questions. The first, in **question/answer format**, is most appropriate for testing yourself on the statistics content. If you cannot calculate a statistic, you have not mastered the technique. The second type of question requires you to define, summarize, analyze, apply, or synthesize content. This is typical of an **essay-type** question, and is more appropriate for testing yourself on basic content, principles, and concepts.

A common complaint of students is that they dislike learning by rote. We hope that the techniques of instructional objectives and formative evaluation will help you to avoid that approach. The objectives and evaluation questions identify key points in a given chapter. Once you have read the chapter itself, you should be familiar with these points. Finally, we hope that by using this approach you will master important content rather than just isolated facts.

We are aware that each student studies differently. However, the following suggestions may help you achieve mastery learning:

1. Before reading a chapter, review the instructional objectives and formative evaluation questions for the chapter. This gives you an overview and directs your attention to the important content areas.
2. Read the chapter, underlining important content. Also underline material that you do not fully understand. After reading the entire chapter, return to the underlined parts to reinforce the important content and to try to grasp the material you do not fully understand.
3. Without referring to the text, answer the formative evaluation questions. After you have written your answers, go back to the material in the text and check your answers. Spend additional time on the questions that you did not answer correctly. If you do not feel comfortable with your answers to some questions, spend more time on these as well.

4. Practical learning activities are provided at the end of each chapter. Try them. We have found that these exercises help students gain further insight into the statistical or theoretical concepts being stressed. (Many of these suggested activities are enjoyable as well as helpful.)
5. When studying for summative exams, use the formative evaluation questions and your corrected answers as the basis for final review of the instructional objectives of each chapter. Examine the list of key words at the beginning of each chapter. They are a good second means for formative evaluation. If you find that you cannot think of a precise definition of a term, go back over the chapter until you find the term's definition.

We wish you good luck with your evaluating techniques.

T.A.B.

A.S.J.

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Key Words

cardiovascular disease	hard disk	prevalence
coronary heart disease	health-related fitness	random-access memory (RAM)
criterion-referenced standard	measurement	software
database	norm-referenced standard	spreadsheet
digital	norms	subjective
evaluation	objective	summative evaluation
floppy disk	personal computer (PC)	
formative evaluation		