MEASUREMENT AND ADJUSTMENT SERIES

EDITED BY LEWIS M. TERMAN

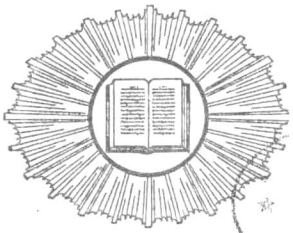
TESTS AND MEASUREMENTS IN HIGH SCHOOL INSTRUCTION

BY G. M. RUCH

Professor of Education, University of California

AND GEORGE D. STODDARD

Assistant Professor of Psychology and Education, State University of Iowa



Yonkers-on-Hudson, New York

WORLD BOOK COMPANY

2126 Prairie Avenue, Chicago

PREFACE

THIS volume has been prepared primarily as a summary of the available tests and test methods in high school instruction. Since no separate treatment of measurement in secondary education has appeared to date, it was thought wise to include certain historical facts in Part I. In response to the increasingly critical attitude toward test selection, Chapter IV was prepared.

Part II presents the more important published measurements which are useful to the high school teacher. A great many tests have not been mentioned chiefly because of the lack of adequate data for their evaluation. Such tests are not necessarily undesirable, but no secure basis for their recommendation could be found in the literature. Part II presents numerous reliability coefficients, most of which were calculated by the authors or their students especially for this volume. Certain apologies might be offered for the scantiness of numbers of cases employed at times in the calculation of reliabilities, and for the many omissions in these data. However, it should be recognized that the burden of such determinations does not in fairness rest with the present authors, but rather with the authors of the tests themselves. If the reliabilities given are at times in serious error due to the limited numbers of cases used, or for other reasons, their presentation will at any rate stimulate their refutation and in time lead to the publication of more accurate results. Incidentally, it should be pointed out that very few makers of tests in the high school field have felt the necessity for ascertaining many pertinent statistical considerations which would be of the greatest value in the careful selection of tests.

In preparing Part II, the authors have tried to avoid being unduly swayed by such facts as great popular recogni-

tion of tests merely because of early historical origin, except to the extent that this is a legitimate criterion of merit. Where experimental findings justify the use of a less well-known test, such a test has been given as great recognition as others of more general reputation, or even greater.

Part III is to be justified upon the basis of the rapidly growing interest in informal objective examination methods. No treatment of test methods for classroom use can in the future ignore these unstandardized tests and examinations, which appear to be supplanting many of the traditional examination practices. Here again, especially in Chapter XVI, the authors were forced to take some position on a number of moot points. In the main, it is thought that the weight of the more extensive investigations indicates the fairness of the tentative recommendations advanced.

Part IV was placed last in the book, although logically it might have followed Part I. This was done for the sake of the reader who is not interested in statistical aspects of tests and test construction. The treatment of Part IV, moreover, is from the point of view of the test builder rather than that of the classroom teacher. A moment's thought will show that there is really no alternative. Part IV is to be defended upon two bases: (*a*) the fact that many high school teachers desire some insight into the more critical phases of test construction and selection; and (*b*) the fact that this book will doubtless find its way into the college classroom as a text in theoretical as well as applied aspects of measurement. There are so very few brief discussions of the general technique of test construction that it was felt that a few dozen pages could well be devoted to matters which obviously facilitate critical selection, use, and interpretation of measurements.

The authors' thanks are due a large number of graduate students who gave, scored, and tabulated test returns, and

who at times purchased test materials out of their own funds. Mr. Richard R. Foster calculated a considerable number of correlation coefficients for Part II. Grateful acknowledgment is made to Dean Paul C. Packer, of the College of Education, State University of Iowa, for funds used for the purchase and scoring of tests and for incidental clerical and stenographic assistance. Mrs. George D. Stoddard gave valuable aid in the preparation of certain sections of the book. Indirectly, the authors have drawn freely from the published work of many writers; particularly, from the statistical treatises of Dr. Truman Lee Kelley. Comment should be made upon the patience of the editor, Dr. Lewis M. Terman, and of the publishers in awaiting the completion of a task which has required the better part of four years.

G. M. Ruch
G. D. Stoddard

EDITOR'S INTRODUCTION

In the history of tests and measurements nothing stands out as more striking or significant than the recent increase of interest in this movement among teachers in secondary schools. The measurement of both intelligence and achievement began in the grades below the high school and for several years was rarely applied above the eighth grade. It is possible that the somewhat tardy introduction of measurement methods at the higher levels may have been due in part to a more marked tendency to conservatism on the part of high school teachers, who, at least in many parts of the country, have frequently had less pedagogical training than teachers in the elementary grades. Perhaps a more potent cause lies in the apparently greater difficulty of devising satisfactory measuring instruments for use with high school students. We are finding, however, that the supposed difficulties were more apparent than real. Experience shows that it is about as easy to measure either the natural abilities or the subject-matter achievement of high school pupils as it is to apply such measurements in the elementary grades. In some respects, indeed, it is easier. With older children a standard test procedure can be more rigidly followed and the factors of attention and effort can be more readily controlled. Moreover, there is probably no greater inherent difficulty in measuring achievement in algebra, geometry, physics, ancient history, or a foreign language than there is in measuring achievement in reading, arithmetic, or spelling.

Not only are measurement methods as applicable in the high school as elsewhere; in no part of the school system is more to be gained from their use. It is in the junior and senior high school that pupil guidance, both educational and vocational, assumes such outstanding importance. The student at this age stands at the threshold of life, subject to

conflicting desires and uncertain as to his abilities and as to the direction he should take. He is facing decisions which will affect his entire life: whether to leave school and go to work, whether to complete the high school course, whether to prepare for college, whether to fit himself to enter one or another of the professions. Without objective information of the kind which is obtainable only from standard tests, the guidance of such a student can rest upon little more than guesswork. One is tempted to put it more strongly and to say that *educational guidance without educational testing is professional quackery*, as much so as in the case of the physician who refuses to employ the approved laboratory techniques in the diagnosis and treatment of certain diseases.

That the truth of the above statements is coming to be generally recognized, among high school teachers as well as among university professors of secondary education, is indicated by the multiplication of high school achievement tests and by their widespread use. For most of the high school subjects fairly satisfactory tests have already been devised, and considerable progress has been made in the testing of special aptitudes and interests at this level.

One obstacle to the use of achievement tests in the high school has been the lack of a suitable textbook. The principal or teacher who would acquaint himself with the recent advances in this field has found it necessary to search through several educational magazines and innumerable monographs. In summarizing and interpreting the scattered contributions which have appeared to date in this field, the authors of the present volume have rendered a service to secondary education which the teaching fraternity will not be slow to appreciate.

The treatment of the subject throughout is direct, intelligible, and helpful. On the one hand it avoids over-emphasis of the theoretical problems of measurement, and on the

other hand it avoids too great preoccupation with the minutiæ of procedure, scoring, and computations. The extensive experience of the authors (the senior author was formerly principal of the University High School at Eugene, Oregon) has enabled them to write a book ideally adapted to its purpose — one that is informative, balanced, and helpful. Both the uses and the limitations of tests are clearly and convincingly set forth. Criteria are given for the selection of tests suitable for a particular purpose. All the important intelligence and achievement tests intended for use in the high school are described and evaluated. Finally, in order that those who make use of testing methods may have more than a superficial knowledge of the instruments they employ, four chapters are added on the principles of test construction. In the opinion of the editor, no other chapters in the book are more worthy of careful study than these last four.

It is safe to predict that *Tests and Measurements in High School Instruction* will find a wide field of usefulness both as a classroom text and for reading-circle purposes. It is a book which the progressive high school teacher cannot afford to ignore.

LEWIS M. TERMAN

CONTENTS

PART FOUR: THE CONSTRUCTION OF EDUCATIONAL AND MENTAL TESTS

TESTS AND MEASUREMENTS IN HIGH SCHOOL INSTRUCTION

CHAPTER ONE

The Present Status of Measurement in Secondary Schools

Historical. The introduction of educational and mental testing into the high school has not shown the same rapid growth which characterizes the applications of standardized measures in elementary education. A great many factors have been responsible for this situation. The retarding influences, for the most part, appear to be transitory in character, and present indications point toward an increasingly greater application and usefulness of test methods in secondary education in the future.

The technique of measurement, like that of curriculum construction, supervision of instruction, or the psychologizing of teaching methods, presents many unique problems in secondary schools which are not paralleled exactly in elementary school practice. Since the elementary school has in the past occupied the more strategic position in educational theory and administration, it is not surprising that the idea of the measurement of classroom products has had its most thorough try-out in the lower schools. Whether the elementary school will continue to lead in the test movement remains to be seen, but there is no doubt at present about the fact that test methods are gaining a secure foothold in the high school, college, and university. Viewed broadly over a period of years, the slower progress of measurement in the high school may prove to be a blessing in disguise, since it will enable the high school teacher or principal and the test builder to avoid many of the mistakes and pitfalls of the early years of experimentation with objective measures in the elementary