



# Kinesiology

for the

## Occupational Therapy Assistant

*Essential Components of Function and Movement*

**Jeremy L. Keough • Susan J. Sain • Carolyn L. Roller**

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*Essential Components of Function and Movement*

**Jeremy L. Keough, MSOT, OTR/L**

Life Care Centers of America

Maryville, Tennessee

**Susan J. Sain, MS, OTR/L, FAOTA**

Academic Fieldwork Coordinator

Roane State Community College

Harriman, Tennessee

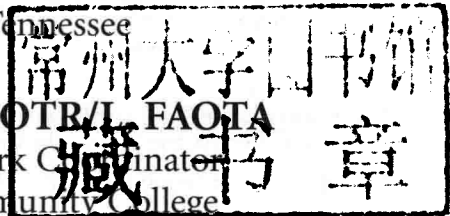
**Carolyn L. Roller, OTR/L**

Supervisor of Occupational Therapy

Tennessee Orthopaedic Clinics

Knoxville, Tennessee

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## ABOUT THE AUTHORS

*Jeremy L. Keough, MSOT, OTR/L*, is currently a staff occupational therapist for Life Care Centers of America. Jeremy earned his undergraduate degree in occupational therapy from Eastern Kentucky University and a post-professional master's degree from Belmont University. His professional experiences include long-term care, inpatient rehabilitation, outpatient rehabilitation, work hardening, acute care, and occupational therapy assistant (OTA) education. Jeremy served as the OTA Program Director at Roane State Community College and instructed the kinesiology course for 3 years. Currently, Jeremy's interests include neurorehabilitation approaches, occupation-based practice, functional movement, and volunteering for the National Board for Certification in Occupational Therapy.

*Susan J. Sain, MS, OTR/L, FAOTA*, is currently a faculty member and academic fieldwork coordinator at Roane State Community College in Tennessee. Susan earned her undergraduate degree in occupational therapy from the University of Wisconsin at Madison along with a degree in Spanish. She later earned a master's degree in health promotion/health education from the University of Tennessee at Knoxville. Her professional experiences include adult and child psychology, long-term care, pediatrics in a variety of settings, early intervention, and academia. Susan served as the Program Director of the OTA program at Roane State Community College for 11 years and has been the Academic Fieldwork Coordinator for 2 years. Susan has instructed the kinesiology course for more than 12 years. Susan has served in a variety of volunteer positions for state associations, AOTA, and NBCOT. Her current interests include international study opportunities for allied health science students and cultural diversity.

*Carolyn L. Roller, OTR/L*, is currently Supervisor of Occupational Therapy at Tennessee Orthopedic Clinics, PC, specializing in upper extremity rehabilitation. Carolyn earned her undergraduate degree in occupational therapy from the University of Wisconsin at Milwaukee. Her professional experiences include outpatient rehabilitation, home and job site analysis, ergonomic considerations in the wellness community, and OTA education. Carolyn was an adjunct faculty member at South College in Knoxville, TN, teaching kinesiology in the OTA program. Currently, Carolyn serves as guest lecturer and chairperson of the advisory board for the OTA program at Roane State Community College in Oak Ridge, TN. Her interests include student fieldwork education, hand rehabilitation and prevention of hand injuries in the wellness community.

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### CONTRIBUTING AUTHOR

*Teresa Plummer, PhD, MSOT, OTR/L, ATP*, is currently an assistant professor in the School of Occupational Therapy at Belmont University. Dr. Plummer graduated with her Bachelor of Science degree in occupational therapy from the Medical College of Virginia, her Master of Science degree in occupational therapy from Belmont University, and her Doctor of Philosophy degree in occupational therapy from Nova Southeastern University. Dr. Plummer is an assistive technology professional through the Rehabilitation Engineering and Assistive Technology Society of North America (RESNA). She has extensive clinical and teaching experience and is currently an assistant professor and primary professor for assistive technology courses at Belmont University's Entry Level Occupational Therapy Doctorate and Master's Program. Additionally, she is employed by Monroe Carrell Jr. Children's Hospital at Vanderbilt in the seating clinic.

Dr. Plummer's professional experiences include adult rehabilitation, seating, and positioning. Teresa has worked in the field of adult rehabilitation for more than 30 years. She has conducted workshops nationally and internationally in the areas of rehabilitation and assistive technology. Dr. Plummer's research interests include wheelchair assessment, empowerment, and vision and its relationship to posture and mobility.

# FOREWORD

This textbook fills a significant gap in educational materials for occupational therapy assistant students. While there are many kinesiology textbooks, most of these have been written by or for physical therapy practitioners or from a strictly body-function point of view. Finally, occupational therapy assistant educators have a textbook that fully embraces occupational therapy tenets. Students can learn the ins and outs of kinesiology while also strengthening their understanding of clients, occupation, and the environment. The authors use the *Occupational Therapy Practice Framework: Domain and Process, 2nd Edition* (OTPF-2) throughout the text to keep students focused on the client and his or her ability to engage in occupations of choice. Movement is an important part of daily function, making knowledge of kinesiology critical to an occupational therapy practitioner's understanding of the client's ability to engage in occupations.

The authors' many years of experience as occupational therapy practitioners and occupational therapy assistant educators come through in every page of this textbook. Each author shares knowledge and insight from his or her own area of expertise and makes the subject of kinesiology understandable and relevant to occupational therapy. Students are given thorough explanations and are provided excellent learning activities to help them put kinesiology into context. The Gold Boxes, pictures, and tables highlight and clarify important concepts and make the study of kinesiology much less daunting for the student. Having a kinesiology book that includes goniometry, muscle testing, and connections to the OTPF-2 is ideal for students, instructors, and practitioners who want a convenient reference book. It provides a seamless integration of theory, fact, and practice. I am delighted to be able to recommend this book and wish it had been available when I was searching for textbooks for occupational therapy assistant students.

Jane Harrold Sorensen, OTR  
Former OTA Program Director  
South College  
Knoxville, Tennessee



# INTRODUCTION

The intent of this text is to enable the reader to identify the underlying components that make movement possible and to connect how kinesiology applies to the client. The reader will gain insight into the practice of occupational therapy through solving problems and developing questions needed to assist the client to achieve movement goals. Gross range of motion and manual muscle testing are also introduced to further enable skill development. This text will refer to those who receive occupational therapy services as clients, following the terminology of the *Occupational Therapy Practice Framework: Domain and Process, 2nd Edition*.

This text is divided into nine chapters to encourage learning of the study of movement. Chapter 1, Kinesiology: A Foundation in Occupational Therapy, summarizes kinesiology and how the study of movement applies in occupational therapy. Historical applications are referenced as well as current influences of kinesiology within the profession. The *Occupational Therapy Practice Framework: Domain and Process, 2nd Edition* is also introduced to help unify chapter organization throughout the text. Specifically, client factors and activity demands are discussed to build on the knowledge needed to identify movement in context.

Chapter 2, Human Body Functions and Structures Influencing Movement, identifies anatomical features that impact movement. Such body functions topics include skeletal and neuromuscular. Body structure information includes specific topics on muscles and joints. Body functions are presented prior to body structures in each chapter to build on the top-down approach used in this text. This also helps to maintain the focus on function.

Chapter 3, Factors Influencing Movement, and Chapter 4, Introducing Movement Demands, provide the basis for understanding movement. Information is provided to better understand how and why abnormal and normal movements occur. Factors are also identified that assist the reader in observing movement of interest to the occupational therapy assistant (OTA) during engagement in activity by the client.

Chapters 5 through 9 focus on the essential functions and movement of the trunk and neck, lower extremity, and upper extremity. Information is focused on specific areas relevant to the OTA with an overview of peripheral topics. Chapters 5 and 6 address the trunk and lower extremity first as a basis for support during movement and to allow the student to develop a system for assimilating information prior to progressing to the upper extremity. Chapters 7 through 9 focus on function of the upper extremity including topics on movement. Again, body functions are identified first followed by information related to body structures.

The text is presented in such a way as to encourage the reader to visualize how all the components of movement fit together and affect each other. Information is provided at the OTA level and in a sequence that enhances learning. The authors feel this approach will maximize learning and keep the reader from simply memorizing detailed bits of information that later prove difficult to remember and apply in the practice setting. We hope the reader will gain an understanding that movement is a complex symphony of all body systems working in harmony. More importantly, we hope the reader is able to perceive how movement enables or hinders function and engagement in daily activities and occupations.

## UNIQUE FEATURES OF THIS KINESIOLOGY TEXT

Many features strengthen the uniqueness of this kinesiology text to provide an enhanced learning experience for the student and health care professional. Specifically, unique features of this text can be found in the following bullets. Of key interest is that this one comprehensive text should be the only text needed for an OTA kinesiology course. Numerous resources, manual muscle testing and range of muscle norms and procedures, and occupational profiles describing OT interventions are included. The authors believe that these unique features make this kinesiology text superior to other texts available on the market.

- Incorporates the *Occupational Therapy Practice Framework: Domain and Process, 2nd Edition*.
- Occupation/real life-based activities and questions at the end of each chapter.
- “Gold Boxes” with additional key information.
- Occupational profiles to present applications to occupational therapy.
- Implications of function across the lifespan.
- Written for the OTA student at the OTA level.
- Written by occupational therapy practitioners with more than 18 years of combined experience teaching kinesiology to OTA students.
- Answers the charge by the American Occupational Therapy Association (AOTA) Representative Assembly for upper extremity guidelines in education.
- Fills an anticipated need as AOTA moves toward creating a “model curricula” for basic sciences. Kinesiology is a hallmark in occupational therapy and can be traced back as a requirement for graduation from programs over the past century.
- Helps meet Accreditation Council for Occupational Therapy Education (ACOTE) Standards for OTA education.
- Changes and improves sequence of topics to enhance OTA learning.
- Enables range of motion and manual muscle testing to be incorporated in the course with the use of one book.
- Provides a top-down approach to learning with a focus on application of information versus rote memorization.
- Allows for OTA program variability in teaching approach to meet the needs of biomechanical to occupation-based programs and preferences of the instructor.

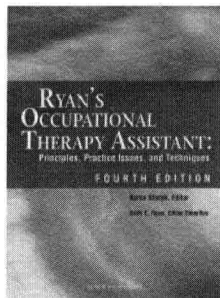
The text also addresses ease of use for faculty. Instructor’s manual materials are provided to include test questions and PowerPoint slides for each chapter. These materials will increase the quality and continuity of learning between reading the text, classroom didactic learning, and the assessment of learning. This also enables the instructor the ability to spend valuable time enhancing his or her course as needed to meet student learning needs as a solid course foundation is provided. Further details about faculty resources can be found at [www.efacultyounge.com](http://www.efacultyounge.com).



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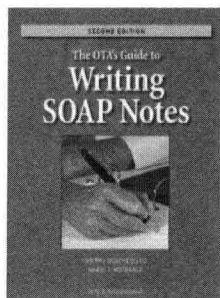
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This updated *Fourth Edition* integrates the *Occupational Therapy Practice Framework: Domain and Process* throughout each section, while including evidence-based practice and research to support the treatment options presented.

Written in a student-friendly format, the text covers all aspects of OTA practice for both education and preparation for the NBCOT exam. Using actual client examples, students are guided throughout the process of learning various principles and disabilities to applying that knowledge in a clinical setting.

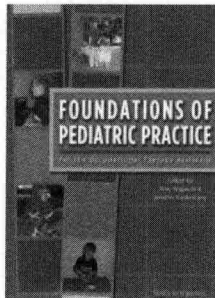
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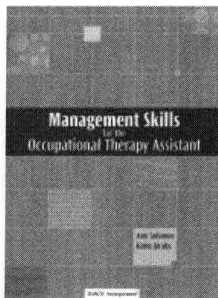
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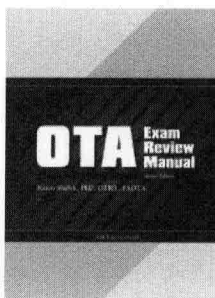
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# CONTENTS

<i>Acknowledgments</i> .....	vii
<i>About the Authors</i> .....	ix
<i>Foreword by Jane Harrold Sorensen, OTR</i> .....	xi
<i>Introduction</i> .....	xiii
Chapter 1      Kinesiology: A Foundation in Occupational Therapy.....	1
<i>Jeremy L. Keough, MSOT, OTR/L and Susan J. Sain, MS, OTR/L, FAOTA</i>	
Chapter 2      Human Body Functions and Structures Influencing Movement.....	27
<i>Susan J. Sain, MS, OTR/L, FAOTA</i>	
Chapter 3      Factors Influencing Movement.....	55
<i>Susan J. Sain, MS, OTR/L, FAOTA</i>	
Chapter 4      Introducing Movement Demands.....	85
<i>Jeremy L. Keough, MSOT, OTR/L</i>	
Chapter 5      Function and Movement of the Trunk and Neck.....	113
<i>Teresa Plummer, PhD, MSOT, OTR/L, ATP</i>	
Chapter 6      The Essential Functions of the Lower Extremity.....	141
<i>Jeremy L. Keough, MSOT, OTR/L</i>	
Chapter 7      Function and Movement of the Shoulder and Scapula.....	175
<i>Carolyn L. Roller, OTR/L; Susan J. Sain, MS, OTR/L, FAOTA;</i> <i>and Jeremy L. Keough, MSOT, OTR/L</i>	
Chapter 8      Function and Movement of the Elbow Complex.....	217
<i>Carolyn L. Roller, OTR/L</i>	
Chapter 9      Function and Movement of the Hand.....	247
<i>Carolyn L. Roller, OTR/L</i>	
<i>Glossary</i> .....	321
<i>Appendix A: Web Address References</i> .....	331
<i>Appendix B: Available Range of Motion Norms</i> .....	335
<i>Appendix C: Epilogue of Occupational Profiles</i> .....	339
<i>Appendix D: Muscle Testing and Grip/Pinch Norms</i> .....	347
<i>Financial Disclosures</i> .....	357
<i>Index</i> .....	359

*Kinesiology for the Occupational Assistant: Essential Components of Function and Movement* includes ancillary materials available for faculty use. Included are Test Bank Questions and PowerPoint slides. Please visit [www.efacultylounge.com](http://www.efacultylounge.com) to obtain access.

# Kinesiology: A Foundation in Occupational Therapy

Jeremy L. Keough, MSOT, OTR/L and  
Susan J. Sain, MS, OTR/L, FAOTA

Kinesiology incorporates the study of many areas to provide an understanding of movement. Anatomy, physiology, physics, calculus, and biomechanics all provide information to define or describe how movement occurs. Anatomy provides information on muscles, bones, and joints, which make up the components that produce movement. Physiology describes the body systems and body functions that influence movement. Physics is the study of nature and provides information to understand how force, motion, and energy apply to movement. Calculus can be applied to general physics to explain how change occurs and thus quantify how movement occurs. Lastly, biomechanics refers to the application of mechanical principles to the human being and thus is directly relevant to kinesiology. A formal definition of kinesiology is provided in Gold Box 1-1.

Unfortunately, one area of study cannot fully and adequately describe how or why movement occurs. Occupational therapy (OT) practitioners use information from all of the above-mentioned areas of study and apply this information to individuals and their unique situations to effect change. One consideration is that each treatment session often necessitates a new analysis of movement during the treatment of physical disabilities. Additionally, the therapist may also change the extent of what to consider in the analysis of movement at each treatment session. The multitude of variables to consider is endless; however, the *Occupational Therapy Practice Framework: Domain and Process, 2nd Edition* (OTPF-2) provides a method to identify some of these important variables. The OTPF-2 is presented in greater detail later in this chapter. Another important consideration is whether or not the practitioner is seeking qualitative or quantitative information about the client's movement.

**Qualitative** information includes information on movement that may come from observation or interview. Examples may include movement analysis through observation, gross range of motion or manual muscle testing, or an interview of a client's perceived performance. Several factors may lead the therapist to choose a qualitative approach. A client may be observed performing activities of daily living (ADL) or may be asked to move a certain way to identify preferred movement patterns and movements available to the client. Formal range-of-motion evaluations may not be indicated, or a lack of time may necessitate a gross range-of-motion or manual muscle testing observation. Another consideration may be impaired cognition that can hamper a client's ability to follow directions and complete a standardized assessment.

On the other hand, **quantitative** information identifies numerical data under standardized situations to gather information. Examples may include obtaining formal range-of-motion measurements with a goniometer, assessing manual muscle testing grade, or using a computer or video

**Gold Box 1-1**

**Kinesiology:** The study of the principles of mechanics and anatomy in relation to human movement.

*Merriam-Webster's collegiate dictionary* (1991, p. 662)

to analyze movement. Each method requires the practitioner to use a standardized procedure or method to gather data about the client. This provides information that can be assessed at a later date to identify change or progress toward OT goals. The complexity of deciding what is important to include in the analysis of movement and how to attain this information is one reason why kinesiology can be considered one of the hardest courses of study in OT.

As the profession of OT and the use of kinesiology have changed over time, both have become more holistic, returning interest to the qualitative characteristics of movement and occupation. Descriptions on qualitative and quantitative approaches can be expressed in much more detail than this text allows; however, important information will be identified that is needed for entry-level practice as an occupational therapy assistant (OTA). A review of the historical connections of OT and kinesiology will provide a link to understanding current OT practice characteristics.

## FOUNDATIONS IN OCCUPATIONAL THERAPY

### *Educational Requirements Related to Kinesiology*

Kinesiology has been a tool OT practitioners have used since the inception of the profession. While the emphasis on kinesiology has changed over the years, the importance of understanding movement and its impact on treatment has remained constant. Kinesiology has always been one of the basic sciences included in OT training programs. One way to examine the emphasis on kinesiology can be found by looking at the training requirements for OT practitioners during the past century.

At the start of the profession during World War I, reconstruction aides were established to meet the rehabilitative needs of returning injured soldiers. Reconstruction aides could specialize in either physical therapy or OT. Kinesiology was one of the lectures provided during the training programs for reconstruction aides specializing in OT (United States Federal Board for Vocational Education, 1918). Following World War I, the American Occupational Therapy Association (AOTA) adopted standards for OT courses in 1923. These standards are reflected in the April 15, 1929 flier describing the Boston School of Occupational Therapy (BSOT, 1929). Figure 1-1 shows students in the classroom at the BSOT in 1925. Courses covering medical, social services, and craft study were provided by the school. In particular, anatomy, kinesiology, hygiene, and physiology were subjects identified under the topic of medical study.

In 1935, the essentials of an accredited school in OT were established by the Council on Medical Education and Hospitals of the American Medical Association in collaboration with AOTA. Again, kinesiology was identified as a required subject listed under the biological sciences (Willard & Spackman, 1947). Kinesiology remained a requirement when the essentials were revised in 1949. Interestingly, kinesiology was viewed as important enough to be included in the first OT master's degree program at the University of Southern California in 1947 (*American Journal of Occupational Therapy*, 1947). A course listed as advanced kinesiology was included for 2 credit hours in the 31 credit hours required to graduate.

The essentials remained in effect until the next major revisions were adopted in 1973. A major change that was incorporated in this revision was that course content and hourly requirements were replaced with terminal behavioral objectives (Huss, 1981). There have been several additional revisions to the essentials or standards since 1973; however, the most recent accreditation



**Figure 1-1.** Occupational therapists in the making—1925 Boston School of Occupational Therapy. (Reprinted with permission of Tufts University, Digital Collections and Archives, Medford, MA.)

standards for OTA programs continue to present requirements stated through terminal behavioral objectives. The most current revisions were established by the Accreditation Council for Occupational Therapy Education (ACOTE) of AOTA and were adopted in 2006 (ACOTE, 2006). Figure 1-2 presents an image of the OTA program at Roane State Community College and current education in contrast to the 1925 picture of the BSOT.

Terminal behavioral objectives reflect what the OTA student should be able to demonstrate upon completion of an OTA program in preparation for becoming an OTA practitioner. Some terminal behavioral objectives from the 2006 Accreditation Standards for Educational Programs for the OTA are identified in Table 1-1. These terminal behaviors apply to education and learning provided by a course in kinesiology.

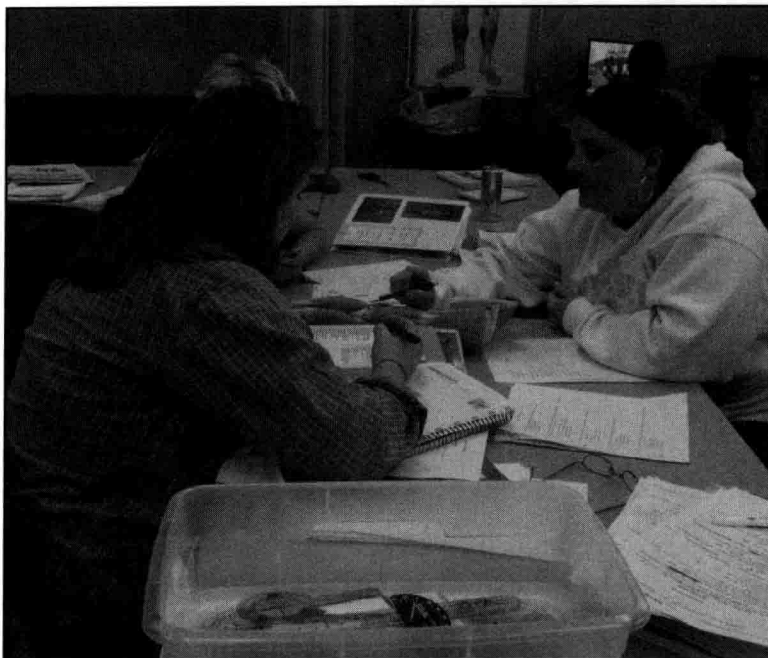
While educational standards for OT have changed over time, basic sciences, and specifically kinesiology, remain a constant educational foundation in the educational preparation of the OTA practitioner. Understanding the terminal behavioral objectives that apply to a kinesiology course will enhance learning and aid in comprehending how kinesiology fits within OT. Reviewing entry-level practice as identified by the National Board for the Certification of Occupational Therapy (NBCOT) can also enhance the understanding of how kinesiology fits in OT.

## *National Board for the Certification of Occupational Therapy*

The 2006 ACOTE educational standards can be compared to the picture of entry-level practice identified by the NBCOT. The NBCOT provides the national certification examination that identifies whether minimum standards of knowledge and competency are achieved as an entry-level OTA practitioner. Entry-level practice is described as an OTA practitioner up to the third year of practice. To identify entry-level competencies, NBCOT collects information on current practice through a “Practice Analysis” (NBCOT, 2008a). The most recent analysis and competencies were established in 2008.

Entry-level practice presented by NBCOT is described by four hierarchical components that include domain areas, task statements, knowledge statements, and skill statements (NBCOT, 2008b).





**Figure 1-2.** Occupational therapy assistants in the making: Roane State Community College, 2010.

**Table 1-1**

### **Terminal Behavior Objectives Relevant to Occupational Therapy Assistant Education of Kinesiology**

#### **Foundational Content Requirements**

Program content must be based on a foundation of the liberal arts and sciences. A foundation in the biological, physical, social, and behavioral sciences supports an understanding of occupation across the lifespan. Coursework in these areas may be prerequisite to or concurrent with occupational therapy assistant education and must facilitate development of the performance criteria listed below. The student will be able to do the following:

<b>B.1.4</b>	Demonstrate knowledge and understanding of the structure and function of the human body to include the biological and physical sciences. Course content must include, but is not limited to, anatomy, physiology, and biomechanics.
<b>B.2.7</b>	Exhibit the ability to analyze tasks relative to areas of occupation, performance skills, performance patterns, activity demands, context(s), and client factors to implement the intervention plan.
<b>B.2.10</b>	Explain the need for and use of compensatory strategies when desired life tasks cannot be performed.
<b>B.3.3</b>	Analyze and discuss how history, theory, and the sociopolitical climate influence practice.
<b>B.4.1</b>	Gather and share data for the purpose of screening and evaluation, including, but not limited to, specified screening tools; assessments; skilled observations; checklists; histories; consultations with other professionals; and interviews with the client, family, and significant others.

(continued)



<b>Table 1-1</b>	<b>Terminal Behavior Objectives Relevant to Occupational Therapy Assistant Education of Kinesiology (<i>continued</i>)</b>
<b>B.4.2</b>	Administer selected assessments using appropriate procedures and protocols (including standardized formats) and use occupation for the purpose of assessment.
<b>B.4.3</b>	<p>Gather and share data for the purpose of evaluating client(s)' occupational performance in activities of daily living (ADL), instrumental activities of daily living (IADL), education, work, play, leisure, and social participation. Evaluation of occupational performance includes</p> <ul style="list-style-type: none"> <li>• Client factors, including body functions (e.g., neuromuscular, sensory, visual, perceptual, cognitive, mental) and body structures (e.g., cardiovascular, digestive systems).</li> <li>• Performance skills, including motor (e.g., posture, mobility, coordination, strength, energy).</li> </ul>
<b>B.5.1</b>	<p>Assist with the development of occupation-based intervention plans and strategies (including goals and methods to achieve them) based on the stated needs of the client as well as data gathered during the evaluation process in collaboration with the client and others. Intervention plans and strategies must be culturally relevant, reflective of current occupational therapy practice, and based on available evidence. Interventions address the following components:</p> <ul style="list-style-type: none"> <li>• The occupational profile, including participation in activities that are meaningful and necessary for the client to carry out in home, work, and community environments.</li> <li>• Client factors, including body functions (e.g., neuromuscular, sensory, visual, perceptual, cognitive, mental) and body structures (e.g., cardiovascular, digestive systems).</li> <li>• Performance skills, including motor (e.g., posture, mobility, coordination, strength, energy).</li> </ul>
<b>B.5.8</b>	Modify environments (e.g., home, work, school, community) and adapt processes, including the application of ergonomic principles.
<b>B.5.11</b>	Provide training in techniques to enhance mobility, including physical transfers, wheelchair management, and community mobility, and participate in addressing issues related to driving.
Adapted from Accreditation Council for Occupational Therapy Education. (2006). <i>The 2006 accreditation standards for an educational program for the occupational therapy assistant</i> . Gaithersburg, MD: Author.	

Domain areas identify the major performance components of the profession. Task statements indicate activities performed in the domain area. Knowledge statements describe the minimum knowledge required to perform each task. Lastly, skill statements identify the skill required to perform each task to acceptable standards. The components of entry-level practice that correspond with the ACOTE accreditation standards and are relevant to knowledge of kinesiology are presented in Table 1-2. ACOTE standards that are relevant to kinesiology are identified in the column to the right. Further information of what specific ACOTE standards apply to task, knowledge, and skill statements can be found in the NBCOT document, "Matrix Study: NBCOT 2008 Practice Analysis" (NBCOT, 2008a).

Table 1-2 Similarities of Entry-Level Practice by National Board for the Certification of Occupational Therapy and Accreditation Council for Occupational Therapy Education		
NBCOT Classification Code	NBCOT Domain Covering Task, Knowledge, and Skill Statements	Corresponding ACOTE Accreditation Standard
Domain 1	Gather information on an ongoing basis using appropriate tools, procedures, and protocols in order to identify factors that impact participation in occupation.	B.1.5, B.2.7, B.2.8, B.4.1, B.4.2, B.4.3, B.5.1
Domain 2	Select and implement evidence-based interventions to support participation in areas of occupation (e.g., ADL, education, work, play, leisure, and social participation) throughout the continuum of care.	B.1.5, B.4.3, B.5.1, B.5.8, B.5.11, B.1.5, B.1.4
Domain 3	Uphold professional standards and responsibilities to promote quality in practice.	B.2.8
Adapted from National Board for the Certification of Occupational Therapy. (2008). Matrix study-NBCOT 2008 practice analysis: Certified occupational therapy assistant COTA. Author.		

The ACOTE accreditation standards and the NBCOT practice analysis highlight necessary components of the current practice of OT. The use of kinesiology in the profession of OT can be identified as one of these components. However, this does not provide a more in-depth description of how OTAs apply the knowledge of kinesiology in daily practice. The OTPF-2 does describe in greater detail how kinesiology is applied in OT. First, a look at the history of the profession may help to provide greater insight into current practice trends.

Historical Influences in Occupational Therapy

The current applications of kinesiology in OT can be identified over the past century by looking at prior trends in practice. While the historical practice of OT may not be reflective of present practice settings, core components can be identified that remain true today as well as in the past. The foremost similarity between today and the past is the use of kinesiology as a tool to achieve goals in OT. The multitude of variables affecting the profession of OT allows similar trends to be grouped together. Particular trends in practice (Table 1-3) can be broken down into groups ranging from the 1900s to 1920s, 1930s to 1950s, 1950s to 1970s, and 1970s to present.

The profession of OT emerged at the start of the 19th century during the reconstruction and curative era. The moral treatment movement in the 1800s identified a need to provide a higher quality of life for individuals in institutions. As a result, OT primarily emerged in mental health institutions to enhance individual engagement in craftwork and therapeutic activities. While aspects of kinesiology were not specifically addressed, movement considerations were identified as aspects to consider in craftwork. Specifically, strength was mentioned 10 times, coordination three times, and endurance one time throughout the first textbook in the study of OT, *Studies in Invalid Occupations: A Manual for Nurses and Attendants* written by Susan Tracy (1910).