

THIRD EDITION

FORMATIVE FEEDBACK
TOOLS FOR COLLEGE AND
UNIVERSITY TEACHERS

CLASSROOM ASSESSMENT TECHNIQUES

THOMAS A. ANGELO
WITH TODD D. ZAKRAJSEK

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Thomas A. Angelo
With Todd D. Zakrajsek

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Dedication to K. Patricia Cross and Richard J. Light

I wish to dedicate this third edition of *Classroom Assessment Techniques* to the two illustrious, extraordinary, and influential higher education scholars and leaders more responsible than anyone else for its genesis:

K. Patricia Cross, PhD, Professor Emerita of Higher Education at the University of California-Berkeley, (1926–2023), and

Richard J. Light, PhD, Carl H. Pforzheimer Professor of Teaching and Learning, Harvard Graduate School of Education

One morning in early June 1986, I crossed paths unexpectedly with Professor Richard J. Light in Harvard Square. In the prior academic year, I had been fortunate to serve as a teaching fellow in his large statistics course for graduate students in Harvard's Graduate School of Education, Kennedy School of Government, and School of Public Health. I learned more about the art of teaching from watching Professor Light teach that course than I had from my 10 years of teaching and many education courses to that point.

During that brief street-corner conversation, Professor Light invited me to help him organize the newly announced Harvard Assessment Seminars. Light had been appointed Director of this new initiative by Harvard's president, Derek Bok. Although I had no real idea what it would involve, I immediately accepted.

A bit later in that same exchange, Professor Light suggested I contact K. Patricia Cross, who needed a research assistant for a summer project. Intrigued, I immediately called Professor Cross's office and set up an appointment. That brief encounter with Professor Light led both to my subsequent two-year stint as Assistant Director of the Harvard Assessment Seminars and to my years-long collaboration with Professor Cross. Had it not occurred, this book would not exist.

That one, brief, entirely fortuitous meeting in Harvard Square nearly 40 years ago set the course of my subsequent academic career. Working for and with these two exceptional higher education leaders was a life-changing experience for which I remain grateful.

I have often wondered since, however, “What if I had slept in that morning?”

Tom Angelo
Sydney, Australia, 2024

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The third edition has benefitted greatly from the advice, ideas, expertise, and creativity of Todd Zakrajsek, PhD, well-known higher education professor, author, speaker, and conference convenor. All useful suggestions about the uses of artificial intelligence (AI) or current teaching and learning technologies—along with many references to cutting-edge learning research—are Todd’s contributions. Todd is also author of the Discussion Questions in Resource A. Throughout these six months, Todd provided suggestions that improved the currency and usefulness of the content, as well as invaluable advice and assistance with the complex editorial process.

McKenzie Baker is quite simply the most intelligent, effective, efficient, and personable project manager and editor I have worked with in my near-half-century academic career. That the manuscript got finished in readable form by deadline is mostly to her credit. While I’m relieved the book is finished, my only regret is that my work with McKenzie is ending as well.

I could not have researched, revised, and updated the book without online access to the excellent libraries of University of North Carolina (UNC) Chapel Hill and Monash University over the past three years. For their ongoing support in making this possible, I am very grateful to Associate Professor Jacqueline McLaughlin, Director of the Center for Innovation in Pharmacy Research (CIPhER) in the Eshelman School of Pharmacy at the University of North Carolina-Chapel Hill, and to Professor Paul White, Deputy Dean and Associate Dean Education at the Faculty of Pharmacy and Pharmaceutical Sciences in Monash University.

Throughout my career, many higher education colleagues influenced my thinking and work, contributed to the development and dissemination of classroom assessment, to my career and, in so doing, to this book. While not all of them are still with us, I want to acknowledge their collegiality,

support, and generosity. (In the interests of brevity, I will omit their titles and degrees, which are numerous and impressive.)

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Many thousands of other individuals contributed ideas, insights, and examples to this book's development during its three-decade gestation, including virtually all of my colleagues in the several teaching, learning, and assessment centers I directed, the academics with whom I taught, the college and university teachers who participated in professional development programs and sessions I led, and the students in courses I taught. While I cannot thank them all by name, I want to recognize here their contributions as well.

I must also recognize and thank the hundreds of scholars and researchers whose publications have expanded my knowledge and understanding of teaching and learning generally and enriched this book.

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Tom Angelo
Sydney, Australia, 2024

About the Authors

Thomas A. Angelo

Tom Angelo currently holds the positions of Clinical Professor Emeritus of Educational Innovation & Research, and Executive Director Emeritus of the Center for Innovative Pharmacy Education & Research (CIPhER), at The University of North Carolina-Chapel Hill's Eshelman School of Pharmacy. He also has an appointment as Adjunct Senior Lecturer in the Faculty of Pharmacy & Pharmaceutical Sciences at Monash University (Melbourne, Australia).

Prior to retiring from UNC-Chapel Hill in 2018, he had served—often concurrently—as faculty member, faculty developer, academic administrator, and/or researcher at several institutions, including: Harvard University, the University of California-Berkeley, Boston College, the American Association for Higher Education (AAHE), Victoria University of Wellington (New Zealand), and La Trobe University (Melbourne, Australia).

He has directed eight university teaching, learning, and assessment-related centers, five of which he also designed and founded. Throughout, he continued to teach undergraduate courses in political science, first-year composition, teacher education, and introductory statistics as well as post-graduate courses in applied linguistics, assessment and evaluation, and teaching and learning in higher education.

He has consulted on higher education curriculum design, assessment, effective teaching, and learning improvement in 20 countries as well as all 50 of the United States and Puerto Rico. He has also consulted with more than 65 higher education associations/systems and more than 250 postsecondary institutions. He has served as invited keynote/featured speaker at more than 90 higher education conferences nationally and internationally.

Internationally, Tom has been awarded fellowships from the Fulbright Program (Italy), the Calouste Gulbenkian Foundation (Portugal), the Carrick Institute for Learning and Teaching in Higher Education (Australia), and the Higher Education Research and Development Society of Australasia (Australia and New Zealand).

Among five books and four dozen articles and chapters, Tom's best-known publication remains *Classroom Assessment Techniques: A Handbook*

for *College Teachers, 2nd Edition* (co-author K. Patricia Cross, 1993), with more than 100,000 copies in print. His current research interests focus on formative assessment, curriculum renewal and redesign, student goals and time-use, and core concepts and concept inventories.

Tom earned his BA with Honors in government from California State University at Sacramento, a Master of Arts in political science and a Master of Education in applied linguistics—both from Boston University—and his Doctorate in Education from Harvard University’s Graduate School of Education.

Todd D. Zakrajsek (Zuh-CRY-sick) is an associate professor in the Department of Family Medicine at UNC-Chapel Hill. At UNC School of Medicine, he is a Co-Associate Director of an early career faculty development fellowship program, providing resources for early career doctors on various topics related to teaching/learning, leadership, and scholarly activity. He is also the President of the International Teaching Learning Cooperative, which hosts four national Lilly Teaching Conferences on Evidence-Based Teaching and Learning annually, and is Editor-in-Chief of the *Scholarly Teacher* blog. Todd has directed faculty development efforts for 18 years and has run interdisciplinary teaching conferences (Lilly Conferences) for over 20 years.

Todd recently authored the fifth edition of *Teaching at Its Best* (with Linda Nilson, 2023) and the third edition of *The New Science of Learning* (2022). He has also co-authored *Teaching for Learning* (with Clair Major and Michael Harris, 1st and 2nd editions; 2015, 2022), *Advancing Online Learning* (with Kevin Kelly; 2021), and *Dynamic Lecturing* (with Christine Harrington; 2018), and is the series editor for a 10-volume collection of books (in development) related to teaching and learning.

Todd also writes articles on teaching and learning in higher education, and has delivered and facilitated over 400 keynotes, workshops, conference presentations, and webinars across 49 U.S. states, 12 countries, and 4 continents. Focuses include classroom assessment, active learning/lecturing, Scholarship of Teaching of Learning (SoTL), and faculty educational development, among many others.

Todd’s career began as a tenured associate professor of psychology at a small college in the Pacific Northwest. He founded centers for teaching and learning and built faculty development efforts at Southern Oregon State College (now University), Central Michigan University, and the University of North Carolina at Chapel Hill. Todd has served on many educationally related boards and work groups, including *The Journal of Excellence in College Teaching*, *International Journal for the Scholarship of Teaching and Learning*, *College Teaching*, and *Education in the Health Professions*. Todd has consulted with organizations such as The American Council on Education (ACE), Lenovo Computer, Microsoft, and the Bill and Melinda Gates Foundation.

Todd is a native of Michigan, earning a BS in psychology from Lake Superior State College (now University). He received his MS and PhD in Industrial/Organizational Psychology from Ohio University, and an Honorary Doctorate in Humane Letters from Lake Superior State University.

Preface

This third edition of *Classroom Assessment Techniques* is a totally revised, updated, and expanded version of the highly successful *Classroom Assessment Techniques: A Handbook for College Teachers, 2nd Edition*, by Thomas A. Angelo and K. Patricia Cross, published in 1993. The third edition contains more Classroom Assessment Techniques (CATs), more new CATs—15 out of 54, more diverse disciplinary examples, more references to relevant research, and more supplementary resources. This practical, scholarly handbook will be a lasting, useful resource for college and university teachers in every discipline and at every level.

WHO WILL IT BENEFIT? This book is designed to be used by busy teachers. It is a handbook—a book to keep close at hand—when you are designing or revising courses, classes, or lessons. This handbook provides practical ideas, useful suggestions, and myriad examples for teachers at all levels of experience and in all disciplines. To that end, there are multiple ways to quickly find exactly what you need via the multiple indices provided in the Resources.

BACKGROUND Since 1993, when the second edition was published, a great deal has changed in higher education generally, and in teaching, learning, and assessment specifically—as well as in technology and society. The third edition reflects those changes and developments throughout. Advances in educational and discipline-based research and scholarship have greatly strengthened the case for formative assessment approaches like Classroom Assessment. The quantity of relevant teaching, learning, and assessment research has grown exponentially over the past three decades, as has the number of scholarly books, journals, and other print and online media that include references to and examples of Classroom Assessment. The hundreds of diverse Classroom Assessment examples shared and published by teacher-scholars since 1993 demonstrate the continuing usefulness and adaptability of CATs across disciplines, institutions, and nations. This edition also reflects the extraordinary changes in technology that have transformed teaching and learning in

the past three decades. Taken together, these developments made it possible to create a much more evidence-based, multidisciplinary, international, and useful third edition.

HOW TO USE THIS BOOK

This is a practical handbook, designed to be useful to teachers at every level of experience, who teach students at any level, in any discipline. To that end, the book is organized into three main parts.

Part I provides an introduction to Classroom Assessment or a comprehensive review, depending on the reader's prior experience. The first chapter explains what Classroom Assessment is, how it works, and how to get started using it. Chapter 2 focuses on getting and giving feedback to enhance student learning. Chapter Three outlines simple steps for getting started in Classroom Assessment successfully. It is your guide to getting started.

Part II provides detailed information on how to do Classroom Assessment effectively. Chapter 4 details the Classroom Assessment Project Cycle, a step-by-step guide for embedding Classroom Assessment into any course. Chapter 4 also introduces and explains how the Teaching Goals Inventory (TGI) and the Course Learning Outcomes Inventory (CLOI) may be used to identify CATs that are appropriate to your course. The final section of Chapter 4 includes a set of guidelines for success in Classroom Assessment Projects.

Chapter 5 is a case study of the Minute Paper, the most popular of all CATs. Chapter 6 provides a dozen examples of Classroom Assessment projects carried out in as many different disciplines. These 12 case studies are detailed mini-cases illustrating how teachers adapt and apply CATs for a variety of reasons in a variety of contexts.

Part III is the heart of the handbook: A compendium of more than 55 CATs. Chapter 7 explains how readers can quickly and easily find and choose the most appropriate and useful CAT(s) for assessing and improving their students' learning and—if they wish—their own teaching. It also explains the structure common to all 54 main CAT entries. (CAT entry #55 is a different animal, as readers will see.)

The end-of-handbook resources are also explained in Chapter 7, including seven indices (up from three in the second edition) to help teachers easily find the right "tool" for the right "job." Counting the listing in the table of contents, this handbook provides eight different ways to find desired CATs.

Chapters 8 through 17 present 54 CATs, plus five more "near CATs." Fifteen CATs are completely new, and 39 others have been extensively revised in light of experience gained over the past 30 years.

Although this handbook is a resource for individual teachers, it has also been designed to serve as a resource for groups—dyads, triads, seminars and study groups, departments and divisions, staff development workshops—and any other gatherings of educators interested in learning more about teaching and learning. To that end, Resource A provides ready-made discussion questions designed to stimulate engaging conversations.

The first two editions sparked a great deal of innovation, experimentation, and adaptation among its readers for more than three decades. I hope this edition will do the same. May it serve teachers and learners well.

Tom Angelo
Sydney, Australia, 2024

P A R T
O N E

*An Introduction
to Classroom
Assessment*

What Is Classroom Assessment?

C H A P T E R

1

This chapter explains the purpose and defining characteristics of Classroom Assessment and offers principles for good practice.

Classroom Assessment is a simple, practical approach to getting and giving feedback to improve the effectiveness and quality of teaching and learning. It is an evidence-based approach to improving learning and teaching that involves college and university teachers and students working intentionally and collaboratively toward shared goals. When Classroom Assessment is effectively employed, teachers obtain useful information—in terms of direct evidence or learners’ perceptions—about what, how much, and how well their students are learning. Analyzing and reflecting on that information provides useful insights for making teaching, assessment, and feedback more engaging, effective, and efficient. By involving students in the cycle of providing, analyzing, and using feedback, teachers help them become more capable, independent, and successful lifelong learners.

K. Patricia Cross and Thomas A. Angelo initially defined and developed *Classroom Assessment* in the mid-1980s, and later refined this concept and practice (Angelo & Cross, 1993; Cross & Angelo, 1988). The terms *classroom assessment* and *classroom assessment techniques* were first mentioned by Professor K. Patricia Cross in speeches and articles in late 1986. She originally envisioned Classroom Assessment as a promising way to engage college teachers in and prepare them for more systematic, ongoing Classroom Research projects. Professor Cross and Mimi Harris Steadman further systematically explored the interrelationships between these two approaches in *Classroom Research: Implementing the Scholarship of Teaching* (1996).

Although Classroom Assessment began as an entry point and adjunct to Classroom Research, it was soon adopted and adapted by many higher education “movements,” organizations, communities of practice, and disciplines. Throughout the intervening years, this formative feedback approach has been applied, field-tested, and shared by thousands of teachers in colleges and universities across the United States and beyond. Classroom Assessment has been disseminated, promoted, and employed by national- and state-level higher education associations, disciplinary and professional

societies, and used on many campuses by assessment and academic/faculty development professionals. Information on Classroom Assessment Techniques (CATs) has become a common feature of teaching and learning center websites. Introductions to CATs, and training in their use, are often included in professional development (PD) for graduate teaching assistants and new faculty. Since the late 1980s, teaching scholars and educational researchers have published numerous conference papers, journal articles, book chapters, master's theses, and doctoral dissertations on Classroom Assessment.

Classroom Assessment, a late-20th-century higher education innovation, has survived, thrived, and continues to be widely used in the 21st century. Although Classroom Assessment originated in the United States, it has proven useful to teachers and learners in higher education throughout the world.

PURPOSE OF CLASSROOM ASSESSMENT

By 2023, across the world, there were more than 25,000 post-secondary institutions of all kinds enrolling approximately 235 million students (UNESCO, 2023). In the United States alone, there were more than 3,500 degree-granting institutions, enrolling nearly 16 million students (Irwin et al., 2022). Globally and within many countries, the diversity of post-secondary institutional missions and student demographics is enormous. Post-secondary institutions worldwide—public and private—include small, specialized trade schools, mid-sized comprehensive institutions, and massive research-intensive universities. Internationally, post-secondary students run the gamut from teenage secondary school graduates to advanced PhD students and mature adults.

However complex and diverse their missions and student bodies, all legitimate post-secondary institutions have at least one core mission in common: to educate their students. In other words, a central aim of all higher education institutions is to help students learn more effectively and efficiently than they could on their own. How well or poorly each institution performs that core educational mission depends, to a large degree, on how and how well its teachers and students engage in the work of teaching and learning. In turn, the effectiveness and quality of teaching and learning depend, to a large degree, on how and how well teachers and students get, give, and use feedback.

Although effective learning can and often does occur without the benefit of teaching—and, at times, despite it—there can be no such thing as effective teaching in the absence of learning. Teaching without learning is just talking. That talking may be extremely engaging and entertaining. It may be extraordinarily erudite and informed. But talking that does not result in student learning is not teaching. Of course, no teacher, however dedicated, gifted, or skilled, can make a student learn. Students must also take an active role in their education and put in the effort necessary to learn. What all teachers can and should do is provide every student with equitable opportunities to learn. But without assessment and feedback, teachers cannot determine whether those learning opportunities are being provided equitably or used effectively.

At the most fundamental level, Classroom Assessment is about asking, not assuming. College and university teachers who do assume that students are learning what they are striving to teach them are sometimes surprised and disappointed by evidence to the contrary when they grade

exams, papers, projects, or performances. Too often, until assessed in some way, students themselves may not even realize they have failed to learn core skills and knowledge, or have not learned them as well as expected. There can be gaps, sometimes quite worrisome ones, between what was taught and what has been learned. Unfortunately, by the time teachers discover gaps in their students' learning, it is often too late. What could have been timely learning diagnoses too often become autopsies.

To avoid such unhappy late surprises, both teachers and students need effective, efficient ways to monitor learning processes and progress, detect gaps, and make necessary adjustments throughout courses. For example, suppose a teacher's main goal is for students learn all points *A* through *Z*. To achieve that goal, that teacher needs first to discover whether all students are really starting at point *A*, and, as the course proceeds, whether all have reached intermediate points *B*, *L*, *Q*, and so on. Given the risk of gaps, it would be unwise to assess students' learning only when the syllabus has arrived at midterm point *M* and final point *Z*.

Classroom Assessment is designed specifically to investigate how well students are learning at those initial and intermediate points, identify gaps, and provide teachers and students with timely and useful information for improvement when needed. Used well, Classroom Assessment minimizes unpleasant surprises on high-stakes assessments. Fortunately, feedback from Classroom Assessment can also lead to positive surprises. At times, students outperform expectations, creating opportunities for teachers to investigate and learn from how they succeeded, and, perhaps, to raise the challenge levels of their courses.

Through practice in using Classroom Assessment, teachers can become better able to assess, evaluate, understand, and promote learning, and, at the same time, increase their ability to help students themselves become self-assessing, self-directed, self-regulating learners. Simply put, the central purpose of Classroom Assessment is to empower both teachers and their students to monitor, understand, and improve the quality of learning in and beyond the classroom—whether those classrooms are physical, virtual, or hybrid.

**DEFINING
CHARACTERISTICS
OF CLASSROOM
ASSESSMENT**

In the United States, it often seems that higher education and kindergarten through grade 12 (PK–12) education are two related sectors separated by a common language. Each sector has its own vocabulary and jargon, often with different terms meaning the same thing, or the same terms meaning quite different things. For that reason, it is important to note that the term *classroom assessment* has long-standing, different, and much broader meanings in U.S. pre-school, elementary, and secondary education than it does in U.S. higher education (see Airasian & Russell, 2011; Brookhart & McMillan, 2020). This chapter will, therefore, define *classroom assessment* as it will be used throughout this handbook, and as the term is often used in American higher education. To differentiate its use in this text from other possible meanings, the term *Classroom Assessment* will be capitalized throughout.

Classroom Assessment is...

1. formative,
2. evidence-based,
3. learning-centered,

4. teacher-directed,
5. constructively aligned,
6. mutually beneficial,
7. metacognitive,
8. context-specific,
9. firmly rooted in good teaching practice, and
10. inclusive and equitable.

The following section elaborates each of the 10 characteristics that define Classroom Assessment.

FORMATIVE Classroom Assessment is a formative, rather than summative, approach to learning assessment and feedback.

There is general agreement among educators that summative assessment involves gathering and documenting information on learners' knowledge and skills—typically at the end of a course, program, or other learning experience. The main purpose of summative assessment is to provide information for summing up, for making judgments and decisions such as who passes a course of study, who is accepted into a college or university, who receives a scholarship or bursary, who is awarded a diploma or degree, and who is licensed to practice a profession. Typical summative assessments are course-level final examinations, final papers and projects, entrance and exit exams, and standardized state and national educational progress tests. Results of summative assessments are usually communicated after the fact via grades, report cards, letters of acceptance or rejection, and state and national accountability reports. For all these reasons, the high stakes involved in summative assessments can provoke high anxiety in some learners.

Regarding definitions of *formative assessment*, however, there is much less consensus. One simple definition is that formative assessment tells us—in relation to where we want to go—where we are now, and how best to get to our desired destination. A more formal, scholarly characterization from *The Handbook of Formative Assessment in the Disciplines* (Andrade et al., 2019) captures the gist of many current definitions in the higher education literature:

As part of a planned assessment system, formative assessment supports teachers' and students' inferences about strengths, weaknesses, and opportunities in learning. It is a source of information that educators can use in instructional planning and students can use in deepening their understandings, improving their achievement, taking responsibility for, and self-regulating, their learning. Formative assessment includes both general principles, and discipline-specific elements that comprise the formal and informal materials, collaborative processes, ways of knowing, and habits of mind particular to a content domain. (p. 14)

Formative assessments are typically *back loaded*, in contrast to summative assessments that require significant work prior to the assessment (e.g., instructors writing the exam; students studying for the exam). For teachers and students, most of the work involved with formative assessments occurs after the data are gathered. At that point, the most challenging

tasks for teachers involve analyzing the data, providing students with relevant feedback and guidance on how to use that feedback to improve in future, and making any indicated changes in instruction. For their part, if students are to benefit, formative assessment requires they take teachers' feedback seriously and act on it to improve their learning and performance.

Classroom Assessment is one of many approaches to formative assessment. As such, its primary purpose is to *inform* and *form* students' understanding of their learning to help them improve both their practice and their performance. A secondary, but very important, formative purpose of Classroom Assessment is to inform and form teachers' understanding of the effects of their teaching on student learning. In this way, Classroom Assessment can provide teachers with useful, actionable information to revise and adjust their teaching practices to benefit their current students.

EVIDENCE-BASED

The use of *evidence*-based rather than *research*-based as a defining characteristic is intentional. The process of Classroom Assessment and the techniques included in this handbook are based on and informed by the best current, available evidence. Wherever possible, this handbook provides references to relevant educational research, research reviews, and meta-analyses published in peer-reviewed academic journals. High-quality research on post-secondary teaching and learning is, however, not equally available regarding all key topics and all disciplines. Post-secondary teachers in accounting, engineering, physics, biology, nursing, medicine, and psychology, for example, all have relatively long and deep discipline-based educational research traditions on which to draw. In many other fields, however, discipline-based education research is a more recent and less well-developed area of scholarship.

In the third decade of the 21st century, we have access to robust evidence about how people learn and what promotes student learning, in general (see Hattie & Yates, 2014; Lovett et al., 2023; Zakrajsek & Nilson, 2023). In higher education, reviews of powerful, high-level meta-analyses demonstrate the benefit of decades of high-quality educational research (Mayhew et al., 2016; Schneider & Preckel, 2017). At this point, we understand from research that factors such as clear learning goals, high expectations, clear standards, effective assessment, and timely formative feedback promote student learning, just as we know from research that clean water and air, good nutrition, and adequate exercise support good health.

Yet, in many cases, we still lack compelling evidence about exactly what works for different teachers teaching unique students in a variety of circumstances in particular disciplines. Consequently, in those cases where relevant peer-reviewed educational research is not yet available to support specific CATs, other sources of evidence have been sought. In some instances, the only relevant evidence comes from firsthand accounts of Classroom Assessment experiences published by scholarly teachers. Some of these firsthand accounts are based on sophisticated examples of the Scholarship of Teaching and Learning (SoTL), such as case studies and quasi-experiments. Others are simple descriptions of how Classroom Assessment was used. Still others focus mainly on students' perceptions of CATs. As a result, available evidence for the effectiveness of individual CATs included in this handbook varies in type, amount, and strength. Given that some evidence is usually better than none, I trust readers to evaluate the relevance of evidence provided to their specific disciplines, students, and teaching contexts and goals.

LEARNING-CENTERED Classroom Assessment focuses the primary attention of both teachers and students on observing, analyzing, and improving learning. What teachers do and how they do it are critical to student learning. In many cases, relatively small changes in teaching behavior can lead to more and better learning (Schneider & Preckel, 2017). At the same time, helping students change their study techniques and metacognitive strategies can also lead to improved learning outcomes (Dunlosky, 2013; Kaplan et al., 2013). Ultimately, if students are to become independent, self-regulating, successful lifelong learners, they must develop the knowledge, skills, and will to take full responsibility for their own learning. To progress toward that point, however, most students will need instruction, feedback, and guidance from teachers. Classroom Assessment can provide just-in-time information that both teachers and learners need to design and make effective, ongoing adjustments to their practice.

Although the terms *student*-centered and *learner*-centered are often used in educational literature—often in contrast with *teacher*-centered—*Classroom Assessment* is intentionally defined as *learning*-centered. There are many important dimensions of students' lives beyond the classroom, and many programs and personnel in colleges and universities are decidedly, and, quite rightly, student- and learner-centered in their goals and activities. Students' physical, mental, and social well-being, for example, are critical to their success in higher education and beyond. Students' satisfaction with their overall educational experience is of central importance to recruitment, retention, and ongoing institutional success. Within those broader institutional and social contexts, Classroom Assessment focuses attention primarily on the *process of learning* that takes place in and in relation to formal courses—on what the students do, in other words—without ignoring or underestimating the critical importance of other dimensions of students' experiences.

TEACHER-DIRECTED Teaching, like all professions, depends on practitioners to make well-informed, ethical, and effective decisions to optimize student learning. Teachers, like all other professionals, require a wide repertoire of knowledge and skills to implement their decisions well. Guidelines and training are valuable and necessary, but not sufficient to inform professional teaching practice. No program or text could possibly provide teachers in advance with a comprehensive set of guidelines covering exactly what to do from moment to moment in the complex and fluid reality of classrooms. What individual teachers do—and how well they do it—depends on their unique combinations of disciplinary knowledge and skills, teaching knowledge and skills, experience, empathy, and insight.

Lee Shulman (1986) coined the term *pedagogical content knowledge* (PCK) for the intersection of teachers' knowledge about and skill in a discipline with their knowledge about and skill in *teaching* that discipline. For example, PCK in organic chemistry involves both knowing a great deal about organic chemistry and knowing about how to teach organic chemistry. Classroom Assessment depends on and respects the PCK, judgment, and autonomy of college and university teachers as professionals. At the same time, engaging in Classroom Assessment can broaden and deepen teachers' PCK and skills.

As responsible professionals—within relevant norms and rules—individual teachers can and should decide what to assess, how to assess,

and how to respond to the information gleaned through Classroom Assessment. Furthermore, although the learners involved have a legitimate need to know, teachers should not be required to share the results of Classroom Assessments with anyone outside their classrooms.

That said, there are many reasons to encourage and support teachers to voluntarily share their Classroom Assessment questions, plans, experiences, and results in support of efforts such as accreditation or informal peer support. As this handbook demonstrates, over the past three and a half decades, many college and university teachers have enthusiastically chosen to share what they have discovered about teaching and learning through the practice of Classroom Assessment in presentations, publications, and online. Local examples can be found on the websites of many institutional teaching and learning centers. No doubt, even more faculty have informally shared experiences and lessons learned with colleagues in their departments, institutions, and disciplines. On many campuses, faculty learning communities and interest groups have been powerful vehicles for this collegial sharing. Throughout, faculty and academic development centers and staff have played key roles in encouraging and facilitating these valuable Classroom-Assessment-related conversations.

Notwithstanding the previous arguments for individually teacher-directed formative assessment, there can also be powerful advantages in collaborative, shared responsibility for the design, delivery, and evaluation of high-stakes summative assessments. One of the great challenges many teachers face is the role conflict inherent in being both coach (teacher) and referee/umpire (grader). Is there any sport in which the same person is responsible both for coaching players and for determining the outcome of games and matches involving those same players? Such a role conflict in sports would seem untenable and obviously unfair to players and spectators alike. In higher education, some departments and programs have avoided this common academic role conflict by designing and administering common summative assessments across classes, having teachers grade the work of students they do not teach, or by grading anonymized work. These and other solutions can increase students' confidence that their high-stakes assessments will be evaluated more fairly—and allow teachers to concentrate on teaching and coaching all their students to achieve their highest potential in learning.

CONSTRUCTIVELY ALIGNED

Constructive alignment is an approach to curriculum design and development closely related to backward design. Widely influential in higher education worldwide, the concept of *constructive alignment* was introduced, elaborated, and popularized by educational theorists John Biggs and Catherine Tang (2011). The *constructive* in *constructive alignment* refers to constructivist theory, which posits that, if learning is to be deep and lasting, students must actively engage in remembering, processing, and making connections—in constructing their own understandings—rather than passively receiving information. The *alignment* in the term refers to the explicit and transparent linkage of intended learning outcomes, teaching and learning activities, and assessment tasks to promote student achievement of those intended learning outcomes (Biggs, 2003).

The term *backward design* first gained currency in the United States among primary and secondary (K–12) educators through the work of Grant Wiggins and Jay McTighe (2005). Despite its potentially confusing name,

backward design is a very common, straightforward, logical approach. Backward design, beginning with the end in mind, like constructive alignment, requires starting by first making clear exactly what we hope to have achieved when we finish. In our daily lives, nearly every product and process we encounter has been designed backward from detailed plans to achieve specified outcomes. For example, before the first shovel of dirt is moved or nail hammered, architects and engineers define, design, and detail exactly what a finished building should look like and how it should function—and only then do they figure out how best to build it. The same backward design approach is used to create nearly every object we use, including coffee cups, cars, and computers.

Alignment, the core idea that links both approaches, means that every aspect of curriculum design must begin with and be explicitly linked to clearly defined, intended learning outcomes, or ILOs (Biggs, 2003). ILOs state what students are expected to know and be able to do by the end of a given lesson, course, or program. Once the ILOs are clearly defined, then teachers or curriculum designers work “backward” from that desired end state to determine the performance/grading standards, assessment and feedback strategies, teaching and learning approaches, content, and resources best suited to help students demonstrate achievement of those ILOs. As many have noted, backward design is the precise opposite of the way in which most courses were traditionally developed and even how class sessions are taught.

At this point, you might wonder how all this relates to Classroom Assessment. Simply put, to be most useful, Classroom Assessment must be constructively aligned with and fit logically in the overall design of the relevant course or program. To be effective, CATs must be transparently and tightly linked to intended learning outcomes, performance/grading standards, and summative assessment approaches. CATs work best when they are designed backward into courses from the beginning, rather than dropped in as afterthoughts.

MUTUALLY BENEFICIAL

Classroom Assessment will only benefit teachers and students if both are motivated to engage in it and take the resulting feedback seriously. Because Classroom Assessment is formative, participating in it typically generates either no or very few “points” toward final course grades. However, although Classroom Assessment offers students no or very minimal immediate extrinsic rewards, it can enhance intrinsic motivation to learn. By collaborating willingly with faculty in formative assessment, students reinforce their grasp of course content and strengthen their skills in self-assessment and self-regulation. Their intrinsic motivation is increased when they realize that faculty are interested and invested in their success as learners.

At the same time, most students’ extrinsic motivation to participate and collaborate is enhanced to the extent they believe that engaging in Classroom Assessment can help them improve their performance on summative assessments, and, consequently, their marks and grades. This justified confidence is known as *self-efficacy*, or the extent to which a learner will persist in achieving a desired outcome (Bandura, 1997). Self-efficacy is an essential element in learning. When students can attempt, practice, and initially fail at tasks, without fear of negative consequences (poor grades)—and receive immediate formative feedback on their performance—they obtain performance experience, one of Bandura’s key elements of self-efficacy.

CATs allow students to gain this experience in a low-risk zone. They are likely to feel a greater sense of justified self-efficacy and perform better throughout the course, including later summative assessments.

Teacher participation in Classroom Assessment also depends largely, but, not entirely, on intrinsic motivation. By engaging in Classroom Assessment, teachers sharpen their teaching focus by continually asking themselves three questions: (1) “What are the essential skills and knowledge I am trying to teach?” (2) “How can I find out how well students are learning them?” (3) “How can I help students learn better?” As teachers work closely with students to answer these questions, they improve their teaching knowledge and skills and gain new insights into the endlessly fascinating mysteries of learning. As a result, the process of Classroom Assessment can be intrinsically motivating and rewarding for teachers.

As with students, teachers may also reap extrinsic rewards from their efforts over time. For example, in some institutions, teachers may use examples of Classroom Assessment activities and their outcomes to document their involvement and achievements as effective, scholarly teachers for purposes of presentation, publication, and career advancement such as promotion and tenure.

At the writing of this edition of *Classroom Assessment Techniques*, a movement called “ungrading” is gaining popularity. Ungrading de-links student learning from grades in an attempt to defuse fear of grades (Blum, 2020; Stommel, 2023). Like CATs, ungrading focuses on consistent formative feedback to encourage student participation and success in achieving learning outcomes. CATs can, therefore, be useful in supporting ungrading efforts. Although some teachers have found success in running entire courses sans grades, some of the benefits of ungrading can be achieved simply by assigning small learning tasks with no grades attached. Whether ungrading is yet another educational fad or develops into a widely used approach focused on formative rather than summative assessment remains to be seen.

All the potential mutual benefits of Classroom Assessment depend largely on teachers’ and students’ mutual respect and trust. Both must trust that the others’ motivations and intentions are positive. Both must listen, respond, and collaborate with patience and respect. And both teachers and students must be willing to take some (usually small) risks; make and learn from errors; and revise old habits and learn new, more effective learning and teaching behaviors.

The good news is that most students seem willing to give teachers the benefit of the doubt, to trust them until and unless that trust is broken. It is critical, therefore, that teachers demonstrate good faith and lead by example from their very first communications and encounters with students. In the end, however, if neither teachers nor students experience tangible benefits from engaging and collaborating in Classroom Assessment early in the process, neither will be motivated to engage long enough to make substantial improvements in teaching and learning. Promoting both intrinsic and extrinsic motivation, with tangible mutual benefits, is key to sustaining Classroom Assessment.

METACOGNITIVE *Metacognition* is often defined as thinking about one’s thinking and has been an important concept in learning for nearly a half a century (Flavell, 1979; Rhodes, 2019). To engage in the kind of metacognition higher education

requires, you have to: (1) notice that you are thinking; (2) monitor your thinking; and (3) try to direct or re-direct your thinking. In a very popular and influential book, Nobel prize-winning psychologist Daniel Kahneman (2011) made a now-famous distinction between “thinking fast,” or System 1 thinking, and “thinking slow,” or System 2 thinking. Kahneman characterized System 1 thinking as instinctive and often driven by emotional responses. He argued that a great deal of research indicates that System 1 thinking is the default setting for most humans most of the time. Slower, System 2 thinking, by contrast, is more deliberative and rational—and, thus, much less common in everyday life. Driving a car and impulse buying are examples of System 1 thinking. Planning a complex road trip or carefully evaluating which car to buy are examples of System 2 thinking.

Although both modes of thinking are necessary and important, virtually all the intended learning outcomes that characterize higher education depend to some degree on slower-paced System 2 thinking. Analytical, critical, and creative thinking all depend on System 2 thinking, as do application and transfer. Self-awareness, self-reflection, self-assessment, and self-regulation all require well-developed System 2 thinking skills. Metacognition is, by definition, System 2 thinking.

Much routine teaching behavior is clearly dependent on thinking fast or System 1 thinking. While one is teaching, there is often little time or opportunity for slow thinking. In face-to-face or synchronous online teaching and learning contexts, teachers depend on System 1 thinking to form impressions of student learning, make quick decisions, and implement real-time adjustments. Few teachers have time to make those informal, sometimes subconscious assessments explicit or to check them against the students’ own perceptions or ability to perform. As a result, teachers often assume a great deal about their students’ learning, and many of those assumptions remain untested. Testing assumptions and questioning initial impressions requires System 2 thinking.

Effective, scholarly teaching requires teachers to assess, not assume.

Students are also likely to spend most of their time in System 1 mode, relying on habitual and largely subconscious routines during instruction and while studying. Research repeatedly indicates that many students routinely engage in classroom and study behaviors that are either ineffective or counterproductive, often differentiated by the performance level of learners (Geller et al., 2018). Though it may be possible for students to pass tests and courses while operating largely in a System 1 mode, significant, deep, and lasting learning requires students to engage in metacognition and deep processing.

Classroom Assessment invites teachers and students to make time and space for System 2 thinking, for slow thinking, by providing opportunities for reflection on teaching and learning practice. A number of CATs provide useful step-by-step processes for learning reflective practice. And CATs provide teachers and students with useful data for that reflection. Classroom Assessment is, therefore, explicitly designed to stimulate, inform, and promote metacognition and reflection by learners and teachers. Indeed, without metacognition and reflection, there can be no lasting lessons learned from assessment—whether formative or summative.

CONTEXT-SPECIFIC To be most useful, Classroom Assessment must respond to the specific characteristics of the teachers, students, disciplines, and courses in which it is applied. Consequently, Classroom Assessment is highly context-specific.