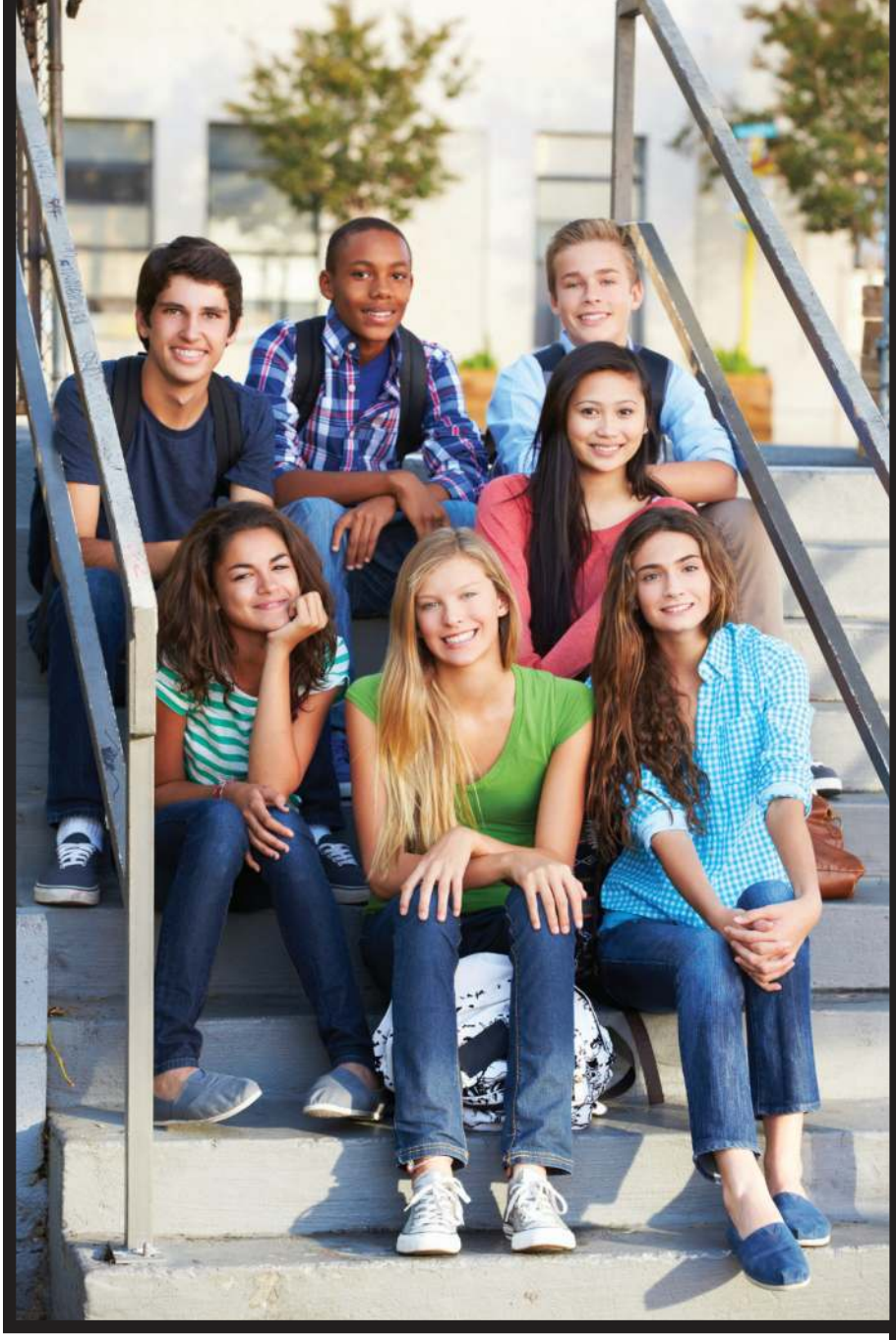


American Psychological Association

TOP 20 PRINCIPLES FROM PSYCHOLOGY FOR PreK–12 TEACHING AND LEARNING

Coalition for Psychology in Schools and Education

TOP 20 PRINCIPLES FROM PSYCHOLOGY FOR PreK–12 TEACHING AND LEARNING

COALITION FOR PSYCHOLOGY IN SCHOOLS AND EDUCATION

Contributing Authors
Joan Lucariello, PhD (Chair)
Sandra Graham, PhD
Bonnie Nastasi, PhD
Carol Dwyer, PhD
Russ Skiba, PhD
Jonathan Plucker, PhD
Mary Pitoniak, PhD
Mary Brabeck, PhD
Darlene DeMarie, PhD
Steven Pritzker, PhD

APA Staff Liaison
Rena Subotnik, PhD
Geesoo Maie Lee

Thanks to the following members and former members of the Coalition for Psychology in Schools and Education and supporters for their contributions as reviewers:

Larry Alferink, PhD
Eric Anderman, PhD
Joshua Aronson, PhD
Cynthia Belar, PhD
Hardin Coleman, PhD
Jane Conoley, PhD
Tim Curby, PhD
Robyn Hess, PhD
Randy Kamphaus, PhD
James Mahalik, PhD
Rob McEntarffer, PhD
John Murray, PhD
Sam Ortiz, PhD
Isaac Prilleltensky, PhD
Yadira Sanchez, PsyD
Peter Sheras, PhD
Gary Stoner, PhD
Adam Winsler, PhD
Jason Young, PhD

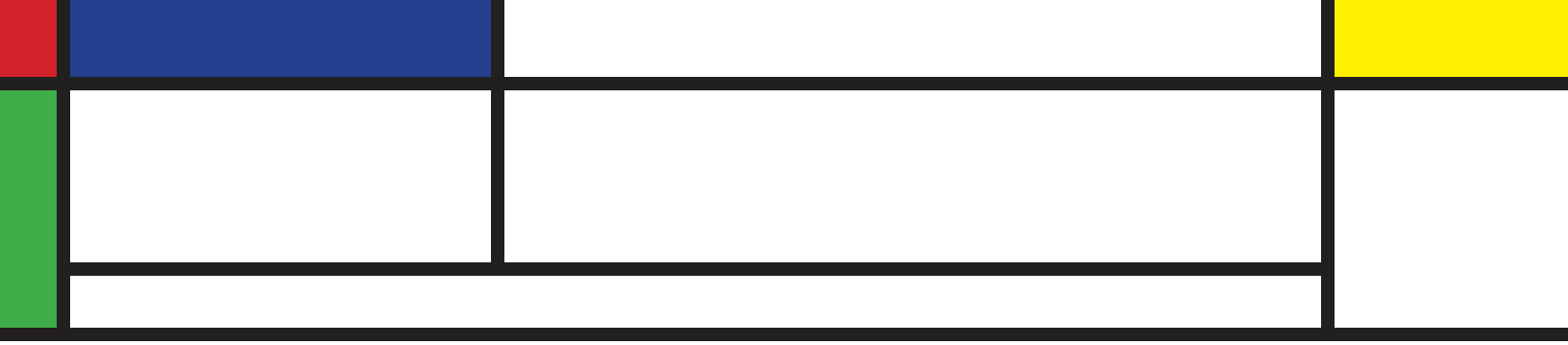
Printed copies are available from:
Center for Psychology in Schools and Education
Education Directorate
American Psychological Association
750 First Street, NE
Washington, DC 20002-4242
202-336-5923
Email: rsubotnik@apa.org

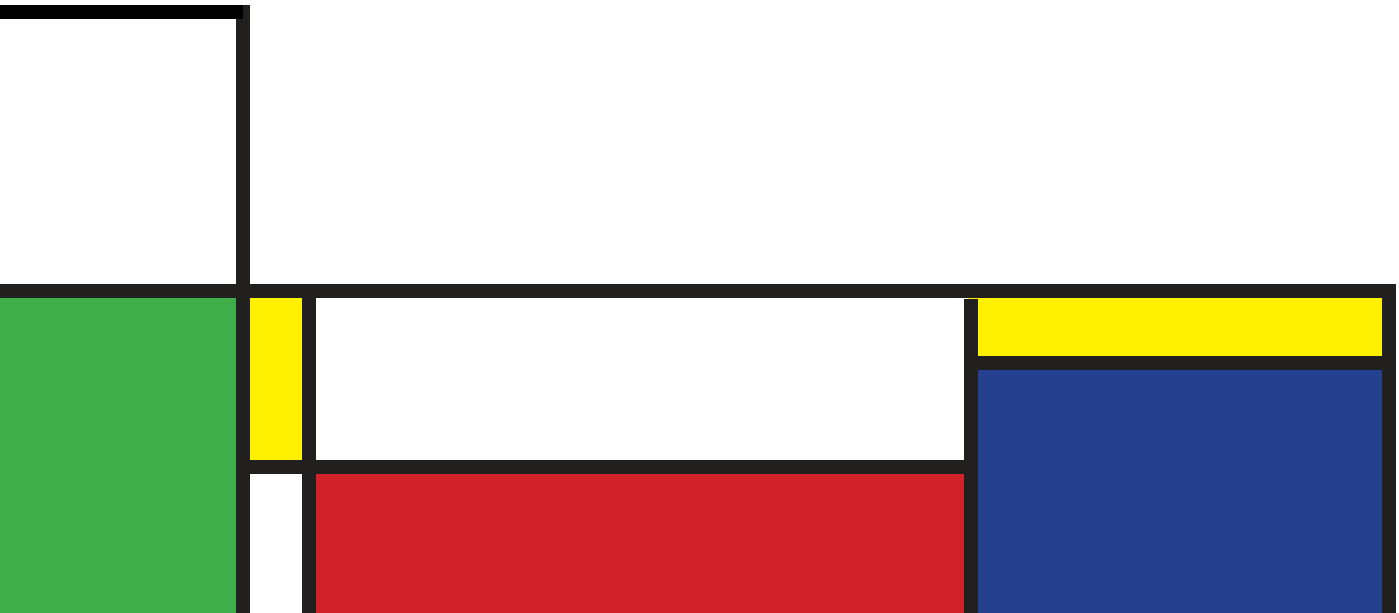
A copy of this report is available online at
http://www.apa.org/ed/schools/cpse/top-twenty-principles.pdf

Suggested bibliographic reference:
American Psychological Association, Coalition for Psychology in Schools and Education. (2015). *Top 20 principles from psychology for preK–12 teaching and learning*. Retrieved from http://www.apa.org/ed/schools/cpse/top-twenty-principles.pdf

Copyright © 2015 by the American Psychological Association. This material may be reproduced and distributed without permission provided that acknowledgment is given to the American Psychological Association. This material may not be reprinted, translated, or distributed electronically without prior permission in writing from the publisher. For permission, contact APA, Rights and Permissions, 750 First Street, NE, Washington, DC 20002-4242.

APA reports synthesize current psychological knowledge in a given area and may offer recommendations for future action. They do not constitute APA policy nor commit APA to the activities described therein. This particular report originated with the Coalition for Psychology in Schools and Education, an APA-sponsored group of psychologists representing APA divisions and affiliated groups.





CONTENTS

Top 20 Principles From Psychology for PreK–12 Teaching and Learning.... 1

Introduction 3

Methodology 4

Top 20 Principles 6

How Do Students Think and Learn? Principles 1–8 6

What Motivates Students? Principles 9–12 16

Why Are Social Context, Interpersonal Relationships, and Emotional Well-Being Important to Student Learning? Principles 13–15 21

How Can the Classroom Best Be Managed? Principles 16–17 25

How to Assess Student Progress? Principles 18–20 28

TOP 20 PRINCIPLES FROM PSYCHOLOGY FOR PREK–12 TEACHING AND LEARNING

PRINCIPLE 1 Students' beliefs or perceptions about intelligence and ability affect their cognitive functioning and learning.

PRINCIPLE 2 What students already know affects their learning.

PRINCIPLE 3 Students' cognitive development and learning are not limited by general stages of development.

PRINCIPLE 4 Learning is based on context, so generalizing learning to new contexts is not spontaneous but instead needs to be facilitated.

PRINCIPLE 5 Acquiring long-term knowledge and skill is largely dependent on practice.

PRINCIPLE 6 Clear, explanatory, and timely feedback to students is important for learning.

PRINCIPLE 7 Students' self-regulation assists learning, and self-regulatory skills can be taught.

PRINCIPLE 8 Student creativity can be fostered.

PRINCIPLE 9 Students tend to enjoy learning and perform better when they are more intrinsically than extrinsically motivated to achieve.

PRINCIPLE 10 Students persist in the face of challenging tasks and process information more deeply when they adopt mastery goals rather than performance goals.

PRINCIPLE 11 Teachers' expectations about their students affect students' opportunities to learn, their motivation, and their learning outcomes.

PRINCIPLE 12 Setting goals that are short term (proximal), specific, and moderately challenging enhances motivation more than establishing goals that are long term (distal), general, and overly challenging.

PRINCIPLE 13 Learning is situated within multiple social contexts.

PRINCIPLE 14 Interpersonal relationships and communication are critical to both the teaching–learning process and the social-emotional development of students.

PRINCIPLE 15 Emotional well-being influences educational performance, learning, and development.

PRINCIPLE 16 Expectations for classroom conduct and social interaction are learned and can be taught using proven principles of behavior and effective classroom instruction.

PRINCIPLE 17 Effective classroom management is based on (a) setting and communicating high expectations, (b) consistently nurturing positive relationships, and (c) providing a high level of student support.

PRINCIPLE 18 Formative and summative assessments are both important and useful but require different approaches and interpretations.

PRINCIPLE 19 Students' skills, knowledge, and abilities are best measured with assessment processes grounded in psychological science with well-defined standards for quality and fairness.

PRINCIPLE 20 Making sense of assessment data depends on clear, appropriate, and fair interpretation.

INTRODUCTION

Psychological science has much to contribute to enhancing teaching and learning in the classroom. Teaching and learning are intricately linked to social and behavioral factors of human development, including cognition, motivation, social interaction, and communication. Psychological science can also provide key insights on effective instruction, classroom environments that promote learning, and appropriate use of assessment, including data, tests, and measurement, as well as research methods that inform practice. We present here the most important principles from psychology—the "Top 20"—that would be of greatest use in the context of preK–12 classroom teaching and learning, as well as the implications of each as applied to classroom practice. Each principle is named and described, relevant supporting literature is provided, and its relevance for the classroom is discussed.

This work of identifying and translating psychological principles for use by preK–12 practitioners was conducted by a coalition of psychologists, known as the **Coalition for Psychology in Schools and Education**, that is supported by the American Psychological Association (APA). The coalition is an ideal group for translating psychological science for classroom use because its members collectively represent a wide spectrum of subdisciplines in psychology, including evaluation, measurement, and statistics; developmental psychology; personality and social psychology; the psychology of aesthetics, creativity, and the arts; consulting psychology; educational psychology; school psychology; counseling psychology; community psychology; psychology of women; media psychology and technology; group psychology and group psychotherapy; psychological study of men and masculinity; and clinical child and adolescent psychology.

Also involved in the coalition are psychologists representing communities of educators and scientists, as well as specialists in ethnic minority affairs; testing and assessment; teachers of psychology in secondary schools; children, youth, and families; and psychology honor societies. Coalition members are employed in K–12 schools and in colleges and universities in education, liberal arts, and science divisions. Some members are in independent practice. All hold expertise in psychology's application to early childhood, elementary, secondary, or special education.

This coalition specifically, and APA generally, has been putting psychological science to work for preK–12 education for over a decade. There are many modules and white papers for teachers on the APA website (**http://www.apa.org/ed/schools/cpse**). The Top 20 project was modeled after APA's earlier effort of identifying *Learner-Centered Psychological Principles* (1997). This initiative updates and broadens those principles.

METHODOLOGY

The method to derive the Top 20 principles was as follows. The coalition, operating in the mode of a National Institutes of Health consensus panel, engaged in a series of activities. **First, each member was asked to identify two constructs, or "kernels"** (Embry & Biglan, 2008), **from psychology thought to be most essential for facilitating successful classroom teaching and learning.** This process led to the identification of approximately 45 kernels/principles.

Next, steps were taken to categorize, validate, and consolidate these principles. The first step was to cluster the 45 principles according to key domains of classroom application (e.g., How do students think and learn?). This was conducted in an iterative process across several meetings of the coalition.

Second, a validation procedure for the 45 principles was undertaken. Several national blueprint publications related to teaching were analyzed to assess whether each of these principles also had been identified by the broader community of educators as critical to teacher practice. Cross-checking analyses were conducted on APA's standards for high school curriculum in psychology; the PRAXIS Principles of Learning and Teaching examination from the Educational Testing Service; documents from the National Council for the Accreditation of Teacher Education; the InTASC (Interstate Teacher Assessment and Support Consortium) standards; a popular educational psychology textbook; and the National Association of School Psychologists' *Blueprint for Training and Practice*. These documents were searched for evidence of what teachers were expected to know or be able to do and whether these expectations could be linked to the principles that the coalition had identified. There was support for all principles in one or more documents. Hence, all were retained for the next step in the validation process.

To identify the most important of the 45 principles/kernels, we used a modified Delphi process (modeled after the Institute of Medicine's report *Improving Medical Education: Enhancing the Behavioral and Social Science Content of Medical School Curricula*). Using a scale system, four coalition members rated each of the principles and assigned each a high, medium, or low priority score (1–3). Mean scores for each item were calculated. On the basis of the mean scores, low-priority principles were discarded, leaving 22 principles. These were then analyzed for their relation to each other and were synthesized into the final 20 presented here.[1]

These Top 20 were then placed into five areas of psychological functioning. The first eight principles relate to cognition and learning and address the question **How do students think and learn?** The next four (9–12) discuss the question **What motivates students?** The following three (13–15) pertain to the social context and emotional dimensions that affect learning and focus on the question **Why are social**

[1] We also wish to acknowledge the invaluable contributions of the following authors to our conceptualization of the work: Henry Roediger III (2013); John Dunlosky, Katherine Rawson, Elizabeth Marsh, Mitchell Nathan, and Daniel Willingham (2013); the Society for the Teaching of Psychology (Benassi, Overson, & Hakala, 2014); and Lucy Zinkiewicz, Nick Hammond, and Annie Trapp (2003) from the University of York.

context, interpersonal relationships, and emotional well-being important to student learning? The next two principles (16–17) relate to how context can affect learning and address the question **How can the classroom best be managed?** Finally, the last three principles (18–20) examine the question **How can teachers assess student progress?**

REFERENCES

American Psychological Association, Learner-Centered Principles Work Group. (1997). *Learner-centered psychological principles: A framework for school reform and design*. Retrieved from http://www.apa.org/ed/governance/bea/learner-centered.pdf

Benassi, V. A., Overson, C. E., & Hakala, C. M. (Eds.). (2014). *Applying the science of learning in education: Infusing psychological science into the curriculum.* Retrieved from the Society for the Teaching of Psychology website: http://teachpsych.org/resources/documents/ebooks/asle2014.pdf

Council of Chief State School Officers' Interstate Teacher Assessment and Support Consortium (InTASC). (2011). *Model core teaching standards: A resource for state dialogue*. Retrieved from http://www.ccsso.org/Documents/2011/InTASC_Model_Core_Teaching_Standards_2011.pdf

Cuff, P. A., & Vanselow, N. A. (Eds.). (2004). *Enhancing the behavioral and social sciences in medical school curricula*. Washington DC: National Academies Press.

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest, 14,* 4–58. doi:10.1177/1529100612453266

Educational Testing Service. (2015). *Principles of learning and teaching*. Retrieved from https://www.ets.org/praxis/prepare/materials/5622

Embry, D. D., & Biglan, A. (2008). Evidence-based kernels: Fundamental units of behavioral influence. *Clinical Child and Family Psychology Review, 11*(3), 75–113. doi:10.1007/s10567-008-0036-x

Institute of Medicine. (2004). *Improving medical education: Enhancing the behavioral and social science content of medical school curricula*. Retrieved from www.iom.edu

Roediger, H. L. (2013). Applying cognitive psychology to education: Translational education science. *Psychological Science in the Public Interest, 14,* 1–3. doi:10.1177/1529100612454415

Whitlock, K. H., Fineburg, A. C., Freeman, J. E., & Smith, M. T. (2005). *National standards for high school psychology curricula*. Retrieved from the APA website: http://www.apa.org/about/policy/high-school-standards.pdf

Woolfolk, A. (2013). *Educational psychology* (12th ed.). Upper Saddle River, NJ: Pearson.

Ysseldyke, J., Burns, M., Dawson, P., Kelley, B., Morrison, D., Ortiz, S., . . . Telzrow, C. (2006). *School psychology: A blueprint for training and practice III*. Retrieved from the National Association of School Psychologists' website: http://www.nasponline.org/resources/blueprint/finalblueprintinteriors.pdf

Zinkiewicz, L., Hammond, N., & Trapp, A. (2003). *Applying psychology disciplinary knowledge to psychology teaching and learning: A review of selected psychological research and theory with implications for teaching practice*. York, UK: University of York.

How do students think and learn?

PRINCIPLE 1 Students' beliefs or perceptions about intelligence and ability affect their cognitive functioning and learning.

EXPLANATION

Students who believe intelligence is malleable and not fixed are more likely to adhere to an "incremental" or "growth" mind-set about intelligence. Those who hold the opposite view, that intelligence is a fixed trait, tend to adhere to the "entity" theory of intelligence. Students holding to the latter view focus on performance goals and believe they continually need to demonstrate and prove their intelligence, making them more hesitant to take on highly challenging tasks and more vulnerable to negative feedback than students holding an incremental view. Students with an incremental mind-set generally focus on learning goals and are more willing to take on challenging tasks in an effort to test and expand (as opposed to defensively prove) their intelligence or ability. Hence, they rebound more easily from negative feedback and failure. Accordingly, students who believe that intelligence and ability can be enhanced tend to perform better on a variety of cognitive tasks and in problem-solving situations.

One evidence-based approach to fostering a growth mind-set is framed in terms of the attributions teachers assign to student performance. When students experience failure, they are likely to ask "why?" The answer to that question is a causal attribution. Causal attributions, which relate to growth and entity mind-sets, respectively, distinguish motivated from unmotivated students. Attributions that tend to blame one's *ability* ("I failed because I'm just not smart enough") are associated with the view that intelligence is fixed. In contrast, attributions that blame lack of *effort* ("I failed because I didn't try hard enough") generally reflect an incremental or growth view of intelligence.

Students are better able to cope when failure is attributed to a lack of effort rather than to low ability because the former is unstable (effort fluctuates over time) and controllable (students can generally try harder if they want to).

RELEVANCE FOR TEACHERS

When teachers attribute a student's poor performance to controllable and modifiable causes, such as lack of effort or poor choice of strategy, they afford students the expectation or hope that things can be different in the future. **Teachers can foster student beliefs that their intelligence and ability can be developed through effort and experiences with applying different strategies:**

- Teachers can convey to students that their failure at any given task is not due to lack of ability but rather that their performance can be enhanced, particularly with added effort or through the use of different strategies. Attributing failure to low ability often leads students to give up when they encounter failure. Hence, when students believe their performance can be improved, they are fostering a growth mind-set that can bring motivation and persistence to bear on challenging problems or material.

- Teachers should avoid generating ability-based attributions when a task is moderately easy. For example, when teachers praise a student by saying "You're so smart" after the student has finished a task or quickly figured out an answer to a relatively unchallenging problem, the teacher may inadvertently encourage that student to associate smartness with speed and lack of effort. These associations become problematic when students are later presented with more challenging material or tasks that require more time, effort, and/or the use of different approaches.

- Teachers need to be judicious in their use of praise, making sure the content of that praise is tied to effort or successful strategies and not ability. Indirect and subtle cues about low ability can be unintentionally communicated by teachers, especially when they are attempting to protect the self-esteem of failure-prone students. For example, offering praise for success on a relatively easy task may not be reassuring or reinforcing to the student. In fact, such praise may undermine motivation because it suggests a student does not have the ability to succeed at a more difficult task (e.g., "Why is my teacher praising me for getting these easy problems right?). [2]

- When presenting students with challenging materials and tasks, teachers may want to be aware of situations in which students expend minimal, modest, or incomplete effort. This self-handicapping may reflect a student's fear of embarrassment or failure ("If I don't even try, people will not think I'm dumb if I fail").

- When teachers are consistent in their offer of help to all students and communicate mild and constructive criticism following failure, students are more likely to attribute their failure to lack of effort and to believe teachers' expressions of high expectations that they will do better in the future. Unsolicited offers of help by a teacher, especially when other students do not receive help, and sympathetic affect from a teacher following student failure can be interpreted by students as indirect and subtle cues about low ability.

To be clear, we are not suggesting that teachers should never praise or help their students or that they should always express disappointment (rather than sympathy) or offer constructive criticism (rather than compliments). The appropriateness of any feedback will depend on many factors based on teacher judgment of the situation. The general message is that attribution principles, which are intricately linked to mind-set, help explain how some well-intentioned teacher behaviors may have unexpected, or even negative, effects on students' beliefs about their own abilities.

[2] See APA module on praise: http://www.apa.org/education/k12/using-praise.aspx.

REFERENCES

Aronson, J., Fried, C., & Good, C. (2002). Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of Experimental Social Psychology, 38,* 113–125. doi:10.1006/jesp.2001.1491

Aronson, J., & Juarez, L. (2012). Growth mindsets in the laboratory and the real world. In R. F. Subotnik, A. Robinson, C. M. Callahan, & E. J. Gubbins (Eds.), *Malleable minds: Translating insights from psychology and neuroscience to gifted education* (pp. 19–36). Storrs, CT: National Research Center on the Gifted and Talented.

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246–263. doi:10.1111/j.1467-8624.2007.00995.x

Dweck, C. S. (2006). *Mindset: The new psychology of success.* New York, NY: Random House.

Good, C., Aronson, J., & Inzlicht, M. (2003). Improving adolescents' standardized test performance: An intervention to reduce the effects of stereotype threat. *Journal of Applied Developmental Psychology, 24,* 645–662. doi.org/10.1016/j.appdev.2003.09.002

PRINCIPLE 2 What students already know affects their learning.

EXPLANATION

Students come to classrooms with knowledge based on their everyday experiences, social interactions, intuitions, and what they have been taught in other settings and in the past. This prior knowledge affects how they will incorporate new learning because what students already know interacts with the material being learned. **Accordingly, learning consists of either adding to existing student knowledge, known as *conceptual growth*, or transforming or revising student knowledge, known as *conceptual change*.** Learning as conceptual growth occurs when student knowledge is consistent with material to be learned. Conceptual change is required when student knowledge is inconsistent or erroneous with respect to correct information. In these cases, students' knowledge consists of "misconceptions" or "alternative conceptions." Many common misconceptions are held by both students and adults, particularly in subjects such as mathematics

and science.[3] Teachers can gain an understanding of students' current understanding of a specific subject area by administering an initial assessment of student knowledge prior to instruction on a topic. This type of assessment, called a formative assessment, can be used as a type of a pretest or as a baseline for student knowledge.

When the baseline assessment shows students to be harboring misconceptions, learning will require conceptual change—that is, revision or transformation of student knowledge. Achieving conceptual change in students is far more challenging for teachers than inducing conceptual growth because misconceptions tend to be entrenched in reasoning and resistant to change. Students, like anyone, can be very reluctant to alter their thinking, since it is familiar to them. Also, students are generally unaware that their concepts are erroneous and hence believe them to be correct.

RELEVANCE FOR TEACHERS

Teachers can be instrumental in achieving both conceptual growth and conceptual change in students:

- When the baseline assessment shows students' current knowledge to be consistent with the curricular concepts to be taught, teachers can facilitate conceptual growth by engaging students in meaningful, thoughtful interaction with the information to be learned. This might include having students engage in activities such as reading, defining, summarizing, synthesizing, applying concepts, and participating in hands-on activities.

- Simply telling students they need to think differently or using teaching strategies for inducing conceptual growth will generally not lead to substantial change in student thinking. Bringing about conceptual change requires teachers' use of specific instructional strategies. Many of these entail methods that precipitate cognitive conflict or dissonance in the minds of students by helping make them aware of the discrepancy between their own thinking and correct curricular material or concepts. For example:

  - Teachers can have students play an active role in predicting solutions or processes and then show these predictions to be faulty.

  - Teachers can present students with credible information or data that run counter to their misconceptions.

REFERENCES

Eryilmaz, A. (2002). Effects of conceptual assignments and conceptual change discussions on students' misconceptions and achievement regarding force and motion. *Journal of Research in Science Teaching, 39*(10), 1001–1015. doi.org/10.1002/tea.10054

Holding, M., Denton, R., Kulesza, A., & Ridgway, J. (2014). Confronting scientific misconceptions by fostering a classroom of scientists in the introductory biology lab. *American Biology Teacher, 76*(8), 518–523.

Johnson, M., & Sinatra, G. (2014). The influence of approach and avoidance goals on conceptual change. *Journal of Educational Research, 107*(4), 312–325. doi:10.1080/00220671.2013.807492

Mayer, R. E. (2011). *Applying the science of learning*. Boston, MA: Pearson.

Pashler, H., Bain, P. M., Bottge, B. A., Graesser, A., Koedinger, K. R., McDaniel, M., & Metcalfe, J. (2007). *Organizing instruction and study to improve student learning* (NCER 2007-2004). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Research. Retrieved from http://ies.ed.gov/ncee/wwc/practiceguide.aspx?sid=1

Savinainen, A., & Scott, P. (2002). The Force Concept Inventory: A tool for monitoring student learning. *Physics Education, 37*(1), 45–52.

[3] For a more detailed discussion and a list and definition of these misconceptions/alternative conceptions, see "How Do I Get My Students Over Their Alternative Conceptions (Misconceptions) for Learning?": http://www.apa.org/education/k12/misconceptions.aspx?item=1.

PRINCIPLE 3 Students' cognitive development and learning are not limited by general stages of development.

EXPLANATION

Student reasoning is not limited or determined by an underlying cognitive stage of development linked to an age or a grade level. Instead, newer research on cognitive development has supplanted these stage theory accounts. Infants have been found to have early, possibly native, competencies (biologically based) in certain domains. For example, children can show knowledge of principles related to the physical world (e.g., that stationary objects are displaced when they come into contact with moving objects or that inanimate objects need to be propelled into motion), biological causality (e.g., animate and inanimate entities differ), and numbers/numeracy (e.g., an understanding of numerical values up to three items). Studies of cognitive development and learning that emphasize the background knowledge or knowledge base of students reveal that they have many structures in place. For example, students have a structure, known as *schemas* (i.e., mental representations), which guide their understanding when encountering text and events.

Contextualist approaches to cognitive development and learning describe how context affects cognition. Supporters of cognitive approaches point out that cognition can be interpersonally based, such that student reasoning can be facilitated to more advanced levels when students interact with more capable others and/or with more advanced materials. This strategy is especially effective when materials are pitched not too near or too far from students' current level of functioning. This principle is captured in what is called the *zone of proximal development*. Contextualist approaches also support the idea that cognition can be "situated," whereby knowledge accrues through the lived practice of people in a society. That is, learning is conceived as participation in communities, with students progressively acquiring situated actions (such as farming, learning a craft, or adapting to societal expectations). Formal schooling can be viewed as a practice.

In sum, students are capable of higher level thinking and behavior when (a) there is some biological base (early competency) for knowledge in the domain, (b) they already have some familiarity or expertise with a knowledge domain, (c) they interact with more capable others or challenging materials, and (d) in sociocultural contexts with which they are familiar through experience. Conversely, when students are not familiar with a particular knowledge domain, are not challenged by the interpersonal context or learning materials, or find the context of learning to be unfamiliar, their reasoning may be less sophisticated.

RELEVANCE FOR TEACHERS

Teachers' estimation of what material should be presented and the method of presentation are more effective when they can take into account the domain-relevant and contextual knowledge of their students. Baseline assesssments can be used to assess this knowledge, and the results can be very informative for instructional design. Students' developmental levels can help teachers decide which instructional experiences might be appropriate and relevant, but age should not necessarily be viewed as the main or sole determinant of what a student is capable of knowing or reasoning.[4] In designing instruction, teachers can facilitate student reasoning by the following:

- Encouraging students' reasoning in familiar areas—that is, in knowledge domains and contexts in which students already have substantial knowledge. For example, students are able to comprehend reading material at a higher level and are able to write with greater sophistication when they have substantial knowledge relevant to the topic of the reading or writing assignment.

- Presenting topics and domains pitched at a moderate distance from students' current level of functioning. Providing information that is not too elementary to be easily understood and not too complex to be out of range of understanding even with assistance represents the perfect level of entry for new material. If a topic is unfamiliar, teachers may want to link that topic to what students

[4] See http://www.apa.org/education/k12/brain-function.aspx.

already know to foster more advanced levels of reasoning.

- Using heterogeneous groupings, whereby students are placed in mixed-ability groups to allow for interaction with higher level thinkers in learning and problem solving.

- Helping students already at very high levels of functioning achieve even higher levels by facilitating their interaction with still more advanced peers or with instructors and by using advanced learning materials (as noted in the third bulleted entry above).

- Familiarizing students with the culture of classrooms and schooling practices. Although not all classroom work can be approached by relying on peer collaboration, when possible this approach can help students whose background experiences have not familiarized them with schooling and classroom practices in the United States.

REFERENCES

Bjorklund, D. F. (2012). *Children's thinking: Cognitive development and individual differences* (5th ed.). Belmont, CA: Wadsworth.

Donaldson, M. (1978). *Children's minds*. New York, NY: Norton.

Mayer, R. (2008). *Learning and instruction*. Upper Saddle River, NJ: Pearson.

Miller, P. H. (2011). *Theories of developmental psychology* (5th ed.). New York, NY: Worth.

Rogoff, B. (2003). *The cultural nature of human development*. New York, NY: Oxford University Press.

PRINCIPLE 4 Learning is based on context, so generalizing learning to new contexts is not spontaneous but instead needs to be facilitated.

EXPLANATION

Learning occurs in context. Contexts can consist of subject-matter domains (e.g., science), specific tasks/problems (e.g., a textbook problem to solve), social interactions (e.g., caretaking routines between a parent and child), and situational/physical settings (e.g., home, classrooms, museums, labs). Hence, for learning to be more effective or powerful, it needs to generalize to new contexts and situations. **Student transfer or generalization of their knowledge and skills is not spontaneous or automatic; it becomes progressively more difficult the more dissimilar the new context is from the original learning context.** Notably, transfer or generalization of student knowledge can be facilitated and supported. Moreover, students' ability to transfer learning is an important indicator of the quality of their learning—its depth, adaptability, and flexibility.

RELEVANCE FOR TEACHERS

Teachers can support student transfer of knowledge and skills across contexts—from highly similar to highly dissimilar contexts. This is best done by the following:

- Identifying and building on strengths that students bring to a learning situation and thereby making connections between students' current knowledge and the teachers' learning goals.

- Teaching a topic or concept in multiple contexts.

- Helping students compare and contrast contexts and noting contextual similarities that make transfer appropriate.

- Taking the time to focus on deep, underlying concepts in a domain and promoting learning by understanding rather than focusing on surface-level elements in a learning situation or by memorizing the specific elements. For example, in biology, the ability to remember the physical properties of veins and arteries (e.g., that arteries are thicker, more elastic, and carry blood from the heart) is not equivalent to understanding why they have these properties. Understanding is critical for transfer problems, such as, "Imagine trying to design an artery. Would it have to be elastic? Why or why not?" Organizing facts around general principles aligns with how experts organize knowledge. For example, while physics experts approach problem solving by way of major principles or laws that apply to the problem, beginners focus on the equations and plugging numbers into the formulas.

- Helping students see the application of their knowledge to the real world (e.g., using multiplication and division to understand the cost of purchases in a store) or assisting them in transferring real-world knowledge when trying to understand academic principles. Teachers can provide occasions and multiple contexts in which students can use and practice their knowledge. For example, students may not spontaneously recognize the relevance of their learning about solving division problems unless it is applied to computing gas mileage in a real-world context. Teachers can help students generalize/apply their knowledge by regularly providing real-life instances of the academic behaviors in which they are engaged.

REFERENCES

Bransford, J. D., Brown, A. L., & Cocking, R. (Eds). (2000). *How people learn*. Washington, DC: National Academies Press.

Mayer, R. (2008). *Learning and instruction*. Upper Saddle River, NJ: Pearson.

Saxe, G. B. (1991). *Culture and cognitive development: Studies in mathematical understanding*. Hillsdale, NJ: Erlbaum.

Sousa, D. A. (2011). *How the brain learns* (4th ed.). Thousand Oaks, CA: Corwin.

PRINCIPLE 5 Acquiring long-term knowledge and skill is largely dependent on practice.

EXPLANATION

What people *know* (their knowledge base) is inscribed in long-term memory. Most information, particularly when related to academic content and highly skilled activities (e.g., sports; artistic endeavors such as playing a musical instrument), must be processed in some way before being stored in long-term memory. At any given moment, students experience an enormous amount of stimuli in the environment, but only a small portion is further processed in the form of attention and encoding, ultimately moving into a time-constrained and limited-capacity memory-storage area known as *short-term* or *working memory*. To be retained more permanently, information must be transferred into *long-term memory*, which by definition is of relatively long duration (e.g., decades), has very large capacity, and is highly organized (e.g., categorized). The transfer of information from short-term to long-term memory is accomplished through different strategies, and *practice* is key to this transfer process.[5]

Studies comparing the performance of experts and novices have uncovered important distinctions between deliberate practice and other activities, such as play or "drill and kill" repetition. Rote repetition—simply repeating a task—will not by itself improve performance or long-term retention of content. **Instead, deliberate practice involves attention, rehearsal, and repetition over time and leads to new knowledge or skills that can later be developed into more complex knowledge and skills.** Although other factors such as intelligence and motivation also affect performance, practice and rehearsal are necessary, if not sufficient, activities for acquiring expertise.

Overall, learning is improved in at least five ways through rehearsal and deliberate practice. Evidence demonstrates that (a) the likelihood that learning will be long term and retrievable is increased, (b) student ability to apply elements of knowledge automatically and without reflection is enhanced, (c) skills that become automatic free up students' cognitive resources for learning more challenging tasks, (d) transfer of practiced skills to new and more complex problems is increased, and (e) gains often bring about motivation for more learning.

RELEVANCE FOR TEACHERS

Student practice can be elicited and encouraged by teachers in a variety of ways. Because practice requires intense, focused effort, students may not find it inherently enjoyable; therefore, teachers need to encourage students to practice by pointing out that expending effort leads to improved performance.

Teachers can motivate students to engage in practice by expressing confidence in their ability to do well in solving practice problems and by designing activities

[5] See http://www.apa.org/education/k12/practice-acquisition.aspx.

that maximize students' opportunities to succeed. Unrealistic or poorly designed practice problems may lead to student frustration and less motivation to attempt future practice problems. Tests (or quizzes) that are given immediately after a learning exercise give students opportunities to practice, and they tend to do well because the learning is recent. However, their success in this case does not ensure long-term retention. Effective methods of implementing practice in the classroom include:

- Using reviews and tests (*practice testing*). The value of testing or any kind of practice exercise is enhanced by conducting them at spaced intervals (distributive practice) and giving them frequently. Brief tests with open-ended questions are particularly effective because they require that students not only recall information from long-term memory but also generate new information from that retrieval.

- Providing students with a schedule of repeated opportunities (*interleaved practice*) to rehearse and transfer skills or content by practicing with tasks that are similar to the target task or using several methods to approach the same task.

- Designing tasks with students' existing knowledge in mind (see Principle 2).

REFERENCES

Campitelli, G., & Gobet, F. (2011). Deliberate practice: Necessary but not sufficient. *Current Directions in Psychological Science, 20*(5), 280–285. doi:10.1177/096372141142922

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest, 14,* 4–58. doi.10.1177/1529100612453266

Roediger, H. L. (2013). Applying cognitive psychology to education: Translational education science. *Psychological Science in the Public Interest, 14,* 1–3. doi.10.1177/1529100612454415

Rosenshine, B., & Meister, C. (1992). The use of scaffolds for teaching higher-level cognitive strategies. *Educational Leadership, 49*(7), 26–33.

Simkins, S. P., & Maier, M. H. (2008). *Just-in-time teaching: Across the disciplines, across the academy*. Sterling VA: Stylus.

van Merrienboer, J. J. G., Kirschner, P. A., & Kester, L. (2003). Taking the load off a learner's mind: Instructional design for complex learning. *Educational Psychologist, 38*, 5–13. doi:10.1207/s15326985EP3801_2

PRINCIPLE 6 Clear, explanatory, and timely feedback to students is important for learning.

EXPLANATION

Student learning can be increased when students receive regular, specific, explanatory, and timely feedback on their work. Feedback that is occasional and perfunctory (e.g., saying "good job") is neither clear nor explanatory and does not increase student motivation or understanding. Clear learning goals help to increase the effectiveness of feedback to students because the comments can be directly tied to the goals, and regular feedback prevents students from getting off track in their learning.

RELEVANCE FOR TEACHERS

The feedback teachers offer can be most effective when it provides students with specific information about their current state of knowledge and performance as related to learning goals. For example:

- Teachers can tell students what they are (or are not) understanding and the strength of their performance by relating their progress to *specific* learning goals.

- Feedback can also incorporate information on what students can do in the future to achieve those goals. For example, rather than general remarks, such as "good job" or "you do not appear to be getting this," teachers can make more directed comments, such as "Your topic sentences provided a good summary of the main idea in each paragraph. In the future, you also need to address the meaning of the text as a whole by generating and explaining a few points that take into account how all the main ideas interact with one another."

- Feedback on quizzes and practice tests is helpful to students and appears to improve classroom performance in the future. Examples of such feedback include providing the correct response when students answer incorrectly or, alternatively, providing guidance that helps students discover the correct response themselves.

- Providing feedback in a timely way (e.g., as quickly as possible after a quiz) assists learning and is usually more effective than providing delayed feedback.

- The tone and targeting of feedback affect student motivation. Students tend to respond better if feedback minimizes negativity and addresses significant aspects of their work and understanding, in contrast to feedback that is negative in tone and focused excessively on details of student performance that are less relevant to the learning goals.

- When students are learning a new task or struggling with an existing one, frequent praise following small degrees of improvement is very important, and when progress is evident, encouragement to persist can matter a great deal. Targeted feedback can also motivate students to continue to practice learning a new skill (see Principle 5).[6]

REFERENCES

Brookhart, S. M. (2008). *How to give effective feedback to your students.* Alexandria, VA: Association for Supervision and Curriculum Development.

Ericsson, A. K., Krampe, R. T., & Tesch-Romer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100,* 363–406. doi.10.1037/0033-295X.100.3.363

Gobet, F., & Campitelli, G. (2007). The role of domain-specific practice, handedness, and starting age in chess. *Developmental Psychology, 43,* 159–172. doi.org/10.1037/0012-1649.43.1.159

Leahy, S., Lyon, C., Thompson, M., & Wiliam, D. (2005). Classroom assessment, minute by minute, day by day. *Educational Leadership, 63,* 19–24.

Minstrell, J. (2001). The role of the teacher in making sense of classroom experiences and effecting better learning. In S. M. Carver & D. Klahr (Eds.), *Cognition and instruction: Twenty-five years of progress* (pp. 121–150). Mahwah, NJ: Erlbaum.

[6] See *Using Classroom Data to Give Systematic Feedback to Students to Improve Learning*: http://www.apa.org/education/k12/classroom-data.aspx.

PRINCIPLE 7 Students' self-regulation assists learning, and self-regulatory skills can be taught.

EXPLANATION

Self-regulatory skills, which include attention, organization, self-control, planning, and memory strategies, can facilitate mastery of the material to be learned. Although these skills may increase over time, they are not subject only to maturation. **These skills also can be taught or enhanced, specifically through direct instruction, modeling, support, and classroom organization and structure.**

RELEVANCE FOR TEACHERS

Teachers can help students learn self-regulatory skills by introducing teaching strategies to enhance attention, organization, self-control, planning, and remembering, all of which can greatly facilitate learning. Moreover, the classroom environment itself can be organized to enhance self-regulation. Organizational assistance can be provided in several ways:

- Teachers can present the goals of lessons and tasks very clearly to students.

- They can break down tasks into smaller, "bite-size," meaningful components and clearly spell out the criteria for successful task performance.

- Teachers also can provide time and opportunities for students to engage in practice.

- Some processing time and activity (e.g., summarizing, questioning, rehearsing, and practice) are necessary for long-term remembering.

- Teachers can help students plan by helping them identify and evaluate the short- and long-term consequences of their decisions.

- Teachers can use cues to alert students that important information is to follow when introducing a new concept to increase student attention.

- Teachers can organize classroom time by incorporating periods of focused time, interactive periods, and so forth, so students are able to practice intense focusing followed by more socially interactive methods of learning.

REFERENCES

Diamond, A., Barnett, W. S., Thomas, J., & Munro, S. (2007, Nov. 30). Preschool program improves cognitive control. *Science, 318*(5855), 1387–1388. doi:10.1126/science.1151148

Galinsky, E. (2010). *Mind in the making: The seven essential life skills every child needs*. New York, NY: HarperCollins.

Wolters, C. A. (2011). Regulation of motivation: Contextual and social aspects. *Teachers College Record, 113*(2), 265–283.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice, 41*(2), 64–70.

Zumbrunn, S., Tadlock, J., & Roberts, E. D. (2011). *Encouraging self-regulated learning in the classroom: A review of the literature*. Retrieved from http://www.mehritcentre.com/assets/documents/Self%20Regulated%20Learning.pdf

PRINCIPLE 8 Student creativity can be fostered.

EXPLANATION

Creativity—defined as the generation of ideas that are new and useful in a particular situation—is a critical skill for students in the information-driven economy of the 21st century. Being able to identify problems, generate potential solutions, evaluate the effectiveness of those strategies, and then communicate with others about the value of the solutions are all highly relevant to educational success, workforce effectiveness, and quality of life. Creative approaches to teaching can inspire enthusiasm and joy in the learning process by increasing student engagement and modeling of real-world application of knowledge across domains. Contrary to the conventional wisdom that creativity is a stable trait (you either have it or you don't), **creative thinking can be developed and nurtured in students, making it an important outcome of the learning process for students and educators.**

RELEVANCE FOR TEACHERS

A variety of strategies are available for teachers to foster creative thinking in students:

- Educators can allow for a wide range of student approaches to completing tasks and solving problems, as the strategies being taught may not be the only ways to answer a specific question.

- Teachers should emphasize the value of diverse perspectives as fuel for discussion, reinforcing that such perspectives are clearly valued and not penalized in the classroom.

- Teachers should also avoid the tendency to see highly creative students as disruptive; instead, student enthusiasm can be channeled into solving real-world problems or taking leadership roles on certain tasks.

The creative process is often misconstrued as being purely spontaneous or even frivolous, yet extensive research provides evidence that creativity and innovation are the result of disciplined thinking. For this reason, other instructional strategies that can foster creativity include:

- Varying activities by including prompts in assignments, such as *create, invent, discover, imagine if*, and *predict*.

- Using methods that focus on questioning, challenging prevailing beliefs, making unusual connections, envisioning radical alternatives, and critically exploring ideas and options.

- Providing opportunities for students to solve problems in groups and communicate their creative ideas to a wide range of audiences (peers, teachers, community members).

- Modeling creativity. Teachers are powerful models, and as such they should share with students their own creativity—including the use of multiple strategies to solve problems across various aspects of their lives. This modeling can also involve examples of how creativity is not necessary in all situations, which may help students develop an improved sense of confidence in their judgment

as to when it is appropriate to focus on getting one right answer and when to pursue alternative approaches.

REFERENCES

Beghetto, R. A. (2013). *Killing ideas softly? The promise and perils of creativity in the classroom*. Charlotte, NC: Information Age Press.

Kaufman, J. C., & Beghetto, R. A. (2013). In praise of Clark Kent: Creative metacognition and the importance of teaching kids when (not) to be creative. *Roeper Review: A Journal on Gifted Education, 35,* 155–165. doi:10.1080/02783193.2013.799413

Plucker, J., Beghetto, R. A., & Dow, G. (2004). Why isn't creativity more important to educational psychologists? Potentials, pitfalls, and future directions in creativity research. *Educational Psychologist, 39,* 83-96. doi.10.1207/s15326985ep3902_1

Runco, M. A., & Pritzker, S. R. (Eds.). (2011). *Encyclopedia of creativity* (2nd ed.). Boston, MA: Academic Press.

Sternberg, R. J., Grigorenko, E. L., & Singer, J. L. (Eds.). (2004). *Creativity: From potential to realization*. Washington, DC: American Psychological Association.

What motivates students?

PRINCIPLE 9 Students tend to enjoy learning and to do better when they are more intrinsically rather than extrinsically motivated to achieve.

EXPLANATION

Intrinsic motivation refers to engaging in an activity for its own sake. To be intrinsically motivated means to feel both competent and autonomous (e.g., "I can do it for myself"). Students who are intrinsically motivated work on tasks because they find them enjoyable. In other words, participation is its own reward and is not contingent on tangible rewards such as praise, grades, or other external factors. In contrast, students who are extrinsically motivated engage in learning tasks as a means to an end, such as to get a good grade, to get praise from their parents, or to avoid punishment. It is not the case that intrinsic and extrinsic motivation are at opposite ends of a motivation continuum, such that having more of one means having less of the other. Instead, students engage in academic tasks for both intrinsic and extrinsic reasons (e.g., because they enjoy it and to get a good grade). Nonetheless, intrinsically motivated task engagement is not only more enjoyable, it is positively related to more enduring learning, achievement, and perceived competence and is negatively related to anxiety.

These benefits occur because students who are intrinsically motivated are more likely to approach their tasks in ways that enhance learning, such as attending more closely to instruction, organizing new information effectively, and relating it to what they already know. They also feel more self-efficacious and are not burdened by achievement anxiety. On the other hand, students who are more extrinsically motivated may be so focused on the reward (e.g., getting a high grade) that learning is superficial (e.g., the student may resort to shortcuts such as skimming the reading for specific terms rather than absorbing the entire lesson), or they may become discouraged if the pressures are too high. Furthermore, externally motivated students may disengage once the external rewards are no longer provided, whereas intrinsically motivated students show more long-lived mastery of learning goals.[7]

Notably, however, a substantial body of experimental research studies shows that extrinsic motivation, when properly used, is very important to producing positive educational outcomes. Research also shows that students develop academic competence when they do tasks repeatedly in carefully constructed ways so that the basic skills become automatic. As more basic skills become automatic, the tasks require less effort and are more enjoyable. Just as in sports, students improve their reading, writing, and mathematics skills when they do these activities repeatedly with teacher guidance and feedback, gradually progressing from less complex tasks to more difficult ones. Students' engagement in these activities often requires teacher encouragement and praise for making progress. **As students develop increasing competence, the knowledge and skills that have been developed provide a foundation to support the more complex tasks, which become less effortful and more enjoyable. When students have reached this point, learning often becomes its own intrinsic reward.**

RELEVANCE FOR TEACHERS

Promoting intrinsic motivation requires the incorporation of practices and activities that support students' fundamental need to feel competent and autonomous:

[7] See also http://www.apa.org/education/k12/learners.aspx.

- When using grades, teachers might want to highlight their informational (feedback) rather than controlling (rewarding/punishing) function.

- A useful strategy when using any external constraints such as deadlines is to think about whether the constraints will be perceived by students as too controlling. Much of the perception of control can be managed by the way in which a task is communicated to students. Autonomy needs are more likely to be satisfied when students have choices. Allowing students to select from an array of achievement activities and to have a role in establishing rules and procedures helps foster perceptions of autonomy. This approach can also help students learn the value of choosing tasks that are of intermediate difficulty for them. Tasks are optimally challenging when they are neither too easy nor too hard.

- Because intrinsic motivation involves enjoying a task for its own sake, teachers might want to incorporate the ideas presented for Principle 8 on creativity so as to introduce novelty by providing some level of surprise or incongruity and allowing for creative problem solving.

Supporting students' intrinsic motivation to achieve does not mean that teachers should completely eliminate the use of rewards. Certain tasks in the classroom and in life, like practicing new skills, are going to be inherently uninteresting to students. It is important to teach students that some tasks, even tasks that are necessary to master, might be uninteresting at first yet require consistent, sometimes tedious, engagement for learning. Once learned, new skills may become their own reward.

REFERENCES

Anderman, E. M., & Anderman, L. H. (2014). *Classroom motivation* (2nd ed.). Boston, MA: Pearson.

Brophy, J. (2004). *Motivating students to learn*. Mahwah, NJ: Erlbaum.

Brophy, J., Wiseman, D. G., & Hunt, G. H. (2008). *Best practice in motivation and management in the classroom* (2nd ed.). Springfield, IL: Charles C Thomas.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum.

Thorkildsen, T. A., Golant, C. J., & Cambray-Engstrom, E. (2008). Essential solidarities for understanding Latino adolescents' moral and academic engagement. In C. Hudley & A. E. Gottfried (Eds.), *Academic motivation and the culture of schooling in childhood and adolescence* (pp. 73–89). Oxford, England: Oxford University Press.

PRINCIPLE 10 Students persist in the face of challenging tasks and process information more deeply when they adopt mastery goals rather than performance goals.

EXPLANATION

Goals are the rationale for why students engage in particular learning activities. Researchers have identified two broad types of goals: *mastery goals* and *performance goals*. Mastery goals are oriented toward acquiring new skills or improving levels of competence. Students who hold mastery goals are motivated to learn new skills or achieve mastery in a content area or on a task. In contrast, students who adopt performance goals are motivated to demonstrate that they have adequate ability or to avoid tasks in an effort to conceal a perception of having low ability. **According to this analysis, individuals can engage in achievement activities for two very different reasons: They may strive to develop competence by learning as much as they can (mastery goals), or they may strive to display their competence by trying to outperform others (performance goals). Performance goals can lead to students' avoiding challenges if they are overly concerned about performing as well as other students. In typical classroom situations, when students encounter challenging materials, mastery goals are generally more useful than performance goals.**

RELEVANCE FOR TEACHERS

There are specific ways in which teachers can organize instruction to foster mastery goals:

- Try to emphasize individual effort, current progress over past performance, and improvement when evaluating student work rather than rely on normative standards and comparison with others.
- In classroom settings, student evaluations are best delivered privately.
- Praise like "perfect," "brilliant," and "amazing" that provides no specific information to the student about what was done so well is best avoided because it does not promote guidance for replicating high-quality work.
- It is best to avoid social comparisons. Whereas high-achieving students often enjoy public recognition of their accomplishments and should be praised when their level of achievement exceeds previous personal levels, those who are struggling or who worry about appearing "dumb" can be discouraged by social comparisons. Instead, teachers could consider the progress each student has made on his or her individual work in a manner that does not compare one student's work to another.
- Encourage students to see mistakes or wrong answers as opportunities to learn rather than as sources of evaluation or evidence of ability. If teachers focus too much attention (through praise) on perfect scores and make mistakes too visible (e.g., red marks on students' papers), students can come to devalue mistakes and be reluctant to view them as a natural part of learning.
- Individualize the pacing of instruction as much as possible. Some students take longer to master the material than others and should be given that extra time. Allowing students a role in setting timelines for completing tasks and monitoring their own progress helps them focus on process (acquiring mastery) in addition to the outcome (performance).

It is important to consider the context of different environments when planning for learning and motivation in classroom settings:

- Organizing instructional activities that allow students to work cooperatively in small mixed-ability groups can downplay ability differences between students and encourage them to develop as a community of learners. Cooperation is one of the best ways to promote a mastery goal orientation.
- Rather than using cooperation and competition as incompatible learning tools in the classroom, teachers could sometimes use teams of mixed-ability groups that compete with each other to reach a common goal.
- There are times when performance goals can work well in situations that are themselves a performance. These situations may be more competitive, such as a science fair where students are organized into teams and given the task of designing a robot, machine, or other device that will then be entered into competition for reward or recognition.

REFERENCES

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84,* 261–271. doi:10.1037/0022-0663.84.3.261

Anderman, L. H., & Anderman, E. M. (2009). Oriented towards mastery: Promoting positive motivational goals for students. In R. Gilman, E. S. Huebner, & M. Furlong (Eds.), *Handbook of positive psychology in the schools* (pp. 161–173). New York, NY: Routledge.

Deci, E. L., & Ryan, R. M. (2002). The paradox of achievement: The harder you push, the worse it gets. In J. Aronson (Ed.), *Improving academic achievement: Impact of psychological factors in education* (pp. 62–90). San Diego, CA: Academic Press.

Graham, S. (1990). On communicating low ability in the classroom: Bad things good teachers sometimes do. In S. Graham & V. Folkes (Eds.), *Attribution theory: Applications to achievement, mental health, and interpersonal conflict* (pp. 17–36). Hillsdale, NJ: Erlbaum.

Meece, J. L., Anderman, E. M., & Anderman L. H. (2006). Classroom goal structure, student motivation, and academic achievement. *Annual Review of Psychology, 57,* 487–503. doi:10.1146/annurev.psych.56.091103.070258

PRINCIPLE 11 Teachers' expectations about their students affect students' opportunities to learn, their motivation, and their learning outcomes.

EXPLANATION

Teachers often hold expectations about the abilities of their students. These beliefs shape the kinds of instruction delivered to students, the grouping practices that are used, anticipated learning outcomes, and methods of evaluation. Most teacher expectations about individual student ability are based on students' past academic performance and, for the most part, may be an accurate representation. In some cases, however, teachers come to hold inaccurate beliefs, such as expecting less of the student than he or she can actually achieve. **If faulty expectations are communicated to a student (whether verbally or nonverbally), that student may begin to perform in ways that confirm the teacher's original expectation.** An inaccurate teacher expectation that creates its own reality has been labeled a *self-fulfilling prophecy*. When these inaccurate expectations do occur, they are more likely to be directed toward stigmatized groups (e.g., ethnic minority youth, economically disadvantaged youth), because negative beliefs or stereotypes about the intellectual abilities of these groups exist in our society.

These faulty expectations are more likely to occur in the earlier grades, at the beginning of a school year, and at times of school transitions—in other words, when the contexts in which information about prior achievement may be least available or reliable and when students may have grounds to question their abilities. Whether accurate or not, expectations influence how teachers treat students. For example, teachers appear to provide a more supportive emotional climate, clearer feedback, more attention, more instructional time, and more learning opportunities overall for their high-expectancy versus low-expectancy students. Such differential treatment may increase the actual differences in achievement between high- and low-performing students over time.

RELEVANCE FOR TEACHERS

It is best for teachers to communicate high expectations to all students and maintain appropriately high standards for everyone in order to avoid negative self-fulfilling prophecies:

- Teachers can continually assess the reliability of the information they are using to form their expectations. A student's weak academic history should not be perceived as the absolute last word about a student (i.e., there may be mitigating factors that may have impaired the student's ability in the past but no longer apply) but rather as a working hypothesis about a student that the teacher has an opportunity to disprove. Also, race, gender, and social class are not solid bases on which to form expectations of student ability.

- Because teachers can sometimes be unaware that they are treating students differently on the basis of their expectations (high-expectancy students vs. low-expectancy students), it can be helpful for teachers to do a self-check. For example, teachers can ask themselves whether (a) only high-expectancy students are seated in the front of the classroom, (b) everyone is getting a chance to participate in class discussions, and (c) written feedback on assignments is comparably detailed for high- and low-expectancy students.

Probably the best antidote to negative expectancy effects is to never give up on a student.

REFERENCES

Jussim, L., Eccles, J., & Madon, S. (1996). Social perception, social stereotypes, and teacher expectations: Accuracy and the quest for the powerful self-fulfilling prophecy. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 28, pp. 281–388). San Diego, CA Academic Press.

Jussim, L., & Harber, K. D. (2005). Teacher expectations and self-fulfilling prophecies: Knowns and unknowns, resolved and unresolved controversies. *Personality and Social Psychology Review, 9*(2), 131–155. doi:10.1207/s15327957pspr0902_3

Jussim. L., Robustelli, S., & Cain, T. (2009). Teacher expectations and self-fulfilling prophecies. In A. Wigfield & K. Wentzel (Eds.), *Handbook of motivation at school* (pp. 349–380). Mahwah, NJ: Erlbaum.

Schunk, D. H., Meece, J. L., & Pintrich, P. R. (2014). *Motivation in education: Theory, research, and applications*. Boston, MA: Pearson.

Stipek, D. J. (2002). *Motivation to learn: Integrating theory and practice* (4th ed.). New York, NY: Allyn & Bacon.

PRINCIPLE 12 Setting goals that are short term (proximal), specific, and moderately challenging enhances motivation more than establishing goals that are long term (distal), general, and overly challenging.

EXPLANATION

Goal setting is the process by which a person establishes a standard of performance (e.g., "I want to learn 10 new words every day"; "I want to graduate from high school in 4 years"). This process is important for motivation because students with a goal and adequate self-efficacy are likely to engage in the activities that lead to attainment of that goal. Self-efficacy is also increased as students monitor the progress they are making toward their goals, especially when they are acquiring new skills in the process.

Three properties of goal setting are important for motivation. First, short-term, or proximal, goals are more motivating than long-term, or distal, goals because it is easier to judge progress toward proximal goals. Developmentally, at least until middle adolescence, students tend to be less skilled at thinking concretely about the distant future. Second, specific goals (e.g. "I will finish 20 addition facts today with 100% accuracy), are preferable to more general goals (e.g., "I will try to do my best") because they are easier to quantify and monitor. Third, moderately difficult goals rather than very hard or very easy goals are the most likely to motivate students because moderately difficult goals typically will be perceived as challenging but attainable. Research has documented the benefits of proximal, specific, and moderately challenging goals on achievement outcomes.

RELEVANCE FOR TEACHERS

Students need to be provided with many opportunities to set short-term, specific, and moderately difficult goals in their classroom work:

- Keeping a written record of goal progress that is regularly checked by both the student and the teacher is especially desirable.
- **As students become proficient at setting moderately challenging proximal goals, they will learn to become intermediate risk takers (not aspiring too low or too high), which is one of the most important characteristics of achievement-oriented individuals.**
- Teachers can also help students begin to think about more distal goals by developing contracts with them that specify a series of subgoals leading to the larger, more distal goal.

REFERENCES

Anderman, E. M., & Wolters, C. (2006). Goals, values, and affect: Influences on student motivation. In P. A. Alexander & P. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 369–389). Mahwah, NJ: Erlbaum.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist, 57,* 705–717. doi:10.1037/0003-066X.57.9.705d

Martin, A. J. (2013). Goal setting and personal best (PB) goals. In J. Hattie & E. M. Anderman (Eds.), *International guide to student achievement* (pp. 356–358). New York, NY: Routledge.

Schunk, D. H. (1989). Self-efficacy and achievement behaviors. *Educational Psychology Review, 1,* 173–208. doi:10.1007/BF01320134

Schunk, D. H., & Zimmerman, B. J. (2006). Competence and control beliefs: Distinguishing means and ends. In P. A. Alexander & P. H. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 349–367). Mahwah, NJ: Erlbaum.

Why are social context, interpersonal relationships, and emotional well-being important to student learning?

PRINCIPLE 13 Learning is situated within multiple social contexts.

EXPLANATION

Learners are a part of families, peer groups, and classrooms that are situated in larger social contexts of schools, neighborhoods, communities, and society. All of these contexts are influenced by culture, including shared language, beliefs, values, and behavioral norms. Furthermore, these layers of context interact with each other (e.g., schools and families). Appreciating the potential influence of these contexts on learners can enhance the effectiveness of instruction and communication across contexts (e.g., between teachers and parents).

RELEVANCE FOR TEACHERS

Teachers who are aware of the potential influence of the classroom's social context on learners and the teaching–learning process can facilitate effective interpersonal relationships and communication with and between students and thereby affect learning:

- The more teachers know about the cultural backgrounds of students and how differences in values, beliefs, language, and behavioral expectations can influence student behavior, including interpersonal dynamics, the better they will be able to facilitate effective teaching–learning interactions in their classrooms. For example, for students whose culture is more collectivist than individualistic, teachers can enhance learning experiences through more frequent use of cooperative learning activities.

- Teachers can relate the curriculum to students' cultural backgrounds—for example, through incorporating local history into social studies lessons or gearing science toward local health problems.

Given potential variations in cultural experiences, it is critical that the teacher facilitate a "classroom culture" that ensures shared meanings, values, beliefs, and behavioral expectations and provides a safe and secure environment for all students.

- Establishing connections with families and local communities can help enhance understanding of student cultural experiences and facilitate shared understandings about learning. Family involvement facilitates student learning, so creating opportunities for family and community involvement in the work of the classroom is vital.

- Seeking opportunities to participate in the local community (e.g., attending local cultural events) can help connect the relevance of learning to students' everyday lives and enhance teachers' understanding of the cultural background and experiences of their students.

REFERENCES

Lee, P. C., & Stewart, D. E. (2013). Does a socio-ecological school model promote resilience in primary schools? *Journal of School Health, 83,* 795–804. doi:10.1111/josh.12096

National Association of School Psychologists. (2013). *A framework for safe and successful schools.* Retrieved from www.nasponline.org

Thapa, A., Cohen, J., Higgins-D'Alessandro, & Gaffey, S. (2012). *School climate research summary: August 2012.* New York, NY: National School Climate Center.

Trickett, E. J., & Rowe, H. L. (2012). Emerging ecological approaches to prevention, health promotion, and public health in the school context: Next steps from a community psychology perspective. *Journal of Educational and Psychological Consultation, 22,* 125–140. doi:10.1080/10474412.2011.649651

Ysseldyke, J., Lekwa, A. J., Klingbeil, D. A., & Cormier, D. C. (2012). Assessment of ecological factors as an integral part of academic and mental health consultation. *Journal of Educational and Psychological Consultation, 22,* 21–43. doi:10.1080/10474412.2011.649641

PRINCIPLE 14 Interpersonal relationships and communication are critical to both the teaching–learning process and the social-emotional development of students.

EXPLANATION

The teaching–learning process in preK–12 classrooms is inherently interpersonal, encompassing both teacher–student and peer connections. These relationships are essential for facilitating healthy social-emotional development of students. **Given their social nature, classrooms provide a critical context for teaching social skills such as communication and respect for others.** Developing successful relationships with peers and adults is highly dependent on one's ability to communicate thoughts and feelings through verbal and nonverbal behavior.[8]

RELEVANCE FOR TEACHERS

Given the interpersonal nature of preK–12 teaching and learning, teachers should attend to the relational aspects of the classroom:

- A safe and secure environment, both physical and social, and shared classroom culture (e.g., ensuring that everyone in the classroom is clear about relevant vocabulary, values, and norms) provide the foundation for healthy teacher–student and peer relationships.
- Teachers can provide clear behavioral expectations related to social interactions (e.g., respect for others, use of clear communication, nonviolent conflict resolution) and opportunities for all students to experience successful social exchanges.
- Not only can teachers establish cooperative and supportive classroom norms but it is also critical that teachers set clear injunctions against bullying in any form.
- Opportunities to learn effective social skills should include planned instruction and opportunities for practice and feedback. These social skills include cooperation/collaboration, perspective taking and seeking, respect for others' views, constructive feedback, interpersonal problem solving, and conflict resolution.
- Teachers are responsible for ensuring that a positive social climate is maintained, promoting peaceful resolution of student conflicts, and intervening early should bullying occur.

One of the foundational skills for the more complex interactions described above is the development of clear and thoughtful communication. Effective student communication requires teaching and practice of component skills. Teachers may incorporate lessons in communication basics as part of the routine curriculum. For example, they might incorporate specific skills into a lesson (such as how to ask relevant questions) and provide opportunities to apply those skills, such as during cooperative learning. In addition, teachers can:

- Prompt students to elaborate on their responses.
- Engage in give-and-take with other students during discussions.
- Seek clarification from others.
- Listen carefully to others.
- Read nonverbal cues.
- Provide opportunities for students to practice communication in both academic and social contexts.
- Provide feedback to enhance skill development.
- Model effective verbal and nonverbal communication by using active listening, matching facial expression with verbal messages, using questions effectively, providing elaboration in response to student questions, and seeking student perspectives.

[8] See also http://www.apa.org/education/k12/relationships.aspx.

REFERENCES

Centers for Disease Control and Prevention. (2009). *School connectedness: Strategies for increasing protective factors among youth*. Retrieved from www.cdc.gov/HealthyYouth

Durlak, J., Weissberg, R., Dymnicki, A., Taylor, R., & Schellinger, K. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*(1), 405–432. doi:10.1111/j.1467-8624.2010.01564.x

Pianta, R. C., & Stuhlman, M. W. (2004). Teacher–child relationships and children's success in the first years of school. *School Psychology Review, 33*(3), 444–458.

Rimm-Kaufman, S. E., Baroody, A. E., Larsen, A. A., Curby, T. W., & Abry, T. (2015). To what extent do teacher–student interaction quality and student gender contribute to fifth graders' engagement in mathematics learning? *Journal of Educational Psychology, 107,* 170–185. doi:10.1037/a0037252

Webster-Stratton, C., Reinke, W. M., Herman, K. C., & Newcomer, L. L. (2013). The Incredible Years teacher classroom management training: The methods and principles that support fidelity of training delivery. *School Psychology Review, 40*(4), 509–529.

PRINCIPLE 15 Emotional well-being influences educational performance, learning, and development.

EXPLANATION

Emotional well-being is integral to successful, everyday functioning in the classroom and influences academic performance and learning. It is also important to interpersonal relationships, social development, and overall mental health. The components of emotional well-being include sense of self (self-concept, self-esteem), a sense of control over oneself and one's environment (self-efficacy, locus of control), general feelings of well-being (happiness, contentment, calm), and capacity for responding in healthy ways to everyday stresses (coping skills). Being emotionally healthy depends on understanding, expressing, and regulating or controlling one's own emotions, as well as perceiving and understanding others' emotions (empathy). Understanding others' emotions is influenced by how students perceive external expectations and acceptance on the part of significant others in their classroom, family, peer group, community, and societal environment (see Principles 13 and 14).

RELEVANCE FOR TEACHERS

The emotional well-being of students can influence the quality of their participation in the teaching–learning process, their interpersonal relationships, the effectiveness of their communication, and their responsiveness to classroom climate. Concurrently, the classroom climate can influence students' sense of security and acceptance, perceptions of social support, sense of control, and overall emotional well-being. The teacher plays a key role in establishing a climate in which all students are accepted, valued, and respected; have opportunities for academic success and relevant support; and have opportunities for positive social relationships with adults and peers. Teachers can help facilitate emotional development by:

- Using emotional vocabulary—for example, facilitating student labeling of emotions (e.g., *happy, sad, fearful, angry*).
- Modeling appropriate emotional expression and reactions.
- Teaching emotion regulation strategies, such as "stop and think before acting" and deep breathing.
- Promoting emotional understanding of others, such as empathy and compassion.
- Monitoring their expectations to ensure they are equally encouraging to all students, regardless of past performance.

REFERENCES

CASEL (Collaborative for Academic, Social, and Emotional Learning). (2012). *CASEL Guide: Effective social and emotional learning programs*. Retrieved from www.casel.org

Hagelskamp, C., Brackett, M. A., Rivers, S. E., & Salovey, P. (2013). Improving classroom quality with the RULER approach to social and emotional learning: Proximal and distal outcomes. *American Journal of Community Psychology, 51*(3–4), 530–543. doi:10.1007/s10464-013-9570-x

Jain, S., Buka, S. L., Subramanian, S. V., & Molnar, B. E. (2012). Protective factors for youth exposed to violence: Role of developmental assets in building emotional resilience. *Youth Violence and Juvenile Justice, 10,* 107–129. doi:10.1177/1541204011424735

Jones, S. M., Aber, J. L., & Brown, J. L. (2011). Two-year impacts of a universal school-based social-emotional and literacy intervention: An experiment in translational developmental research. *Child Development, 82*(2), 533–554. doi:10.1111/j.1467-8624.2010.01560.x

Seligman, M. E. P., Ernst, R. M., Gillham, J., Reivich, K., & Linkins, M. (2009). Positive education: Positive psychology and classroom interventions. *Oxford Review of Education, 35,* 293–311. doi:10.1080/03054980902934563

How can the classroom best be managed?

PRINCIPLE 16 Expectations for classroom conduct and social interaction are learned and can be taught using proven principles of behavior and effective classroom instruction.

EXPLANATION

Students' ability to learn is as much affected by their interpersonal and intrapersonal behavior as it is by their academic skills. Student behavior that does not conform to classroom rules or teacher expectations cannot simply be regarded as a distraction to be eliminated before instruction can take place. Rather, **behaviors conducive to learning and appropriate social interaction are best taught at the beginning of the academic year and reinforced throughout the year.** These behaviors can be taught using proven behavioral principles. For students exhibiting more serious or consistent problem behaviors, understanding the context and function of the behavior is a key element in teaching appropriate replacement behaviors.[9]

RELEVANCE FOR TEACHERS

A common assumption is that instruction is only intended for those who are "ready to learn" and that the learning environment will be improved if those who disrupt or distract from it are removed.

- Improved social and classroom behavior, like academic skill, can be shaped and taught. In the most effective classrooms, classroom rules and expectations represent a social curriculum that is taught and retaught throughout the academic year. The first 2 weeks of school are considered a crucial time for teachers to establish their rules and expectations.
- Proactive disciplinary strategies that avoid behavior problems are always better than reactive strategies that try to reduce problem behaviors after they are already present. Thereafter, student behavior that does not conform to classroom rules becomes an opportunity to bring student attention back to classroom expectations.
- Classroom rules and expectations can be taught and retaught using the same principles as those used in academic instruction, including clear presentation of a goal, task, or behavior; opportunities for practice, with timely and specific feedback; reinforcement of desired behavior; and behavioral correction as needed.
- A range of behavioral principles, including praise of appropriate behavior, differential reinforcement (desired behaviors or responses are reinforced and inappropriate behaviors or responses are ignored), correction, and planned consequences, can be used to consistently teach and remind students of their expectations.
- On the schoolwide level, these same principles can be used to clarify expectations and reward positive behavior through programs such as Positive Behavior Interventions and Supports (PBIS).
- The problem-solving process known as functional behavioral assessment (FBA) has enabled teachers and school psychologists to identify the antecedent events and functional relationships associated with inappropriate behavior. The information drawn from an FBA enables school personnel to identify appropriate replacement behaviors—that is, more

[9] See also http://www.apa.org/education/k12/classroom-mgmt.aspx and http://www.apa.org/ed/schools/cpse/activities/class-management.aspx).

adaptive behaviors that allow students to reach the same behavioral goal in a more acceptable way.

REFERENCES

American Psychological Association, Zero Tolerance Task Force. (2008). Are zero tolerance policies effective in the schools? An evidentiary review and recommendations. *American Psychologist, 63,* 852–862. doi:10.1037/0003-066X.63.9.852

Evertson, C. M., & Emmer, E. T. (2009). *Classroom management for elementary teachers* (8th ed.). Upper Saddle River, NJ: Pearson.

Skiba, R., & Peterson, R. (2003). Teaching the social curriculum: School discipline as instruction. *Preventing School Failure, 47*(2), 66–73.

Slavin, R. E. (Ed.). (2014). *Classroom management and assessment*. Thousand Oaks, CA: Corwin Press.

Sprick, R. (2006). *Discipline in the secondary classroom: A positive approach to behavior management* (2nd ed.). San Francisco, CA: Jossey-Bass.

Sugai, G., & Simonsen, B. (2015). Supporting general classroom management: Tier 2/3 practices and systems. In E. T. Emmer & E. J. Sabornie (Eds.), *Handbook of classroom management* (2nd ed., pp. 60–75). New York, NY: Taylor & Francis.

PRINCIPLE 17 Effective classroom management is based on (a) setting and communicating high expectations, (b) consistently nurturing positive relationships, and (c) providing a high level of student support.

EXPLANATION

At both the classroom and the school level, the development of an effective learning climate is based on structure and support. In terms of structure, students need to have a clear understanding of the behavioral rules and expectations of the classroom, and these expectations must be communicated directly and frequently and consistently enforced. Yet we also know that support is essential. To be both effective and culturally responsive, teachers can develop and maintain strong, positive relationships with their students by consistently communicating that they are firmly committed to supporting all of their students in meeting those high academic and behavioral expectations.

RELEVANCE FOR TEACHERS

Students profit from a predictable structure and high expectations for both academic achievement and classroom behavior.
For example:

- A safe and well-arranged physical environment, a predictable schedule, and rules that are clearly explained and consistently enforced all contribute to a safe and orderly learning climate that reduces distraction and keeps the focus on academic instruction.

- High expectations, especially when communicated in a punitive manner, are not sufficient to establish and maintain a positive and productive learning climate. The most effective teachers, schools, and programs also emphasize the development of supportive and nurturing relationships with students.

- Maintaining a high ratio of positive statements and rewards to negative consequences, as well as expressing respect for all students and their heritage, builds trust in the classroom.

At the school level:

- Programs such as Restorative Practices[10] enable students to gain an understanding of how to restore relationships damaged by disruption and violence through strategies such as collaborative decision making.

- Social-emotional learning strategies[11] explicitly teach students interpersonal and intrapersonal skills (e.g., managing emotions, establishing positive relationships, and making responsible decisions) needed to succeed in school and society.

[10] See http://www.iirp.edu/what-is-restorative-practices.php.

[11] See, e.g., http://www.casel.org/social-and-emotional-learning.

Balancing structure and support is central to culturally responsive classroom management and is associated with lower levels of suspension and bullying when applied at the school level.

REFERENCES

Evertson, C. M., & Emmer, E. T. (2009). *Classroom management for elementary teachers* (8th ed.). Upper Saddle River, NJ: Pearson.

Rothstein-Fisch, C., & Trumball, E. (2008). *Managing diverse classrooms: How to build on students' cultural strengths*. Alexandria, VA: Association for Supervision and Curriculum Development.

Skiba, R., & Peterson, R. (2003). Teaching the social curriculum: School discipline as instruction. *Preventing School Failure, 47*(2), 66–73.

Weinstein, C., Tomlinson-Clarke, S., & Curran, M. (2004). Toward a conception of culturally responsive classroom management. *Journal of Teacher Education, 55*, 25-38. doi:10.1177/0022487103259812

How to assess student progress?

PRINCIPLE 18 Formative and summative assessments are both important and useful but require different approaches and interpretations.

EXPLANATION

Formative assessments are used to guide and shape classroom instruction directly. *Summative assessments* are used to produce an overall judgment of student learning progress or the effectiveness of educational programs. Formative assessments take place before or during instruction, can be "on the fly," and have the explicit purpose of improving current learning. Summative assessments measure learning at a particular point, usually at the end of a unit of study, semester, or academic year, and by design provide limited opportunities to influence current learning activities.

The approach used to collect information is likely to differ between the two types of assessment as well, given their different purposes. Formative assessments, in the service of achieving learning goals, are more likely to incorporate learning progressions and include discussion, collaboration, self- and peer assessment, and descriptive feedback. Summative assessments, given their purpose of evaluating progress against a benchmark, are more likely to be high-stakes, standardized large-scale assessments that evaluate individual work to yield an overall score or performance-level designation.

Both formative and summative assessments can be developed by teachers or those outside of the classroom—for example, by a testing company on behalf of a state agency. In general, however, formative assessments are more likely to be developed by teachers, and large-scale, high-stakes assessments are more likely to be developed by an external organization. Overall, the goal of both types of assessments is fundamentally the same—to produce valid, fair, useful, and reliable sources of information.

RELEVANCE FOR TEACHERS

Employing formative assessments can result in important increases in student learning when teachers:

- Clearly communicate to students the purposes of each lesson.
- Use lessons and other classroom experiences to collect evidence on student learning.
- Use this evidence to help understand what students know and promptly redirect students as needed.

Teachers can improve the effectiveness of formative assessments when they:

- Focus systematically on setting goals for their students.
- Determine whether students have met these goals.
- Consider how to improve their instruction in the future.
- Keep the length of time between the formative assessment and subsequent interventions relatively short; this is when effects on student learning will be strongest.

Teachers can make better use of both formative and summative assessments when they understand basic concepts related to educational measurement. Teachers can also use assessment data to evaluate their own instruction to consider whether they adequately covered the material they intended to cover and wheth-

er they were effective in meeting their instructional goals. Teachers will also want to ensure that their assessments align with overall learning goals to elicit questions in different ways to assess students' level of knowledge.

Principle 19 provides a discussion of the importance of validity and fairness in assessments and how they affect the appropriateness of inferences that may be made from test results. Furthermore, it is important to consider the length of the test when making important or irrevocable decisions, since test length is one factor related to the reliability, or consistency, of test results. Principle 20 describes how the meaning of assessment outcomes depends on clear, appropriate, and fair interpretation of test results.

REFERENCES

Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2003). *Assessment for learning: Putting it into practice.* Buckingham, England: Open University Press.

Council of Chief State School Officers (CCSSO). (2008). *Formative assessment: Examples of practice.* Retrieved from the CCSSO website: http://ccsso.org/Documents/2008/Formative_Assessment_Examples_2008.pdf

Heritage, M. (2007). Formative assessment: What do teachers need to know and do? *Phi Delta Kappan, 89*(2), 140–145.

Sheppard, L. A. (2006). Classroom assessment. In R. L. Brennan (Eds.), *Educational measurement* (4th ed., pp. 623–646). Westport, CT: American Council on Education/Praeger.

Wylie, C., & Lyon, C. (2012, June). Formative assessment—Supporting students' learning. *R & D Connections* (No. 19). Retrieved from the Educational Testing Service website: http://www.ets.org/Media/Research/pdf/RD_Connections_19.pdf

PRINCIPLE 19 Students' skills, knowledge, and abilities are best measured with assessment processes grounded in psychological science with well-defined standards for quality and fairness.

EXPLANATION

PreK–12 teachers and leaders are working in an era when assessments are a constant topic of discussion and debate. It is important to remember, however, that there are clear standards for judging the quality of assessments of any type. This is true of both formative and summative assessment (see the *Standards for Educational and Psychological Testing*; AERA, APA, & NCME, 2014). **Assessments that are both reliable and valid help test score users make appropriate inferences about students' knowledge, skills, and abilities.**

The validity of an assessment can be thought of in relation to four essential questions:

- How much of what you want to measure is actually being measured?
- How much of what you did not intend to measure is actually being measured?
- What are the intended and unintended consequences of the assessment?
- What evidence do you have to support your answers to the first three questions?

The validity of an assessment tool is not simply a number. It is a judgment, over time and across a variety of situations, about the inferences that can be drawn from test data, including the intended or unintended consequences of using the test. For example, test users need to be able to infer from a test score that it accurately reflects student learning and not other factors. For this to be true, the test must be validated for the purpose and population for which it is being used. Further, individual test takers must be motivated to show what they can actually do. Otherwise, school personnel

cannot tell if student learning is being measured or if what is being measured is the degree of effort put into taking the test.

Fairness is a component of validity. Valid assessment requires saying clearly what an assessment is and is not supposed to measure and requires evidence of this for all test takers. Tests showing real, relevant differences are fair; tests showing differences that are unrelated to the purpose of the test are not.

Reliability of an assessment is also a key factor. A reliable assessment is one whose results are consistent indicators of student knowledge, skills, and abilities. Scores should not be affected by chance factors associated with, for example, student motivation or interest as it relates to a given set of test questions, variations in testing conditions, or other things that are not part of what test givers intend to measure. In general, longer tests are more reliable than shorter tests.

RELEVANCE FOR TEACHERS

Whenever teachers give an assessment, it is best to consider its strengths and limitations with respect to what they hope it will tell them about their students' learning. Teachers can apply strategies to improve the reliability of their assessments and be cognizant of why some assessments will be more reliable than others. Ways in which teachers can improve the quality of the assessments they use include:

- Carefully aligning assessments with what is taught.
- Using a sufficient number of questions overall and variety of questions and types of questions on the same topic.
- Using item analysis to target questions that are too hard or too easy and are not providing sufficient differentiation in knowledge (e.g., 100% of students answered correctly).
- Being mindful that tests that are valid for one use or setting may not be valid for another.
- Basing high-stakes decisions on multiple measures instead of a single test.
- Monitoring outcomes to determine whether there are consistent discrepancies across performance or outcomes of students from different cultural groups. For example, are some subgroups of students routinely overrepresented in certain types of programming (e.g., special education)?

REFERENCES

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.

Brookhart, S. (2011). Educational assessment knowledge and skills for teachers. *Educational Measurement: Issues and Practice, 30*(1), 3–12.

Moss, P. A. (2003). Reconceptualizing validity for classroom assessment. *Educational Measurement: Issues and Practice, 22*(4), 13–25.

Smith, J. K. (2003). Reconsidering reliability in classroom assessment and grading. *Educational Measurement: Issues and Practice, 22*(4), 26–33.

Wiliam, D. (2014). What do teachers need to know about the new *Standards* for educational and psychological testing? *Educational Measurement: Issues and Practice, 33,* 20–30. doi:10.1111/emip.12051

PRINCIPLE 20 Making sense of assessment data depends on clear, appropriate, and fair interpretation.

EXPLANATION

The meaning of assessment outcomes depends on clear, appropriate, and fair interpretation. **Scores from any assessment should generally be used only for the specific purposes for which they were designed.** For example, tests intended to rank order students for a competition may be valid, fair, and useful for that purpose, but at the same time these tests would likely be misleading for determining the strengths and weaknesses of each individual student's mastery of material in a particular subject-matter area.

RELEVANCE FOR TEACHERS

Effective teaching depends heavily on teachers being informed consumers of educational research, effective interpreters of data for classroom use, and good communicators with students and their families about assessment data and decisions that affect students. Teachers can weigh curriculum and assessment choices to evaluate whether those resources are supported by research evidence and are suitable for use with diverse learners.

To effectively interpret assessment data, teachers should address the following about any assessment they use:

- What was the assessment intended to measure?
- What comparisons are the assessment data based on? Are students being compared to one another? Or, instead, are students' responses being directly compared to samples of acceptable and unacceptable responses that the teacher or others have provided?
- What are the criteria for cut-points or standards? Are the students' scores being classified using a standard or cut-point, such as a pass/fail category, letter grades, or some other indicator of satisfactory/unsatisfactory performance?

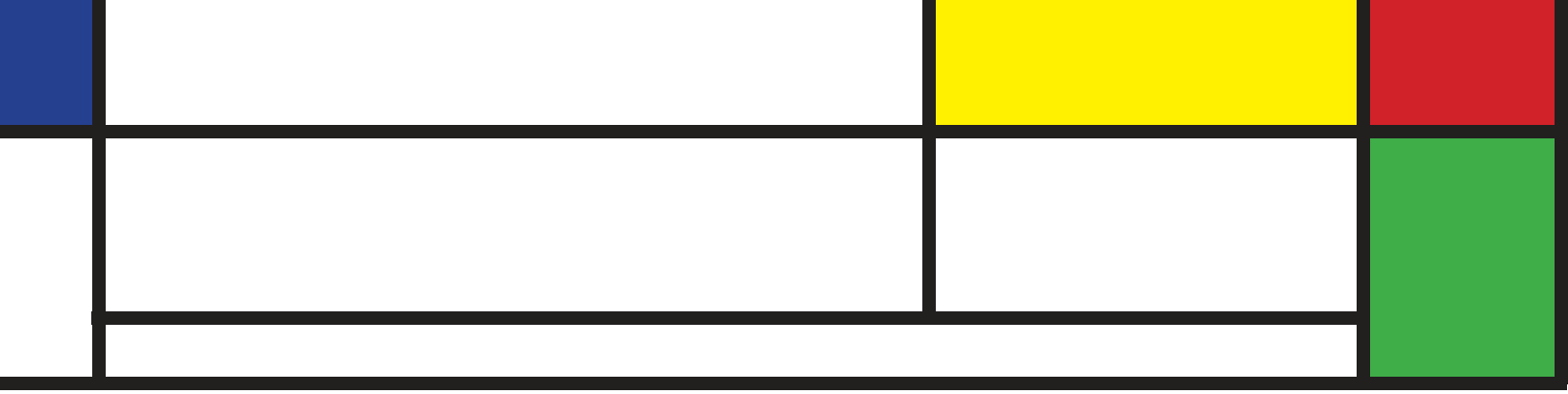
Data gathered from any assessment are best interpreted in light of their suitability for addressing specific questions about students or educational programs, their appropriateness for individuals from a variety of different backgrounds and educational circumstances, and the intended and unintended consequences that result from using the assessment. Because both higher- and lower-stakes tests can have significant impact on students, it is important to make careful interpretations of the results of either type of test.

Awareness of the strengths and limitations of any assessment is critical. Such awareness also enables teachers to communicate caveats, such as the imperfect reliability of scores (see more on this in Principle 19) and the importance of using multiple sources of evidence for high-stakes decisions.

REFERENCES

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.

American Psychological Association. (n.d.). *Appropriate use of high-stakes testing in our nation's schools*. Retrieved from http://apa.org/pubs/info/brochures/testing.aspx



AMERICAN
PSYCHOLOGICAL
ASSOCIATION

750 First Street, NE
Washington, DC 20002–4242

Printed in the United States of America