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Coalition for Psychology in Schools and Education



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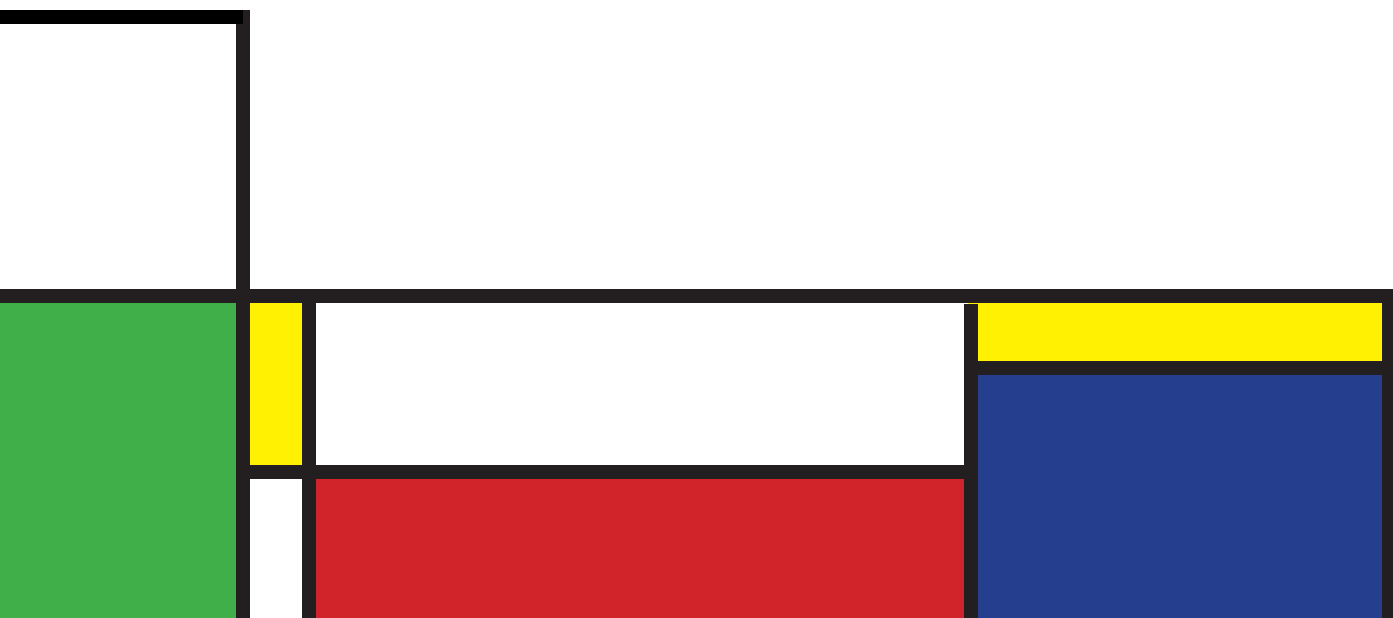
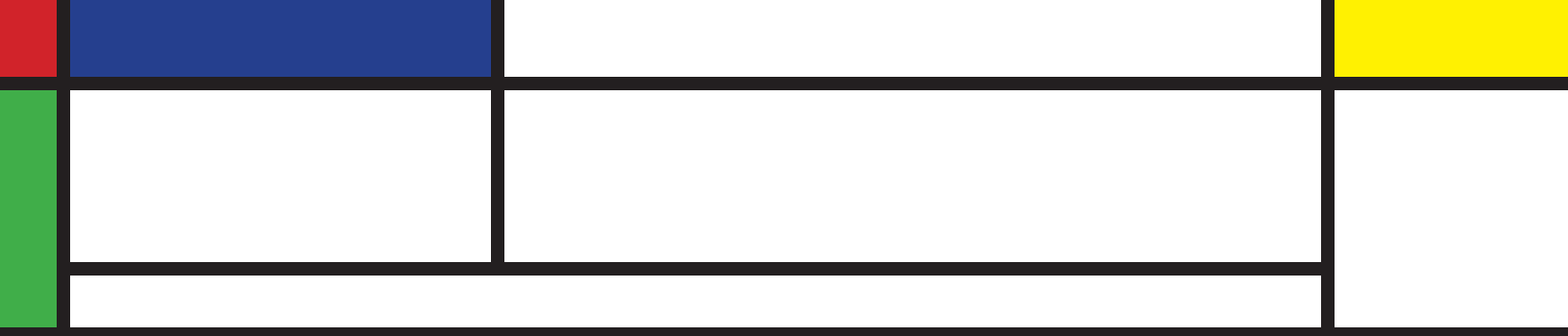
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1 Students' beliefs or perceptions about intelligence and ability affect their cognitive functioning and learning.

2 What students already know affects their learning.

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

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

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

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

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

Student creativity can be fostered.

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

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

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

12 Setting goals that are short term


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.

ally, 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.



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

**social context, interpersonal relationships,
and emotional well-being important to student**

The next two principles (16–17) relate to

How do students think and learn?

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

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).

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 de-**

- 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

and science.³ Teachers can gain an understanding of

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

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,

- 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.

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.

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) performance can be sustained and (b) expertise is developed through deliberate practice. The process of deliberate practice involves repeated and focused attention on a specific task, with the goal of improving performance over time. This process is often described as “deliberate practice” and is characterized by several key features: (1) a clear goal, (2) focused attention, (3) repetition, (4) feedback, and (5) a challenging task. The process of deliberate practice is often used to describe the training of experts in various fields, including music, sports, and the arts.

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

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

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).

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., & Willing D. T. (2013). The science of learning: A meta-analysis of retrieval practice effects on long-term retention. *Journal of Experimental Psychology: Applied*, 19(1), 10–21. doi:10.1037/xap0000018

- 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

Brookhart, S. M. (2008).

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. Minin

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- 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.

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

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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>

Student creativity can be fostered.

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.**

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.

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

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

- When using grades, teachers might want to highlight their informational (feedback) rather than

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.

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.

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

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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.

Goal setting is the process by which a person establishes a standard of performance (e.g., “I want to learn

13 Learning is situated within multiple social contexts.

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).

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

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

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>.

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How can the classroom best be managed?

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

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

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

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

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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.

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

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.

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

Formative assessments are used to guide and shape classroom instruction directly. *Summative*



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