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A Motivational Science Perspective on the Role of Student Motivation in Learning and Teaching Contexts

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A motivational science perspective on student motivation in learning and teaching contexts is developed that highlights 3 general themes for motivational research. The 3 themes include the importance of a general scientific approach for research on student motivation, the utility of multidisciplinary perspectives, and the importance of use-inspired basic research on motivation. Seven substantive questions are then suggested as important directions for current and future motivational science research efforts. They include (1) What do students want? (2) What motivates students in classrooms? (3) How do students get what they want? (4) Do students know what they want or what motivates them? (5) How does motivation lead to cognition and cognition to motivation? (6) How does motivation change and develop? and (7) What is the role of context and culture? Each of the questions is addressed in terms of current knowledge claims and future directions for research in motivational science.

The importance of student motivation has varied from peripheral to central in psychological and educational research over the years. Currently, research on student motivation seems to be central to research in learning and teaching contexts. Researchers interested in basic questions about how and why some students seem to learn and thrive in school contexts, while other students seem to struggle to develop the knowledge and cognitive resources to be successful academically, must consider the role of motivation. In addition, researchers and educators focused on the development of new instructional interventions, design projects, reform curricula, and innovative technological tools confront problems of student motivation to learn from all of these reform efforts. At the same time, even with all of this interest in student motivation, motivational research can appear to be fragmented and diffuse, especially to those from outside the motivational research community (Murphy & Alexander, 2000).

The purpose of this article is to provide an overview of current motivational research in learning and teaching contexts that highlights the most commonly accepted and empirically supported knowledge claims about student motivation as well as central questions and directions for future research. A motivational science perspective is proposed as a framework that can help to integrate diverse research findings as well as help to organize and unify future research efforts. I suggest three general themes that characterize a motivational science perspective and then discuss seven general substantive questions that are of current and continuing interest to motivational science researchers.

Three Themes for Motivational Science

The addition of the term *science* to various fields of social and behavioral science research has become common place in recent years. Cognitive science has been a field for some time now (Posner, 1989), and psychology has generally adopted the phrase *psychological science* to describe scientific research efforts at understanding human behavior. More recently, there have been volumes on developmental science (e.g., Cairns, Elder, & Costello, 1996), motivational science (e.g., Higgins & Kruglanski, 2000), affective science (Davidson, Scherer, & Goldsmith, 2003), and personality science (e.g., Cervone & Mischel, 2002). The *learning sciences* is also a term that has gained currency in research on teaching and learning (e.g., Bransford, Brown, & Cocking, 1999) and has resulted in a journal on learning sciences (*The Journal of the Learning Sciences*). There are many reasons and assumptions underlying the use of the word *science* in these efforts, but I will just note three themes that I think are important for a motivational science of student motivation.

First, the use of the term *science* is an important signal that research on human behavior, including motivation, can be and should be approached from a scientific perspective. In a postmodern era that emphasizes the construction, deconstruction, and relativity of knowledge, there are many challenges to the use of a scientific perspective (Gergen, 1994, 2001). Some of the criticisms come from a misplaced equating of a scientific perspective with logical positivism, but there are postpositivistic perspectives that still emphasize the importance of a scientific approach to knowledge generation. For example, Phillips and Burbules (2000) have noted that "what scientific research seeks, on the postpositivistic account, is a way to establish procedures and criteria that can

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support commonly adjudicated truth claims that do not depend solely on those subjectively experienced or believed 'realities'" (p. 37). They also noted that truth claims are not directed at the reality of objects in the world, but are in reference to statements or propositions about the situation or state of affairs in the world. As such, these statements are always conjectures about the situation, or in other words, knowledge is always conjectural. However, there is still a need for warrants for making these conjectural statements or knowledge claims (Phillips & Burbules, 2000). Most important, following Dewey's pragmatic suggestions, one of the key warrants is empirical evidence from well-conducted and competent empirical investigations (Phillips & Burbules, 2000).

Accordingly, a scientific perspective entails the use of empirical evidence to support knowledge claims. This perspective is agnostic about the use of quantitative or qualitative data, and the arguments over the relative utility of these methods are not particularly helpful. Data can be drawn from any type of study, including experimental, correlational, field, ethnographic, and case studies. The important point is that the data and study are well done and the inferences drawn from the data are well reasoned in support of the knowledge claims. As Mayer (2000, 2001) has pointed out, the reliance on empirical evidence and reasoned argument are important hallmarks of a scientific approach to educational research in comparison with other perspectives that draw on a more humanities- or arts-based epistemology (e.g., Barone, 2001).

In terms of motivational science, this means that our generalizations need to be supported by good empirical evidence in line with theoretical and conceptual reasoning about the nature of motivation. This does not imply that ideas from other perspectives can't play a role; it just provides some criteria for assessing the relative utility of the knowledge claims. For example, Gaskins (1999) in a recent essay in this journal on motivation from a Zen Buddhist approach suggested some intriguing ideas about the role of the self in motivation and learning in classrooms. However, he built his argument mainly on the use of quotes and epigrams from various Zen Buddhist texts, not empirical evidence from studies of students in classroom settings. More dangerously, he concluded that one instructional implication of his perspective is that classrooms should not be designed to foster self-regulation, self-efficacy, or self-determination (Gaskins, 1999, p. 213). From a motivational science perspective, this type of argument and conclusion is fatally flawed because it does not rely on empirical evidence from well-conducted studies. This type of argument may be persuasive in philosophical or literary circles, but it does not pass the scientific criteria for reasoned argument from evidence.

As a result, the conclusions and implications for instruction from Gaskin's (1999) essay are not warranted from a scientific perspective, especially in light of the strong empirical evidence in support of the constructs of self-regulation, self-efficacy, and self-determination (Bandura, 1997; Boekaerts, Pintrich, & Zeidner, 2000; Deci & Ryan, 1985; Pintrich & Schunk, 2002). This does not mean that these ideas about Zen, motivation, and the self are not interesting or useful or that the conclusions from Gaskins (1999) eventually may turn out to be correct. Science is inherently self-correcting because of its reliance on new empirical evidence to support or falsify competing knowledge claims (Phillips & Burbules, 2000). However, from a motivational science perspective, the current empirical evidence is not supportive of these ideas, and for those who wish to argue in favor of them, then it behooves them to test them empirically with students in learning situations before they can be accepted uncritically.

At the same time, Gaskins's (1999) use of philosophical ideas to understand human behavior, such as motivation, reflects the second theme of motivational science and the other new sciences. The second theme concerns the importance of multidisciplinary approaches to the problems of motivational science, developmental science, personality science, or the learning sciences (Cairns et al., 1996; Cervone & Mischel, 2002; Higgins & Kruglanski, 2000). As the questions and problems of human behavior are inherently complex and multifaceted, there is a need to draw on a diversity of traditional disciplines to understand the phenomena of interest, especially in the area of human cognition and motivation (Pintrich, 1994). Just as cognitive, developmental, and the learning sciences draw from psychology, anthropology, sociology, linguistics, philosophy, artificial intelligence, neuroscience, biology, and education, motivational science should draw from multiple disciplinary perspectives in terms of theories, constructs, and methods to address questions regarding the role of student motivation. In this way, philosophical ideas about the self and Zen Buddhism may be integrated into our models pending empirical support. The diversity of disciplinary approaches should lead to the evolution of motivational science as different ideas and constructs have different levels of relative success in helping us understand motivational phenomena. Psychological constructs, theories, and methods may hold a special place at the center of our research efforts, but the field should be informed and enriched by a multidisciplinary orientation that draws ideas and methods from many different fields that have bearing on issues of motivation (Pintrich, 1994). In particular, given the importance of understanding the learning and teaching contexts, educational theory and constructs will be important.

The importance of both psychological and educational perspectives brings me to the third theme that involves a focus on use-inspired basic research (Greeno, 1998; Pintrich, 2000b; Stokes, 1997). There has been a long tradition of conceptualizing basic and applied research as opposite endpoints on a simple continuum, and in research on student motivation, seeing those endpoints as mainly defined by psychological (basic) and educational (applied) research. In contrast, Stokes (1997) suggested that this is a false dichotomy and proposed two dimensions that when crossed form a 2×2 matrix that defines a two-dimensional space of four quadrants or types of research (see Table 1). The first dimension concerns the goal of scientific understanding, and research can vary from a high to a low concern for scientific understanding. The second dimension involves the goal of usefulness, and again research can vary from a high to low concern for utility and practical applications.

Stokes (1997) labeled the quadrant that is focused on the goal of scientific understanding but with little concern for utility *pure basic research* or *Bohr's quadrant*, in honor of the physicist who was only concerned with understanding atomic structure with little interest in the practical applications of his research (see Table 1). In contrast, the quadrant defined as high utility but low in the goal of scientific understanding was labeled *pure applied research* and *Edison's quadrant* by Stokes, after the great inventor Thomas Edison who was only concerned with the development of the practical uses of electricity, not with deeper scientific understanding. Stokes (1997) left unlabeled the cell that is low in both

Table 1
Different Types of Research in Motivational Science

Research goal	Pure basic research (Bohr's quadrant)	Use-inspired basic research (Pasteur's quadrant)	Unlabeled	Pure applied research (Edison's quadrant)
Goal—scientific understanding	High	High	Low	Low
Goal—practical utility	Low	High	Low	High
Research examples	Research on physiological mechanisms of motivation; role of basic motives and unconscious processes	Theory-driven design or intervention studies; longitudinal, developmental studies of role of motivational constructs in context	Research undertaken for a class to learn research skills	Testing and developing interventions, technologies, curricula to foster student motivation

scientific understanding and utility goals, but suggested that it may represent research taken on by an individual to satisfy his or her own curiosity about a local phenomenon or research undertaken by novices to learn research skills. The remaining cell, called *use-inspired basic research*, reflects a focus on both goals of scientific understanding and utility (see Table 1). Stokes named this cell *Pasteur's quadrant* in honor of Pasteur who made contributions to our basic scientific understanding of the microbiological processes of disease, but also applied his knowledge of microbiology to develop procedures to prevent the spoilage of vinegar, wine, beer, and milk. Stokes argued that Pasteur was a model of a scientist who combined both goals of understanding and utility in his research program and that much scientific research should follow in this tradition.

Both Greeno (1998) and Pintrich (2000b) have suggested that educational research and educational psychology should be working in Pasteur's quadrant in order to develop deeper scientific understanding as well as practical and useful applications to improve education. Pintrich (2000b) also has suggested the importance of research in Bohr's quadrant for educational psychology. In terms of motivational science, our research should be focused in Bohr's and Pasteur's quadrants. There will always be a need for pure basic research in Bohr's quadrant to help us understand motivational processes. For example, experimental research on the physiological and brain processes that underlie motivational processes may not have immediate practical applications in the classroom. Nevertheless, it is important to understand these processes as they represent the basic biological and physiological constraints that are operating on the cognitive and motivational systems. This type of physiological and neuroscience research can help us model the interactions among the various levels of the biological and psychological systems that should be integrated in our models (Pintrich, 1994; Schultheiss, 2001; E. O. Wilson, 1998).

However, for much of motivational science, especially the subfield of motivational science that is focused on student motivation in academic settings, the need for use-inspired basic research or work in Pasteur's quadrant is paramount. We should be striving for both goals of contributing to basic scientific understanding of motivation as well as developing useful ideas and design principles to improve motivation in educational and other teaching and learning settings. There can still be educational research and development efforts that are focused on the development of new programs and instructional strategies, new curricula and materials, and new and exciting technologies to motivate students. On the other hand, if these efforts are not accompanied by a goal of scientific understanding why and how they work, then they are more representative of work in Edison's quadrant. This work would not be considered motivational science, although it can be very useful, just as Edison's development and engineering work with electricity was very useful for society.

Seven Substantive Questions for Motivational Science

These three themes help to define a general motivational science perspective, but what are the key substantive questions or issues that reflect current research and future directions for a motivational science? There are a number of key questions in current motivation research (see Eccles, Wigfield, & Schiefele, 1998; Higgins & Kruglanski, 2000; Wigfield & Eccles, 2002a), but I focus on seven here. For each question, I highlight some of the commonly accepted knowledge claims as well as point to directions for future research. Given space limitations, the discussion of research concerning each question is not meant in any way to be comprehensive (for more detail, see recent reviews or books, e.g., Eccles et al., 1998; Pintrich & Schunk, 2002; Sansone & Harackiewicz, 2000; Volet & Jarvela, 2001; Wigfield & Eccles, 2002a).

1. What Do Students Want?

Motivational theories are concerned with the energization and direction of behavior. The term *motivation* is derived from the Latin verb *movere*, which means to move. In other words, motivational theories attempt to answer questions about what gets individuals moving (energization) and toward what activities or tasks (direction; Pintrich & Schunk, 2002). Higgins and Kruglanski (2000) suggested that this comes down to a central question of what do individuals want and whether there are basic needs that define what people want. This question about basic needs has had a long and troubled history in psychology, with theories and models of instincts, drives, and needs all foundering on issues regarding the overall number, decision rules for establishing the number, measurement issues, procedures and criteria for distinguishing basic or primary from secondary instincts, drives, or needs, and cross-cultural generalizability (Heine, Lehman, Markus, & Kitayama, 1999; Higgins & Kruglanski, 2000; Pintrich & Schunk, 2002). Given these specific difficulties, it is not surprising that most recent motivational research has focused on social–cognitive models that do not rely on drive or need con-

structs and focus instead on various cognitive, motivational, and regulatory constructs. This move to cognitive models in motivation also parallels the general cognitive revolution in psychology at large, albeit motivation research has focused on social–cognitive models, symbolizing the importance of the social context and interactions with others in comparison with cognitive models that downplay the importance of social factors. However, there is a renewed interest in the role of needs and motives, as the limitations of the social–cognitive models' emphasis on cognitive and rational processes become more clear. Needs and motives are more affective, and interest in their function should lead to more research on the important role of affect and emotions in school contexts (Schutz & DeCuir, 2002). Needs and motives also are assumed to operate at a more implicit or unconscious level, counterbalancing the cognitive and conscious processes stressed in social–cognitive models. It seems clear that future research will attempt to build models that integrate implicit, unconscious processes with more explicit and conscious processes as their relative strengths and weaknesses complement one another (Elliot, 1997; Epstein, 1994).

In current research on student motivation, self-determination theory (Deci & Ryan, 1985; R. M. Ryan & Deci, 2000) is one model that has integrated both needs and social–cognitive constructs. In this model, there are three basic needs: competence, autonomy, and relatedness. The need for competence refers to the desire to master and be competent in interactions with the environment. The need for autonomy reflects a desire to be in control or to feel autonomous or self-determining in terms of one's own behavior. The need for relatedness reflects a wanting to belong or be attached to a group (cf. Baumeister & Leary, 1995). These needs are assumed to be innate for all humans in all cultures and apply across all situations, and if individuals can't satisfy these needs, then their motivation as well as a host of other cognitive, affective, and behavioral indicators of adaptive functioning will suffer. Although these needs are basic to human functioning, self-determination theory proposes that the effects of these needs on behavior or other outcomes are mediated by social–cognitive constructs such as perceived competence, control beliefs, and regulatory styles (R. M. Ryan & Deci, 2000).

Covington (1998) also has proposed a theory of motivation based on a needs approach, but in contrast to self-determination theory, this theory only assumes that there is one basic need, the need for personal self-worth. As students attempt to establish and maintain their personal self-worth, they approach and avoid different types of academic tasks. In addition, social–cognitive constructs such as perceptions of competence and attributions also play an important role in mediating between the need for self-worth and behavior. Finally, given the concern with personal self-worth and self-esteem, this model includes more affective components such as emotions and achievement motives such as the need for success and the fear of failure (Covington, 1998; Covington & Dray, 2002). Crocker and Wolfe (2001) have presented a domain-specific model of self-worth that expands and clarifies the role of self-worth by focusing on how self-worth can influence motivation, affect, and behavior through the different contingencies or personal relevance to self-worth different domains have for individuals. This model helps to clarify and specify in a more detailed and precise manner the role that self-worth may play in achievement dynamics, and future research on it may help to resolve some of the inconsistencies in the research on self-worth and achievement.

Research on achievement motives has a long history in research on student motivation, with much attention to the motives to approach success and to avoid failure (Atkinson, 1964; Elliot, 1997; McClelland, Atkinson, Clark, & Lowell, 1953). Personality researchers have been concerned with general motives such as need for achievement, need for power, and need for affiliation, which reflect wishes or desires that the individual would like to bring about in many different situations (Elliot, 1997; Winter, John, Stewart, Klohnen, & Duncan, 1998). These three motives share some similarities in content with the three needs of self-determination theory, with need for achievement representing a desire to achieve and be successful, similar in some ways to the need for competence. The need for affiliation reflects a need or desire for attachment to others, paralleling the need for relatedness. The need for power is not really compatible with the need for autonomy, as it reflects a desire to influence or have control over others, whereas the need for autonomy is directed at the self in terms of a need for control over one's own behavior (Pintrich & Schunk, 2002). These motives are assumed to vary substantially between individuals, with some people being higher in some motives than other motives, whereas self-determination and self-worth theories assume that all individuals have the same basic needs.

Finally, although motives can be conscious, in many cases they are assumed to be unconscious or implicit and as such differ from more cognitive constructs such as goals that people strive for, which also represent their wishes and desires. In most current models, these three motives are assumed to be one personal factor that influences the types of goals and regulatory styles that individuals adopt (e.g., Elliot, 1997; Elliot & Church, 1997; Schultheiss, 2001). In other words, similar to the role of needs in self-determination and self-worth theories, the effects of motives on behavior are assumed to be mediated through various social–cognitive constructs such as goals and regulatory strategies. For example, Elliot and Church (1997) have shown that motives do not have a direct effect on achievement behavior, but are linked to different achievement goals that individuals pursue, which in turn influence behavior. Schultheiss (2001) has suggested that when explicit goals and implicit motives are congruent, then individuals are more motivated and perform better. The exploration of how implicit motives and explicit goals are related and their links to self-regulation, affect, and achievement will be an important direction for future basic motivational science research.

Higgins and Kruglanski (2000) mentioned a number of other potential basic needs or wants that may play a role in motivating people, but also noted the importance of developing criteria to determine what defines a basic need or want. Research on this problem reflects a more basic research question from Bohr's quadrant for motivational scientists. In terms of use-inspired research on motivation in classrooms, it has been, and will continue to be, a more active research area to examine the role that the various social–cognitive constructs play in motivating students. If there is some general consensus that the effects of needs and motives on behavior are mediated through social–cognitive constructs, then it is important to examine these social–cognitive constructs as they should be more causally related to behavior. In addition, if the social–cognitive constructs are assumed to be more

situated and malleable, not stable personality traits, then it is more productive from an educational perspective to focus on constructs that offer the potential to be changed or more strongly influenced by the context. Most of the recent research on student motivation has focused on these social–cognitive constructs and their role in classrooms.

2. What Motivates Students in Classrooms?

There are a host of social–cognitive models and constructs that have been proposed to answer this question, and this can be confusing and limit progress in the field (Murphy & Alexander, 2000), although the plethora of models is probably not that different from research on cognitive constructs such as working memory (see Miyake & Shah, 1999). Nevertheless, there are five basic families of social–cognitive constructs that have been the focus of most recent research on student motivation in classroom contexts. These social–cognitive constructs are assumed to be much more situation and domain specific in contrast to the more general needs and motives discussed in the previous section. In line with this assumption, the research has focused on achievement-, classroom-, and school-related beliefs of students and their roles in motivating them in learning contexts. There is no need to review in detail all of the research on these constructs given recent reviews (e.g., Eccles et al., 1998; Pintrich & Schunk, 2002), but I will highlight some important generalizations from this work, their implications for design principles, and directions for future research. Given that these social–cognitive constructs have been the focus of so much of the recent motivational research in educational settings, discussion of this second question is longer than the other six questions.

Adaptive self-efficacy and competence perceptions motivate students. It has been a major finding from the earliest models of achievement motivation and behavior that when people expect to do well, they tend to try hard, persist, and perform better (Pintrich & Schunk, 2002). It is important to note that there are some important theoretical and substantive differences among different expectancy constructs, but for the purpose of this article, the focus is on the general principles that can be derived from synthesizing across different theoretical approaches and models. Accordingly, there are a number of different expectancy constructs such as self-efficacy, perceptions of competence, and expectancy for success from self-efficacy, self-worth, self-determination, and expectancy-value theories, but the general principle remains the same. Students who believe they are able and that they can and will do well are much more likely to be motivated in terms of effort, persistence, and behavior than students who believe they are less able and do not expect to succeed (Bandura, 1997; Eccles et al., 1998; Pintrich & Schunk, 2002). There also is good evidence to suggest that these confident students will also be more cognitively engaged in learning and thinking than students who doubt their capabilities to do well (e.g., Pintrich, 1999; Pintrich & Schrauben, 1992; Schunk, 1991).

It is important that these self-efficacy and competence beliefs are adaptive, in terms of representing a fairly accurate perception of one's capabilities. There are dangers associated with overly optimistic or pessimistic perceptions of efficacy or competence (Bandura, 1997). There is a clear need for more research on this issue of the calibration of knowledge, expertise, efficacy, and competence beliefs in classroom contexts (Pintrich, 2000d; Pintrich & Zusho, 2002; Stone, 2000). On the one hand, from a motivational perspective, it would seem that having as high as possible efficacy and competence beliefs would be useful and keep students motivated. On the other hand, from a self-regulatory perspective, if students are consistently overestimating their capabilities, they might not be motivated to change their behavior in the face of feedback that provides them with information about their weaknesses. For example, a student who consistently overestimates his understanding of text, who believes he is a good reader, when he is not, is unlikely to be motivated to go back and repair his understanding or to change his overall reading behavior and strategy use (Pintrich, 2000d; Pintrich & Zusho, 2002). There has been very little research on this issue of the calibration of efficacy beliefs and how they are linked to cognition, self-regulation, and behavior. Future research will have to distinguish among perceptions of current task performance, knowledge and expertise, more general self-competence beliefs, and self-efficacy for learning (Stone, 2000). It may be that situation-specific perceptions and judgments should be relatively accurate in terms of directing cognition and self-regulation during task performance, but that more general beliefs should be overly optimistic in terms of high confidence in one's capabilities, which could lead students to choose to do the task initially and also operate as a protective factor and promote resilience if initial attempts at the task are not successful. This type of research also will help clarify the roles of different expectancy constructs and the utility of different theoretical approaches.

This issue of differing levels of analysis and the problems of situational and domain specificity of constructs is a recurring theme in all areas of motivation, not just for research on the role of efficacy and competence beliefs (e.g., Crocker & Wolfe, 2001; Volet & Jarvela, 2001). There is a need for more research that carefully delineates among these different levels of analysis and also examines how the different levels may interact to produce motivated behavior. It is likely that there are multiple motivational pathways for the energization and direction of behavior (Pintrich, 2000c). Some students may be motivated and sustained through their self-efficacy beliefs, whereas others are motivated to try hard, persist, and achieve because of their goals, their personal interests, their value beliefs, or contextual factors that motivate, support, and direct their behavior. At this point in the development of motivational science, it seems more productive to attempt to understand these multiple pathways through research that examines how different personal and contextual factors interact to generate different patterns of motivated behavior. This strategy would seem to be more fruitful than attempts to prove or falsify the importance of single constructs, such as self-efficacy, in relation to other factors, or to pit personal and contextual factors and explanations against each other (Pintrich, 1994, 2000b). At the same time, it is important to avoid the proliferation of similar constructs with different labels that serve the same motivational function. It is important to maintain distinctions in constructs and labels when they reflect important and real differences in the terms, theories, and supporting empirical data, but not let constructs and models proliferate when they signify distinctions without theoretical or functional differences (Pintrich, 2000a).

Table 2 lists the generalizations about the motivational role of the social–cognitive constructs as well as the implications for the design of instruction that are common to the motivational literature

Table 2
Motivational Generalizations and Design Principles

Motivational generalization	Design principle
Adaptive self-efficacy and competence beliefs motivate students.	Provide clear and accurate feedback regarding competence and self-efficacy, focusing on the development of competence, expertise, and skill.
	Design tasks that offer opportunities to be successful but also challenge students.
Adaptive attributions and control beliefs motivate students.	Provide feedback that stresses process nature of learning, including importance of effort, strategies, and potential self-control of learning.
	Provide opportunities to exercise some choice and control.
	Build supportive and caring personal relationships in the community of learners in the classroom.
Higher levels of interest and intrinsic motivation motivate students.	Provide stimulating and interesting tasks, activities, and materials, including some novelty and variety in tasks and activities.
	Provide content material and tasks that are personally meaningful and interesting to students.
	Display and model interest and involvement in the content and activities.
Higher levels of value motivate students.	Provide tasks, material, and activities that are relevant and useful to students, allowing for some personal identification with school.
	Classroom discourse should focus on importance and utility of content and activities.
Goals motivate and direct students.	Use organizational and management structures that encourage personal and social responsibility and provide a safe, comfortable, and predictable environment.
	Use cooperative and collaborative groups to allow for opportunities to attain both social and academic goals.
	Classroom discourse should focus on mastery, learning, and understanding course and lesson content.
	Use task, reward, and evaluation structures that promote mastery, learning, effort, progress, and self-improvement standards and less reliance on social comparison or norm-referenced standards.

(Brophy, 1999; Pintrich & Schunk, 2002; Stipek, 1996). The first principle relates to efficacy and competence judgments and concerns the provision of accurate feedback to students about their performance and learning, focusing on the development of competence, expertise, and skill. Although some folk theories and popular self-help books may stress the importance of only providing positive feedback to students to build their self-worth, it is more important that students understand what they can and can't do and have accurate and realistic feedback that can help them acquire the expertise needed to learn (Pintrich & Schunk, 2002). The second design principle listed in Table 2 highlights the fact that many motivational theories, as well as cognitive theories (including Vygotskian models), stress the importance of providing tasks that are within the range of competence for students. The tasks should be neither too easy nor too difficult, but challenge students in appropriate ways (Brophy, 1999; Pintrich & Schunk, 2002). This allows students to use their prior knowledge and expertise as well as engages students in tasks in which they feel confident and competent and can succeed.

Before moving on to discussing the role of attributions and control beliefs, there are two important general features about all of the design principles in Table 2 that should be noted. First, given the dynamics of motivation, there is overlap between principles (see Ford, 1992), such that implementing one principle may not just facilitate one component of motivation (e.g., efficacy), but also may facilitate others (i.e., interest, value). Second, it should be clear that these design principles are stated in a general form that then must adapted to the local school, classroom, disciplinary, and cultural contexts by teachers and designers. Architects may have some general design principles that guide their work, but there are clearly very different instantiations of these principles as there are many different types and forms of buildings that are built. In the same manner, teachers and instructional, curriculum, and technology designers need to adapt these general principles to fit their goals and the affordances and constraints of the local instructional context and culture. As students may take multiple pathways to achievement, so may teachers and instructional designers take multiple pathways in using these design principles to create motivating and challenging learning environments for students.

The implication is that there is no single right way to design classrooms to foster motivation and learning and that all motivating classrooms do not have to be designed, organized, and structured in the same way. Moreover, this suggests that research that pits one intervention or reform against another in simple "horse-race" designs that make global comparisons across interventions may not serve scientific goals of understanding motivational processes, albeit this type of research may certainly serve practical utility and policy goals (see Table 1). The key issue for future

use-inspired basic research seems to be to try to understand effective ways to implement these principles and to empirically examine how they work; under what conditions; with what type of students and teachers; in what types of schools; how different principles may support or conflict with other principles when actually implemented in classrooms; and how these principles may foster student motivation, cognition, and learning in diverse classrooms.

Adaptive attributions and control beliefs motivate students. Another important family of motivational constructs includes attributions and control beliefs, and again there are many different models (see Skinner, 1996) that span the range from attributional theory to self-determination theory. The basic construct refers to beliefs about the causes of success and failure and how much perceived control one has to bring about outcomes or to control ones' behavior (Skinner, 1996; Weiner, 1986). Although there are some mixed results (cf. Findley & Cooper, 1983; Stipek & Weisz, 1981), the general trend is that students who believe they have more personal control of their own learning and behavior are more likely to do well and achieve at higher levels than students who do not feel in control, such as those who are often labeled as *learned helpless* (Pintrich & Schunk, 2002; Skinner, Zimmer-Gembeck, & Connell, 1998). For example, Perry and his colleagues (e.g., Perry, Hladkyj, Pekrun, & Pelletier, 2001) have shown that higher levels of perceived control are positively related to a host of positive cognitive, motivational, affective, and academic achievement outcomes. Skinner et al. (1998), in a longitudinal study, found that optimal patterns of perceived control were linked to more engagement in school as well as higher levels of academic achievement.

Research from self-determination theory also has demonstrated the importance of an internal locus of causality and perceptions of autonomy and competence in adaptive behavior (Deci & Ryan, 1985; R. M. Ryan & Deci, 2000). Recent research from this perspective has expanded the traditional distinction between intrinsic and extrinsic motivation to a more complex differentiation of extrinsic motivation. Intrinsic motivation reflects behavior that is undertaken for its own sake, enjoyment, and interest with a high degree of perceived internal control. In contrast, extrinsic motivation reflects an activity or behavior undertaken for some instrumental value or external reason. Current research in this tradition has differentiated four types of extrinsic motivational styles that reflect a continuum from most externally controlled to internally controlled or self-determined. They are (a) external, which is the most externally regulated or controlled by others or by external constraints such as rewards; (b) introjection, which reflects the start of an internalization of values, but control is still perceived as being external to the person as he or she seeks approval from others; (c) identification, where there is more internal control and self-endorsement of values and goals; and (d) integration, which reflects high internal control and congruence between the self and values and goals (R. M. Ryan & Deci, 2000). These qualitatively different styles of motivation can lead to different outcomes, with a generally positive correlation between the more internalized styles and more engagement in school, better learning and performance, as well as greater psychological well-being (R. M. Ryan & Deci, 2000). The specification of these different motivational styles from four different types of extrinsic motivation to intrinsic motivation again highlights the general idea that there are multiple extrinsic and intrinsic motivational pathways to adaptive outcomes and there is a need for more research on how students pursue these different pathways and how they are socialized to internalize the different styles.

However, there may be times when having little perceived control may be adaptive for students, especially in the face of failure, when they can attribute it to causes outside of their control (Weiner, 1986). At the situational level of attributions for a specific event, the stability dimension, not the controllability dimension, seems to be more important in predicting future expectancies and motivated behavior (Weiner, 1986). In contrast, perceived control is usually assumed to be a more stable individual difference construct, reflecting a different level of analysis. At an individual difference level, the construct of theories of intelligence, with the basic distinction between incremental (malleable) or entity (unchangeable) intelligence, reflects the controllability dimension. Dweck (1999, 2002) has shown the importance of this construct for cognition, motivation, and achievement.

There does seem to be an important difference between general developmental beliefs about the stability of ability or intelligence in contrast to the individual difference construct of theories of intelligence (incremental and entity theories) with differential relations to various self-evaluative processes (e.g., Pomerantz & Saxon, 2001). As noted previously, there is still a need for research that relates individual difference level constructs such as perceived control or regulatory styles with more dynamic and situationally responsive constructs such as attributions or even theories of intelligence that may be both situational and stable. As Perry et al. (2001) and Dweck (2002) both pointed out, how they operate together may provide us with a much richer understanding of motivational dynamics. In fact, there is a need for research that examines the interactions and dynamic relations among all of the various social–cognitive constructs, not just those regarding attributions, control beliefs, and theories of intelligence.

Table 2 also lists some design principles that follow from the research on these constructs. For example, Dweck (1999) suggested that feedback that focuses on the processes of learning, including the use of strategies, effort, and the general changeable and controllable nature of learning, should foster the adoption of a more incremental view of ability with concomitant positive outcomes. This type of feedback also should foster adaptive attributional patterns. Self-determination theory, with its emphasis on the basic need for autonomy, would highlight the importance of providing some autonomy, choice, and control for students, especially in order to foster intrinsic motivation (Deci & Ryan, 1985). At the same time, too much choice could have some less adaptive qualities (e.g., Iyengar & Lepper, 2000), and the key issue for future use-inspired basic research in this area is to understand the different parameters that impinge on the effective and adaptive provision of choice and control. For example, there may be developmental and individual factors such as students' knowledge, cognitive, and self-regulatory resources that can dramatically influence how students might cope with and react to different levels of choice and control. In addition, there are contextual factors in the school and classroom and more general cultural factors (e.g., Iyengar & Lepper, 1999) that might make the implementation of this design principle about choice and control more or less effective.

Finally, in terms of self-determination theory and helping students internalize the different extrinsic regulatory styles related to

personal control, Grolnick, Gurland, Jacob, and Decourcey (2002) suggested the importance of providing not only meaningful and cognitively understandable rationales, but also that the there is a warm, caring, and involved teacher or parent. This type of relationship will help to satisfy the basic need for relatedness in self-determination theory, but interestingly, also is in line with other general design principles calling for the creation of a community of learners (Brown, 1997) that are based on more cognitive analyses of learning and teaching. In fact, many of the design principles in Table 2 (e.g., provision of optimally challenging tasks within the zone of proximal development) can be derived from both cognitive and motivational analyses (cf. Bransford et al., 1999; Pintrich & Schunk, 2002). This congruence is not just serendipitous, but reflects the interpenetration of motivational and cognitive systems when considering the whole learner in context.

Higher levels of interest and intrinsic motivation motivate students. Besides beliefs about competence and control, interest and intrinsic motivation motivate students (Renninger, Hidi, & Krapp, 1992). An important distinction in this area of research is between personal and situational interest. Personal interest is a more stable individual difference variable that represents an individual's relatively enduring disposition to be attracted to, to enjoy, or to like to be engaged in a particular activity or topic (e.g., interest in sports, dinosaurs, music, computers, etc.). It is differentiated from curiosity, which is assumed to be a personal characteristic of the person, but is more diffusely directed toward many different activities (e.g., a student who is curious about many different topics). In contrast, situational interest is assumed to be a psychological state of being interested in a task or activity that is generated by the interestingness of the task or context (e.g., experiencing interest in a topic as a function of hearing a fascinating lecture or watching an exciting and stimulating television program; see Pintrich & Schunk, 2002).

Research on both personal and situational interest has shown that higher levels of both are associated with more cognitive engagement, more learning, and higher levels of achievement (Eccles et al., 1998; Hidi, 1990; Pintrich & Schunk, 2002; Schiefele, Krapp, & Winteler, 1992). A key direction for future research is not demonstrating that interest matters, but rather trying to understand how and why interest has its effect on learning and achievement. In contrast to much of the classroom research on self-efficacy and control beliefs, much of the interest research has been focused on the role of interest in text comprehension, using more experimental designs. This orientation has lead to a closer examination of how interest may influence cognitive processing, the activation of prior knowledge, and strategy use (Alexander, Kulikowich, & Jetton, 1994). In fact, interest research has been most concerned with how interest and knowledge interact, providing an excellent model for future research on the relations among motivational and cognitive constructs. A continuation of this type of research will certainly help us understand how motivational constructs relate to various cognitive processes, leading to much-needed integrated models of motivation and cognition.

There also is a need for research on how personal interests develop, how exactly individuals become interested in one specific topic or activity over other activities, and how these interests relate to the development of other motivational constructs (e.g., efficacy, value) and the development of the self- and personal identity (Krapp, 2002). We do not really understand the role contextual factors play in interest development. Situational interest and designing environments to "catch" and "hold" student interest may foster the development of personal interest (Hidi & Harackiewicz, 2000), but there is still a need for longitudinal, microgenetic, and intraindividual developmental studies that examine the mechanisms that might underlie this relation (Krapp, 2002). Finally, there is a need for research on how various contextual factors might promote both situational and personal interest and their interactions (Bergin, 1999; Hidi & Harackiewicz, 2000).

Interest is also one of the central features of intrinsic motivation in self-determination theory (Deci & Ryan, 1985). Students who are intrinsically motivated not only feel autonomous and self-determined, but also experience high levels of interest. Intrinsic motivation in this theory would encompass personal interest, but also incorporate the feelings of autonomy and self-determination and in that sense would exclude situational interest, which is more externally regulated. Intrinsic motivation is autotelic as the activity is undertaken for its own sake, for the inherent satisfaction in doing the task, and from involvement in the task. Individuals will also experience higher levels of interest. Intrinsic motivation has been positively linked to a number of important and desired cognitive and motivational outcomes in both academic and nonacademic settings (Deci & Ryan, 1985; R. M. Ryan & Deci, 2000).

The factors mentioned in the previous section on personal control can influence intrinsic motivation and interest, but there also has been a recent renewal of the debate about the role of rewards in undermining interest and intrinsic motivation (Cameron & Pierce, 1994; Deci, Koestner, & Ryan, 1999; Eisenberger & Cameron, 1996, 1998; Sansone & Harackiewicz, 2000). The issues are complicated, and the findings vary by outcome measures and a host of other conditions, but a key distinction is between informational and controlling rewards, with rewards that convey some information to students about their developing competence, skills, or self-efficacy not being detrimental to student motivation and achievement. Basic researchers may want to pursue the general question regarding the detrimental effects of rewards, but for use-inspired basic classroom research, it seems more fruitful for future research to focus on how the traditional rewards used in classrooms (such as grades or point systems, which are not going to disappear in the near future) can be combined with other classroom factors to effectively support and maintain student motivation. The effects of rewards can be mediated through the four different external regulatory styles discussed previously, which highlight again how there may be multiple pathways of student motivation and achievement through different classroom contexts.

Table 2 lists some design principles that should encourage interest and intrinsic motivation, even in the face of common extrinsic classroom practices like the use of rewards and grades (see also Bergin, 1999). These include the provision of tasks and activities that are interesting, stimulating, novel, and personally meaningful in some manner. The nature of the discourse in the classroom concerning how interesting the content and activities are should foster the development of interest as well. Of course, the key issue for designers and teachers is to determine how to implement these principles in the classroom, and there is certainly a need for research on the various parameters of classrooms that can lead to the development of interest and intrinsic motivation.

Higher levels of value motivate students. Although interest and intrinsic motivation can certainly motivate students to learn, it

also matters whether students care about or think the task is important in some way. In recent achievement motivation research, this has been operationalized most explicitly in expectancy-value theory, with task value beliefs defined in terms of four components—intrinsic interest, utility, importance, and cost (Eccles & Wigfield, 1995; Wigfield, 1994; Wigfield & Eccles, 1992). In this model, intrinsic interest is similar to personal interest, whereas utility is defined in terms of individuals' perceptions of the usefulness of the content or task to them, a more extrinsic orientation to the task. Importance or attainment value refers to how important it is to do well on the task for the individual as well as how central the task is perceived to be to the individual's personal identity. Cost beliefs refer to the perceptions of the costs or negative consequences of engaging in the task, although it has not been empirically investigated as much as the other three components of task value (Pintrich & Schunk, 2002).

One of the most interesting findings in recent research on task values from an expectancy-value framework is the differential prediction of outcomes. Eccles and Wigfield and their colleagues (Eccles et al., 1998; Wigfield & Eccles, 1992, 2002b) have shown in their longitudinal studies that task value beliefs seem to predict choice behavior, such as intentions to enroll in future math courses as well as actual future course enrollment, whereas expectancy beliefs like efficacy or competence perceptions seem to predict achievement once students are enrolled in the course. This finding is another example of the idea of multiple outcomes and multiple pathways to learning and achievement. In this case, it seems clear that both values and efficacy perceptions have different roles to play in motivating students, and we need research to understand how they work together, rather than horse-race research that attempts to determine which is the best predictor of motivated behavior. There is some emerging evidence (e.g., Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002) that developmental changes in competence perceptions lead to changes in values over time, but there is a clear need for more research on how competence perceptions and values develop together and differentially influence learning and achievement. Finally, as in research on interest, Brophy (1999) has noted that there is a need for more research on how to facilitate the development of values and the role of contextual factors in facilitating task value.

Table 2 also lists some design principles that can be derived from the generalization about value. Brophy (1999) has suggested the importance of providing tasks and activities that students find useful, meaningful, and personally relevant, and that allow for them to identify with the content. He noted that the principle of personal identification is in need of empirical support, but it does highlight the theme of multidisciplinary research that attempts to integrate the research on the basic social–cognitive components of motivation (efficacy, control, interest, value, and goals) with other constructs from social and personality psychology as well as anthropology and sociology. It may be that constructs like personal identity or possible selves are higher level constructs that represent some integration of the social–cognitive constructs and that the effects of personal identity are mediated through the social–cognitive mechanisms already identified by motivational theory and research (Garcia & Pintrich, 1994). On the other hand, these higher level constructs like personal identity may operate differently to influence learning and achievement and may be linked to contextual and cultural factors in a different manner. There is a clear need for research on these constructs like personal identity in terms of how they are related to the more traditional social–cognitive constructs, how they influence learning and achievement, and how they are developed and fostered in different classroom and cultural contexts (see Leary & Tangney, 2003; Paris, Byrnes, & Paris, 2001).

Goals motivate and direct students. The fifth family of social–cognitive constructs that has been a major focus of research on student motivation is goals and goal orientation. There has been a great deal of research on different goal constructs and their role in motivating and directing human behavior (Austin & Vancouver, 1996), but in research on student motivation, there have been two main programs of research. One program focuses on goal content and the multiple goals that students can pursue in school settings, whereas the other has focused on the nature of achievement goals or goal orientations. In both cases, the specific content and the nature of the goals serve to motivate and direct behavior in classroom contexts.

Goal content approaches (e.g., Ford, 1992; Wentzel, 2000) assume that there are multiple goals that students can pursue in a classroom, and Ford (1992) has provided a comprehensive taxonomy of 24 goals that individuals might pursue in any context. Wentzel (1991, 1999, 2000) has applied this goal content approach to the classroom and examined the role that different goals play in learning, adjustment, and achievement. In particular, she has shown that the pursuit of social goals such as making friends and being responsible (adhering to classroom rules and norms) are related to academic outcomes including effort and achievement. Accordingly, social goals, which are often assumed to distract from academic pursuits, can be harnessed in the service of academic goals. She also has suggested that there are several different models for how social goals might be related to academic goals and outcomes and that there is a clear need for more research on the mechanisms that link social and academic goals and outcomes. For example, Anderman (1999) and Patrick (1997) have suggested that social goals may be linked to academic outcomes through self-regulation processes, an important new area of research that is expanding our understanding of motivation by integrating social and academic goals and regulation. Finally, this research on social goals also highlights the importance of peer groups and interactions, with other students as important contexts for the shaping and development of motivation, a context that has tended to be ignored, but research is underway that will help us better understand the role of peers in motivation (e.g., A. Ryan, 2000, 2001).

This work on social and academic goals has highlighted the importance of considering how the pursuit of multiple goals is coordinated and enacted in the classroom. Wentzel (2000) has suggested that values such as utility, importance, interests, and costs provide the reasons for why students might pursue different goals, but we still do not understand how this "binding" of goals and values occurs or why students may pursue goals that they do not necessarily value or why they don't pursue goals that reflect their values. We also do not really understand how students may regulate toward multiple goals and the different strategies that they may use to achieve social and academic goals simultaneously. There is a clear need for more research on multiple goals and their regulation and achievement in the classroom.

In keeping with the multidisciplinary theme, and as Anderman (1999) has suggested, motivation research in this area could be

informed by social psychological perspectives (e.g., Shah & Kruglanski, 2000) that suggest that goals can be attained through different means (the principle of equifinality), such that some goals can be readily achieved through many means, whereas others may have only one route to satisfaction. In addition, any one strategy or means can be associated with multiple goals (the principle of multifinality), meaning there is not necessarily a one-to-one correspondence between goals and means. Understanding how multiple academic and social goals operate and how multiple strategies or means are associated with different goals in different types of classroom contexts should be a focus of much future research.

Besides the goal content approach, one of the most active areas of motivation research in classroom contexts over the last 15 years or so has been research on achievement goal orientations. Goal orientations are defined as the reasons and purposes for approaching and engaging in achievement tasks. Original formulations of goal orientation stressed two general orientations to achievement, mastery and performance goals, although other labels have been used including *learning*, *task-involved*, and *ego-involved goals* (cf. Ames, 1992; Dweck & Leggett, 1988; Nicholls, 1984). There are some salient differences in these models, hence the different labels, but for the most part the terms *mastery* and *performance goals* have become the standard labels. Mastery goals orient the student toward learning and understanding, developing new skills, and a focus on self-improvement using self-referenced standards. In contrast, performance goals represent a concern with demonstrating ability, obtaining recognition of high ability, protecting self-worth, and a focus on comparative standards relative to other students and attempting to best or surpass others. Under this normative two-goal model, mastery goals have generally been associated with a host of positive cognitive, motivational, affective, and behavioral outcomes, whereas performance goals have been linked to less adaptive outcomes (Ames, 1992; Dweck & Leggett, 1988).

Paralleling the multiple goals perspective of goal content approaches, recent research on achievement goals has stressed three reasons for considering multiple achievement goals (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002). First, this multiple goals perspective has questioned the utility and validity of the simple two-goal model and suggested instead that besides the mastery−performance distinction, another important dimension to consider is whether the goals lead students to approach or avoid their goals (e.g., Elliot, 1997, 1999). This approach−avoid distinction was originally applied to distinguish two types of performance goals, performance-approach goals where the student is focused on achieving at higher levels than others and demonstrating high ability, and performance-avoid goals where the student is concerned with avoiding the demonstration of low ability or appearing stupid or dumb. There is a great deal of empirical evidence to support the performance approach−avoid goal distinction (e.g., Elliot, 1997, 1999; Elliot & Church, 1997; Harackiewicz, Barron, & Elliot, 1998; Harackiewicz et al., 2002; Pintrich, 2000d), and there is little question that future goal orientation research needs to distinguish between these two types of performance goals.

Following this logic, both Elliot (1999) and Pintrich (2000a, 2000d) have suggested that the approach−avoid distinction also may be applied to mastery goals, generating a full 2×2 matrix of four distinct achievement goal orientations. Mastery-avoid goals would entail a focus on avoiding misunderstanding or not learning the material or avoiding the possibility of not meeting very high self-set standards for performance (Elliot, 1999; Pintrich, 2000a, 2000d). At this point in the development of theory, the empirical evidence for mastery-avoid goals is just emerging (e.g., Elliot & McGregor, 2001), and there is much research to be done before mastery-avoid goals can be accepted as valid or useful in goal theory.

Second, a multiple goals perspective suggests that the role of performance-approach goals may not be as maladaptive as asserted in normative goal theory. There is empirical evidence from both experimental and classroom correlational studies that performance-approach goals can be adaptive for some outcomes; in particular, they seem to result in increases in actual achievement and performance (Harackiewicz et al., 1998, 2002). However, this generalization is not universally accepted or supported in the literature (e.g., Kaplan & Middleton, 2002; Midgley, Kaplan, & Middleton, 2001), and there is an obvious need for more research to clarify the role of performance-approach goals. Given the acceptance of the performance approach−avoid goal distinction even among advocates of a normative goal theory perspective (e.g., Kaplan & Middleton, 2002; Midgley et al., 2001), it is important for future research to examine when and how performance-approach goals operate to influence different cognitive, motivational, affective, and behavioral outcomes and set students on different pathways or trajectories of achievement (Harackiewicz et al., 2002; Pintrich, 2000c). Just as the simplistic intrinsic (good)–extrinsic (bad) motivation dichotomy has been replaced by a more complex continuum of five types of intrinsic and extrinsic motivational styles in self-determination theory (R. M. Ryan & Deci, 2000), future research on achievement goals needs to move beyond a simplistic mastery goals (good) versus performance goals (bad) characterization to consider multiple goals, multiple outcomes, and multiple pathways to learning and achievement in multiple contexts.

Third, as in any multiple goals model, it is important to consider the interactions among multiple goals, and in terms of achievement goals, how the different types of mastery and performance goals may combine to produce different outcomes. Barron and Harackiewicz (2001) have suggested four possible patterns for describing how mastery- and performance-approach goals may interact, including an additive pattern where they both have independent positive effects on outcomes, an interactive pattern where students who are high on both are advantaged, and a specialized pattern where the two goals have positive effects, but on different outcomes. There has been some empirical support for all three of these patterns (Harackiewicz et al., 2002; Pintrich, 2000c), and there is a need for more research on these patterns. More important for future research, Barron and Harackiewicz (2001) suggested that the fourth possible pattern, what they term the *selective goal pattern*, is where individuals would focus on an achievement goal that is most relevant to them at a particular time or in a particular context. For example, students might focus on mastery goals when reading text or when in a small discussion-based seminar and focus on performance-approach goals when preparing for a test or when in a large, competitively graded lecture course (Harackiewicz et al., 2002). In this sense, there might be some advantage to adopting goals that fit or match the contextual goal stresses, as would be suggested by general person–environment fit models. This selective goal pattern is also more in line with a contextual view of

achievement goals, which assumes that goal adoption is more dynamic and situated than just a function of personal characteristics (Linnenbrink & Pintrich, 2001). All four of these patterns suggest a much more complicated picture of achievement goal dynamics than a simple mastery (good) versus performance (bad) dichotomy is operating in classroom contexts. Our research programs and methodologies will have to be much more sophisticated and complex in order to capture these dynamics and will have to include both microgenetic and longitudinal studies with multiple outcomes across multiple contexts.

In summary, there is not an easy generalization to state about what types of goals can motivate students as there is with self-efficacy or interest constructs. From a goal content perspective, students who want to learn, who want to achieve, and who are willing to follow the classroom rules and take responsibility for their learning seem to be more motivated and perform better. From an achievement goal theory perspective, both mastery- and performance-approach goals can have some positive outcomes, whereas performance-avoid goals do not seem to lead to any positive outcomes. However, these basic patterns are complicated by interactions with other goals and may be moderated by contextual factors. We do not have a good understanding of multiple goals dynamics across multiple contexts, and this will be a focus of future research on goals and goal orientations.

Beyond clarifying the relation between multiple goals and context, there is a need to examine how goal orientations and values are related to one another (Wigfield, 1994). Current models of motivation have tended to emphasize one or the other of these constructs. Expectancy-value models have emphasized the role of values and their relation to achievement, but have not researched how values might be attached to goals or how the goals and regulatory strategies individuals adopt in different situations may mediate the role of values. Achievement goal theory has essentially ignored values and not considered how goals may operate differently if different levels of importance or utility are attached to mastery or performance goals. Within goal content approaches (Ford, 1992; Wentzel, 2000), there is some consideration of values, at least as implicitly indexed by an individual's endorsement or commitment to some specific goals over an array of all possible goals in a context. Nevertheless, these three major perspectives on values and goals have pursued quite separate research agendas, and there is a clear need for future research to examine how these different constructs might be related to each other and serve complementary roles in motivating students (Wigfield & Eccles, 2002a). In general, it will probably be more useful for future motivational science research to examine how different constructs from different theoretical models relate to one another, rather than attempting to discover new constructs or create new theories. This type of synthetic and integrative research would not only shed light on the motivational dynamics and potential mediating and moderating roles of different constructs, it could help lead to some clarity and parsimony in the field as it becomes clears how different constructs serve similar functions.

Even though there is not one clear and simple generalization from research on goals, it is clear that the types of goals students adopt do influence their learning and achievement in classrooms. The design principles offered in Table 2 reflect research from both goal content and goal orientation approaches. The first two principles stem from a goal content approach that highlights the importance of social goals, including fostering social responsibility through the use of appropriate organizational and management structures as well as allowing students to pursue their social friendship goals through the use of small groups. The last two design principles represent the research on goal orientation and focus on developing a classroom context that fosters a general mastery goal press in the classroom context where the emphasis is on learning, understanding, and self-improvement. It is important to note that the current disagreement among goal orientation researchers mainly concerns the role of personal-performance-approach goals, not necessarily the role of mastery-oriented classroom contexts (cf. Harackiewicz et al., 2002; Kaplan & Middleton, 2002).

3. How Do Students Get What They Want?

Higgins and Kruglanski (2000) noted that another important question for motivational science is investigating how individuals actually get what they want. As basic wants give rise to interests, values, and goals, how do individuals then translate these wants, goals, and beliefs into action? How do they attain their goals? One central approach to this question involves the use of models of self-regulation (e.g., Carver & Scheier, 1998; Gollwitzer, 1999; Zimmerman, 2000) to describe the planning, monitoring, control, and regulation of cognition, motivation, and behavior in the service of the individual's goals. The popularity and utility of this approach is highlighted by the proliferation of models of self-regulation to explain behavior in many different domains, not just in education (see Boekaerts et al., 2000).

In the academic domain, models of self-regulated learning have been the focus of recent research that reflects this self-regulatory approach. This research has shown that students who are self-regulating, in other words those who set goals or plans, and try to monitor and control their own cognition, motivation, and behavior in line with these goals are more likely to do well in school (Pintrich, 2000d; Zimmerman, 2000). Much of this research has focused on cognitive regulation, in terms of how students use different cognitive and metacognitive strategies to learn and do well in school. In fact, much of the research on cognitive learning strategies and metacognition from the 1980s and earlier has been folded into the more general research program on self-regulated learning. At the same time, there has not been as much research on the strategies and tactics that students use to monitor, control, and regulate their own motivation, affect, or behavior (but see Boekaerts & Niemivirta, 2000; Wolters, 1998, in press).

It is not clear how students learn or develop these different strategies and tactics in general or how the strategies bind with or become associated with different goals. Research has shown that mastery-approach goals are associated with reports of self-regulated learning (Pintrich, 2000d), but it is not clear how and why this relation develops. It may be that there are some general costs associated with the use of various self-regulatory strategies in terms of extra time (e.g., self-testing and rereading text to repair lack of understanding takes more time than just reading a text once), but that a focus on learning makes these costs seem worthwhile or that time or other costs are not perceived in quite the same manner under a mastery-goal orientation. However, it is also possible that it may just be an issue of the accessibility and knowledge of certain types of strategies, with some students know-

ing more strategies than others and having more flexibility in associating different goals with these strategies (the issues of equifinality and multifinality, as noted previously). It is clear we need more developmental and microgenetic research on these issues, and at this point in the development of the field, simple one-shot correlational studies with self-report instruments will probably not provide us with much more knowledge gain.

A related issue concerns the role of intentionality and conscious awareness in the linking of goals to strategies and behavior. Many self-regulation models assume that students are aware of their goals and then intentionally use strategies or intentionally engage in actions that will help them reach those goals (Pintrich, 2000d). Mischel, Cantor, and Feldman (1996) also noted that willpower or self-control processes are one of the important linking mechanisms that bind goals to strategies and behavior in a conscious manner. The role of intentionality in regulation and learning is an important addition to our models. Although the construct of intentionality is fraught with theoretical problems and raises a number of difficult methodological issues (see Malle, Moses, & Baldwin, 2001), it can be used productively to develop new descriptions and explanations of student learning. For example, a recent book by Sinatra and Pintrich (2003) includes chapters on how intentional processes can be related to knowledge development and conceptual change and highlights important issues that must be resolved in future work on intentionality and learning.

4. Do Students Know What They Want or What Motivates Them?

Models of self-regulation that assume the intentional pursuit of conscious goals have certainly made an impact on our understanding of student motivation and learning. Yet, there are many occasions when motivation and learning, in the classroom and in life in general, are not so conscious, intentional, and self-regulating. In research on cognition, there has been a great deal of research on implicit cognition where cognitive processing occurs outside conscious awareness and control. In a similar manner, the work on implicit motives or unconscious needs suggests that motives or needs may operate to influence cognition and behavior, but at a level below conscious awareness and control (Epstein, 1994; Schultheiss, 2001), in effect suggesting that individuals do not need to know what they want in order for motives or needs to influence them. Bargh and his colleagues (e.g., Bargh & Chartrand, 1999; Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trotschel, 2001) also have shown that goal pursuit may be nonconscious and the "will" or actions taken to pursue these goals may be automated and outside of conscious control. This research suggests that individuals can attain their goals without necessarily being consciously self-regulating and in control of their behavior, certainly a description that resonates with anyone who has observed students learning in many classroom situations where they seem to proceed in rather habitual and unreflective ways.

In other research on implicit cognition, Greenwald and Banaji and their colleagues (e.g., Greenwald et al., 2002; Nosek, Banaji, & Greenwald, 2002) have developed and tested a model of implicit attitudes, stereotypes, and identity that shows how implicit attitudes and beliefs can interact to produce evaluative and affective reactions to a variety of tasks, including academic tasks. For example, Nosek et al. (2002) showed that social group membership (being a woman) lead to negative reactions and less identification with math as a function of group identification (self = female) and gender stereotyping of the math domain (math = male). Moreover, the implicit reaction time measures of group identification and stereotyping were more strongly associated with attitudes toward math than explicit self-report measures. These results point toward the power of group and social identity for motivation and behavior and the fact that these effects may be produced without much conscious awareness or regulation. Finally, these models of group and social identity offer strong theoretical models and empirical data in support of the potential role of identity in motivation and learning and in keeping with the general theme of multidisciplinarity, should be pursued more vigorously by classroom researchers interested in the role of identity in learning.

It is important to note that these models of unconscious or implicit motives, needs, attitudes, beliefs, and nonconscious goal pursuit are not simply a recasting of Freudian desires or behaviorist habits, but rather represent attempts to link nonconscious motivational and cognitive processes with more conscious processes to explain behavior. In other words, our models of student motivation and learning will need to integrate both implicit and nonconscious processes with more conscious, intentional, and self-regulatory processes (Epstein, 1994; Schultheiss, 2001). Basic research in this area in Bohr's quadrant also will link these processes more closely to neuroscience research on the physiological underpinnings of motivation and emotion (e.g., Hamm, Schupp, & Weike, 2003; Ochsner & Barrett, 2001). Moreover, it will probably be more productive for future research to attempt to understand the interactions between these different systems than to engage in research that pits conscious and explicit systems and constructs against nonconscious and implicit systems and constructs (Epstein, 1994; Fazio & Olson, 2003).

For example, Greenwald and Banaji and their colleagues (Greenwald et al., 2002; Nosek et al., 2002) have noted that in some of the earlier models of implicit attitudes, it was assumed that the implicit and explicit systems were independent, but their more recent research shows that implicit and explicit measures are correlated, although they do not seem to be completely overlapping in their functions. T. Wilson, Lindsey, and Schooler (2000) also have made a similar argument for the importance of examining the operation of both implicit and explicit attitudinal and belief systems. It seems clear that an important direction for future research will be to examine how these different implicit and explicit systems interact to influence motivation, learning, and performance and to understand the parameters and moderators of the relations, such as under what task or contextual conditions which system seems to play a more important functional role (Fazio & Olson, 2003). This type of research will help to integrate motives and needs models of motivation related to basic wants (Question 1) with more social–cognitive models of motivation (Question 2), resulting in a more comprehensive understanding of motivation. Finally, the inclusion of both implicit and explicit constructs will entail the use of other methods, such as experimental designs, implicit association tasks, projective techniques and measures, besides correlational designs and simple self-report questionnaires. This diversity of methods, designs, and measures will result in a much stronger empirical base for motivational science.

5. How Does Motivation Lead to Cognition and Cognition to Motivation?

In their classic *Handbook of Child Psychology* chapter on learning, remembering, and understanding, Brown, Bransford, Ferrara, and Campione (1983) summarized then current research on academic cognition in this way,

> Bleak though it may sound, academic cognition is relatively effortful, isolated, and cold. . . . Academic cognition is cold, in that the principal concern is with the knowledge and strategies necessary for efficiency, with little emphasis placed on the emotional factors that might promote or impede that efficiency. (p. 78)

In other words, emotions and motivation do not matter in terms of academic cognition, and the main factors that need to be understood are knowledge and strategies. Following this generalization, it was then an easy step to design instructional interventions and programs that focused on improving student knowledge and strategies, as much of the subsequent cognitive strategy instruction research attempted in the 1980s. However, once cognitive researchers started working in classrooms, they quickly became aware of the importance of motivational factors, as well as social factors, and came to see that Brown et al. (1983) were only correct on one of out three characteristics of academic cognition. That is, they were correct that academic cognition is effortful, but it is not isolated, rather it is socially mediated and supported, and it is not cold, but hot, in terms of the involvement of motivational and emotional factors (Bandura, 1997; Bransford et al., 1999; Pintrich, Marx, & Boyle, 1993).

Fortunately, this misrepresentation has been corrected as motivational research, and research on self-regulated learning since the 1980s has demonstrated the importance of motivational factors for cognitive and learning strategy use and self-regulation (Bandura, 1997; Pintrich, 1999, 2000d; Pintrich & Schrauben, 1992). However, research on motivational factors has not explored in as much detail the linkages among motivational factors and the activation, acquisition, and development of knowledge or of other general perceptual and cognitive processes such as attention, reasoning, and thinking. It might be assumed that the use of cognitive strategies and self-regulated learning strategies would result in more involvement with the content and lead to more knowledge acquisition or conceptual change (Pintrich et al., 1993), but it is not really clear how various motivational factors influence the activation and acquisition of knowledge. We have very rich and detailed cognitive models of knowledge structures and acquisition, but there has been relatively little research on how motivational factors relate to the operation of these models. There is a clear need for research that links motivation to these knowledge-based models of cognition.

The role of affective factors, including both general moods and specific emotions, are not well understood and have often been ignored in our current social–cognitive models of motivation. With the exception of test anxiety (see Zeidner, 1998), there has been little research on the role of affect and emotions in classroom learning (Pekrun, Goetz, Titz, & Perry, 2002). To be sure, there have been studies of emotions as outcomes of classroom activities, such as the work on "flow" (Csikszentmihalyi & Rathunde, 1993) and the role of attributions as generators of emotions (Weiner, 1986), but very little on how various positive and negative moods or emotions might guide or direct academic cognition and learning (Linnenbrink & Pintrich, 2002; Pekrun et al., 2002). So, although our models of cognition and learning are "hotter" since the Brown et al. (1983) chapter, because of the introduction of motivational constructs (Pintrich et al., 1993), most of these social–cognitive motivational constructs are still more cognitive than affective.

Nevertheless, there are a number of different ways that affect may play a role in cognition and learning, and it may be time for an "affective" revolution to complement the earlier "cognitive" revolution in research on students in teaching and learning contexts. Affect can serve to attune individuals to their goal progress and lead them to attend to and encode different types of information as well as lead to differential behavior (Carver & Scheier, 1998; Schutz & DeCuir, 2002). In other words, affect can serve a major guiding and regulatory role in our cognitive and motivational systems. Affect also may increase or decrease working-memory load by using cognitive resources that could be devoted to the academic task (Pekrun, 1992; Pekrun et al., 2002). Finally, lest it be thought that positive affect is always "good" and negative affect "bad," there is some controversy, at least in the social–psychological literature, on the adaptive role of positive and negative affect in cognition and learning. Some models suggest that negative affect can lead to more detailed, analytical, and careful processing of information, whereas others suggest that positive affect has more beneficial effects for more heuristic processing (cf. Bless, 2000; Fiedler, 2000; Forgas, 2003; Fredrickson, 2001; Schwartz, & Clore, 1996). The limitation of much of this intriguing social–psychological research on affect and cognition is that it has focused on attitudes and social judgments, not specifically on learning academic content. There is a clear need for more research in this area with academic tasks and careful attention to the nature of the tasks and the different kinds of cognitive processing or learning activities that are required (Forgas, 2003; Linnenbrink & Pintrich, 2002). Nevertheless, the potential for differential adaptive roles of positive and negative affect in cognition and learning again suggests the importance of avoiding simple dichotomies in future motivational science research.

Just as affect has been neglected, most of the research on the role of motivation has been focused on how motivation influences subsequent cognition, and there has been very little research on how cognition influences motivation. It seems clear that there is a reciprocal and recursive relation between motivation and cognition (Bandura, 1997), but there is a need for more research on this topic. Even in the area of motivation and self-regulated learning, where there is a fair amount of research, it has focused on how various motivational beliefs facilitate or constrain self-regulated learning, not on how the use of various self-regulatory strategies might then influence subsequent motivation. Research on this issue also would be improved by less reliance on self-report measures of motivation, cognition, and self-regulation, as the potential for method bias to obscure or confound substantive relations among these constructs is very high in many of the studies in this area that clearly suffer from a mono-method bias (Winne, Jamieson-Noel, & Muis, 2002; Winne & Perry, 2000).

In the area of knowledge structures, there is even less research, but it might be useful to examine how the activation of certain types of knowledge structures also results in the activation of various motivational beliefs and affect. For example, it seems likely that it is not just specific content knowledge that is activated

when students engage in an academic task, but also a host of closely tied motivational beliefs such as their interest in the content, their efficacy, their values, and their affect toward the content are all connected in a network of associations (Mischel & Shoda, 1995). This hypothesis needs to be examined empirically, but it seems reasonable to predict that motivational beliefs should be represented in similar ways as content knowledge. Cognitive psychologists have a number of different connectionist models of knowledge representation and how these representations function in cognitive processing, but motivational researchers have not really investigated the nature of motivational representations. Moreover, if the representations and functions are similar, this will help us build more integrative models of motivation, affect, and cognition. This type of research will require reaction time measures and other on-line or stimulated recall measures of motivation besides self-report questionnaires, which will help in building a stronger empirical base in motivational science.

In fact, Mischel and Morf (2003) suggested that a general connectionist metaphor can help us build integrated models of the cognitive–motivational–affective self-system (Mischel & Shoda, 1995) that transcends some of the traditional false dichotomies between stable–changeable, rational–irrational, consistent–inconsistent, conscious–unconscious, controlled–automatic, and agentic–routinized descriptions of the individual. These self-system models also will help to bridge the current gap between social–cognitive and situated models of motivation that differentially emphasize the individual or the context. They also will allow us to link our more psychological models to the biological and physiological processes involved in cognition, motivation, and affect (Hamm et al., 2003; Ochsner & Barrett, 2001). To the extent that these models and future research on them help to break down these simplistic distinctions and misleading dichotomies, they can only increase our understanding of motivational, affective, and cognitive phenomena in academic settings.

6. How Does Motivation Change and Develop?

Another important question for motivational science concerns the nature of change and development in motivation over time. There are a number of important questions regarding the development of motivation, but Wigfield and Eccles (2002a) suggested four that are most salient. First, how do children and adolescents understand motivational constructs and how does the meaning of these motivational constructs change with age and time? Second, how do these constructs become more differentiated and complex with age? Third, how does the level and quality of motivation change over time? Finally, how do the relations between motivation and various outcomes change as well as how do the relations between contextual factors and motivation change with development?

Besides these four questions, there are at least two general perspectives that need to be considered: One concerns general developmental and age-related changes in motivation, and the second involves more microlevel changes in motivation as expertise at a task develops (Pintrich & Zusho, 2002). In terms of the first two questions, it appears that students' understandings and beliefs about motivation become more differentiated over time, with more complex meanings and understandings of ability, effort, intelligence, interest, and value emerging with age. In terms of the third question, there is good empirical evidence from cross-sectional and longitudinal studies that over the course of the school years, student motivation on the average declines or becomes less adaptive, with a large drop as students enter the junior high or middle school years (Eccles et al., 1998). This declining motivation generalization is very well supported and seems to be characteristic of most motivational beliefs including efficacy and control constructs as well as values and personal interest (Eccles et al., 1998).

There are both age-related and maturational personal factors as well as school and classroom contextual factors that seem to be related to this general decline. Although some research has attempted to pit these personal and contextual explanations against each other, it seems more useful that future research will explore how the personal and contextual factors interact to produce this decline in motivation as well as explore the fourth question regarding potential developmental changes in the relations between contextual factors and motivation. In addition, there is a need for research on the personal and contextual factors that seem to generate individual growth trajectories for some students who become more motivated over time in school. This type of research will help us understand the "risk" and "protective" factors that promote individual motivational development that counters the general motivational decline trajectory. Finally, this research may be helpful in developing supportive school and classroom contexts that can reverse the general motivational decline (Zusho & Pintrich, 2001).

At the task-expertise level, there is research that describes the development of cognitive expertise over time (Bransford et al., 1999), but there is little on the changes in motivation as expertise develops. Alexander, Jetton, and Kulikowich (1995) have shown that interest and prior knowledge are related in complex ways at different points in the development of expertise. Zimmerman and Kitsantas (1997) suggested that different types of goals may be more adaptive at different points in the development of expertise, as they serve to guide the learner to focus on different skills that are needed to perform the task. There is a need to better understand these complex dynamics between the development of motivation and expertise in a particular domain. Questions of this nature can only be investigated with microgenetic designs that trace the developmental trajectories of motivation and expertise over shorter periods of time but with much more detailed and in-depth measures of motivational and cognitive processes. This type of research will not only help us develop a better understanding of how motivation changes over time, it can have important implications for the design of instruction, especially technology-supported instruction, which can use the power of the computer to adjust the task demands to the observed microlevel changes in motivation and cognition.

7. What Is the Role of Context and Culture?

One of the legacies of early motivational theory and research being founded on needs-based models is a focus on the individual as the main unit of analysis. After all, if needs and wants are internal, stable, and basic to all individuals, regardless of context or culture, then it makes sense to examine how motivation operates from the inside out, in other words, how internal needs, wants, and motives propel the individual to take action in different contexts.

Context may be important in terms of shaping some of the actions, but it is not as important as understanding the internal dynamics that lead to action. Of course, one limitation of this perspective, at least from an educational point of view, is that it does not afford a very strong role for contextual factors and, by implication, does not provide much hope to teachers that they can make much difference in terms of student motivation.

In contrast, current situated views of cognition, and by extension, situated motivation (e.g., Hickey, 1997), suggest that contextual and cultural factors are paramount in the operation of cognition and motivation and that we need to examine cognition and motivation from the outside in first and not focus on the individual and intrapsychological processes. There are different "strong" and "weak" versions of this situated view, with strong versions denying or ignoring any individual or intrapsychological processes as important, whereas weaker versions allow that there may be some role for internal processes. Both strong and weak forms stress the importance of how the context affords or constrains cognition and motivation, thereby promising teachers that what they do in terms of instruction really does make a difference to students. This underlying supposition is probably one reason the situated perspective tends to be more popular in educational research than in psychological research on motivation.

However, one of the underlying leitmotifs of this article is the need to avoid simple dichotomies and contrasts such as basic versus applied research, motivation versus cognition, intrinsic versus extrinsic motivation, mastery versus performance goals, positive versus negative affect, person versus context, and this is another case where simple dichotomies between cognitive and situated perspectives should be abandoned. As Anderson, Greeno, Reder, and Simon (2000) have pointed out, both perspectives have much to offer, and the important task is to build theory and conduct research that builds on the strengths of both and works toward an integrative and systemic model of how individual and social processes jointly combine to shape student cognition and learning. Interestingly, Anderson et al. (2000) made no mention of motivational processes, harkening back to the outmoded "cold" model of cognition and learning summarized by Brown et al. (1983). Nevertheless, motivational science research does not need to recapitulate the battles between the cognitive and situated perspectives that at least some researchers who focus on cognition and learning have moved beyond (Anderson et al., 2000). There are many difficulties inherent in such integrative work and a need for both new theories and models as well as new methodologies (Volet, 2001), but approaches that truly attempt to integrate both cognitive−individual and social−cultural perspectives will be more useful than perspectives that propose that strong social−cultural models represent a higher level integration (e.g., Hickey & McCaslin, 2001).

For example, the situated perspective can offer models and empirical data on how different contextual and cultural features can lead to the development and internalization of different motivational beliefs. These models are well designed for helping us understand the important role of contextual and cultural factors, and the focus of our research efforts should be on investigating the internalization processes whereby context and culture create, shape, facilitate, or constrain the development of student motivation. Just as simple one-shot correlational studies with self-report measures will not generate much new knowledge, neither will contextual studies that simply demonstrate that student motivation is situated. Most social–cognitive models accept this and have moved on to more productive questions regarding the role of various contextual factors in shaping, facilitating, and constraining student motivation. In fact, the design principles listed in Table 2 are good exemplars of both social–cognitive and situated perspectives that assume that student motivation is situated in, influenced by, and changed through the nature of classroom interactions, tasks, activities, practices, and culture.

In other words, the issue is not whether student motivation is situated or not, it clearly is, but the key issue is understanding the role that different contextual and cultural practices play and how they continually interact with and are connected to intrapsychological construals, processes, and beliefs (Kitayama, 2002). Given this *systemic cultural perspective*, as Kitayama (2002) labeled it, the same four questions raised about developmental differences in motivation also apply to research on the role of context and culture (Tangney & Leary, 2003), albeit they are framed somewhat differently. In terms of the first two questions regarding the meaning and complexity of student motivation, it is crucial to understand how different cultural or ethnic groups within a culture understand and define motivation as well as understand cross-cultural differences in motivation and various self-related beliefs. For example, does the need for autonomy or choice and control have the same meaning in different ethnic groups or cultures (cf. Deci & Ryan, 1985; Iyengar & Lepper, 1999)? Are beliefs about efficacy, competence, control, and self-worth defined and made in a similar manner in different ethnic groups or cultures (cf. Graham, 1994; Heine et al., 1999; Holloway, 1988; Markus & Kitayama, 1991)? These types of questions will be central for future motivational science research.

Moreover, although there is a great deal of disagreement about the applicability of social–cognitive beliefs and processes to different ethnic groups and cultures, they provide an excellent theoretical and conceptual foundation on which to build our future research efforts (Graham, 1994). In other words, it will not be productive for future research to do away with or ignore intrapsychological motivational beliefs and processes as in some strong situated models, but rather come to understand them as resources and tools used to cope and adapt to contextual and cultural demands and affordances. Following this tool metaphor, answers to Questions 1 and 2 about the meaning and complexity of motivation will involve research on how individuals in different ethnic groups and cultures come to use or rely on different motivational tools or resources, differentially define and solve problems that require different motivational tools, and assemble tool kits that provide differential access to some tools over others (Nisbett, Peng, Choi, & Norenzayan, 2001).

Another implication of this tool kit metaphor and the systemic cultural approach (Kitayama, 2002) to research on context and culture is that the third question about the levels or quality of motivation in different groups or cultures is framed differently. Questions about whether individuals in different ethnic groups or cultures are higher or lower in various motivational beliefs such as self-efficacy, control, values, goals, and self-esteem (cf. Graham, 1994; Heine et al., 1999; Oyserman, Coon, & Kemmelmeier, 2002) are not made easily without considering the contextual and cultural meanings and functions of the constructs. Difficulties with the use of simple self-report and attitudinal questionnaires within

and across cultures (Kitayama, 2002; Peng, Nisbett, & Wong, 1997) make comparisons of general mean-level differences problematic. This does not mean that ethnic group or cross-cultural comparisons are meaningless, but rather that our research designs and measures must be sensitive to the potentially different meanings and complexity of the constructs (the first two questions) within different groups or cultures. As noted earlier, this means that the mono-method bias in favor of simple self-report questionnaires in much motivational research will have to be overcome and other types of measures developed and used.

Kitayama (2002), in line with a systemic cultural approach, has suggested that what he terms *on-line* measures of cognition, motivation, and emotion can provide better indicators of these processes and help us understand cultural similarities and differences. These on-line measures can be self-reports or behavioral measures of cognitive, motivational, or emotional responses; choice behavior; or persistence in situ including in experimental situations. The use of these kinds of measures reflect calls for diverse methods in research on motivation (Pintrich & Maehr, 2002). For example, Graham, Taylor, and Hudley (1998) used peer nominations of other admired and respected students to demonstrate that African American and Latino boys valued low-achieving boys, whereas White students and ethnic minority girls valued high-achieving same-gender students. Other studies have shown differences in motivational constructs between Asians and Americans (e.g., Heine et al., 1999; Iyengar & Lepper, 1999). These types of studies suggest that there may be important ethnic and cultural differences in motivation. These differences do need to be understood, and our research designs and measures must be sensitive enough to generate valid data on the level and quality of motivation in different ethnic groups and cultures.

Even more important than investigating general mean-level differences, it is crucial to understand potential ethnic or cultural differences in the functional relations of motivational constructs to other important outcomes like performance, achievement, and learning (Question 4). For example, Table 2 lists some generalizations about the role of motivational beliefs in learning and achievement, but a key question is whether they hold for all ethnic groups (African American, Asian American, Latino, Native American, etc.) in western cultures as well as in other nonwestern cultures. It will not be sufficient for future research to just note that the generalizations do not hold for these different groups or different cultures, but rather to grapple with when, why, and how they do or do not hold for the different groups. This would include building and developing culture-dependent models of the nomological network of the motivational constructs and their functional relations with other important outcomes, including the addition of new constructs or models if necessary to understand motivation in these different groups (cf. Graham, 1994; Heine et al., 1999; Kitayama, 2002).

In a parallel fashion, different classrooms and schools can be conceptualized as different cultures (e.g., constructivist or inquiry-oriented classrooms and more traditional classrooms), and there is a need to examine how the motivational generalizations in Table 2 might be moderated by these different contexts. Over 10 years ago, Blumenfeld (1992) suggested the need for more research to examine the role of motivational constructs in more constructivist classroom environments. These classrooms are different in many ways from more traditional classrooms in terms of how they are organized instructionally, the nature and types of academic tasks and activities students engage in, the nature of the relations between teachers and students, as well as the technological resources available to the members of the classroom community (Bransford et al., 1999). All of these changes in instructional practice might lead to quite different meanings and complexity of motivation (Questions 1 and 2) as well as different levels or quality of motivation (Question 3) and, most important, different functional relations among motivation and other important outcomes (Question 4). Future motivational science research needs to examine all of these questions in these new more constructivist and inquiry-oriented classrooms, not just to understand student motivation, but also to help us understand how classrooms processes and practices create, sustain, and change student motivation as well as to inform instructional practice.

There is obviously a great deal of research needed to understand the role of contextual and cultural processes in motivational science research. The many potential contextual and cultural differences or moderators of the basic generalizations listed in Table 2 certainly challenge the goal of developing basic scientific knowledge and generalizations. Nevertheless, the recognition of the crucial role of context and culture in student motivation does not imply that there are no universals or that scientific research on these issues should not continue. Avoiding the relativistic and eventually solipsistic traps of the most radical forms of postmodernism, motivational science can continue to make progress in understanding student motivation in learning and teaching contexts. As Greenfield, Keller, Fuligni, and Maynard (2003) have suggested, there are multiple cultural pathways through the universal developmental tasks all individuals confront in all cultures. In a similar fashion, there are multiple self- and cultural pathways through the universal motivational tasks that individuals confront in learning and teaching contexts, and we need to describe, understand, and explain these multiple pathways.

Conclusion

Motivational science will be able to advance as we continue to make progress in answering the seven substantive questions outlined here. As we better understand these questions and issues, we certainly will improve our understanding of student motivation, serving the basic goal of scientific understanding in motivational science a la Bohr. Moreover, progress on these questions will help us understand and design better instruction in classrooms and schools that will facilitate motivation, cognition, and learning, serving the utility goal of motivational science a la Pasteur. At this point in time, we can state instructional design principles like those in Table 2 that reflect reasonable generalizations about student motivation in terms of increasing adaptive student motivation such as efficacy, control, interest, values, and goals. These design principles actually overlap with many of the design principles generated by cognitive researchers (Bransford et al., 1999; Brown, 1997), again demonstrating the utility of considering both motivation and cognition simultaneously.

Nevertheless, these design principles will always need to be adapted to the affordances and constraints operating in the local classroom, school, community, or cultural context. The development of design principles does not take away from the creativity and ingenuity of teachers and other educators in terms of the

design of instruction. The application of these principles is where the art of teaching takes over from the science of motivation and cognition. Just as in architecture and engineering, there are many creative and artistic ways to design bridges and buildings that differ dramatically from one another in appearance, there are some basic scientific foundations and principles that ensure that the bridges and buildings remain standing. Classrooms and schools also can differ in dramatic ways; they do not all have to look the same in terms of how they attempt to motivate students or how they facilitate cognition and learning through instruction. Just as there are multiple pathways for development (Greenfield et al., 2003), there are multiple pathways for the design of motivating classrooms and schools. There should be some underlying foundations and principles that are followed, but how they are developed and implemented are up to the Edisons of the education world. Our task as motivational scientists is to follow Bohr and Pasteur in terms of the development of basic and use-inspired basic research that generates well-reasoned, empirically supported understandings that can become the scientific foundations for educational practice to improve motivation, learning, and teaching.

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