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Reflections on Wittrock's Generative Model of Learning: A Motivation Perspective

Eric M. Anderman
School of Educational Policy and Leadership
The Ohio State University

In this article, I examine developments in research on achievement motivation and comment on how those developments are reflected in Wittrock's generative model of learning. Specifically, I focus on the roles of prior knowledge, the generation of knowledge, and beliefs about ability. Examples from Wittrock's theory and from current motivational theory are used to elaborate on the parallel dimensions of these two areas of research.

In 1974, Wittrock presented his generative model of learning to the research community. Wittrock's model effectively integrated several important processes and emphasized the important roles of (a) cognition, (b) prior knowledge, (c) transfer, and (d) generation in human learning.

Of interest, Wittrock's model examined and influenced the way that educational psychologists think about and conceptualize learning. However, the relation of this model to motivation was not emphasized in Wittrock's initial presentation of the model. In addition, over the past 35 years, Wittrock's model has not been consistently cited as a major source for current models of academic motivation.

Nevertheless, from a historical perspective, it is clear that Wittrock's model is related in important ways to current research and theory in the field of achievement motivation. Indeed, when one examines the major components of Wittrock's model, one can easily identify processes that have become central components in many contemporary theories of academic motivation; these theories now influence research, practice, and policy.

In the present article, I identify three important components of Wittrock's model. After briefly describing each of these components, I argue that Wittrock's model in fact was related to many of the developments that occurred in academic motivation during the past 35 years. Wittrock's model may have caused educational psychologists to seriously consider the roles of several variables and issues that had largely been ignored prior to the 1970s. Whereas the model's influence may not have been direct, it indirectly brought many important issues to the attention of motivation researchers, whose theories changed dramatically after the mid-1970s.

Correspondence should be addressed to Eric M. Anderman, School of Educational Policy and Leadership, The Ohio State University, Ramseyer Hall, Building 090, 29 West Woodruff Avenue, Columbus, OH 43210. E-mail: Eanderman@ehe.osu.edu

THE GENERATIVE MODEL AND ACHIEVEMENT MOTIVATION

Several components of Wittrock's model are particularly relevant to developments that have occurred in the field of achievement motivation. First and foremost, as I discuss next, the emphasis on cognitive processes in Wittrock's theory was mirrored in developments in social-cognitive theories of motivation. Second, Wittrock clearly acknowledged the importance of *prior knowledge* in human learning; again, this is mirrored in motivation, in that many contemporary perspectives, such as Eccles and Wigfield's expectancy-value theory (Wigfield & Eccles, 1992) and Bandura's notion of self-efficacy, which is a key component in Bandura's social cognitive theory (Bandura, 1997), acknowledge that motivation to engage in future behavior is intricately tied to prior knowledge and experiences in particular domains.

In the following sections, I briefly outline three major components of current motivation theories. These components include (a) the role of cognition in motivation research, (b) constructing meaning and motivation, and (c) beliefs about ability. After briefly describing each of these components, I examine how these current theories are related to the important ideas put forth by Wittrock regarding human learning.

COMPONENT 1: THE ROLE OF COGNITION IN MOTIVATION RESEARCH

Prior to the 1970s, much of the research on academic motivation emanated from a behavioral perspective (see Graham & Weiner, 1996, and Schunk, Pintrich, & Meece, 2008, for reviews). Behavioral theories of motivation emphasized the notion that motivated behaviors are observable. Specifically, motivated behaviors occur because they are either reinforced by various external events, or because they have been paired with other stimuli (Schunk et al., 2008). Behavioral theories generally do not acknowledge the roles of cognitive processes such as decision making, information processing, and beliefs in determining motivated behaviors.

The two most commonly cited behavioral theories that have been used to explain motivation are *classical conditioning* and *operant conditioning*. In classical conditioning, motivation is explained by the fact that behaviors result from exposure to conditioned stimuli (Pavlov, 1927). For example, a student who gets bullied at the playground may eventually relate unpleasant physiological reactions to bullying (e.g., anxiety, upset stomach) with playgrounds; thus such students might experience unpleasant reactions at any playground, not just at the initial playground where bullying occurred. Cognitive processes are not emphasized in this conception of motivation—reactions merely occur as a result of reactions to stimuli.

In operant conditioning, behaviors are shaped by reinforcers (which increase the likelihood of a behavior reoccurring in the future) and punishments (which decrease the likelihood of a behavior reoccurring in the future (Skinner, 1953)). For example, a student who is reinforced for good behavior by receiving candy from a teacher may continue to behave well; in contrast, a student who is badly behaved and is berated by the teacher (i.e., punished) may stop behaving badly. In both of these cases, the role of cognition is not considered; rather, behavior is determined by environmental stimuli (reinforcers or punishments) that are presented after behaviors have occurred; in operant conditioning, those stimuli are considered without regard to any type of cognitive decision making or judgments that might occur.

Thus with both classical and operant conditioning, motivated behaviors either increase or decrease through associations, contingencies, and learned relationships between various external stimuli and those behaviors. Other motivation theories that were prominent in the first half of the 20th century emanated from different perspectives than did classical and operant theories but still did not emphasize cognitive components. For example, some theories of motivation emphasized *drives* and *needs*. Such theories emphasize that individuals have physiological needs; psychological drives arise that propel the individual to engage in behaviors that meet those needs (Deckers, 2005). Influential theories in this perspective include Hull's Drive Theory (Hull, 1943, 1952) and Maslow's Hierarchy of needs (Maslow, 1970).

However, during the 1970s, cognitive views of motivation began to emerge in academic discussions of achievement motivation; during the 1980s and until today, cognitive views (and more specifically social-cognitive views) came to the forefront in studies of academic motivation.

Cognitive theories of motivation acknowledge the roles of thoughts, information processing, and complex decision making in determining motivated behaviors. Today, most of the major theories of academic motivation include cognitive components, although these theories emphasize different aspects of cognition. These theories include attribution theory, which focuses on the cognitions and emotions that arise after an event has occurred (Weiner, 1985, 1986, 2005); goal orientation theory, which focuses on the reasons why individuals choose to engage with certain tasks (Ames, 1992; E. M. Anderman, Austin, & Johnson, 2002; Dweck & Leggett, 1988; Elliot & Harackiewicz, 1996; Midgley et al., 1998; Urdan, 1997); expectancy-value theory, which focuses both on perceived competence and valuing of specific tasks (Eccles & Wigfield, 2002); self-determination theory, which focuses on intrinsic motivation in terms of how specific human needs are met (Deci, 1980; Deci, Vallerand, Pelletier, & Ryan, 1991), and social cognitive theory (self-efficacy), which focuses on perceptions of competence at specific tasks (Bandura, 1986, 1997). Whereas a review of the cognitive components of these theories is well beyond the scope of this article, others have fully documented the cognitive components of these theories (e.g., E. M. Anderman & Wolters, 2006; Schunk et al., 2008; Weiner, 1992).

Fundamental to Wittrock's model is the notion that learning is facilitated when individuals generate their own cognitive meanings for newly learned materials (Wittrock, 1974); these generated meanings are based on prior knowledge and prior experiences. Thus the learner is an active participant in the learning process. This development in learning theory parallels similar developments that occurred in motivation theory, starting at roughly the same time. The role of cognition in motivation grew to a new level of importance with the rising popularity of cognitively based theories and perspectives such as attribution theory, goal orientation theory, and social cognitive theory. Thus as Wittrock brought to the forefront the active role of cognition in human learning, motivation theorists were mirroring this development in their own work.

COMPONENT 2: CONSTRUCTING MEANING AND MOTIVATION

In Wittrock's (1974) original article, he argued that a paradagmitic shift was occurring in the study of learning, as newer conceptions of learning (including his own model) acknowledged and validated "the perception and interpretation of the learner processing the information and actively constructing meaning from it" (p. 88). This acknowledgment of the role of

the learner's mind in creating meaning out of novel situations and stimuli was reflected in the field of motivation, albeit not as immediately.

Although a review of developments in the role of the construction of meaning within theories of motivation is beyond the scope of this article (see Hickey & McCaslin, 2001, for a review), it is important to note that most current views of achievement motivation clearly acknowledge that the meanings that individuals derive from certain experiences and situations affect their motivation. In particular, research in educational psychology in general, and in the study of achievement motivation more specifically, acknowledges that social contexts play important roles in how learners interpret and perceive what they are learning (L. H. Anderman & Anderman, 2000).

Theoretical Examples

Several current theoretical perspectives exemplify how learners construct meaning, and how this affects academic motivation. Eccles and Wigfield posited in their expectancy-value model of motivation (Eccles, 2005; Eccles et al., 1983; Eccles & Wigfield, 2002) that an important predictor of motivated behaviors is the *value* that learners attach to academic tasks. Values consist of attainment value (i.e., the importance of a task to the individual), intrinsic value (i.e., how much an individual likes a task), utility value (the perceived usefulness of a task), and cost (perceptions of whether or not it is worth taking the time to engage with the task). These four components of achievement values are in fact beliefs, which develop over many years (Wigfield & Eccles, 2002) These values develop as a result of experiences that individuals have over time within various academic domains (E. M. Anderman et al., 2001).

From a motivational perspective, learners construct their own values (i.e., values have different meanings for different people). Thus an individual who has positive experiences with mathematics may construct more positive beliefs about the value of math; in contrast, an individual who has unpleasant experiences with mathematics may develop negative achievement beliefs about the value of math (e.g., "Math is boring and stupid."). This is important, because achievement values are highly predictive of subsequent behaviors; thus students who "value" mathematics are more likely to actually enroll in mathematics courses in the future (Wigfield & Eccles, 2002). In addition, students who do not come to value certain academic subjects may be unlikely to engage in activities and careers related to those subjects (Eccles, 2009; Wigfield & Eccles, 1992).

The construction of meaning also is apparent in recent theoretical developments in achievement goal theory. Goal orientations and perceptions of goal structures usually are measured through survey instruments (Karabenick et al., 2007; Midgley, 2002), and many studies conducted in this tradition have provided evidence that students' perceptions of classroom environments and the tasks that are provided in those environments facilitate the construction and development of students' motivational beliefs (e.g., E. M. Anderman & Young, 1994; Greene, Miller, Crowson, Duke, & Akey, 2004; Roeser, Midgley, & Urdan, 1996).

In addition, recent observational studies have more clearly outlined how learners actively construct their motivational beliefs (i.e., beliefs about the goal structures that are emphasized in classrooms). For example, Turner and her colleagues (Turner et al., 2002) conducted a multimethod study examining the relations of perceived achievement goal structures to students' reported use of avoidance strategies in mathematics. Although results from surveys in that study indicated that students reported lesser use of avoidance strategies (i.e., self-handicapping and the avoidance of help-seeking) in classrooms where students perceived that the teacher emphasized mastery goals, results from subsequent *qualitative analyses of classroom discourse* indicated that the motivational supports provided by teachers were the likely *sources* of motivation that yielded these findings. Specifically, discourse analyses provided evidence regarding how students constructed their own understandings of the motivational contexts of classrooms. Specifically, when teachers helped students to understand material, gave students opportunities to demonstrate knowledge, and encouraged students not to feel ashamed or incompetent when confronted with difficult work, students were more likely to perceive classroom contexts as supportive, and consequently used fewer avoidance strategies. This study demonstrated that the actual discourse practices of the teachers provided students with the information that the students used to construct their own understanding of motivation within specific classrooms. Just as Wittrock acknowledged that we generate new knowledge from our prior experiences, motivation studies such as this one and other similar studies indicate that the social interactions and discourse patterns that occur in classrooms provide students with the tools with which they construct meaning in classrooms (see also Patrick, Anderman, Ryan, Edelin, & Midgley, 2001).

COMPONENT 3: BELIEFS ABOUT ABILITY

Wittrock's model had particularly important implications for motivational theories and constructs related to students' beliefs about their abilities. Probably the most notable and referenced construct in this tradition is *self-efficacy*. Self-efficacy refers to a learner's belief that she or he has the cognitive capabilities to perform a specific task (Bandura, 1986, 1997). Self-efficacy is an extremely powerful predictor of learning (Bandura, 1997); students who believe that they have the ability to complete a task are in fact more likely than students with lower efficacy beliefs to actually successfully complete the task.

The sources of efficacy beliefs, and the research on goal-setting and efficacy beliefs, are all reflected in Wittrock's emphasis on the generation of knowledge. Wittrock emphasized the role of *prior knowledge* in learning; indeed, prior knowledge is also an important component in the development of self-efficacy beliefs. Specifically, efficacy beliefs are enhanced when individuals experience success with specific tasks and develop confidence in their abilities to perform and complete those tasks; in particular, the successful achievement of proximal (short-term) goals can lead to enhanced efficacy beliefs (Bandura & Schunk, 1981). Learners can only achieve mastery of those goals when they are aware of their prior levels of knowledge and are also aware of how newly developed skills and strategies have improved their prior knowledge; as an individual realizes that prior knowledge and skills are improving, efficacy beliefs change. Indeed, changes in self-efficacy beliefs do not occur in a vacuum; rather, such changes depend upon changes in prior knowledge; as learners generate new ideas and conceptions, they also need to develop confidence in their abilities to understand those new ideas, or to utilize newly developed skills.

One of the hallmarks of self-efficacy research has been the study of how self-efficacy beliefs develop and increase. Wittrock (1974) described a study in his article in which 336 children were asked to read passages; the students were randomly assigned to one of several conditions: (a) a condition in which students were provided with one- or two-word organizers at the start of each paragraph, (b) a condition in which students were asked to generate and the write a summary statement about each paragraph, and (c) a control group. Although the study was more complex than is described here, the major finding was that children who were in the groups that were required to generate "summaries" of the readings scored better on tests of retention than did students in the other groups.

Although Wittrock did not directly discuss the motivational implications of this finding, they are in fact quite profound. The generative model of learning demonstrated that learning is enhanced when individuals are asked to generate their own meaningful cognitions; those generated cognitions are *based on their prior knowledge*. In the aforementioned study, the children who were in the "generating" group experienced greater retention than did students in either of the other two conditions. In that study, if success is operationalized in terms of retention of information that was read, then the students in the "summarization" group experienced greater success than did students in the other groups. Thus students in that group had to call upon their prior knowledge, and generate their summaries based on that knowledge.

Bandura (1997) identified four sources of self-efficacy: *mastery experiences*, *emotional and physiological arousal*, *vicarious experiences*, and *social persuasion*. Of particular interest in the discussion of the generative model is the role of *mastery experiences*. In the study that was just described, students in the "generative" condition experienced the greatest success; by experiencing success, those students' beliefs about their abilities may have become enhanced.

Although Wittrock did not examine in his original work the effects of multiple successes on building self-efficacy beliefs, Bandura (1997) demonstrated that repeated experiences of success ("mastery") do in fact lead to enhanced self-efficacy. Consequently, if generative techniques lead to more successful learning, it stands to reason that academic tasks that encourage students to generate knowledge will lead to successful learning, and that repeated successes on similar tasks will build self-efficacy.

Reciprocal Teaching: An Example of Generation of Knowledge and Self-Efficacy

Palincsar and Brown's (1984) reciprocal teaching strategies provide a potent example of how the generation of new ideas based on one's prior knowledge can enhance self-efficacy beliefs. In reciprocal teaching, students are taught four basic reading strategies: *summarizing*, *asking questions*, *clarifying*, and *predicting*. These strategies generally are taught in a social setting, with a teacher or more experienced individual providing scaffolded instruction in the strategies. Three of these strategies (*summarizing, asking questions,* and *predicting*) are generative in nature. When students *summarize* previously read information (similar to what Wittrock asked students to do in the study just described), they are generating their own meaningful statements about what they have read. When readers *clarify* confusing sections of texts, they are generating clear statements with the goal of comprehending complex ideas in texts; when readers *predict*, they are using their prior knowledge about the text (as well as other prior knowledge) to generate predictions about what will happen next in the text. Thus in summary, the generation of new concepts is a fundamental feature of reciprocal teaching.

From a motivational perspective, this is important, because reciprocal teaching has been demonstrated to greatly improve reading comprehension, particularly in poor readers (Rosenshine & Meiseter, 1994). In Palincsar and Brown's original studies of reciprocal teaching, results indicated that when students experienced success at reading by using these newly learned strategies, the students were likely to transfer those strategies to other contexts. In particular, students reported using the summarizing and predicting techniques in their other content classes during the school day (Palincsar & Brown, 1984). When students who traditionally are poor readers suddenly experience great success with reading due to such generative techniques, it is likely that their self-efficacy for reading will dramatically improve. This will be a particularly fruitful area for future research.

DISCUSSION

Wittrock's model of learning as a generative process was not designed as a model of human motivation. Nevertheless,

the basic tenets of the model are reflected in many current motivational theories and research programs. Perhaps most important is the fact that Wittrock's model and research findings have important implications for educational interventions and for teacher education, with the goal of enhancing student motivation.

In this article, I examined three components of motivation theory/research that are reflected in Wittrock's model: (a) the role of cognition, (b) the construction of meaning, and (c) beliefs about ability. These are in fact three areas that have become extremely important themes in the study of academic motivation over the past three decades. It is important to note that these three ideas were proposed within Wittrock's model before they became influential within the field of motivation. Thus Wittrock's ideas may have served as an important precursor to many of the developments in motivation research.

Wittrock's model has not been directly examined in many empirical studies of motivation research. Although this is somewhat disturbing, it also provides an important avenue for future research. Studies of knowledge generation and achievement motivation offer much promise for the future.

I believe that one of the most fruitful areas for future research will be the study of the relations of generative learning to self-efficacy beliefs. Although there is surprisingly little direct research in this area, studies of generative techniques such as reciprocal teaching, which have led to drastic improvements in reading comprehension, are likely to simultaneously yield improvements in self-efficacy beliefs. This is particularly important, because research clearly indicates that enhanced self-efficacy is related to improved academic achievement and to decisions about career choices (see Pajares, 1996, for a review).

Wittrock's important work on learning as a generative process provided an important framework for the study of academic motivation. From an historical perspective, many of Wittrock's ideas preceded subsequent but highly similar developments in the field of achievement motivation. Near the end of his article, Wittrock (1974) stated that "it seems that instruction which causes the learner to generate distinctive associations between stimuli and memory facilitates long-term recall and understanding" (p. 94). Wittrock's statement also reflects core tenets of motivation research. Most theories of motivation readily acknowledge that when learners are engaging with meaningful information (i.e., they are generating relations between their prior experiences and interests with newly learned material), they will become more motivated to continue to engage with the information in the future.

REFERENCES

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*, 261–271.

Anderman, E. M., Austin, C. C., & Johnson, D. (2002). The development of goal orientation. In A. Wigfield & J. Eccles (Eds.), *Developmental perspectives on achievement motivation* (pp. 197–220). San Diego, CA: Academic Press.

Anderman, E. M., Eccles, J. S., Yoon, K. S., Roeser, R. W., Wigfield, A., & Blumenfeld, P. C. (2001). Learning to value math and reading: Individual differences and classroom effects. *Contemporary Educational Psychology, 26*, 76–95.

Anderman, E. M., & Wolters, C. (2006). Goals, values, and affect. In P. Alexander & P. Winne (Eds.), *Handbook of Educational Psychology* (2nd ed., pp. 369–390). Mahwah, NJ: Erlbaum.

Anderman, E. M., & Young, A. J. (1994). Motivation and strategy use in science: Individual differences and classroom effects. *Journal of Research in Science Teaching, 31*, 811–831.

Anderman, L. H., & Anderman, E. M. (2000). Considering contexts in educational psychology: Introduction to the special issue. *Educational Psychologist, 35,* 67–68.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology, 41*, 586–598.

Deci, E. (1980). *The psychology of self-determination*. Lexington, MA: D.C. Heath.

Deci, E., Vallerand, R., Pelletier, L., & Ryan, R. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist, 26*, 325–346.

Deckers, L. (2005). *Motivation: Biological, psychological, and environmental* (2nd ed). Boston: Pearson.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*, 256–273.

Eccles, J. S. (2005). Subjective task value and the Eccles et al. model of achievement-related choices. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 105–121). New York: Guilford.

Eccles, J. S. (2009). Whare are all the women? Gender differences in participation in physical science and engineering. In S. J. Ceci & W. M. Williams (Eds.), *Why aren't more women in science: Top researchers debate the evidence* (pp. 199–210). Washington DC: American Psychological Association.

Eccles, J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., et al. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motivation* (pp. 75–146). San Francisco: Freeman.

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology, 53*(1), 109–132.

Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology, 70,* 461–475.

Graham, S., & Weiner, B. (1996). Theories and principles of motivation. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 63–84). New York: Macmillan Library Reference USA.

Greene, B. A., Miller, R. B., Crowson, H. M., Duke, B. L., & Akey, K. L. (2004). Predicting high school students' cognitive engagement and achievement: Contributions of classroom perceptions and motivation. *Contemporary Educational Psychology, 28*, 462–482.

Hickey, D. T., & McCaslin, M. (2001). A comparative, sociocultural analysis of context and motivation. In S. Volet & S. Jarvela (Eds.), *Motivation in learning contexts: Theoretical advances and methodological implications* (pp. 33–55). Elmsford, UK: Pergamon.

Hull, C. L. (1943). *Principles of behavior*. New York: Appleton-Century-Crofts.

Hull, C. L. (1952). *A behavior system*. New Haven, CT: Yale University Press.

Karabenick. S. A., Woolley, M. E., Friedel, J. M., Ammon, B. V., Blaveski, J., Bonney, C. R., et al. (2007). Cognitive processing of self-report items

in educational research: Do they think what we mean? *Educational Psychologist, 42*, 139–151.

Maslow, A. H. (1970). *Motivation and personality* (2nd ed.). New York: Harper & Row.

Midgley, C. (Ed.). (2002). *Goals, goal structures, and patterns of adaptive learning*. Mahwah, NJ: Erlbaum.

Midgley, C., Kaplan, A., Middleton, M., Maehr, M. L. Urdan, T., Anderman, L. H., et al. (1998). The development and validation of scales assessing students' achievement goal orientations. *Contemporary Educational Psychology, 23*, 113–131.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*, 543–578.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction, 1*, 117–175.

Patrick. H., Anderman, L. H., Ryan, A. M., Edelin, K. C., & Midgley, C. (2001). Teachers' communication of goal orientations in four fifth-grade classrooms. *Elementary School Journal, 102*, 35–58.

Pavlov, I. P. (1927). *Lectures on conditioned reflexes* (G. V. Anrep, Trans.). London: Oxford University Press.

Roeser, R., Midgley, C., & Urdan, T. (1996). Perceptions of the school psycholgoical climate and early adolescents' self-appraisals and academic engagement. *Journal of Educational Psychology, 88*, 408–422.

Rosenshine, B., & Meister, C. (1994). Reciprocal teaching: A review of the research. *Review of Educational Research, 64*, 479–530.

Schunk, D. H., Pintrich, P. R., & Meece, J. (2008). *Motivation in education: Theory, research, and applications* (3rd ed.). Boston: Merrill.

Skinner, B. F. (1953). *Science and human behavior*. New York: Free Press.

Turner, J. C., Midgley, C., Meyer, D. K., Gheen, M., Anderman, E. M., Kang, Y., et al. (2002). The classroom environment and students' reports of avoidance strategies in mathematics: A multimethod study. *Journal of Educational Psychology, 94*, 88–106.

Urdan, T. (1997). Achievement goal theory: Past results, future directions. In M. L. Maehr & P. R. Pintrich (Eds.), *Advances in motivation and achievement* (Vol. 10, pp. 99–141). Greenwich, CT: JAI Press.

Weiner, B. (1985). An attribution theory of achievement motivation and emotion. *Psychological Review, 92*, 548–573.

Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer-Verlag.

Weiner, B. (1992). *Human motivation: Metaphors, theories, and research*. Newbury Park, CA: Sage.

Weiner, B. (2005). Motivation from an attributional perspective and the social psychology of perceived competence. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 73–84). New York: Guilford.

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12*, 265–310.

Wigfield, A., & Eccles, J. S. (2002). The development of competence beliefs, expectancies for success, and achievement values from childhood through adolescence. In A. Wigfield & J. S. Eccles (Eds.), *Development of achievement motivation. A volume in the educational psychology series* (pp. 91–120). San Diego, CA: Academic Press.

Wittrock, M. C. (1974). Learning as a generative process. *Educational Psychologist, 11*, 87–95.