Appendix 1: CRAVE Review of Literature

Below is a recap of the major educational psychology theories (in no particular order) used to describe motivation as it pertains to the classroom setting. My purpose in summarizing these ideas is to communicate them to the average adult. Thus, there are places in which paraphrasing is used to avoid an overabundance of technical jargon.

Expectancy-Value Theory

The first formal expectancy-value model described people's motivation in achievement situations. It believed that what caused student behaviors was determined by an individual's achievement motives, expectancies for success, and incentive values (Wigfield & Eccles, 1992). Other researchers have built on this model, both expanding it and personalizing it for their own studies. Bernard Weiner (1985) proposed the attributional theory (discussed below) to explain what impacts student expectancies for success. A widely-used variation of this model has been most heavily researched by Wigfield and Eccles (2000). It theorizes that both expectancies, which are influenced by ability beliefs along with the perceived difficulty of the task and individual goals, and values, including attainment values (importance of doing well), intrinsic values, perceived usefulness of the task, and cost (both effort and emotional), are key factors in determining a student's motivation. Adding to this, Pintrich and De Groot (1990) adapted the model to include a third component, affective or emotional.

To sum up, the expectancy-value model describes student motivation as being subject to two major dimensions. The first, expectancy, contains beliefs of competence, self-efficacy, and goal orientation. In other words, students are more motivated if they think they can perform adequately and expect success from an activity or task. The second dimension is value, which contains attainment values, utility values, and expected effort. Student motivation, then, is also seen to be influenced by how valuable the task is to the student and if the task is worth the effort needed to complete it. The expectancy-value model theorizes that how motivated a child is to perform a task depends on the degree to which the child expects success and how much value the child places in the activity.

For example, a student may be a whiz at multiplication facts but believe them worthless or unrelated to her world, resulting in low motivation to engage in the task. Another student might love history and binge watches the History channel but be horrible with remembering dates and timelines, thus is uninterested in filling out a worksheet about the events leading up to World War I. When students can pair both importance and competence, though, motivation soars and students are much more engaged in the classroom.

Attributional Theory

The brainchild of Bernard Weiner (1985), the attributional theory of achievement motivation and emotion starts first with the perceived causes of achievement behavior. His theory puts forward the idea that the causes for achievement strivings can be laid at the feet of locus, stability, and controllability. Locus refers to the center of causality and seeks to discern if an event occurs because of an external or internal force. Stability describes whether the perceived cause is likely to be repeated (stable) or not (unstable). Controllability is used to further define a cause by whether or not it is in the control of the person in question.

If a student fails a vocabulary quiz, to what she attributes her failure will go a long way toward affecting her motivation for future activities. If she determines her poor grade is due to her not studying, she's attributing her performance to internal, unstable, and controllable factors since she could reasonably assume that, if she would have studied, she would have done better. If she blames her lack of success on a test that was intentionally designed to be frustrating and cause confusion, she's attributing her bad grade to external, uncontrollable factors because she didn't make the test and she doesn't know if the next test will be any easier.

While the former situation could expect increased motivation to study for the next test, the latter example would instead cause a decrease in motivation because of the attributions of her performance. Thus, students who ascribe their cause for success to internal, stable, and controllable factors have a higher degree of learning confidence resulting in greater motivation than those that see outside, unstable, and/or uncontrollable dimensions affecting their performance (Dickinson, 1995).

Control-Value Theory

This theory, most heavily researched by Reinhard Pekrun, integrates assumptions from the expectancy-value theory and the attributional theory in addition to theories of perceived control (Skinner, 1996) and models that include emotional considerations (Pekrun, 2006; Pekrun R., Goetz, Frenzel, Barchfeld, & Perry, 2011). This theory differs from the expectancy-value theory in the first element, control. Where expectancy in the expectancy-value theory simply considers if a student expects to be successful in a given task without ever looking too deeply at what causes those expectancies, control in the control-value theory integrates Weiner's attributional theory so that expectancies for success and the causes for those beliefs (attributions) work together to determine the amount of control one feels over an outcome. The second element of both the control-value and expectancy-value theories are very similar, identifying intrinsic and extrinsic values that combine for the overall value of the outcome (Pekrun, 2006).

The goal of this theory is to attempt to describe the causes of various emotions encountered in achievement settings. Both control and value work together to describe various emotions based on the positive or negate valuation of each component. For example, students might feel anticipatory joy for an activity that has a positive value and high internal control of success. Conversely, they may feel anger during a task that has negative value and an external control of failure. Boredom is encountered when there is no perceived value regardless of how high or low the control over the activity.

The control-value theory looks at the positive attraction or negative aversion of a task and whether the emotion activates or deactivates the learner's response (Pekrun R., Goetz, Daniels, Stupnisky, & Perry, 2010; Pekrun R., Goetz, Frenzel, Barchfeld, & Perry, 2011). For example, enjoyment is an activating positive emotion while contentment is a deactivating positive emotion. On the other side, anger is an activating negative emotion while hopelessness is a deactivating negative emotion. It is these emotions, categorized by control and value antecedents, that are thought to influence the role of achievement goals on academic performance (D'Mello & Graesser, 2012; Goetz, Pekrun, Hall, & Haag, 2006; Pekrun, Elliot, & Maier, 2009).

Flow Theory

Mihaly Csikszentmihalyi has conducted extensive research on a condition of optimal performance called *flow* (Shernoff, Csikszentmihalyi, Shneider, & Shernoff, 2003). This desirable work environment is a state of deep absorption in an activity that is perceived as intrinsically enjoyable. Flow is based on a symbiotic relationship between task challenge and individual skills. This balance is fragile, though, and imbalances can lead to negative emotional states such as anxiety if a task has a high challenge but the student has low skill, apathy for a low challenge with accompanying low skill, or relaxation for a high-skill, low-challenge task. Thus, flow occurs when concentration, enjoyment, and interest all converge in a task that is challenging but achievable based on perceived skill level. Breaking it down to a more granular level, flow is a fragile state of consciousness that coalesces when academic intensity (challenge and relevance positively correlated with concentration, attention, and interest) meets emotional response.

Goal Orientation Theory

Another angle with which to evaluate student behaviors and motivations are their learning goals, labeled performance and mastery by some (Dweck & Leggett, 1988), and ego involvement and task involvement by others (Nolen, 1988). Goal orientation describes how students either adopt a goal of learning for its own sake (i.e., mastery or task involvement) or a goal of achievement (i.e., performance or ego involvement) when

involved in learning. The goals students adopt influence the quality, timing, and appropriateness of cognitive strategies used for the task. This in turn greatly impacts the quality of the student's overall achievement (Covington, 2000). Performance and mastery goals held by students have been found to be an outcome of the perceived goal orientation of the classroom itself (Ames & Archer, 1988).

Elliot and his colleagues, however, have subsequently postulated a three-tiered approach in which performance goals are divided into performance-approach and performance-avoidance (Elliot, 1999; Elliot, McGregor, & Gable, 1999; Linnenbrink, 2005; Nolen, 1988; Pekrun, Elliot, & Maier, 2009). Performance-approach goals are adopted when students desire to do well on a task and appear intelligent and capable, either to themselves, their classmates, and/or their teachers. Conversely, performance-avoidance goals motivate students to achieve because of a desire not to appear inadequate or unintelligent before others. Using this approach, not only mastery goals but performance-approach goals as well have been found to be beneficial motivational orientations for student performance (Elliot, 1999; Liem, Lau, & Nie, 2008).

Mindset Theory

No modern-day examination of student motivation and engagement would be complete without a close look at Carol Dweck's mindset theory. This theory first came about when observing students' reactions to failure and described two major patterns of cognitive-affect-behavior: maladaptive "helpless" responses and more adaptive "mastery-oriented" responses (Dweck & Leggett, 1988). The maladaptive pattern is characterized by challenge avoidance and low persistence when facing difficulty while the adaptive pattern is characterized by challenge-seeking persistence (Dweck C. S., 1986).

Later, these approaches to one's ability were described by innate theories of intelligence. Students that held to an incremental theory of intelligence believe that intelligence is malleable and can be improved with effort. On the other hand, those that believe in an entity theory hold to the notion that intelligence or ability is fixed and cannot change regardless of desire or work ethic (Blackwell, Trzesniewski, & Dweck, 2007; Dweck & Leggett, 1988; Hong, Chiu, Dweck, Lin, & Wan, 1999).

Finally, these behaviors morphed into the modern descriptions of growth and fixed mindsets (Dweck C., 2006; Dweck C. S., 2008). The growth mindset is characterized by a belief that your basic qualities are things that you can cultivate through effort while the fixed mindset is focused on the understanding that you only have a certain amount of qualities, such as intelligence, skill, or morality, and nothing can be done to change those quantities. More than just a social-cognitive theory, the importance of having a growth mindset agrees with neuroscience research regarding brain plasticity (Mangels, Butterfield, Lamb, Good, & Dweck, 2006), the ability of the brain to rewire itself throughout one's life.

Self-Efficacy Theory

Most heavily researched by Albert Bandura (1993), self-efficacy theory proposes that beliefs about one's ability to produce a desired result influences how people think, feel, behave, and motivate themselves. Perceived self-efficacy impacts these areas through four major processes: cognitive, motivational, emotional, and selection processes. For the first process, cognitive, an incremental theory of intelligence is borrowed so that ability is seen not as a fixed quantity but as an improvable skill. One's self-efficacy beliefs about not only ability but the amount to which it can be increased will then greatly impact performance. Regarding motivation, Bandura borrows from other theories to describe three motivators: causal attributions (attribution theory), outcome expectancies (expectancy-value theory), and cognized goals (goal orientation theory). Thus, one's goal orientation, expectancy for success, and perceived causes for performance all work together to motivate students. Emotionally, the ability to cope is seen to affect avoidance behaviors and serves as the basis for actions in threatening or emotionally disabling situations. Finally, overall self-efficacy shapes the course of our lives by influencing our selection of activities and environments.

Cognitive-Evaluation Theory

First delineated by Richard Ryan and Edward Deci (Koestner, Ryan, & Bernieri, 1984; Reeve & Deci, 1996; Ryan & Grolnick, 1986), the cognitive-evaluation theory proposes that intrinsic motivation is based in the organismic needs for competence and self-determination. An event or environment will affect motivation depending on its functional significance, or interpretation of the meaning of the event or environment by the individual, being viewed as either controlling or informational. Controlling elements exist if an event or environment is experienced as pressure toward a specified outcome. This perceived control makes the person attribute the cause to an external locus of causality, thus making it controlled by external forces rather than internal desires. Informational elements, on the other hand, exist if an event or environment is viewed as providing relevant information for effecting change within an autonomy-supportive context. Students that believe an environment to be informational attribute causes to internal desires, thus facilitating an internal locus of causality. Functional significance, which determines self-determination perceptions, works together with perceived competence to fulfill a person's basic needs and affect motivation.

Self-Determination Theory

Subsequently put forward by Ryan and Deci, the self-determination theory is a macro-theory of human motivation (Niemiec & Ryan, 2009), applied to the narrower focus of student motivation, that puts forward the areas of competence, autonomy, and relatedness as the main areas of motivational causality (Deci, Vallerand, Pelletier, & Ryan, 1991; Ryan & Deci, 2000). As opposed to the aforementioned theories of student motivation which are largely based on social-cognitive constructs, self-determination weaves these social-cognitive needs (competence and autonomy) together with a larger need of the human condition: relatedness (Pintrich, 2003).

Building on the previously considered cognitive-evaluation theory, which put forth competence and self-determination as the major factors affecting motivation, self-determination theory renames self-determination as autonomy and includes relatedness, or relationships, as a third component that affects people's desires to engage or withdraw from activities. These three areas in turn greatly affect motivation, whether it be a lack of motivation or the formation of extrinsic or intrinsic motivation.

One of the contributions of the self-determination theory has been to examine four types of extrinsic motivation (external regulation, introjection, identification, and integration) and examine the positive characteristics of the latter two (Deci, Vallerand, Pelletier, & Ryan, 1991; Dickinson, 1995; Ryan & Deci, 2000). Specifically, extrinsic motivation that has a somewhat internal locus of causality, in which the learner finds value in the activity, is described as identified regulation. Likewise, extrinsic motivation with a perceived internal locus of causality, in which the learner synthesizes and adopts the values as his own, is described as integrated regulation. Both of these types of extrinsic motivation, in addition to truly intrinsic motivation, are known to increase autonomous engagement in activities and support higher academic performance (Deci, Vallerand, Pelletier, & Ryan, 1991; Niemiec & Ryan, 2009).

Person-Object-Theory of Interest

Postulated by Andreas Krapp (1999; 2006), this theory seeks to explain the development of interest and interest-related motivational orientations. Using aspects of self-determination theory, the person-object-theory of interest theorizes a two-tiered regulation system that consists of both cognitive-rational and emotional control mechanisms. It is within this regulation system that Krapp believes the three basic needs of self-determination theory (competence, autonomy, and relatedness) play a crucial role. Motivation is then characterized by its content or object specificity and will only occur if both cognitive-rational (competence, autonomy, and relatedness) and emotional feedback are experienced in a positive way (Krapp A. , 1999; Krapp A. , 2006).

Bringing it all together

As you can imagine, my head was swimming after diving into the deep end of over three decades of educational and psychological research into the field of student motivation. Who was I to decide between Dweck and Csikszentmihalyi? I understand and believe in Pekrun's interpretation of the expectancy-value model while at the same time Deci and Ryan's self-determination theory resonates with me and my experiences as a teacher.

Not wanting to genuflect at the altar of one researcher to the exclusion of all others, I began to look for commonalities between the various theories. The most glaring commonality was the idea of competence. Whatever name it goes by, whether expectancy in the expectancy-value theory, control in the control-value theory, competence in the self-determination theory, or self-efficacy in the self-efficacy theory, I found competence to be a central theme in most theories of motivation. Likewise, my own experiences showed me that students are more highly motivated to attempt and persevere in tasks when they believe that they have the ability (self-efficacy) to complete the task and can envision themselves (expectancy) doing it. Similarly, mindset theory begins upon the assumption that learning involves setbacks and works to describe the proper mindset needed to value the learning process in its entirety.

I also ran across the construct of value in most of the achievement motivation theories. Called value in both the expectancy-value model and the control-value model but described as cognitive-rational regulation in the person-object-theory of interest, I have seen how students' motivation is greatly impacted by the value a student places on a task or achievement goal. If the task is uninteresting or lacking in value, motivation will be hard to come by. Relating to both competence and value, the goal orientation theory (e.g., performance-avoidance vs. performance-approach vs. mastery) takes into account both a student's perceived competence and the inherent value of learning (or lack thereof) when describing how various goals affect motivation. Value is also considered as one of the three motivational processes affecting self-efficacy in the self-efficacy theory and a vital construct in flow theory.

However one views their impact and origin, emotions play a key role in motivational research. Pintrich's adaptation of the expectancy-value theory included an affective component (Pintrich & De Groot, 1990), emotional feedback is integral to the person-object-theory of interest, and the control-value theory is designed to try and explain the causal factors of achievement emotions. Whether emotions are caused by internal or external factors, a student's emotional state can greatly enhance or wreak havoc on learning (Pekrun, Elliot, & Maier, 2009) and enjoyment is essential to flow. Called the affective process in the self-efficacy theory, emotions are pivotal not only as an outcome of motivational processes but also as a conduit for those factors (Pekrun, Elliot, & Maier, 2009; Meyer & Turner, 2002).

Next, the idea of autonomy showed up not only in Weiner's (1985) attributional theory but as an aspect of control in the control-value theory, the key consideration in the cognitive-evaluation theory, and as a separate psychological need in the self-determination theory. Though not as cross-referenced as competence or value, autonomy has been found to be a great motivator in my experience as an educator, both as a teacher and as an administrator. Students, like most humans, desire to be in control of their lives and their day-to-day activity, even if that control is illusory. Incorporating choice into classroom activities has many beneficial effects (Dickinson, 1995) and autonomy is an important aspect of self-efficacy theory as it boosts involvement and persistence (Bandura, 1993) and flow theory since it is seen to foster a positive emotional response (Shernoff, Csikszentmihalyi, Shneider, & Shernoff, 2003). Without autonomy, intrinsic motivation withers on the vine since it is a result of an internal locus of causality (Deci, Nezlek, & Sheinman, 1981).

Finally, relationships, as a part of the relatedness aspect of the self-determination theory, brings into focus a quadrant that is absent from most motivational research: the social nature of people and an intrinsic desire to belong (Deci, Vallerand, Pelletier, & Ryan, 1991; Niemiec & Ryan, 2009; Ryan & Deci, 2000). Whether the connectedness is with a teacher, another student or a group of students, or with a school, students who feel like

they fit in, like they are a part of something bigger than themselves, who feel that they connect with others, are much more engaged and motivated to learn.

In my extensive research into student motivation, I ran across a synthesis by Pintrich (2003) of social-cognitive constructs that attempts to cut through the clutter of most of the student motivation literature. Looking at social-cognitive-based theories, thus excluding the self-determination theory, he correlated the existing literature into five basic families or factors when describing student motivation: self-efficacy and competence, attributions and control beliefs, interest and intrinsic motivation, value, and goals.
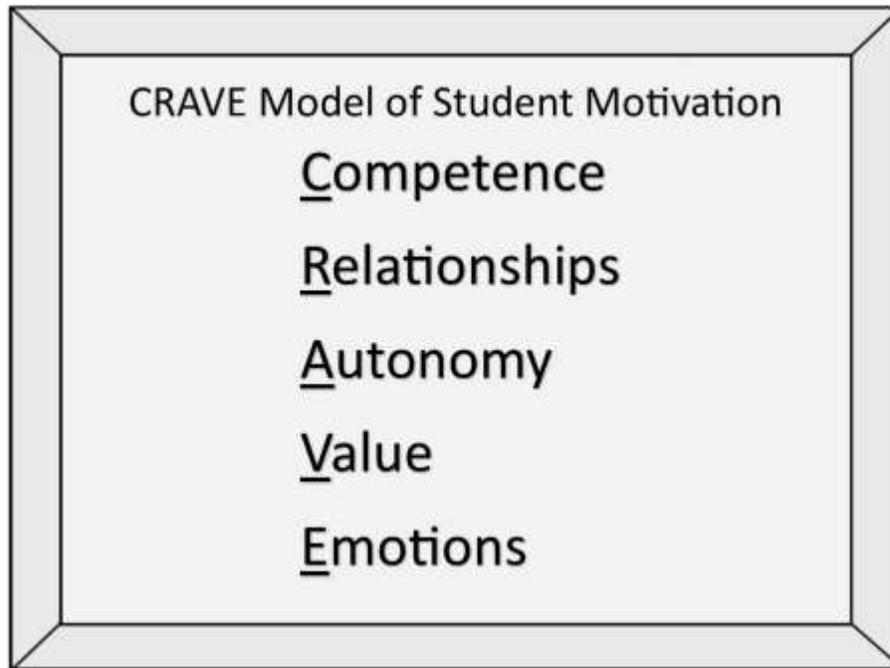
CRAVE Model of Student Motivation

Competence

Relationships

Autonomy

Value

Emotions

Figure 1: CRAVE model of student motivation

My CRAVE acronym runs parallel with Pintrich's (2003) analysis in the three aspects of competence, autonomy, and value. What I term competence Pintrich described as self-efficacy and competence. Two distinct areas in his correlation, attributions and control beliefs along with interest and intrinsic motivation, are described by the single facet of autonomy within CRAVE. Similarly, his areas of value and goals are both described in CRAVE by the facet of value. One of the remaining areas of CRAVE, relationships, incorporates the social aspect of students from the self-determination theory while emotions are a somewhat more confused in the literature. Whether seen as antecedents or conduits of motivational behavior, they are a definite reality for students and have been often ignored by most social-cognitive theories (Pintrich, 2003).

CRAVE, then, can be used not only to explain student motivation but also as a diagnostic tool that I hope teachers can use to increase their teaching efficiency and the overall performance of their classroom. Students will be loath to learn if they lack sufficient motivation but how can teachers increase motivation if they can't identify its components? For some students, they lack interest in the learning activities because they see no value in what that are doing. Bringing in real-world applications can do wonders to increase motivation for those students but will do nothing for the negative impact of low self-efficacy. Teachers can make something as relevant as humanly possible but will still run into roadblocks if students do not believe they can accomplish the interesting task at hand. Other teachers will stumble because their students do not relate to them at all as a human and think that they are cold-hearted aliens bent on destroying the lives of young children. Similarly, student emotional states, sometimes not even having anything to do with the classroom, will derail student engagement. Who wants to learn about polynomials when their parents are going through a divorce?

Teachers are not educational psychologists by trade but are amateur psychologists by nature of their day-to-day activities. Tapping into student motivation is one key to successful instruction. After all, don't teachers wish that all students were intrinsically motivated to learn because they craved knowledge for its own sake?

The following table details how each facet of motivation relates to the major motivational theories in educational research.

Strand	Key Motivational Question	Motivational Theories
Competence	Can I do this?	Expectancy-value theory; Attributional theory; Control-value theory; Self-determination theory; Goal orientation theory; Self-efficacy theory; Flow theory; Cognitive evaluation theory; Mindset theory
Relationships	Does this connect me to others?	Self-determination theory
Autonomy	Do I have to do this?	Attributional theory; Control-value theory; Self-determination theory; Flow theory; Cognitive evaluation theory
Value	Why am I doing this?	Expectancy-value theory; Control-value theory; Person-object-theory of interest; Goal orientation theory; Flow theory
Emotions	How do I feel about doing this?	Expectancy-value theory; Control-value theory; Person-object-theory of interest; Self-efficacy theory; Flow theory

Table 1: Motivational theories incorporated into the CRAVE model

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