A Review of Student Perceptions on the Impact of Effort and Ability on Learning

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**Effort and Ability on Learning**

Perceptions allow people to make meaning of events, expectations, and experiences and shape how they view themselves. These views fuel their belief systems, which in the realm of education affect their behavior and academics. Accountability in the education system has greatly increased in the last two decades. Students are assessed more frequently and teacher evaluations are tied to student learning outcomes (citation). Now more than ever in education it is important to understand the effect of a student’s perception of the impact of his or her effort and ability on learning. Over the past several decades, a breadth of research has been conducted around student beliefs of intelligence and effort. The depth in this area has been strengthened by new research studies extending previous studies. The findings within these studies indicate that students’ perceptions of the impact of their effort and ability on learning significantly affects choices they make about their education and career trajectories.

**Development of Self-Concepts**

**Motivation and ability.** Blackwell, Trzesniewski and Dweck (2007) discovered that beliefs about motivation may not be developed until a child experiences a challenge where it is difficult to succeed. For most students in middle school, early in adolescence, motivational beliefs have become apparent and can be measured. Elementary school settings tend to be more supportive of students and they do not experience the level of rigor in their work to cause frustration. As a student gets older, the type of task required becomes more complex and the content becomes more challenging. When students reach a point of being challenged their motivation, or lack of motivation, becomes apparent. It was recognized by the authors that this development happens at different times for each individual.

Other research argues aspects of the development of motivation and academic performance are evident in younger children. The motivation of children who were in Kindergarten through third grade was associated with the use of motivational support provided by their teachers (McCombs, Daniels, & Perry, 2008). Their degree of motivation was connected to their perception of the extent their teacher exhibited this support. Children this age recognized motivational support and responded by demonstrating greater effort. This in turn influenced their thinking about their learning, leading to the beginning of their own development of academic motivation. In early research, Nicholls (1978) found that when younger students believed a more difficult task would provide a greater level of success, they preferred the task with more difficulty. This belief develops the growth of personal responsibility for success on more difficult tasks.

**Self-efficacy and academic performance.** Davis, Burnette, Allison, and Stone (2010) demonstrated that self-efficacy, the feeling of being capable of successfully completing a task, is predictive of academic achievement when facing a challenge. Marsh and Craven (2006) investigated which develops first, self-efficacy or successful academic achievement. If self-efficacy were the beginning point, then a stronger focus on enhancing the self-esteem of students rather than a strong focus on performance would lead to better results. If successful academic performance built a stronger sense of self-efficacy, then the focus for students would be on performance. The results of their study found that there is a reciprocal relationship between the two, with one not necessarily developing prior to the other. They found “improved self-concepts will lead to better performance, *and* improved performance will lead to better self-concepts “ (p. 159). In order to have long lasting gains in both self-efficacy and academic performance, it is important to improve self-concept and performance at the same time.

Williams and Williams (2010) investigated the relationship between self-efficacy and academic performance by analyzing the performance in mathematics of 15 year-olds on the 2003 Program for International Student Assessment (PISA). Their analysis included thirty-three nations who had provided the data necessary to be compatible with the study. The reciprocal relationship between self-efficacy and successful academic performance was supported by the findings. This relationship was evident in 26 of the nations, leading to the conclusion that this reciprocal relationship is a fundamental process that goes beyond cultural boundaries.

**Implicit Theories of Intelligence**

Naturally, people develop theories about their world and how they interact within it. The theories that are automatic and unconscious are referred to as implicit theories (Glock & Kovacs, 2013). In the educational system, the implicit theories a student brings to school each day can greatly affect how he or she approaches learning. These beliefs become the mental *baggage* that they bring to the classroom (Blackwell et al., 2007). These theories create an understanding of why some students approach challenging academics as motivating and why others view the same task as insurmountable (Robins & Pals, 2002). Once implicit beliefs are formed, they influence the choices of activities a student makes and the amount of effort he or she applies to the activity. The research and literature categorizes these implicit theories of intelligence as entity theories and incremental theories.

**Entity theorist versus incremental theorist.** Entity theorist believe that intelligence is a fixed trait that cannot be affected by effort. In contrast, incremental theorists believe intelligence is a malleable trait and can be increased based on strong study habits (Blackwell et al., 2007; Burnette, O’Boyle, VanEpps, Pollack, & Finkel, 2013; Burns & Isbell, 2007; Dweck, 2010; Ommundsen, Haugen, & Lund, 2007). Dweck (2010) calls this a growth mind-set. Students with a growth mindset do not believe that everyone’s intelligence is the same, but that their personal intellectual ability can grow. An incremental mindset has also been observed to enhance the strength associated with people’s attitude (Henderson, Liver, & Gollwitzer, 2008).

Students who hold a fixed mind-set focus on performance goals and strive to prove the adequacy of their fixed ability level. These goals are focused on comparing themselves to other students (Ommundsen et al., 2007). They are concerned with how much ability they have and demonstrating their skills. These students demonstrate low self-efficacy for academic performance and can be defensive or threatened by academic failure because failure measures their fixed ability (VanDeWeghe, 2003). Research conducted by Robins and Pals (2002) found students with a fixed mind-set believe experiencing a challenging task means they don’t have the ability to succeed. If they did have the ability, the task wouldn’t be difficult. This belief often leads to them giving up before finishing the task. Students who are incremental theorist focus on learning goals and strive to increase their intelligence through mastering the content (Robins & Pals, 2002). They set goals that are challenging and stay committed to them (Williams & Williams, 2010).

Entity and incremental theorist perceive academic success and failures differently. Students who have an entity belief provide ability-based attributes when describing success and failure. Students who are incremental theorist often attribute their success to effort and their failure to insufficient effort or a deficit in their knowledge or skill level. This growth mind-set provides a greater sense of self-efficacy, which leads to focusing on positive outcomes. However, when they do experience failure, they choose more positive, effort-based strategies in the future (Robins & Pals, 2002; Blackwell et al., 2007).

**Implicit theories of intelligence in the educational setting.** A variety of research studies have been completed over the past fifty years in an academic setting to provide a deeper understanding of the effect of student’s implicit theory of intelligence and learning. Some of the more recent research during the past decade builds on the earlier studies.

***Mind-sets in college*.** Robins and Pals (2002) created a real-world achievement context study that extended the framework of implicit self-theories outlined by Dweck (1999)*.* This study investigated how students altered their beliefs on intelligence as they transitioned from high school through their college years, knowing that an increased academic challenge would be present allowing students to demonstrate their implicit self-theories. They found an individual’s intellectual mind-set is pervasive in the academic realm. Their beliefs impacted the effort they applied in their coursework, goals they set for themselves, and the courses they chose to take. The stability of implicit theories of intelligence over time, demonstrated by students’ mind-set identified at the end of high school, were still present throughout college. The correlation over time was significantly higher than previous research on children, suggesting that these theories are more deeply ingrained in a person’s belief system as he or she moves from childhood into adolescence.

Findings from this study supports Dweck’s (date) work on implicit mind-sets. Entity theorist felt more concerned about their academic performance, even when they were performing well. They reported giving up on challenging situations and had lower self-esteem than incremental theorist. The fact that this esteem gap grew larger during the four years at college, demonstrated the fixed beliefs for students who held a fixed mind-set. The relationship between an entity orientation, performance goals, and attributions of helplessness were stronger in situations of failure, but were present in success as well. Failure was blamed on low ability and success was described as being lucky. Incremental theorist adopted learning goals and responded to success and failure through a mastery-orientation lens. They attributed success to a strong commitment to using effective study skills. However, the study did show even though there was a stronger bias towards selecting a performance goal if a student had an entity mind-set and a learning goal if they had an incremental mind-set, the two were not mutually exclusive. In the real-world context, both types of goals were chosen as some point for both mind-sets.

Throughout the study, students with a fixed mind-set showed greater academic ability while students with a growth mind-set demonstrated earning higher grades. The progression of the long-term decline in self-esteem for entity theorist was traced through a path analysis and showed the process of repeatedly not believing they were smart enough throughout college continually chipped away at their self-esteem. The ways students with a fixed mind-set approach achievement situations, places them at risk in the academic environment. “To an Entity theorist, the achievement context is a perilous place in which their fate – success or failure, smart or dumb – is determined by relatively uncontrollable forces” ( Author, date, p. 333).

***Mind-sets in middle school.*** In another real-world context study Blackwell et al. (2007) confirmed that adolescents who endorse a theory of malleable intelligence set strong learning goals, attribute their success to applying positive effort, and were able to increase their achievement in mathematics over a transition to junior high school. The junior high age group was selected because of the uneasiness around increased academic rigor paired with new peer relationships experienced by most students as they transition into this new academic setting. Two studies were completed within this research. The first was a longitudinal study, following four waves of students as they entered junior high school. Implicit beliefs of intelligence and achievement through eighth grade were measured at the beginning and end of each school year. Junior high school students who held a incremental mind-set were more likely to believe that working hard was necessary and led to academic success. These students were less likely to attribute potential failure to a lack of ability and were more likely to show greater effort in future challenges. Academically, students who had a growth mind-set outperformed those who had a fixed mind-set in mathematics.

In the second study, Blackwell et al. (2007) divided one of the waves of students up into an experimental group and a control group. Both groups were taught eight lessons, four of which were the same between the two groups, focusing on the structure and function of the brain and study skills. The other four lessons for the experimental group taught the incremental view of intelligence and for the control group were . A key finding from this study was that the decline in grades for the control group followed a parallel trajectory to what is often evident after a transition to junior high school. In the experimental group, students changed the downward direction of their trajectory within a few months form the intervention lesson on malleable intelligence theory. Within the experimental group, students who endorsed a more incremental framework improved their math grade compared to those who endorsed a more entity framework. Promoting an incremental theory increased motivation in the classroom, proving that students’ theory of intelligence place a significant role in their achievement.

***Adolescent academic aspirations in the United Kingdom*.** Ahmavaara and Houston (2007) compared academic aspirations of students who attended selective schools and non-selective schools in the United Kingdom. At the time of the study, one in ten students in the nation applied and were accepted to go to a selective school. The findings showed a strong tie between a student’s aspiration and the type of school attended. Students at selective schools demonstrated higher achievement aspirations. Similar to findings of Dweck and Leggett (1988), the impact of intelligence theory on students’ aspirations is closely connected with their perceived performance, confidence in their intelligence, and their self-esteem. In contrast with earlier research, Ahmavaara and Houston did not find any evidence of a relationship between a student’s theory of intelligence and gender. Whereas Dweck and Leggett reported girls are more likely than boys to view their intelligence as a fixed entity, this study found boys held higher levels of self-esteem and significantly higher levels of confidence in their intellectual abilities than girls in both the selective and non-selective school settings.

Students who attend a non-selective school had lower aspirations, lower perceived performance and confidence in their own intelligence. Also in the selective schools, students with incremental mind-sets held higher levels of aspirations. The authors questioned if this was because of the selection criteria used to be admitted to this type of school rated a student higher who demonstrated his or her view of intelligence as malleable.

**Modifying an implicit belief.**  Several research studies have shown that a student’s perception about their academic effort and abilities can be successfully manipulated. Incremental theory interventions are most successful with improving academic performance with students who hold an entity theory rather than those who already have an incremental mind-set (Yeager, Johnson, Spitzer, Trzesniewski, Powers, & Dweck, 2014). One suggested reason for this is that there is greater room for growth and change from an entity to an incremental mindset. Burns and Isbell (2007) used malleable and fixed priming theories to manipulate students’ implicit views of their math intelligence. The study found that malleable and fixed views of math intelligence can be primed, however the malleable priming was most successful for students with a fixed view of their math ability. Malleable prime conditioning also decreased test anxiety and increased students’ perceived math intelligence.

Following an intervention lesson on malleable intelligence, Blackwell et al., (2007) found 27% of the students showed a significantly greater positive change in their theory of intelligence. Students who were taught these interventions also demonstrated enhanced motivation in challenging tasks. Increasing student self-efficacy and decreasing their feelings of helplessness can be achieved for many students by priming their theory of intelligence with incremental beliefs (Davis, Burnette, Allison, & Stone, 2010). An intervention of incremental conditioning explaining the role of neurons and dendrites, along with the brain’s capability of forming new neural connections throughout life successfully manipulated theories of fixed intelligence significantly in female students and slightly in male students by teaching them the premise the more the brain is used, the stronger it will grow. This manipulation led to higher math scores for these students (Good, Aronson, & Inzlicht, 2003) Dweck (2010) believes that teaching a growth mind-set has even been shown to decrease an achievement gap, resulting in more equitable outcomes.

**Stereotype threat and student implicit beliefs.** Good et al. (2003) conducted a study to identify effective methods, which would assist females, minority, and low-income adolescents to overcome stereotype threat in a standardized testing environment. Stereotype threat is the confirmation of negative factors due to an individual’s racial, ethnic, gender, or cultural identity. Two factors that contribute to stereotype threat in a testing environment are the scrutiny involved in being evaluated and the racial or gender mix within the testing environment. An example of the effect of stereotype threat is demonstrated in Aaronson’s earlier research. Black college students performed worse than their white peers on standardized tests when they were reminded, just prior to taking the test, of the importance of the exam and that their racial group tends to do poorly on exams. In a control group where their race was not emphasized, black students performed similarly to their white peers.

The 2003 study conducted by Good et al. created four groups of seventh-grade students in a school that was primarily low socioeconomic backgrounds and 80% were Black or Hispanic. All four groups attended sessions focused on manipulating their implicit theory beliefs around intelligence. The incremental condition group received intervention messages highlighting that intelligence is not limited, but rather expandable and could increase with challenging mental work. The attribution condition group was taught that all students have a tendency to experience difficulty when transitioning to a new school, but through effort and focus they become successful. Students in the third group were taught a combination of these two messages. The final group was taught the dangers of drug use. The effects of the interventions were measured through analysis of standardized math and reading assessments at the end of the school year.

Boys from the incremental condition group saw an increase in math performance, but not as significant as the increase the girls demonstrated. Results from the combined condition group showed the gender gap on math assessments disappeared when students were exposed to both the incremental and attribution messages. For students who must live with stereotypes calling into question their intellectual abilities, teaching them about malleable intelligence and positive attributes make the standardized tests more equitable.

Many of the research studies discussed so far highlight academic achievement in mathematics and gender, particularly the performance of girls in a mathematical setting. Through an analysis of 2003 PISA results from 33 countries, a substantive and consistent negative effect of gender on self-efficacy was uncovered in most of the 33 countries (Williams & Williams, 2010). As noted previously self-efficacy leads to greater effort, which results in greater academic achievement. Williams and Williams argued the expectation of significant others depress the self-efficacy levels of girls. The stereotyping of girls mathematic abilities has resulted in females underrating their capabilities compared to boys within this content area. Female students internalize the stereotype that their potential for academic success is defined by hard work and effort (Patell, Awad, Cestone, 2014). Kurtz-Costes, Rowley, Harris-Britt, and Woods (2008) claimed girls who are consistently exposed to gender views about math and science, stereotype threat and its effects have taken hold by the time they reach middle school. A significant number have already developed an identity belief that degrades the importance of math and science in their future education and careers. It is recommended that late childhood is the best fitting developmental stage for interventions focusing on reducing the gender gaps in mathematics and science.

Davis et al. (2011) researched the academic benefits from incremental theories for students who view themselves as underdogs versus viewing themselves as having top dog status in a competitive setting. Underdogs were defined as students who have the odds stacked against them and have a low chance of success. Students’ implicit theories of math ability and helplessness attribute were assessed after the underdog status of students was manipulated during a math competition. Entity theorist in an underdog position reported greater feelings of helplessness and exhibited a loss of self-efficacy in their math abilities. Implicit theories and self-perceptions are powerful when students experience situations that threaten their confidence in their abilities. When students perceive themselves as an underdog, their low self-efficacy level affects their effort they exert leading to lower achievement.

**Self-regulation and Implicit Theories**

The strength model of self-control suggests that acts of self-regulation deplete a resource that is limited. This depletion, referred to as ego depletion, makes it less and less likely to apply self-control on subsequent tasks that closely follow. However, self-regulation is strengthened by use over time. Completing a daily task where self-control is needed has proven to gradually improve self-regulation (Baumeister, Vohs & Tice 2007). Job, Dweck, and Walton (2010) investigated whether holding a theory that difficult tasks are energizing rather than depleting helped people avoid ego depletion and sustain self-regulation. Three of the four studies completed in this research showed only people who thought of will power as a limited resource showed ego depletion. A fourth study demonstrated that the more a person held a limited-resource theory, the poorer their self-regulation applied in real world context was exhibited. For people who held a non-limited resource theory, effort was not reduced because of prior uses of self-regulation. Students can affect their self-control by understanding their own belief about willpower, limited or non-limited resources, and how these affect situations when the need for self-regulation is high.

Incremental theorists are less likely to experience feelings of helplessness in challenging situations and demonstrate a capability to regulate their emotions. This ability allows them to build their self-efficacy. Effectively regulating their emotions and remaining optimistic in challenging situations leads them towards greater achievement (Davis et al., 2010).

Meltzer, Reddy, Polica, Roditi, Sayer, and Theokas (2004) conducted a study to research how student effort connects to strategies used to improve academic performance of successful students with learning disabilities. They demonstrated that student academic perception aligned to the amount of effort they displayed. Middle school students with a positive academic perception were more likely to work harder and use strategies in their schoolwork to help overcome their learning disability. Students with negative academic self-perception viewed themselves as making only average effort in their schoolwork. The implications of students’ self-perceptions framing their willingness to work hard and apply strategies to overcome their learning disability are significant when teaching students with learning disabilities. Students who frequently experience low grades and negative teacher feedback are at risk of developing a learned helplessness, which leads to an inability to self-regulate effort and emotions.

While researching the connection between perceived academic potential, level of satisfaction with the perceived level, and academic success, Patall et al. (2014) found that perceived academic potential positively predicted the ability to regulate effort. The higher the level of perceived ability, the greater the ability to self-regulate their effort. Male students with greater levels of satisfaction who viewed their academic potential as low, were less able to regulate their effort. They were more likely to engage in self-handicapping behaviors leading to underachievement. No relationship was found between male students who viewed themselves as having high academic potential and their ability to self-regulate effort.

The perseverance and passion towards completing a long-term goal is referred to as grit. Duckworth, Peterson, Matthews, and Kelly (2007) describe a gritty individual as someone who works hard towards challenges, even when there they experience setbacks. These individuals set long-term objectives and do not take their focus off of them until it is successfully completed. In a school setting, students who demonstrate a high degree of grit work harder and longer than their peers with lower degrees of grit. This perseverance and focus creates a greater academic success over a long period of time. These students show a strong ability to self-regulate their effort and do not exhibit views of helplessness. Some of the characteristics of gritty students are similar to those with a growth mind-set, such as the application of committed effort, perseverance and resiliency. The authors findings differ from Dweck and others (citation) on intelligence theories when claiming that successful achievement is the product of talent and effort. Talent is an ability trait and falls into the fixed mind-set.

**Teacher Impact on Students’ Implicit Beliefs**.

The presented research demonstrates that a student’s perception of the impact of his or her effort and ability in an academic setting is related to success. A central component of the implicit theories of intelligence model is activated based on a student’s belief. This cycle consists of a series of processes that are causally linked. For example, the belief that one’s intellectual ability is fixed, contributes to a performance goal orientation and potentially a helplessness response pattern. The lack of success deepens the implicit fixed belief of intelligence (Robins & Pals, 2002). Understanding the considerable impact a student’s beliefs about intelligence can have on academic success leads to the question of what impact can an educator have to interrupt this cycle process?

**Teach incremental beliefs*.*** Explicitly teaching students to view their talents and abilities as malleable has proven to be an effective method of intervention to manipulate an entity belief and to strengthen incremental beliefs. Framing students’ intellectual abilities and traits as improvable through persistent engagement and effort allows them to remain engaged on tasks longer and following up on their incorrect answers to determine what they did wrong (Slavich & Zimbardo, 2012) Duckworth et al. (2007) argue that students should be encouraged to work not only with intensity, but also with stamina.

**Feedback and Praise.** Feedback is information about a performance that is derived form a variety of sources (Hattie & Tipperly, 2007). Through feedback, students are able to realistically appraise their abilities and make necessary adjustments, which impacts their self-beliefs. These self-beliefs influence future performance, and the feedback loop begins over again (Williams & Williams, 2010) The feedback given to students should not focus on their abilities, rather it should focus on the processes used to complete the task (VanDeWeghe, 2003).

How we praise students’ achievement has a direct connection to their belief systems. Praising their intelligence encourages students to choose tasks that make them look smart and avoid tasks that challenge them. Praising their effort on challenging tasks enforces qualities such as perseverance and taking risks. Effort praise also prevents triggering a student’s defense mechanism because the praise is focused on the process rather than his or her intellectual ability (VanDeWeghe, 2003). Dweck (2010) also cautions not to praise a student’s intelligence after he or she has performed well. This promotes a fixed mind-set message to the student.

**Attitudes, expectations and relationships.** With younger children, interpersonal relationships are key to building positive self-beliefs (McCombs et al., 2008). When a teacher provides learner centered experiences, students self-reported feeling more positive about their abilities and increased their self-efficacy.

Slavich and Zimbardo (2012) suggest that not only must teachers focus on the implicit beliefs of their students, they also must understand their own beliefs regarding each student’s ability to learn as well as their ability to successfully facilitate the learning. Good et al. (2003) argued teacher expectations are often to blame for race and gender gaps. Low expectations and believing that students’ abilities are fixed communicates to students that a lack of ability prevents academic success. Teachers who approach their students with a fixed mind-set believe that learning is the students’ responsibility. If the student doesn’t have what it takes to be academically successful, there is nothing the teacher can do to change the achievement outcome. The teacher who has a growth mind-set views learning as a collaboration in which the teacher has an equal responsibility (Dweck, 2010). Teachers with a fixed mind-set about students often have low classroom management self-efficacy, which can lead to teacher burnout (Aloe, Amo, Shanahan, 2014).

**Relevant, engaging, and enjoyable learning.** A student’s perceptions of classroom climate, goals, perceived ability, and instrumentality—the relationship between the task and its personally valued future outcome of the learning—are integrally connected and reciprocally influence each other in ways that inform teaching planning and practices. Hardré, Crowson, Debaker, and White (2007) demonstrated that perceived instrumentality is a strong predictor of learning goals. Teachers have influence over the perception of the relevance of a task to future outcomes. If students are unable to make the connections on their own, the teacher needs to assist the process. Student perceptions of a supportive classroom environment were also found to be predictive of perceived ability. In other words, students who are engaged in the tasks in their classroom, believe they have the ability to learn and succeed. In primary grades, a student’s enjoyment of math is strongly linked to the student’s math self-concept (Pinxten, Marsh, De Fraine, Van Den Noortgate, & Van Damme, 2013). It is important for teachers to strive to make lessons engaging and enjoyable and to pay close attention to declining student enjoyment in mathematics to prevent a decrease in a student’s self-concept.

**Conclusion**

Students’ beliefs about the impact of effort and ability on their learning can have significant implications towards the educational choices they make. Their implicit theory of intelligence drives whether they will set challenging learning goals and apply great effort to grow their intelligence; or whether they will feel they have little control over becoming successful in areas they do not believe they can be successful. The literature strongly implies that the significance of these beliefs cross through gender, race, ethnicity, socioeconomics, and even reach internationally. With the importance of students’ implicit theory of intelligence, teachers must adapt their instructional practices to promote the concept of malleable intelligence, persistence, and resilience.

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Hi Teresa,

Nice job. Thanks. There are a bunch of comments in the paper. A few more here:

1. Don’t forget about serial commas.
2. There are a number of spots where you make a statement and then attribute research at the end. The attribution should go up front so that reader knows what research you are talking about.
3. I went through the references rather quickly but I only found one error. Thanks for paying attention.

If there is one thing that feels like it is missing in this paper it is investigation of the idea that beliefs about learning are culturally bound or at least culture has a strong influence. You kind of dismissed this early in the paper with the PISA study but there is a great deal of literature that has looked at this, particularly comparisons of Japanese and American culture. If that work has any veracity (which I believe it does) it would mean that any attempt to help students be better learners is going to have to take cultural background into account. Good teachers do this, of course, but Dweck et al are particularly silent on this aspect of learning theory. Just something to think about …

Dr. Carroll