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One Size Fits Some: Instructional Enhancements to Promote Interest

Amanda M. Durik, Chris S. Hulleman, and Judith M. Harackiewicz


This chapter reviews accumulating research showing how individual differences shape learners’ responses to instructional enhancements designed to promote interest in mathematics and science. We describe research showing that the effectiveness of these instructional enhancements for secondary and postsecondary learners depends on students’ levels of individual interest and self-concept of ability. The data reveal that interest is triggered by different factors for different people, and the emerging pattern of results suggests that interest in mathematics and science activities is shaped by both features of the person and features of the situation. For example, individuals with low individual interest in mathematics find mathematics activities more interesting when the activity is enhanced with superficial features designed to trigger attention. However, these same features tend to undermine interest for those with high individual interest in mathematics. Beyond catching attention, some enhancements are designed to instill a sense of utility or purpose for learning. The effects of these utility value enhancements vary depending on individuals’ existing levels of self-concept of ability in the domain. We consider how these complex research findings fit within existing frameworks of task motivation and self-regulation, and how they might help explain and illuminate these emerging patterns.
One Size Fits Some: Instructional Enhancements to Promote Interest

Anyone who has spent even a few minutes in a classroom will notice that students span the entire spectrum of motivation. Some students eagerly wait to start learning, whereas other students are inattentive, and others actively resist becoming involved. Because of these differences, it is important to consider whether instructional enhancements designed to trigger student interest work the same for all students. In this chapter, we describe research that helps to answer the question of whether triggering interest works differently for learners who span this motivational continuum.

To address this question, we review research on the experimental effects of several instructional enhancements designed to promote student motivation, specifically interest, among secondary and postsecondary learners. Ideally, such enhancements would promote task interest for everyone. However, the emerging evidence suggests that these processes are more complex. For example, a given instructional enhancement might “turn on” one student and “turn off” another student at the same time. In order to support the interest development of as many students as possible, it is important to recognize that students have different reactions to instructional enhancements, and also to understand why these different reactions occur.

The Learner and the Situation: Defining the Key Elements

Learners Are Diverse

Students enter learning situations having had prior experiences that may shape how they think about and interact with the content to be learned. These individual differences include variables such as individual interest and self-concept of ability. We conceptualize individual interest as a multifaceted construct that includes value for a domain and positive affect, as well as stored knowledge and learners’ evolving beliefs about their competence in the domain (Hidi &
Renninger, 2006; Krapp, 1999; Renninger, 1990, 2010; Renninger, Hidi, & Krapp, 1992; Schiefele, 2001). When students enter a classroom, the content with which they interact may be of an individual interest or not. If it is, the student will likely become absorbed in the activity, care about doing well, attend closely to the task, and want to learn (Dewey, 1913; Hidi, 1990; Pintrich, Marx, & Boyle, 1993). In contrast, students with low individual interest are less poised to learn. They may strain to keep their attention on the task, worry about low performance, or give up before getting involved at all (Hidi & Harackiewicz, 2000).

Individual interest tends to be related to *self-concept of ability*, which is another dimension on which students vary. Self-concept of ability includes individuals’ perceptions of their current level of competence (i.e., perceived competence), their ability to engage in the behaviors needed to do well at an activity (i.e., self-efficacy), and their expected level of competence in the future (i.e., expectations for success). Although the research literature treats these variables as related, yet distinct constructs, we treat them together as self-concept of ability (Pintrich, 2003).

Although self-concept of ability is often related to individual interest, they are not the same. They may be more or less related depending on the situation (Sansone & Smith, 2000) or the level of development of individual interest (Hidi & Renninger, 2006). For example, students taking an introductory course in chemistry may be interested in the subject but recognize that they have limited knowledge of it. Overall, students enter learning situations with varying levels of individual interest and self-concept of ability, which can affect their learning experiences.

**The Situation Matters**

Although important, individual interest does not completely determine the interest a person experiences in a particular learning situation. *Situational interest* is the interest a person
experiences in the moment of task engagement, in response to situational cues (Hidi & Renninger, 2006; Mitchell, 1993; Schraw & Lehman, 2001). For example, even students without an individual interest in chemistry may be captivated by a chemistry demonstration that involves a small explosion. The concept of situational interest is promising for educators because it leaves room for instructional enhancements to promote task motivation, even for those students with initially low individual interest. However, the gap that separates students who are interested in the content from the start, and those who are not, may mean that students need different supports in the learning situation to optimize their task engagement (Hidi & Renninger, 2006). The challenge for researchers and teachers is to identify instructional enhancements that can maintain or amplify the motivation of those with existing high individual interest as well as cultivate the motivation of those with low individual interest.

**Learners Respond Differently to Instructional Enhancements**

Our work has concentrated on identifying the effects of instructional enhancements on situational interest in particular tasks. In order to identify promising instructional enhancements, we considered the facets of individual interest and elements of task motivation that have been outlined in theory. We reasoned that it might be possible to enhance learning situations in ways that target one or more of these facets. If the enhancements have their desired effects, they might promote situational interest. The instructional enhancements we have worked with fall into two categories: those designed to attract attention to the task (catch features), and those designed to foster personal utility value of tasks (self-generated utility value and communicated utility value information).

**Enhancements that Attract Attention**
Features of tasks that increase novelty, complexity, and uncertainty (i.e., catch features) have been found to gather attention, and inspire curiosity and exploration (Berlyne, 1960, 1963; Reeve, 1989; Silvia, 2005). We have tested the effects of these types of variables on situational interest. In two studies, college students were randomly assigned to learn a new technique for solving multiplication problems with materials that either contained catch features or not (Durik & Harackiewicz, 2007). The catch features included bright colors and engaging pictures. These features were superficial to the instruction in that they were not essential for learning the mathematics technique, and the written instructions were identical across both conditions. After learning the technique with one of these two sets of instructions, learners used the technique on a set of problems and reported their situational interest. We also measured individual interest at the beginning of the session, and this turned out to be essential.

Learners’ responses to the situational enhancement (i.e., bright colors and engaging pictures) had opposite effects on situational interest, depending on the level of individual interest in mathematics with which learners started. For those with low individual interest in mathematics, the catch features raised situational interest as well as task involvement in the activity. In other words, individuals with low individual interest became more involved and absorbed in the activity if it was enhanced with colors and pictures, and this carried through to their interest in the material.

In contrast, the opposite pattern was observed for those with high individual interest in mathematics. These learners actually reported lower interest if they had been exposed to materials that contained the catch features. A similar pattern emerged when humor was introduced into learning materials, such that the humor had a positive effect on situational interest for those with low individual interest, but an opposite effect for those with high
individual interest (Matarazzo, Durik, & Delaney, 2010). These studies suggest that variables that catch attention by way of novelty, uncertainty, and humor may be more effective for raising the situational interest of learners with low versus high individual interest in the content to be learned.

**Enhancements that Emphasize Personal Utility**

A second approach that we have taken in effort to increase situational interest draws from Eccles and colleagues’ conceptualization of subjective task values (Eccles et al., 1983; Eccles & Wigfield, 2002). They outline several different task values, one of which is utility value. A task has utility value if a person perceives it as providing a means for reaching either a short- or long-term goal (Eccles et al., 1983). Given the centrality of perceived value in the development of interest, we again reasoned that learners may have more situational interest if they were encouraged to think about how a task could be useful for achieving subsequent goals. We manipulated the presence of utility value in two ways. One approach encouraged learners to generate their own utility for the task (self-generated utility, Hulleman & Harackiewicz, 2009; Hulleman, Godes, Hendricks, & Harackiewicz, 2010) whereas the other approach communicated utility value to learners during instruction (communicated utility, Durik & Harackiewicz, 2007).

The task values outlined in the model by Eccles et al. (1983) are subjective, in that the values will be relevant to learners only if they are recognized as personally meaningful. This led us to consider whether utility value could be self-generated by learners, if they were prompted to consider how material that they were learning in class was useful to them (Hulleman & Harackiewicz, 2009; Hulleman et al., 2010; Hulleman, Kosovich, Barron, & Daniel, 2013). In this research, half of the learners were asked to generate various ways that the learning material could be useful for them. The other half of the learners simply summarized the material they
were learning. Again, the effect of this instructional enhancement was not simple, but this time varied based on learners’ beliefs about ability. The results showed that individuals with low self-concept of ability (i.e., those who anticipated poor performance at the beginning) benefited from self-generated utility. They performed better and reported greater situational interest. In contrast, self-generated utility did not affect those with high self-concept of ability.

Although the addition of self-generated utility was effective for some learners, we also wanted to test the effect of what might happen more naturally in a classroom situation, when a teacher communicates the utility of a task for achieving short- or long-term goals. In other words, we wondered what might be the effect of teachers explicitly pointing out to students how class material can be useful to them in other situations. To address this, we designed two sets of instructional materials for the same novel mathematics activity mentioned above (Durik & Harackiewicz, 2007; Durik, Shechter, Noh, Rozek, & Harackiewicz, 2013). Both sets of instructions contained the same information about the technique, but one also contained information about how the task could be useful to learners. For example, the utility information revealed how the technique could be useful in college classes, standardized tests, or various careers. Again, it is important to note that we also collected baseline measures of initial individual interest in mathematics. Our results showed that the presence of utility information had different effects depending on the interest level of students before they started learning. For learners who began the learning session with higher individual interest in mathematics, the utility information promoted situational interest whereas the same utility information failed to influence the situational interest of those with lower individual interest (Durik & Harackiewicz, 2007).

Subsequent research has continued to clarify the effects of communicated utility value. Specifically, our more recent research suggests that self-concept of ability, rather than individual
interest, may be the more critical variable that determined these differential responses to utility value information (Durik et al., 2013). Although the earlier studies showed that the effect of utility value information was moderated by individual interest, more recent research reveals that self-concept of ability is the more robust moderator. Specifically, utility value information undermined situational interest as well as performance for those with low self-concept of ability in mathematics, but had the opposite effect for those with high self-concept of ability, such that utility information promoted interest for individuals with a strong self-concept of ability (Durik et al., 2013). Similarly, the manipulation of self-generated utility benefitted low self-concept of ability students but not those with high self-concept of ability (Hulleman et al., 2010; Hulleman & Harackiewicz, 2009). These results reveal the vital role that self-concept of ability has in determining the effectiveness of situational enhancements on learning. In short, situational enhancements designed around utility value do not work the same for everyone.

Considered together, our results suggest that for instructional enhancements that involve utility value, self-concept of ability appears to be the more vital moderator. But why? One possibility is that perceptions of utility value and self-concept of ability are intertwined. Utility is not simply a static characteristic of a task, but instead, depends on whether the person can do the task well enough to make use of it. In many cases, a given behavior has greater potential for utility if an individual can execute it successfully. For example, if a person knows how to use a computer, then a computer can be very useful. However, if a person does not know how to use a computer, then a computer will not be useful at all. In this way, perceptions of utility value initiate considerations of ability perceptions. In turn, such self-perceptions trigger basic motivations, such as wanting to feel effective in the world (White, 1959), and desiring to maintain positive beliefs about the self in the face of threats (e.g., Tesser, 1988; Trope, 1986).
Individuals with low self-concept of ability may be sensitive to cues suggesting low competence, and shield themselves from threats by ignoring or reacting against competence-related messages. In contrast, individuals with high self-concept of ability may be sensitive to cues suggesting high competence, and readily incorporate competence-related messages as an opportunity for growth or personal enhancement.

**Integrating Leaners and Situations**

The disparate effects of these instructional enhancements call for a conceptual framework that can help clarify the interplay between individual differences and situational enhancements. Harackiewicz and Sansone’s (1991) process model provides an organizing framework to explain and predict how individual differences combine with situational factors to influence motivation. This model was initially developed to describe the emergence of intrinsic motivation (e.g., wanting to learn for the inherent enjoyment of learning). In order to apply the model to interest, we assume that intrinsic motivation is similar to situational interest, in that both involve motivation to engage in a task in the moment, for the value inherent in doing the task (e.g., Deci & Ryan, 1985; Hidi, 2000). In this model, Harackiewicz and Sansone argued that it is necessary to consider both individual difference factors (e.g., individual interest in a topic) and external factors (e.g., instructional enhancements) in order to understand learners’ subsequent motivation in a situation. In particular, their model has focused on how the goals an individual adopts for an activity interact with the situation to affect how learners respond to instruction.

According to the model, individuals enter achievement situations with different purposes for engaging in the task (i.e., purpose goals). Linked to these purpose goals are lower-order target goals that define how an individual can attain the purpose goals (Harackiewicz & Sansone, 1991; Sansone & Harackiewicz, 1996; Sansone & Smith, 2000). For example, the purpose goal
for some students may be to learn the material, and the target goals may involve various strategies for working with domain content in order to comprehend and retain it as thoroughly as possible (Pintrich, 1999; Zimmerman & Martinez-Pons, 1990). Such goal matching may help learners establish meaningful plans for making progress on goals and satisfaction when progress is made. However, the purpose goal for other students may have nothing to do with the learning material. Many students are in the learning situation because it is required by parental authority and the law, and these learners do not have an overarching goal to learn the material. The target goals adopted by students in this situation may conflict with the broader purpose and lead to poorer learning outcomes. For example, a student with a purpose-target mismatch may adopt the goal to do as little as possible to get by, or the goal to avoid incompetence. Neither of these goals will lead students to fully engage in the learning process.

However, when there is a match between the person and the situation, the model hypothesizes that three key psychological processes are triggered that can facilitate the experience of situational interest. First, competence valuation can be initiated before task engagement, and reflects whether individuals care about doing well or not. Second, task involvement occurs during task engagement and reflects whether individuals become absorbed in what they are doing. Finally, self-concept of ability is salient during and after task engagement, and reflects individuals’ evaluations of how well they performed. In summary, individuals enter learning situations with goals that can either collide or mesh with the situation, thereby triggering these psychological processes that promote the experience of situational interest, or not.

**How the Model Explains the Effects of Enhancements Designed to Attract Attention**

In order to apply Harackiewicz and Sansone’s model to these results, it is essential to consider the goals, either explicit or implied, pursued by different individuals. We argue that the
goals of learners with a developed individual interest in the content domain are different from the goals of learners without a developed interest in the content domain. It is helpful to consider the psychological processes related to the different instructional enhancements and to consider how the goals of different individuals may have contributed to the observed effects.

**Learners with lower individual interest.** By definition, individuals who come to an achievement situation with low individual interest are present for reasons other than interest in the content. Assuming that interest in a task helps funnel attention toward the task (Izard, 1977; James, 1970), learners with low individual interest may have difficulty staying focused on the material. Specific to the model, these individuals will not experience task involvement and situational interest unless they are first able to attend to the learning task. The studies of instructional enhancements designed to attract attention show how catch features embedded in instructional materials facilitated the extent to which individuals with low interest became involved in the activity, and experienced situational interest in the task (Durik & Harackiewicz, 2007). The presence of catch features in a learning activity may guide attention toward the task for learners who are otherwise prone to distraction. In sum, the presence of catch features may have raised involvement and interest for learners with initially low interest because the catch features of the task kept their attention on the learning material. If the primary challenge for learners with low individual interest is apathy or inattention, then instructional enhancements that increase the catch features of tasks, and thereby influence the sensory experience of task engagement, may be especially useful for raising their situational interest.

Extending from this, Sansone and her colleagues (Sansone & Thoman, 2005; Sansone, Weir, Harpster, & Morgan, 1992; Sansone, Wiebe, & Morgan, 1999) have given careful consideration to the motivational plight of individuals with low interest. They have pointed out
that only those with low interest have a self-regulatory challenge (Sansone & Thoman, 2005), being required to engage in a task even though they do not experience it as involving and rewarding. Individuals in this situation employ various strategies for becoming engaged in a task, including varying or personalizing the way they do it (Sansone et al., 1992; 1999).

**Learners with higher individual interest.** In contrast, learners with a well-developed individual interest may simply have a goal to learn the content. Specifically, these individuals value the content domain, can challenge themselves within the domain, and tend to be secure in their beliefs about ability in that domain (Hidi & Renninger, 2006). The alignment of these facets may translate into a chronic goal to learn about the domain, and to focus on domain content. These individuals may consciously pursue a goal to learn or simply act on the goal upon entering a situation in which there is content available to learn. Consistent with this analysis, individual interest has been shown reliably to correlate with learning goals (e.g., Harackiewicz et al., 2008), which are goals focused on competence defined by learning and skill development.

The superfluous presentation of pictures and colors reduced task involvement and situational interest for learners with high individual interest, presumably because the enhancement was distracting or annoying. Unlike individuals with low individual interest, those with high individual interest should not have difficulty focusing in the task. Consistent with this, individual interest has been positively correlated with task involvement (Durik & Harackiewicz, 2007), suggesting that these individuals’ attention is naturally directed toward the task, with fewer distracting or intrusive thoughts. However, because their attention was already focused on the content and because the catch features were nonessential to the material to be learned, the presence of these features may have directed these learners’ attention away from, rather than toward, the task. In summary, the presentation of material enhanced with catch features was not
necessary to guide their attention toward the task, and may have been distracting. These learners may have experienced frustration or other negative emotions that undermined their situational interest.

**How the Model Explains the Effects of Enhancements that Emphasize Utility**

Because goals operate at different levels, it is possible to consider the match or mismatch between situations and individuals. The extent to which competence matters in a given situation dictates whether self-concept of ability is more or less related to the experience of interest (Sansone & Smith, 2000). Specifically, when the situation emphasizes competence, individuals with higher self-concept of ability will experience more interest (Sansone & Smith, 2000). When the situation does not emphasize competence, however, self-concept of ability will be less important. Thus if the presence of utility information makes competence more salient, then self-concept of ability will be a determinant of whether these instructional enhancements work or not.

**Learners with lower self-concept of ability.** Again, it is helpful to consider the goals of individuals with low self-concept of ability in order to better understand the effects of the instructional enhancements related to utility. Those with a low self-concept of ability, who also tend to have lower individual interest, may want to shield themselves from competence-related threats, which could be a barrier to the triggering of situational interest. Individuals with lower self-concept of ability in mathematics felt less competent in the learning situation when utility was presented to them than when it was not (Durik & Harackiewicz, 2007; Durik et al., 2013). However, not all instructional enhancements involving utility undermined the interest of these individuals. When the enhancement prompted learners to generate their own utility, those with a lower self-concept of ability actually performed better and found the material more interesting (Hulleman et al., 2010; Hulleman & Harackiewicz, 2009). In other words, those individuals with
a vulnerable self-concept of ability may be especially sensitive to utility information, but they may not entirely discount it. For example, a struggling mathematics student may be open to considering the utility of mathematics for activities already integrated into his or her life, but feel threatened if someone else mentions the utility of mathematics for loftier aspirations. Learners with low self-concept of ability may be able to manage the application of utility so that it remains in their comfort zone, which may downplay self-doubt and facilitate their involvement in the task. Accordingly, Hulleman (2007) found that students with low self-concept of ability became more task involved in self-generated utility conditions, and that this increase in task involvement explained the effect of self-generated utility on situational interest.

**Learners with higher self-concept of ability.** In contrast, those individuals with a robust self-concept of ability do not have this vulnerability, and they may be eager to expand their capacities and further the growth of skills. These individuals benefitted from utility value information (Durik et al., 2013). They found the activity more interesting when utility information was presented, and this effect was mediated through ability perceptions. In other words, these individuals performed better and felt more confident in the utility value condition, suggesting that the presence of utility added to their sense of confidence. Individuals with a secure self-concept of ability may be open to information about the potential value of skills that go beyond their present competence level, which can help them experience situational interest.

**Implications for the Broader Context of Instruction**

**Attention and Involvement in Science and Mathematics Classrooms**

Science teachers have various tools available that may be more or less focused on helping students attend to learning science. One type of instruction that was designed to promote science learning and motivation involves hands-on kit-based science curricula (see review by Pine et al.,
2006). These science programs introduce learners to scientific inquiry by using ready-made activities with materials that students interact with to discover and learn content. These curricula may be appealing to the senses and have catch features that help learners with lower individual interest stay focused on doing the activity, and thus raise their situational interest. However, the research described above also suggests that activities that are designed solely to draw attention may have an unintended effect of reducing the involvement of those with higher individual interest. In other words, the materials themselves, without proper scaffolding to facilitate conceptual understanding, may undermine the involvement of learners with high interest.

Although no research is known to have tested the differential effect of these types of curricula for learners with low versus high individual interest in science, the accumulating data suggest that the kit-based approaches are minimally effective for learning if not accompanied by instruction from the teacher that promotes active learning and deep understanding (Minner, Levy, & Century, 2010; Pine et al., 2006; Slavin, Lake, Hanley, & Thurston, 2012). Compounding this problem is a tendency for teachers to shy away from putting science instruction in the context of scientific theory development and evaluation (Windschitl, 2004).

Considering the importance of instructional support within kit-based science programs, as well as the possibility of “turning off” high interest students with superfluous attention-grabbing enhancements, we believe that science programs will benefit the most students when they stimulate attention but also facilitate deep comprehension and conceptual challenge.

**Feelings of Competence in Science and Mathematics Classrooms**

In addition to the match between the student and the utility of the task, it is crucial to understand that each student-task interaction also occurs in a broader social context of classroom learning. This broader social context includes how science is viewed relative to other disciplines
and how other characteristics of students (e.g., gender) might influence the learning experience. These aspects of context are likely to affect the definition of competence in a situation and one’s role within that context, which may in turn affect the extent to which an individual perceives a discipline as useful and personally meaningful.

Students are aware of how different disciplines are viewed, the skills required to be successful in those disciplines, and the role of students in these learning situations (Archer et al., 2010; Shanahan & Nieswandt, 2011). For example, students may believe that art students are unconventional and creative whereas engineering students are precise and efficient. In particular, research suggests that there is a profile that describes successful science students (Shanahan & Nieswandt, 2011). Students report that science students need to be competent in science, conscientious, and good students overall. In addition, students perceive a greater emphasis on having competence in science compared to other school subjects, and students tend to believe that people who are good at science have a natural proclivity toward science (Archer et al., 2010; Shanahan & Nieswandt, 2011). Overall, students’ understanding of science provides some insight into why the effects of the utility manipulations were contingent on self-concept of ability rather than on individual interest.

Perceptions of the disciplines in general are not the only way in which competence concerns may emerge. Social categories also influence how learners perceive themselves and experience tasks. For example, gender stereotypes prescribe the types of activities that are most fitting for women and men, based in beliefs about how certain abilities run stronger in one gender or the other. These beliefs can undermine individuals’ self-concept of ability from the start of task engagement and hinder performance. For example, in one study (Horgan & Smith, 2006), men and women performed the same interpersonal task that was framed as consistent with
either the male or female stereotype. Members of each gender performed better if the purpose of the task was consistent with their gender role than if it was inconsistent (Horgan & Smith, 2006). Moreover, individuals who cared about high performance overall were especially likely to be concerned about a bad performance when doing a task believed not to be favored by their gender (Smith, Sansone, & White, 2007). These studies reveal how social categories can change how individuals think about their own potential for tasks.

In the classroom, many disciplines are gender stereotyped to be more consistent with the male or female stereotype. Specifically, stereotypes of mathematics and science suggest that these disciplines are more consistent with the male gender role (e.g., Francis, 2000; Lightbody & Durndell, 1996; Whitehead, 1996). There is reason to believe that these stereotypes are prominent when students engage in science and mathematics at school, and this is likely to undermine students’ sense of competence during instruction.

It is neither possible nor desirable to eradicate the press for competence in learning situations; however, low self-concept of ability does seem to be a vulnerability when considering learners’ value for tasks. Situational enhancements that allow students to self-generate utility value may have more beneficial effects for such stereotyped students, whereas enhancements that communicate utility information may undermine it. Further, enhancements that focus on catch features may help students engage who are initially reluctant due to concerns about confirming stereotypes. This is a crucial area of research that needs to be explored in the future.

In Conclusion: What Instructional Enhancements to Use?

In summary, these instructional enhancements (i.e., the introduction of catch features, self-generated utility value, and utility value information) paint the same complex story: one intervention may benefit some learners and another intervention may benefit other learners. In
answer to our initial question about whether triggering interest works differently for learners who span this motivational continuum, it seems the answer is a resounding “yes.”

It is also helpful to consider the commonalities among learners with varying levels of motivation to engage in tasks, regardless of whether the motivation stems from the presence or absence of individual interest, or higher or lower self-concept of ability. The common factor is that learners must focus on the task content in order to deepen their interest. Those with high individual interest will be oriented to the task, so the learning situation simply needs to provide opportunities to engage in the content. Those with low individual interest are more challenging because they will not naturally orient their attention to the task. Moreover, because individual interest overlaps with self-concept of ability, those with lower individual interest will also tend to have a more vulnerable self-concept of ability.

Second, the pivotal role of self-concept of ability in the extent to which learners respond to statements of utility suggests that competence needs to be nurtured rather than evaluated. Enhancements that engage the learner through catch features, or that encourage the learner to discover their own value in the material, may serve to disrupt negative perceptions of ability and instead focus on the value of the activity (Middleton & Spanias, 1999). In addition, educators may do well to focus on the malleable nature of abilities in mathematics and science in order to dispel some of the beliefs that mathematics and science abilities are fixed (cf. Dweck, 2007; Mueller & Dweck, 1998). This change in focus to a greater growth mindset may go far not only in extending skills, but also in supporting interest development.

**Concluding Thoughts**

This chapter focuses on research relevant to the question of whether triggering interest works differently for different learners. Drawing from experimental research with secondary and post-secondary learners, the data reveal that interest is indeed triggered by different factors for different people, and the
emerging pattern of results suggests that interest in mathematics and science activities is shaped by features of both the person and the situation. These data paint a complex picture for educational practice of secondary students and older. Although this research speaks to a limited set of situational variables in a limited set of contexts, the main message is that educators should be aware that motivational enhancements may not work well for all learners, and to be especially attuned to differences among learners in individual interest and self-concept of ability. We urge educators to be alert and sensitive to cues from learners that might reflect the effectiveness or ineffectiveness of strategies designed to promote interest so that they may adjust accordingly. Finally, it is important to note that the research reported here was conducted with samples of students from secondary and post-secondary levels of education. There is much to learn about how younger learners will respond to these types of situational enhancements. Learners’ cognitive and emotional development across childhood and adolescence in general may also change the situational enhancements that trigger and maintain interest in learning situations. It is our hope that these remaining questions will trigger the interest of future researchers and practitioners.
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