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Principles of increasing interest in science, in particular for the study of foreign languages

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Annotation : Interest is a powerful motivational process that energizes learning, guides academic and career trajectories, and is essential to academic success. Interest is both a psychological state of attention and affect toward a particular object or topic, and an enduring predisposition to reengage over time. Integrating these two definitions, the four-phase model of interest development guides interventions that promote interest and capitalize on existing interests. Four interest-enhancing interventions seem useful: attention-getting settings, contexts evoking prior individual interest, problem-based learning, and enhancing utility value. Promoting interest can contribute to a more engaged, motivated, learning experience for students.

Keywords: interest, education, achievement gaps, motivation, social-psychological interventions, problem-based learning, personalization, utility value, expectancy-value, educational policy

Whether it be a “race to the top” or “no child left behind” or “every student succeeds,” U.S. educational policies focus on elevating students’ performance, with much less focus on sustaining students’ interest. Yet, when students are interested in an academic topic, they are more likely to go to class, pay attention, become engaged, take more courses, as well as process information effectively and ultimately perform well (Hidi & Harackiewicz, 2000). Students who discover academic interests in high school and college are better prepared for satisfying careers. Interest is a powerful motivational process that energizes learning and guides academic and career trajectories (Renninger & Hidi, 2016). Can policies help instructors harness this motivation and thus help students develop interest?

Defining Interest

The term *interest* can describe two distinct (though often co-occurring) experiences: an individual’s momentary experience of being captivated by an object as well as more lasting feelings that the object is enjoyable and worth further exploration. Interest is, therefore, both a psychological *state* characterized by increased attention, effort, and affect, experienced in a particular moment (*situational interest*), as well as an enduring *predisposition* to reengage with a particular object or topic over time (*individual interest*; Hidi & Renninger, 2006). This duality not only highlights the richness of the interest concept but also contributes to the complexity of defining interest precisely. Situational interest combines affective qualities, such as feelings enjoyment and excitement, with cognitive qualities, such as focused attention and perceived value, all fostered by

features of the situation (Hidi & Renninger, 2006). For example, a student might enjoy an entertaining lecture about tsunamis, become fascinated by their power, engage more in the class, and appreciate the subject's personal relevance. Thus, being in a state of interest means that affective reactions, perceived value, and cognitive functioning intertwine, and that attention and learning feel effortless (Ainley, 2006; Dewey, 1913; Hidi, 2006). Situational interest relates to self-regulation, task engagement, and persistence (Sansone & Thoman, 2005; Smith, Wagaman, & Handley, 2009; Thoman, Smith, & Silvia, 2011).

Experiencing situational interest can directly promote learning by increasing attention and engagement. A student who sees a painting by Monet for the first time in an art history class may be captivated by the bright colors and unusual brushstrokes, and as a result, will pay more attention and engage more deeply. If that interest develops into an individual interest, the student will more likely reengage with the material overtime and explore the topic further (Harackiewicz, Durik, Barron, Linnenbrink-Garcia, & Tauer, 2008). Interest, therefore, predicts traditional measures of educational success, including future course taking and performance.

Individual interest highlights individuals' stable preferences for specific content. Here, the immediate experience of interest reflects a well-developed personal preference to enjoy and value a particular subject or activity across situations. Individual interest is, therefore, a stable, underlying disposition activated in particular situations. For example, students interested in geophysics might be especially likely to be in a state of interest during a lecture on tsunamis, whether the lecture is entertaining or not, because their interest is more developed and less dependent on situational factors.

Triggering Students' Situational Interest: Context Personalization

Another way to trigger students' interest in a new subject is to leverage their existing individual interests by presenting instruction in the context of those interests. For example, to teach math to a musician, talk about the mathematical principles inherent in music. Building content around existing interests is an intuitive approach for educators. To be sure, taking stock of each student's interests and adjusting the content accordingly is not without its practical challenges, particularly for instructors of large classes (Walkington & Bernacki, 2014). Indeed, catering to the personal interests of a heterogeneous group of students who differ in their interests can be challenging and time-consuming (Hidi & Harackiewicz, 2000).

However, advanced learning technologies that adjust content based on student preferences can provide feasible and scalable solutions for tailoring instruction to learners' needs and interests, as in context personalization (Collins & Halverson, 2009; Walkington & Bernacki, 2014). This practice matches instructional tasks with characters, objects, and themes of students' out-of-school interests (Cordova & Lepper, 1996; Høgheim & Reber, 2015). For example, in a physics class, a learner interested in extreme sports might be given a task that involves sky diving, to learn about gravity and air resistance. Even with content constraints about what students are expected to learn, the context of

that content may be flexible. Personalized contexts connect new content to learner's pre-existing individual interests. Students given personalized math problems work harder and perform better (Walkington, 2013), with the most pronounced positive effects for students struggling with mathematics and among learners with low individual interest in the content area.

Personalization interventions can be characterized along three dimensions: *depth, grain size*, and *ownership* (Walkington & Bernacki, 2014). Depth refers to the quality of the connections to learners' existing interests. Here, interventions range from simple insertions of surface-level information about students' interests (e.g., a favorite movie) to elaborate contextualized tasks that relate to students' interests and hobbies. Grain size refers to the size of the reference group: It differentiates between tasks that are tailored to the interest of an individual learner or to groups of learners such as a certain age group. Here, the intervention depends upon the homogeneity of the class and whether broad categories of personalization are relevant to a wide audience or smaller subgroups of students who would benefit from more individualized personalization. Ownership refers to the degree of autonomy in generating the personalization. Novel topics might require support from the instructor or peers to give ideas for personalization, but students can also play a role in personalizing their learning, which can create the deepest connections (Walkington & Bernacki, 2014).

For example, some groups of students (Native Americans and Latinos) benefit when the presentation of a science topic emphasizes giving back to their community, an important interest for these students (Brown, Smith, Thoman, Allen, & Muragishi, 2015; Smith, Cech, Metz, Huntoon, & Moyer, 2014; Thoman, Brown, Mason, Harmsen, & Smith, 2015). An intervention designed to integrate topics of giving back to the community in a science course would be a deep, large-grained personalization intervention because it targets the well-developed interests of a group of students. Furthermore, this intervention could be implemented with little ownership (e.g., if the instructor provides information about how science can be used to address community issues) or with a great deal of ownership (e.g., if the instructor tasks students with proposing community outreach activities). What combination of grain, depth, and ownership best connects with students' existing interests is unclear, but these concepts must inform the design of personalization interventions.

Triggering and Maintaining Situational Interest: Problem-Based Instruction

Problem-based learning is an instructional method that creates a need to solve an authentic dilemma (Belland, Kim, & Hannafin, 2013; Hung, Jonassen, & Liu, 2008). From an interest theory perspective, problem-based learning provides a learning environment that can trigger and maintain situational interest. First, the problem presented to students highlights a lack of critical knowledge needed to solve the problem, which can trigger situational interest. Second, the search for answers to the problem stimulates curiosity questions—self-generated questions that can promote the development of deeper interest—while requiring students to acquire and organize new knowledge about the topic, which can promote both interest and learning (Renninger & Hidi, 2016).

Previous research on problem-based learning provides insights into how to create problems that promote interest. Work with Singaporean students suggests that intriguing problems (e.g., why the Japanese were able to conquer Singapore during World War II despite being highly outnumbered) can be effective for eliciting situational interest, but that interest may decline once students discover the answer to the problem (Rotgans & Schmidt, 2014). Thus, a stimulating problem in and of itself may not be enough to promote maintained interest. In a meta-analysis, complex problems were more effective for promoting student learning than were well-structured problems (Walker & Leary, 2009). Indeed, a problem (climate change) that increased in complexity as students learned more about potential solutions repeatedly triggered situational interest across the 15-lesson unit, rather than dropping off once a potential solution was discovered (Knogler, Harackiewicz, Gegenfurtner, & Lewalter, 2015). Thus, complex problems that build on themselves and continually lead students to ask additional questions can repeatedly trigger situational interest (Walker & Leary, 2009).

Utility-Value Interventions: Integrating Situational and Individual Interest Processes

Interest theory suggests that another route to capturing and sustaining students' motivation is helping students find meaning and value in their courses (Harackiewicz & Hulleman, 2010). Extensive experimental and longitudinal survey studies have documented the importance of *value-related beliefs*, defined as perceived usefulness and relevance to the student's identity and both short- and long-term goals (Eccles, 2009; Harackiewicz, Tibbetts, Canning, & Hyde, 2014). When students perceive value in course topics, they develop greater interest, work harder, perform better, persist longer, take additional courses, and complete their degree programs (Harackiewicz et al., 2008; Hulleman, Durik, Schweigert, & Harackiewicz, 2008). Students who see the value of a field of study experience greater involvement, more positive task attitudes, and greater identification with the domain (Brown et al., 2015; Smith, Brown, Thoman, & Deemer, 2015).

Value perceptions play a key role in another prominent theory of motivation: expectancy-value theory (Eccles et al., 1983). According to this theory, people choose challenging tasks—such as persisting in a college physics course—if they (a) value the task and (b) expect that they can succeed (based on self-beliefs). Beliefs about the self and beliefs about the value of the task both predict interest, course choices, and major choice. Task value includes intrinsic value (the enjoyment an individual experiences from performing a task), attainment value (the personal importance of doing well on a task), and utility value (how useful or relevant the task is for the individual's current and future goals). Intrinsic value is of course closely aligned with situational interest, and both intrinsic and attainment values predict academic interest and persistence (Eccles & Wigfield, 2002). Utility value, however, is an ideal target for interest interventions, because it is the task value most amenable to external influence (Harackiewicz & Hulleman, 2010).

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