Educational Psychologist
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t775653642

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Online Publication Date: 01 April 2009

To cite this Article RENNINGER, K.ANN(2009)'Interest and Identity Development in Instruction: An Inductive Model',Educational Psychologist,44:2,105 — 118
To link to this Article: DOI: 10.1080/00461520902832392
URL: http://dx.doi.org/10.1080/00461520902832392

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Interest and Identity Development in Instruction: An Inductive Model

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An inductive model is proposed that suggests that support for the development and deepening of interest can be aided by knowledge of identity development. The model suggests that instructional practice would be usefully informed were educators (e.g., teachers, parents, museum curators, counselors) to have information about both the phase of a learner’s interest and age-related expectations about their identity development, when working to promote learning of particular disciplinary content. Research describing phases in the development of interest and the age-related challenges and expectations specific to self-representation is reviewed, followed by evidence from the literature that provides preliminary support for the model. Research directions needed to challenge and refine the model follow.

Asked about whether she could imagine pursuing science in the future, an eighth-grade girl responded, “I want to work with people, not become a scientist.” Her perception that becoming a scientist is incompatible with working with people could suggest that she does not realize that research in science always involves collaboration (in the laboratory, building on prior research) or that training in science is essential for becoming a teacher, a doctor, a trainer, and so forth. In other words, she may lack knowledge about science, and as a result lack value for science. Or she may know that science involves working with people, but she may have had negative experiences collaborating with others in science. It is also possible that others’ opinions have led her to think that science is not something that she wants to do. In this case, her prototype for science might be said to be presently constraining the likelihood that she will develop an interest for and/or identify with science (Hannover & Kessels, 2004). It is important to note that the literatures on both interest and identity suggest that this eighth-grade girl could be supported to revise her thinking (e.g., Aspinwall & Staudinger, 2002; Bergin, 1999; Hannover, 1998; Harter, 1999; Hidi & Renninger, 2006; Hoffmann, 2002; Mitchell, 1993; Schraw & Lehman, 2001); however, how to reliably support such a change remains an open question.

The proposed inductive model of interest and identity development in instruction builds on theory and research suggesting that, to promote change, the educator needs information about the phase of learner interest as well as the stage of learner identity development. The model suggests that information about interest and identity development could usefully inform the design of tasks, exhibits, and activities; instructional conversations; and expectations for learner participation and achievement.

An inductive model is one that builds on evidence and needs to be tested in order to be refined (Babbie, 2007). It is a middle ground between anecdotal or case description and a model that has already been refined through experimentation. It describes indicators that have emerged from the theoretical literature and research findings. It provides a basis for hypothesis-generation, and for subsequent testing. For the proposed inductive model, working definitions of both interest and identity are reviewed, and evidence from the literature is discussed, followed by research directions that are needed to challenge and refine the model.

WORKING DEFINITIONS OF INTEREST AND IDENTITY

The terms interest and identity each have a long but almost distinct history in the psychological literature. They have both been used to describe either content or process, although in the present discussion each is discussed as (a) including both
content and process and (b) developing through phases with age and experience. Interest refers to a learner’s predisposition to reengage particular disciplinary content (science, chess, soccer; henceforth, content) over time and the psychological state that accompanies this engagement (cf. Hidi & Renninger, 2006; see also Ainley, 2006; Alexander, 2004; Dewey, 1913; Krapp, Hidi, & Renninger, 1992; Silvia, 2006).

Interest, in this sense, is distinguished from conceptualizations of vocational interest that match a person to an occupation and do not account for the possibility that the capacities for some yet-to-be-developed interest might be developed (e.g., Holland, 1985). Identity, for the purposes of model development, refers to the learner’s self-representation as a person who pursues particular content and the processes that inform the development of this self-representation (e.g., Harter, 2003, 2006; Hannover, 1998). In this sense, identity, like interest, develops through interactions.

In earlier phases of interest development, a learner is not necessarily aware of the potential to have and/or develop interest. Similar to Eccles and her colleagues’ discussions of stage-fit (Eccles & Middely, 1989; Eccles, Wigfield, Harold, & Blumenfeld, 1993), a learner’s ability to make connections to content to be learned is primarily dependent on the learner’s environment (interactions with others, particular activities, recognition of opportunities; see Del Favero, Boscolo, Vidotto, & Vicentini, 2007; Nolen, 2006; Pressick-Kilborn & Walker, 2002). It is only in later phases of interest development that a learner is likely to self-define as having an interest for particular content (Azevedo, 2006; Barron, 2006; Renninger & Hidi, 2002).

For the eighth-grade girl described at the beginning of this article, developing an interest for science and/or identifying with science may seem unlikely but is not impossible. Both interest and identity develop in relation to available experiences and to how learners perceive, understand, and represent these experiences. The shared dependence on experience of both interest development and identity development provides the basis for suggesting the utility of more explicitly considering their relation in instructional practice—particularly for instructing learners in earlier phases of interest development, or those who do not yet identify with content to be learned.

The girl is presently in an early phase of science interest, meaning that she most likely needs to have any connections that she makes to science facilitated by others who position her to ask, reflect on, and pursue answers to questions about science. Such scaffolding could support her to develop connections to science content that lead to developing knowledge and value for science. Of importance, the girl’s ability to connect independently to science content could be supported to deepen and develop (Nolen, 2006, 2007; Pressick-Kilborn & Walker, 2002; Renninger & Hidi, 2002), positioning her to ask, reflect on, and pursue answers to her own questions about science. Similarly, her present identity-related choices and actions can be understood to be informing her current and future self-definition. Her present choices could change were others to help her negotiate her self-perceptions (Baran & Raja, 1996), and her assigned and self-assigned identities (Brickhouse & Potter, 1991; Drake & Sherin, 2006; Drake, Spillane, & Hufferd-Ackles, 2001; McCarthey, 2001; Spencer, 1999; Spencer, Noll, Stoltzfus, & Hapalani, 2001) given her affective and cognitive self-representation (Harter, 2006).

In the sections that follow, research and theory is overviewed from the literatures on interest development and identity development, here focused on self-representation. Following this, evidence is described that suggests the utility of coupling information about the phase of learner interest and identity development in instruction.

### Interest and Its Development

Interest is defined as both a psychological state and as a predisposition to reengage content over time. It highlights the possibility that learners can develop interest and that the environment (teachers, museum personnel, peers, texts, activities) can support its development. More commonly, interest refers to liking, preference, or attraction (Valsiner, 1992), the psychological state of heightened affect that accompanies engagement with particular content, in a given context, at a particular point in time. The present discussion expands on state-based conceptualizations of interest by also accounting for the possibility of change in a person’s phase of interest for content over time—development that is dependent on feelings as well as stored knowledge and stored value.

Interest, in this sense, is both a cognitive and affective motivational variable that develops, is experienced-based, and is not necessarily age-related—in other words, a young person and an adult can have either a situational interest or individual interest for science, although what is of interest to each may differ (see Krapp & Fink, 1992). Interest is initially triggered

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2Interest is always linked to some class of objects, activities, or events; this may be a broad category (e.g., science) or a more focused classification (e.g., dissections in biology). For purposes of the present discussion, interest should be understood as possibly referring to both. It is, however, the existence, process and impact of interest that is the focus of the present discussion, not the particular topic or content (e.g., science vs. soccer).

Differences among domains of potential interest do exist and these affect the nature of engagement, and the possibilities for learning (e.g., mathematics, chess, and music are more hierarchical, whereas English literature, biology, and psychology are less so; see related discussions in Breen & Lindsay, 2002; Johnson, Alexander, Spencer, Leibham, & Neitzel, 2004; Krapp & Fink, 1992; Rheinberg & Schiefele, 1997).

3For ease of readability, interest development is discussed throughout this text at the level of the individual; however, interest also develops in groups and between individuals (see Cobb, McClain, & Gravenmeijer, 2003; Pressick-Kilborn & Walker, 2002, for examples).

4An important caveat to the present discussion is that it focuses on normative development. Katz and Renninger (2006) reported that the development of interest among persons with Asperger’s Syndrome appears to initially unfold as a triggering and maintaining of situational interest,
interest development is specifically described in terms of phases instead of stages, because without support and/or possibilities for challenge, even well-developed individual interest may go dormant, regress, or disappear all together (see discussions in Bergin, 1999; Renninger, 2000; Renninger & Lipstein, 2006). Interest in all phases of development needs to be cultivated and sustained.

When present, interest for content impacts learners’ choices about how to spend time, the goals they set, and the activities in which they engage (Renninger, 2000). Learners of all ages are generally ready to work with feedback and prioritize their activity in ways that allow their learning to deepen when they have well-developed individual interest (see Azevedo, 2006; Barron, 2006; Lipstein & Renninger, 2006; Renninger & Hidi, 2002). Findings also indicate, however, that educators’ expectations about the observed “interest” of learners can be misinformed if they attribute positive value or exclamations of fun to the existence of more developed phases of interest (Renninger et. al., 2008). In such instances, the learners could develop and deepen interest but may not yet have enough knowledge to respond to feedback and/or opportunities that would lead them to the kind of curiosity questions and goal-setting characteristic of more developed phases of interest. They also may not have enough context, meaning, or ability to rationalize the self-regulation required to ultimately experience the joy of answering content-related questions (Brophy, 2008).

When educators think about interest and learning, it is the behaviors of learners with well-developed interest to which they point. Lipstein and Renninger (2006) reported, however, that only 4 of 178 academically oriented 11- to 15-year-old students could be identified as having a well-developed individual interest for writing. Data such as these suggest that the numbers of learners with well-developed interest are very small. Interest can be promoted to develop, however. Harackiewicz and her colleagues, for example, reported that the mastery goals of college students both emerge from and promote later phases of interest (Harackiewicz, Barron, Tauer, & Elliot, 2002; see also Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000) and that the learner’s phase of interest moderates his or her readiness to respond to triggers in the environment (Durik & Harackiewicz, 2007). Such findings indicate that the readiness to engage proximal cues is related to phase of interest and that information about the phase of a learner’s interest could be critical for instruction.

In workshops with teachers, Lipstein (personal communication, April 26, 2006) has repeatedly observed that teachers often misattribute interest based on learners’ apparent interest in receiving feedback. Although learners in earlier phases of interest may appear to be most interested in feedback, it is only learners in later phases of interest who are positioned effectively to work with feedback (see Katz, Assor, Kanat-Maymon, & Bereby-Meyer, 2006; Sansone, 1986), further complicating things for educators. Learners in earlier phases of interest development are more interested in teachers’ suggestions so that they can complete and be finished with assignments and/or because they have an interest in achievement rather than the content they are learning (Renninger & Cai, 2008).

Most learners need support to develop interest so that they do more than simply address or ignore feedback. The ability to rework solution strategies, further develop an idea, or rethink an argument is more or less difficult depending on their phase of interest. In earlier phases of interest, the learner is more likely to accept suggestions that enable them to complete the task; as the learner moves into the phase of emerging individual interest and has his or her own questions and ideas about goals for learning, responses to suggestions may then be met with resistance at least in part because the learner is working to understand what he or she knows (Lipstein & Renninger, 2006; see Figure 1). Learners need to develop enough knowledge to have content to value, question, and refine their understanding.

Research findings suggest that learners with less developed interest need (a) principled content knowledge in order to pose questions on which they can follow-through to find answers and/or to set goals for themselves (Renninger et al., 2008); (b) models of how to make connections to content knowledge and skills to recognize and make use of opportunities and resources (Barron, 2006; Mitchell, 1993); and (c) value for the content knowledge that they have (Bandura & Schunk, 1981; Wigfield & Eccles, 2002), self-concept of ability (Denissen, Zarrett, & Eccles, 2007; Eccles et al., 1993), competence (Harackiewicz & Sansone, 2000; Sansone & Thoman, 2006), and a sense of possibility about their own involvement (Husman & Lens, 1999; Markus & Nurius, 1986).

but differences in the processing capacities that accompany Asperger’s Syndrome impact the developmental trajectory into emerging and well-developed individual interest even though one familiar with this syndrome might assume that the person with Asperger’s Syndrome has a well-developed individual interest.
### Phases of Interest Development

<table>
<thead>
<tr>
<th>PHASE 1 – TRIGGERED SITUATIONAL INTEREST</th>
<th>PHASE 2 – MAINTAINED SITUATIONAL INTEREST</th>
<th>PHASE 3 – EMERGING INDIVIDUAL INTEREST</th>
<th>PHASE 4 – WELL-DEVELOPED INDIVIDUAL INTEREST</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learner Characteristics</strong></td>
<td><strong>Learner Characteristics</strong></td>
<td><strong>Learner Characteristics</strong></td>
<td><strong>Learner Characteristics</strong></td>
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<tr>
<td>– Learners:</td>
<td>– Learners:</td>
<td>– Learners:</td>
<td>– Learners:</td>
</tr>
<tr>
<td>• Attend to content, if only fleeting</td>
<td>• Re-engage content that previously triggered attention</td>
<td>• Are likely to independently re-engage content</td>
<td>• Independently re-engage content</td>
</tr>
<tr>
<td>• Need support to engage:</td>
<td>• Are supported by others to find connections between their skills, knowledge, and prior experience</td>
<td>• Have curiosity questions that lead them to seek answers</td>
<td>• Have curiosity questions</td>
</tr>
<tr>
<td>• From others (e.g., group work, instructional conversation)</td>
<td>• Have positive feelings</td>
<td>• Have positive feelings</td>
<td>• Self-regulate easily to reframe questions and seek answers</td>
</tr>
<tr>
<td>• Through instructional design (e.g., software)</td>
<td>• Are developing knowledge of the content</td>
<td>• Have stored knowledge and stored value</td>
<td>• Have positive feelings</td>
</tr>
<tr>
<td>• May experience either positive or negative feelings</td>
<td>• Are developing a sense of the content’s value</td>
<td>• Are very focused on their own questions</td>
<td>• Can persevere through frustration and challenge in order to meet goals</td>
</tr>
<tr>
<td>• May or may not be reflectively aware of the experience</td>
<td></td>
<td>• May have little value for the canon of the discipline and most feedback</td>
<td>• Recognize others’ contributions to the discipline</td>
</tr>
<tr>
<td><strong>Feedback Wants</strong></td>
<td><strong>Feedback Wants</strong></td>
<td><strong>Feedback Wants</strong></td>
<td><strong>Feedback Wants</strong></td>
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<td>– Learners want:</td>
<td>– Learners want:</td>
<td>– Learners want:</td>
<td>– Learners want:</td>
</tr>
<tr>
<td>• To have their ideas respected</td>
<td>• To have their ideas respected</td>
<td>• To have their ideas respected</td>
<td>• To have their ideas respected</td>
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<tr>
<td>• Others to understand how hard work with this content is</td>
<td>• Concrete suggestions</td>
<td>• To express their ideas</td>
<td>• Information and feedback</td>
</tr>
<tr>
<td>• To simply be told how to complete assigned tasks in as few steps as possible</td>
<td>• To be told what to do</td>
<td>• NOT to be told to revise present efforts</td>
<td>• To balance their personal standards with more widely accepted standards in the discipline</td>
</tr>
<tr>
<td><strong>Feedback Needs</strong></td>
<td><strong>Feedback Needs</strong></td>
<td><strong>Feedback Needs</strong></td>
<td><strong>Feedback Needs</strong></td>
</tr>
<tr>
<td>– Learners need:</td>
<td>– Learners need:</td>
<td>– Learners need:</td>
<td>– Learners need:</td>
</tr>
<tr>
<td>• To feel genuinely appreciated for the efforts they have made</td>
<td>• To feel genuinely appreciated for the efforts they have made</td>
<td>• To feel that their ideas and goals are understood</td>
<td>• To feel that their ideas have been heard and understood</td>
</tr>
<tr>
<td>• A limited number of concrete suggestions</td>
<td>• Support to explore their own ideas</td>
<td>• To feel genuinely appreciated for their efforts</td>
<td>• Constructive feedback</td>
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<td></td>
<td></td>
<td></td>
<td>• Challenge</td>
</tr>
</tbody>
</table>

**FIGURE 1** Learner characteristics, feedback wants, and feedback needs in each of the four phases of interest development.
Although older learners (16 years or more) with little interest may be able to self-regulate (Renninger, Sansone, & Smith, 2004; Sansone, Weir, Harpster, & Morgan, 1992) or be self-determined (Krapp, 2002), like younger learners, they also benefit from supports that help them to sustain engagement and develop connections to content to be learned.

The interest literature points to several types of supports for promoting connections to disciplinary content (henceforth, content) to be learned, specifically the design of texts, tasks, exhibits, and activities (Freeman, McPhail, & Berndt, 2000; Hidi & Baird, 1988; Lipstein & Renninger, 2007; Hidi & Berndorff, 2001; Zahorik, 1996) and instructional conversation (Renninger et al., 2005; see Yamauchi, Wyatt, & Carroll, 2005). Although such supports may result in interest development, qualitative work tracking change in interest suggests that change is likely to be gradual (Pressick-Kilborn & Walker, 2002; Nolen, 2006, 2007; Ray & Renninger, 2006), can progress or regress (Renninger & Lipstein, 2006), requires multiple triggers (Azevedo, 2005; Barron, 2006; Renninger, et. al., 2008; Renninger & Hidi, 2002), and is not necessarily supported in the same way for all learners (Renninger & Lipstein, 2006).

The development and deepening of interest appears to be critically linked to learners’ perceptions of the resources and opportunities that are available to them and also to their sense of possibility (Renninger & Lipstein, 2006; Renninger et al., 2008). Todt and Schreiber (1998), for example, reported that by 10 or 11 years of age, boys and girls tend to constrain their own possibilities by deciding that they identify with particular content (e.g., science) or not. Their findings suggest that prior to 10 years of age, the development of interest may be more malleable and more easily supported by educators. Given research indicating that interest for content can be triggered and developed into adulthood (Harackiewicz et al., 2002), Todt and Schreiber’s findings also point to the likely importance of educators’ understanding of age-related identity development. This literature and its implications for promoting positive change in learner interest for content to be learned is reviewed in the section that follows.

Identity and Its Development

In everyday usage, identity describes a person’s domain-general sense of self with reference to groups (e.g., a Chicagoan, an African American) or particular content (e.g., science). It is often assessed across contexts to describe ongoing, age-related cognitive and affective developments in a person’s thinking, decision making, and response to challenge. A learner’s identity is conceptualized as the product of all earlier interactions with others—responses to these interactions and how these interactions are understood. Because identity evolves through interaction, it is also responsive to intervention and can be supported to change (Aspinall & Standinger, 2002; Grotevant, 1987; Harter, 1999; Ryan & Deci, 2003). Identity, or one’s identities to be more accurate, is considered to evolve as part of the cognitively and affectively informed self-system (Harter, 2006; Leary & Tagney, 2003; Mischel & Morf, 2003) and is understood to be both informed and regulated by culture and context (Roeser, Peck, & Nasir, 2006; Schwartz, Montgomery, & Briones, 2006).

Numerous studies of identity have pointed to the relevance of understanding how the learning environment might be organized to meet the strengths and needs of school-age learners, for example, Eccles and her colleagues’ discussions of stage-fit (Eccles & Midgley, 1989; Eccles, Midgley, & Adler, 1984); Deci and Ryan’s discussions of self-determination theory (Ryan & Deci, 2000, 2003; Tsai, Kunter, Ludtke, Trautwein, & Ryan, 2008). Links between this work and phases in the development of interest for particular content could usefully be explored. In this phase of model development, however, the relation between interest development and identity development focuses on the development of self-representation (sense of self and possibility) because self-representation charts specific changes in the developing cognitive capacity of the learner, beginning with early childhood. Self-representation describes the developing capacity to compare the self to others, the capacity that informs learners’ achievement motivation and feelings about success (Bandura, 1997; see Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). Defined in terms of the relation to particular content self-representation details learners’ age-related understanding of themselves and their interactions, whereas phase of interest describes the learners’ cognitive and affective connections to content.

SELF-REPRESENTATION AND AGE-RELATED DEVELOPMENT

Self-representation focuses on the age-related development of abilities to engage in self-other comparisons: a person’s understanding of him- or herself develops in relation to his or her perceptions of how peers, parents, teachers, and so on, perceive him or her (see Harter, 1998, 2003, 2006). Adapted to the learning of particular content, Harter’s description focuses attention on age-related differences in the capacity and focus of learner’s comparisons of themselves to others and their needs for acceptance. Three aspects of this description are particularly useful for thinking about strategies that could promote interest development.

First, Harter points out that the cognitive capacities of learners at different ages vary and this influences whether and with whom they engage in social comparison—thus, although group work may trigger interest (Mitchell, 1993), use of group work with middle school students may need to be organized differently than group work with elementary school students, to ensure that middle school students’ attention is focused on the content of group work rather than their age-related interests and concerns about participants in the group (Renninger et al., 2007).
Second, Harter explains that with age, learners’ skills and competencies become the focus of their comparisons of themselves to others and have an impact on their self-representations. Thus, decisions to have students work together to provide peer feedback may only be effective for two groups: younger students who are not likely to be making comparisons between themselves and peers and those who have a well-developed individual interest for the content with which they are working and consider differences of opinion opportunities to develop their understanding (Lipstein & Renninger, 2006).

Third, Harter emphasizes the significant impact others can have on learners’ understandings of expectations and competencies, and sense of possibility. Thus, strategies such as pairing stronger and weaker students to provide the weaker student with a model for working with content could only reinforce the difficulty of the content (and explain why students in earlier phases of interest do not like partnering for peer feedback, and why students in later phases of interest are frustrated since they do not receive useful feedback; Lipstein & Renninger, 2006).

To consider the relation among phases of learner interest and self-representation, Harter’s (2003, 2006) description of the development of self-representation is summarized here briefly, by stage, beginning with early childhood. In early childhood, Harter describes children as typically having positive self-representations because they do not engage in social comparison or self-evaluation. At this age, they neither have the ability to compare two points of reference nor do perspective taking. They also do not distinguish between actual and ideal self-attributes. As a result, differences among children in their self-representations are not so apparent at this age, because they are neither able to compare two points of reference nor do perspective taking. They also do not distinguish between actual and ideal self-attributes. As a result, differences among children in their self-representations are not so apparent at this age, despite the fact that the others (e.g., mothers, caretakers, siblings) who are part of the children’s lives use the language and approaches of some (e.g., the language and problem solving approaches of science) rather than other disciplinary contents, thus potentially priming the children to identify with certain disciplines, rather than others.

By middle childhood, as Harter (2006) points out, learners’ self-representations shift from being concrete and positive to include comparison of individual competencies in relation to others (e.g., tall, smart). Children at this age are also very sensitive to context. They may describe themselves as both intelligent and dumb, and recognize that contexts differ and that their attributes in each differ. They also come to be able to describe both positive and negative emotions for the same experience (e.g., liking science class and being worried about being able to do well in science class). The children’s use of social comparison information at this age is also influenced by others’ (e.g., teachers, parents) use of this information to place them in the social hierarchy. This is also the age at which Todt and Schreiber (1998) suggest that learners think their capacities and interest are solidified. It may also be the time when the strategies used to promote the development and deepening of interest especially need to incorporate information about identity development.

By early adolescence, Harter (2006) characterizes learners’ self-representations as typically including social attributes (e.g., talkative, rowdy, shy) and academic competencies gleaned from social comparison and interactions with others. Adolescents are described as increasingly understanding themselves to have different selves in relation to others in their lives (e.g., their father, mother, close friends) and the variety of roles that they have (e.g., student, teammate, brother). They are very dependent on others’ opinions and cannot easily resolve multiple senses of selves with differences in the opinions of these others. This is similar to findings from study of learners’ difficulties receiving feedback in all phases of interest development except well-developed individual interest.

In early adolescence, there is an emerging tension between student needs for feelings of academic competence and the emphases of the educational system (e.g., grades, advanced work; see Eccles & Midgely, 1989; Eccles et al., 1984; Wigfield et al., 2006). A further contribution to differences at this age involves the adolescents’ developing bodies; as Harter (2006) points out, girls who mature earlier are at a disadvantage because they are heavier in a culture that promotes being thin, and boys who mature early are privileged because they are taller and more muscular.

By middle adolescence, Harter (2006) suggests that learners’ self-descriptions increasingly reflect concerns about what others think. By this age, adolescents are able to both identify and compare multiple types of information available from others. They are often not able to resolve contradictions in information, however, and this results in self-representations that may be unstable. From the perspective of interest theory, uncertainty, along with the other collative variables (surprisingness, complexity, novelty, and incongruity; see Berlyne, 1960), triggers attention and enables different types of connections to content, questioning and reflection in more developed phases of interest (see Renninger et al., 2008).

Individual variation at this stage is also expected. Harter (2006) reports that girls (especially girls whose gender orientation is explicitly female) are more likely than boys to identify more contradictory self-attributes, and she suggests that this may be because of the socialization of girls in the family and emphasis on connectedness to others which pulls them in more directions than the boys. She also points to the similar experiences of minority adolescents who must bridge differences of culture, and notes that many youths easily bridge such differences whereas others have much difficulty. It appears that difficulty is less likely when the values of the family, teachers, and peers are similar, or when a clear alternate set of possibilities is available.

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5Harter (2006) also noted, however, that studies of children at this age are also largely observational and may only be tapping certain aspects of self-representation.
In older adolescence, Harter (2006) suggests that learners identify meaningful connections with others and can use these to resolve differences. Their attributions and self-representations draw on beliefs and values that they have come to think of as their own, although these tend to be consistent with those of their parents. They have a sense of direction and a sense of their possible selves (Markus & Nurius, 1986). Identity is likely to be achieved; interests have firmly taken hold and learners are able to direct the course of their learning based on the interests they have been supported to develop (Csikszentmihayli, Rathunde, & Whalen, 1993). Self-regulation to support the development of new interests is possible, at least in part because at this age the learner is able to set goals for himself or herself and follow through to realize them (Sansone et al., 1992).

**SELF-REPRESENTATION AND INTEREST DEVELOPMENT**

It should be noted that much of the preceding discussion has focused on the relation between phases of interest and self-representation in the development of interest. Unlike the age-related stage model posited for self-representation, interest develops independent of age. There is no absolute level of knowledge that needs to be attained; rather, as knowledge develops, value can accrue. Because interest develops in relation to the other content that the learner engages, the phase of the learner’s interest is always relative to his or her other engagements (Ainley, Hidi, & Berndorff, 2002; Renninger, 1992). Learners begin as early as 18 months of age engaging contents of interest differently than other content (DeLoache, Simcock, & Macari, 2007). As young as 3 years of age, they are able to be more flexible, ask more questions, and explore more possibilities in free play with contents of interest (e.g., trains, dolls, paint) than with other familiar content (Renninger, 1990). Although one child is not likely to have the same content(s) of interest as the next child, even when the content of interest does vary by gender, the role of interest in their learning and development does not (Renninger, 1990). All children are likely to attend to, recognize, and recall identified contents of interest more frequently than other familiar content when these are inserted into experimental tasks (Renninger & Wozniak, 1985).

Unlike self-representation which explicitly involves the development of reflective awareness, even older learners with well-developed individual interest are not necessarily aware of the flow of their activity during engagement (Renninger, 2000; see Csikszentmihalyi, 1991). At early ages, children are also not likely to be aware of their actions or goal setting, even though they do spend most of their time engaged with contents of interest and may appear to self-regulate their behaviors as they develop their understanding (e.g., rearranging the cars on the train, placing the engine at the front and at the end; see Renninger, 1989, 1990; Renninger & Leckrone, 1991). They often are assigned identities based on their engagements by parents or teachers (e.g., the child is a future engineer because he or she plays with trains), but as the developmental work on self-representation also indicates, they are not concerned with self-comparison unless they want another child’s toy—the focus of attention is the toy not the other child. Younger learners’ interest appears to drive their learning about the immediate class of content (e.g., the train), and through this interest they learn about properties, balance, momentum, and so forth (see Piaget, 1968). In this sense, children’s interests become the context for their learning and can be said to lead their development (Renninger, 1992).

Even in middle school, learners are likely to be unaware of the amount of time and effort that they invest when working with well-developed individual interest compared to other familiar content (Renninger & Hidi, 2002). They are strategic and able to self-regulate in their work with interest, and as a result their efforts feel effortless (Renninger & Hidi, 2002; see also Dewey, 1913; Hidi & Ainley, 2008). Presumably, with the development of self-representation learners become increasingly conscious of their developed skills and ease in working with some rather than other contents and this accounts for Todt and Schreiber’s (1998) observation that by early adolescence learners think that they either do or do not have interest for particular content.

There are differences between the younger and older learner in term of how self-aware they are of interest and its development. Young children and some middle school students might be expected to have a diffuse understanding of content to be learned and not yet identify with content because they are not engaged in comparisons of themselves to others. Regardless of age, however, once individual interest for particular content is well developed, this includes identification with the discipline, and a readiness to be challenged and engage with others to consider alternate possibilities (Azevedo, 2006; Barron, 2006; Lipstein & Renninger, 2006). For younger and older learners alike, the phases of interest development prior to having a well-developed individual interest are the challenges for the educator. When the learner is in earlier phases of interest development, it seems likely that the educator needs to consider the learner’s phase of interest and information about his or her age-related self-representation.

**An Inductive Model for Instruction: Interest and Identity Development**

The proposed inductive model of interest and identity development suggests that information about both the phase of a learner’s interest and age-related expectations for identity development could usefully inform instructional practice when educators are working to promote learning of particular disciplinary content. More specifically, the model suggests...
1. In earlier phases of interest development, learners may be most likely to benefit from external supports (e.g., group work, meaningful content) that trigger and help to sustain their interests if the triggers account for likely age-related vulnerabilities (e.g., challenges to present understanding, and with age, increased sensitivity to the others’ competencies and opinions).

2. In later phases of interest development, learners already have questions about the content and understand that work with the discipline involves open questions that will lead them to challenge their ideas. Thus, external support needs to trigger the learner to stretch thinking about the content. To the extent that learners identify with the content to be learned, they are not likely to be as vulnerable to comparisons with the competencies of others as peers in earlier phases of interest development. They are not vulnerable in the sense that they do not question their ability to pursue work with the content. They may well be competitive with others, and vulnerable because of achievement goals.

The model builds on the suggestion that interest can develop and deepen and that educators are positioned to support this process. In addition to the research reviewed, two additional forms of support for the inductive model are provided: the juxtaposition of research findings from studies of writing, and details from the case of the eighth-grade girl introduced earlier in this article, a student in a cross-sectional study of middle and high school science students in a suburban working-class neighborhood.

RESEARCH FINDINGS FROM STUDIES OF WRITING

Most middle school writers in an academically oriented school are likely to describe themselves as disliking the peer-editing and group work of Writers Workshops. The exceptions are those who have a well-developed individual interest for writing for whom others’ competencies and/or comparison with others do not seem to be an issue (Lipstein & Renninger, 2006). The majority of the students (those who do not have a well-developed individual interest for writing) report that these instructional practices make them feel left open to criticism. While those in more developed phases of interest for writing may be invested in receiving feedback because it enables them to continue to stretch their understanding, students in less developed phases of interest not only find writing challenging because it requires learning to listen to and work with the opinions of others, they also dislike the fact that the Writer’s Workshop requires them to compare their writing to that of others. Based on Harter’s (2006) description of the development of self-representation, early adolescence is a time in their life when comparison of competencies with others may need to be decreased.

Juxtaposing findings of Oldfather and Shanahan (2006) with the Lipstein and Renninger (2006) findings underscores the potential importance of considering the relation between the phase of learner interest and information about age-related expectancies for identity development in instruction. Oldfather and Shanahan (2006) found that early adolescent students could be supported to learn conventions for writing and expression through group work when this instructional practice did not single the students out. They describe a think/pair/share prewriting activity in which the students worked in small groups to think about an assigned topic, then worked with one other peer to think about the issues raised in the small-group discussion, and finally together with their peer partners shared their thinking with the class. Presumably because this instructional approach did not leave any of the students open to criticism as individuals, the students were able to focus on listening to and thinking about others’ ideas—which may have posed challenges to their identity. In this instructional context, listening and thinking with others appears to have given the students content about which to write and an opportunity to think about how they had communicated when provided with feedback.

Nolen’s (2006, 2007) study of emerging writers in early elementary school provides further support for addressing learners’ interest and their age-related identity challenges in instruction. Using the same Writer’s Workshop methods of peer conferencing on which Lipstein and Renninger (2006) reported, Nolen found uniformly positive results with younger children. She described all of the students in the early elementary-level class feeling that they had something valuable to say, and suggested that it is through peer feedback that the students developed their skills and interest for writing. The Writer’s Workshop method enabled the children to engage the challenges of learning and to listen and think with others without feeling like the instructional demands were overwhelming or leaving them vulnerable. Presumably the younger children were able to work with the Writer’s Workshop approach so successfully because at their age they were not likely to engage in the same forms of social comparison and self-evaluation that early adolescent students do—or, more precisely, than early adolescent students with less developed interest for writing do.

Nolen’s (2006, 2007) study also involved a comparison class that did not work with the Writer’s Workshop and was more teacher directed. This class of students did not develop the level of interest or make the same advances as those in...
the Writers’ Workshop classroom, presumably because of the different supports afforded by the Writer’s Workshop as a learning environment. Work on self-representation suggests that learners in early childhood may have general positive regard about themselves and others as learners but differ in the forms of modeling and opportunities available to them for developing the language of the discipline. It appears that the Writer’s Workshop made a difference in terms of the way that the early elementary students were encouraged to engage and learn writing through practice that involved developing a language for thinking about and doing writing.

The links between the phase of learner interest development and age-related identity development in the domain of writing suggest two further clarifications about learners’ strengths and needs in different phases of interest:

1. With age, those in earlier phases of interest development are likely to be increasingly challenged by social comparison; their readiness to learn may be additionally complex if the content on which they are working also requires them to revise existing understanding.
2. Those in later phases of interest development may be less subject to the vulnerabilities of self-representation when participating in the tasks and activities of the domain than are their peers in earlier phases of interest development because they already identify with the domain.

THE CASE OF THE EIGHTH-GRADE GIRL AND SCIENCE

The eighth-grade girl described at the beginning of this article has only a triggered situational interest for science. We know from her interview that she likes group work and that there are topics in science that she would like to know more about (such as animals and anatomy). We also know that she does not yet think that she could or would want to pursue science and that for her, science class is primarily a social experience. She is in middle adolescence, a stage of identity development when her sense of her competence is likely to be informed by social comparison and her interactions with others.

The girl’s science class includes lab work conducted in groups and discussions of class projects. Her descriptions of her science class, however, focus only on the activities and whether she likes the others whom she works with, not the science of the activity. We also know that she has only a triggered situational interest for science, she would probably be receptive to a discreet amount of feedback if it helped her to know how to do an assignment, work with an exhibit, and so on. In other words, she would like to be told what to do, as long as she also knows that her own ideas are heard and appreciated (see Figure 1).

Instructional conversations that take the girl’s ideas seriously and provide her with feedback to think about should trigger her interest. Whether they do, however, could depend on how well the girl is understood as a learner (Renninger & Hidi, 2002; Yamauchi et al., 2005). If educators were to have information about both her phase of interest and her expected self-representation, the content and the process of the conversation is more likely to be gauged to her strengths and needs.

If the girl’s teacher were able to sit and think with the girl’s group about an assigned problem: describing aloud how he or she is thinking and asking questions of each of the students in such a way that a conversation about the problem begins (see Schoenfeld, 1992), this might be the kind of triggered support to connect to science content that could make a difference—it would model exploration of approaches to problem solving, communicate valuing of her and the other students’ abilities to think, and provide a basis for helping her to build the type of principled knowledge she needs to work productively with science content (Nieswandt, 2007). Her own teacher’s apparent expectation that an early adolescent in an early phase of interest for science would seriously engage her peers during group work to develop an understanding of science seems flawed.

Although others in more developed phases of interest for science are likely to be able to engage seriously and learn science through group work, and can describe their work in the group in terms of the science questions on which they are working, this girl does not yet have enough knowledge to set goals for herself as a learner of science (see Renninger et al., 2008). From the girl’s perspective, group work is fun, and a forum for socially engaging others and getting worksheets
completed: “It is fun, the people behind us, no, the kids in front of us—they, like, always turn around and we, like, all work together. Like, everybody gets it, to tell everybody the answers.” She needs more targeted support to develop her understanding, although it is not clear how many triggers are needed to support her to make connections to science as a discipline, or what types of triggers are likely to be most effective.

The results of Hoffmann and Häussler’s intervention (1998; Hoffmann, 2002) to support seventh grade girls and boys to learn physics suggests, for example, that students can be supported to make connections to science as a discipline when both learner interest development and presenting identity needs are accounted for. The prototype of physics is that it is masculine and more difficult than other subjects; success in physics is also considered to be unrelated to the amount of work invested in learning it (Hannover & Kessels, 2004; Kessels, 2005; Kessels, Rau, & Hannover, 2006). Given this prototype, Hoffmann and Häussler’s intervention focused on learners in the first year that physics is introduced in the school curriculum, the interestingness of the content to be learned, and the gender composition of participating classes. Their findings indicate that when the physics curriculum triggers interest (e.g., the heart is used as an example of a pump, instead of the more traditional use of an oil pump—a less complex but also less interesting context for girls), the girls’ learning in the single-sex classrooms was equivalent to the boys’, and the boys experienced no decreases in learning.

Harter’s (2006) description of self-representation suggests that in early adolescence girls may not easily resolve their multiple senses of selves. They tend to compartmentalize competencies in terms of absolutes, and they are not always accurate about their own competence or others’ perceptions. For the middle-school girls in the Hoffmann and Häussler (1998) study, productively working with subject matter that could carry a negative prototype may only have been possible via a known interest of girls, in a classroom of students of the same gender. Like talented Black children who are positioned through the beliefs of family and friends to develop a counternarrative about possible achievement (Perry, 2003), the girls (and boys) of this study may have had the impact of existing physics prototypes offset by meaningful lessons designed to trigger their interest. Although all of the students benefited from the revised curriculum, it is noteworthy that the girls in this study achieved best in classrooms with other girls. Coupling targeted content of interest with information about age-related self-representation appears to have been the kind of trigger that goes beyond simply catching attention to enhancing content learning and sense of possibility.

Not unrelated to the discussion of coupling age-related identity development with the triggering of interest is the fact that those who continue to pursue science often have parents in science (Margolis & Fisher, 2002; Sonnert, 1995). As children, they are familiarized with science, develop science knowledge, and become comfortable thinking and talking with others, and they are thus positioned to identify as learners of science. Harter (2006) suggests that early and middle childhood are times when knowledge of competency contributes to identification, and times when the standards and evaluation of others can contribute to individual differences in self-representation and self-evaluation. For learners who do not come from families that have led them to identify with (or develop a counternarrative about participation in) a particular discipline at an early age, it appears that instructional practices must target present understanding of learners’ phase of interest development and age-related characteristics and liabilities in identity development, if the development and deepening of interest is to be supported.

The experiences of the girl corroborate this observation. To more seriously engage science as a discipline, she needs to see the value of what she is being asked to learn (Brophy, 2008). It appears that without parental support, she would have benefited in early childhood from educators who worked to support her to develop her knowledge of science by modeling their own observations and scientific thinking, thereby enabling her to begin developing a language for science. In middle childhood, she would have benefited from similar instructional approaches, models of scientific thinking and encouragement to begin developing a language of science, and efforts by educators to downplay comparisons between her understanding and the work and thinking of others.

As an early adolescent, and as she moves into middle and late adolescence, the girl could benefit from direct work with adults who respect her ability to think and learn science and contexts for learning science content that are personally meaningful. If she is to overcome comparisons with others to experience a sense of her own possibilities for science, she is likely to continue to need models and individualized support to develop the principled knowledge that she needs to pursue work in science. Her interest for science needs to be triggered and maintained, and incremental achievements need to be acknowledged so that she can recognize and value what she is learning (Renninger et al., 2008). In this way, she would also be positioned to reorganize her present sense of possibilities for science.

Although it may not be sufficient to focus only on phases in the development of interest and self-representation as the approach to identity development, it does appear that accounting for each is likely to be necessary for instruction especially when the learner is in earlier phases of interest development. There is presently too little research to more specifically describe the triggers for interest and expectancies.

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7 In German schools, physics is first introduced in seventh grade and is then taken each year through high school.

8 Similar findings have also been reported in math (Gisbert, 1998) and music (Sloboda, 1990).
for age-related identity development that could support the development of the girl’s interest for science. This is consistent with the notion of an inductive model. It does appear that such development is possible and that it is dependent on her receiving external support to begin making her own connections to science. It is essential to recognize that the girl could develop an interest for science but does not yet have the type of principled knowledge that would enable her to set and begin to realize different goals for herself in science. It is also necessary to appreciate her vulnerability both because of her phase of interest and her age.

RESEARCH DIRECTIONS

Proposing an inductive model presumes that additional research is needed for purposes of its refinement. Central questions for the proposed model include the following:

1. Could information about both a learner’s phase of interest and age-related expectations for identity development reliably predict the development and deepening of interest and learning?
2. What are valid indicators of a learner’s phase of interest and age-related identity development?
3. What do educators need to know to respond to learners based on their phase of interest and stage of age-related identity development?

The intention of proposing any inductive model is that discussion and reexamination should follow. In terms of the proposed inductive model, this discussion focuses on further detailing a research agenda and, following this, assessment of its validity, internal consistency, and utility. At present, the evidence reviewed here supports a previously uncharted relation between the phase of a learner’s interest and expectations for age-related challenges in identity development specific to self-representation that could make a significant contribution to instructional practice.

ACKNOWLEDGMENTS

I acknowledge the thoughtful insight and support of Jessica Bachrach, Hanoch Flum, Suzanne Hidi, Cheryl Jones-Walker, Avi Kaplan, Alex List, Gale Sinatra, and two anonymous reviewers as I worked on different iterations of this article. I am very appreciative of their unstinting support.

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