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Situational and Individual Interest

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With the publication of *The Role of Interest in Learning and Development* in 1992, Ann Renninger, Suzanne Hidi, and Andreas Krapp directed the attention of educational and motivational scientists to the concept of interest. For the first time, this book brought together authors from various fields who had conducted empirical studies involving interest. Since then, an increasing number of researchers studied interest and theorized about it (see Hidi, 2001; Hidi, Renninger, & Krapp, 2004; Renninger & Hidi, 2001). As a consequence, interest is now well established as a motivational construct in education (cf. Schunk, Pintrich, & Meece, 2008).

In everyday language, "interest" and "motivation" are often used synonymously. This mirrors the history of the concept of interest. Long before the term "motivation" became prevalent in psychology and education, many motivational phenomena have been dealt with under the label of "interest" (cf. Hidi et al., 2004). Therefore, it is important to start by clearly distinguishing these terms. *Motivation* is commonly understood as the state of wanting to perform a specific activity in a given situation (e.g., Schunk et al., 2008; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). The determinants of the strength of a specific, current motivation have been identified by various approaches, including the expectancy-value theories of motivation (e.g., expectancy of success) and self-efficacy theory. In addition, the process of forming a specific motivation is influenced by enduring motivational characteristics of the person, such as motives or goal orientations.

Interest also represents a possible antecedent of motivation. A relatively unique feature of interest is its strong emphasis on the *content of learning*. Unlike many other motivational constructs, such as motives, needs, self-concepts, or goal-orientations, interest is always related to a *specific* object, activity, or subject area. In his person-object theory of interest, Krapp (2002) described interest as a *relational construct* that consists of a more or less enduring relationship between a person and an object. This relationship is realized by specific activities, which may comprise concrete or hands-on actions and abstract mental operations.

In addition, the meaning of interest may range from a single, situation-specific person-object relation (e.g., reading a stimulating text) towards the development of enduring value beliefs with respect to particular domains (e.g., interest in physics). Accordingly, two major conceptions of interest have been suggested: situational and individual interest (e.g., Hidi, 2000; Hidi et al. 2004; Krapp, 1999, 2002). *Situational interest* is a temporary state aroused by specific features of a

situation, task, or object (e.g., vividness of a text passage). This state has been described as focused and effortless attention accompanied by a positive emotional tone (Krapp, Hidi, & Renninger, 1992). Experiencing situational interest may facilitate specific motivations to act. For example, after lively and expressive introductions of new topics by teachers, some students are highly concentrated and eager to learn more about it.

Individual interest is conceptualized as a relatively stable affective-evaluative orientation toward certain subject areas or objects. A high level of interest in a particular subject area involves close associations between that subject area and positive feeling- and value-related attributes (e.g., excitement). When an individual interest becomes activated (e.g., by external cues), it also potentially affects the formation of specific motivations (e.g., to buy a book related to one's interest).

In this chapter, I will first present conceptualizations of situational and individual interest in more detail and address the relation between interest and intrinsic motivation. This is followed by a brief overview of interest measurement. The next sections refer to interest development and the effects of interest on learning. Finally, contextual influences on interest are discussed. The focus of the present chapter is on academic and text-related interests as opposed, for example, to leisure or vocational interests.

Situational Interest

Definitions of Situational Interest

Situational interest describes a short-term psychological state that involves focused attention, increased cognitive functioning, persistence, enjoyment or affective involvement, and curiosity (Hidi, 2000; Ainley & Hidi, 2002; Renninger, 2000). In addition, when interest is high, focusing attention and cognitive activity feel relatively effortless. According to Hidi (1995), automatic attention may explain the facilitative effect of interest on cognitive functioning.

Theoretically, situational interest is created in two different ways (Hidi, 2000; Krapp, 2002). On the one hand, it may be caused by particular conditions or factors in the environment that focus attention and lead to an affective reaction. On the other hand, the experience of interest may be aroused through the activation of enduring individual interests. In the first case, the psychological state of interest is called *situational interest* and in the second case *actualized individual interest*. However, it remains unclear whether these two states are different or the same. Because of the lack of empirical evidence, it seems more parsimonious to assume only one state of interest that may be caused by different factors.

Silvia (2005, 2006) proposed that situational interest should be conceptualized as an emotion. He argued that interest involves all components that characterize emotions: typical facial expression, physiological parameters (e.g., level of activation), subjective experience (engaged, caught-up, fascinated, and curious; cf. Izard, 1977), behaviors (e.g., time spent reading a text), and goals (e.g., wanting to explore an object). Empirical studies confirm that these components are relatively coherent and predict each other (e.g., Reeve & Nix, 1997).

Based on an appraisal theory perspective, Silvia (2005, 2006) identified those appraisals that are most relevant for evoking interest. Appraisal theories assume that emotions are caused by cognitive appraisals of events (e.g., judging the goal relevance of an event; cf. Lazarus, 1991). According to Silvia, the appraisal structure of interest involves two components: an appraisal of novelty or complexity (including uncertainty and conflict) and an appraisal of coping potential. The novelty check includes appraising something as new, ambiguous, complex, obscure, unex-

pected, or otherwise not understood. Numerous studies confirm that judgements of novelty and complexity affect interest (cf. Silvia, 2006). However, both too low and too high levels of novelty or complexity may reduce interest. Therefore, at least one other variable is interacting with novelty to predict interest. A likely candidate for that variable seems to be *coping potential*. This second appraisal component refers to estimates of being able to understand a (new, complex, or surprising) event. In accordance with earlier research findings (e.g., Millis, 2001), Silvia (2005) was able to show that appraisals of novelty-complexity and coping potential interacted in expected ways to predict interest. In addition, the findings revealed that ratings of *pleasantness* did not influence interest. The latter finding is in line with several studies showing that interest and similar positive emotions such as happiness or enjoyment are distinct with respect to their antecedents (Silvia, 2006). For example, complex stimuli are rated as interesting, whereas simple stimuli are rated as enjoyable. Presumably, enjoyment serves a rewarding function, to reinforce goal attainment or attachments to familiar things. In contrast, interest motivates exploration of new and complex domains or objects.

A comparison between definitions of situational interest provided by Hidi (2000; see also Renninger, 2000) and Silvia (2006) reveals a substantial overlap. In both cases, the subjective experience of situational interest is characterized by attention and persistence (being engaged and caught-up), positive affective involvement (being fascinated), and curiosity. Only the role of enjoyment as a defining aspect of situational interest (Hidi, 2000) seems doubtful. However, Silvia's position is more strongly based on an elaborated theory that, in addition, allows us to deduce relevant determinants of situational interest (see also next section). Therefore, it may be more preferable to conceptualize situational interest as an emotion and not as a more vaguely defined psychological state.

Sources of Text-Based Interest

Because of reading's importance to achievement, there has been a great deal of work on interest that focuses on the domain of reading. The literature on situational interest with respect to reading mainly refers to factors that make text materials interesting (e.g., Hidi, 1990, 2001). Consequently, *text-based interest* and situational interest are often used synonymously. A multitude of text-based factors facilitating interest have been suggested (cf. Schraw, 1997; Schraw & Lehman, 2001; Silvia, 2006). These factors often seem to be closely related or redundant (e.g., factors like surprisingness and unexpectedness). The following examples may represent more or less unique sources of interest: surprisingness, coherence, concreteness, vividness, emotiveness, ease of comprehension, simple vocabulary, and engaging themes (death, power, sex). Only a few of the many possible interest sources have been extensively evaluated by research. Relatively strong empirical support exists for surprisingness, coherence, concreteness, vividness, and ease of comprehension (Schraw & Lehman, 2001; Silvia, 2006). Accordingly, well-organized and comprehensible texts with concrete, surprising, and vivid information enhance text-based interest.

Silvia (2006) proposed that most of the potential sources of text-based interest can be integrated in his appraisal model. The different sources of interest should refer to either one of the two appraisal components (novelty-complexity or coping potential). Thus, the sources of interest are to be understood as *facets* of the appraisal components underlying interest. According to Silvia (2006), interest sources that exemplify the novelty-complexity dimension are: surprisingness, vividness, emotiveness, and engaging themes. In contrast, interest sources thought to reflect the coping dimension are: coherence, concreteness, ease of comprehension, and simple vocabulary.

This assignment of interest sources to appraisal components, however, is preliminary and needs to be supported by empirical research.

Triggered vs. Maintained Situational Interest

Both Hidi and Baird (1986) and Mitchell (1993) distinguished two phases or forms of situational interest: triggered and maintained interest. Triggering (or catching, in Mitchell's terms) interest describes the induction of attention and arousal for only a short term. According to a qualitative study by Mitchell (1992), appropriate methods to catch interest in the mathematics classroom include puzzles (and other tools for arousing students' curiosity, such as mind-teasers or starters), group work (social exchange among students enhances the interestingness of the classroom environment), and computers (because they provide cognitive stimulation and allow exploration and testing of conjectures). Mitchell suggests that these "catch facets" are not effective for holding interest over a longer period of time. In order to hold or maintain interest, it is necessary to emphasize the meaningfulness of subject content and facilitate students' involvement ("hold facets"). Meaningfulness refers to students' perception of subject content as being relevant to their daily lives. Involvement refers to students' experience of active participation in learning. Both facets are facilitated when students are allowed to realize projects that are personally meaningful and include a high level of active engagement.

Based on her own and Mitchell's work, Hidi (2000) proposed a two-phase model of situational interest in which triggered situational interest is considered as the first phase and maintained situational interest is considered as the second phase. In addition, only maintained situational interest potentially contributes to the development of long-term individual interest (see also Hidi & Renninger, 2006; Krapp, 1998; Renninger, 2000).

The descriptions given by Hidi (2000) and Mitchell (1993) do not suggest that triggered and maintained interest represent qualitatively distinct experiential states. Instead, triggered interest differs from maintained interest mainly with respect to its duration. However, there is no empirical evidence so far that maintained situational interest—incited, for example, by enhancing the meaningfulness of learning materials—lasts for longer periods of time than situational interest triggered, for example, by vivid text elements. Although it is probable that hold facets (e.g., meaningfulness) create more extensive periods of situational interest, the case of longer lasting triggered interest seems also conceivable. The latter may take place, for example, when a given text contains *numerous* vivid, concrete, and emotive sentences or paragraphs. In addition, episodes of triggered interest with respect to a particular subject area may be experienced repeatedly. Therefore, the duration of situational interest may be not as critical for the development of individual interest as proposed by Hidi (2000). It can be argued, instead, that catch and hold facets differ with respect to their effects on *cognitions being related to an object of interest*. Catch facets, such as puzzles, group work, or use of computers only have an arbitrary relation with a given subject content. Thus, it seems likely that these facets only elicit temporary and short-lived feelings of engagement or curiosity and do not contribute to object-related value cognitions. In contrast, hold facets (e.g., emphasizing the relevance of a topic for students' daily lives) are more directly related to a potential object of interest. They enhance the meaningfulness of subject content and the active involvement with it. As such, these factors facilitate positive *value-* and *feeling-related cognitions* that may turn (especially when they occur repeatedly) into more stable beliefs being characteristic of individual interest (see below).

An interesting task for future research pertains to the question whether only hold facets or

maintained interest may lead to an individual interest. It seems also possible to envision a process in which the repeated experience of triggered situational interest transforms into an individual interest. If a teacher, for example, succeeds in eliciting situational interest repeatedly by using catch facets such as puzzles, group work, or coherent text materials with concrete and vivid examples, it may become more likely that students associate their positive experience with a particular subject content and increasingly exhibit positive content-related value cognitions. Through repeated engagement with that subject content, these associations will become stronger and more stable and eventually form an individual interest.

To summarize, it seems plausible to assume two different developmental trajectories from situational to individual interest, one based on catch facets or triggered interest and one based on hold facets or maintained interest. In addition, it is hypothesized that both pathways to individual interest are mediated by the occurrence of positive content-related value cognitions. These assumptions could be tested experimentally by exposing students to subject content they find uninteresting (e.g., statistics). Then, for one group of students, catch facets should be introduced during several sessions, whereas the other group receives instructions in order to enhance the meaningfulness of subject content. After each session, the strength of situational interest and the occurrence of value cognitions must to be tested. By means of a follow-up assessment, the strength of individual interest (also tested at the beginning of the experiment) can be determined.

Individual Interest

Two different conceptions of individual interest have been proposed. The first conception describes interest as a relatively stable affective-evaluative orientation toward certain domains (i.e., subject areas, objects, events; e.g., Hidi et al., 2004; Krapp, 1998; Schiefele, 2001). That orientation is conceived of as a quantitative variable ranging from low to high levels. The second conception favors a qualitative distinction between interests and noninterests or—more recently—between well-developed and less-developed interests (Renninger, 2000; Renninger, Ewen, & Lasher, 2002). Well-developed interest is characterized by high levels of content-related knowledge and value, whereas less-developed interest includes a high level of knowledge but low value. Research related to this conception is focused on differences between well-developed and less-developed interests, whereas research related to the first conception is mainly directed at the strength of associations between interest and learning or achievement.

Individual Interest as an Affective-Evaluative Orientation

Individual interest is defined as a relatively stable set of *valence beliefs* (Schiefele, 1996, 2001). Valence beliefs are a subgroup of motivationally relevant beliefs, such as expectancies, attributions, and self-concepts. All of these beliefs are important antecedents of specific motivations to act. Valences denote cognitively represented relations between a domain (e.g., physics) and evaluative attributes. These attributes may be either feeling- or value-related. Feeling-related attributes refer to feelings that are associated with a domain, whereas value-related attributes refer to the personal significance of a domain. Theoretically, there are as many feeling-related valences as there are feelings that are possibly related to a knowledge domain (e.g., excitement, stimulation, flow). Similarly, different value-related valence beliefs are to be distinguished depending on the underlying reasons for the personal importance of a domain (e.g., self-realization, centrality within one's self-concept).

Because individual interest is conceptualized as a relatively stable characteristic, feeling- and value-related valences take the form of *enduring* domain-attribute-relations stored in long-term memory. Enduring valences are called valence beliefs, whereas temporary, current valences are referred to as valence cognitions (cf. Schiefele, 2001). It is possible to think of interest as a specific part of the network of knowledge stored in long-term memory (see also Hannover, 1998). The basic idea is that the representation of the interest domain, which itself may constitute a complex network, is related to a number of feeling- or value-related attributes (see above).

It is important to note that both feeling- and value-related valence beliefs are intrinsic in nature. Both types of beliefs are directly related to a certain interest object and are not based on the relation of this object to other objects or domains. For example, if a student highly values mathematics because competence in that domain helps him or her to get a prestigious job, then this student holds extrinsic valence beliefs which result in extrinsic motivation but not in interest (cf. Pekrun, 1988). However, it is possible that a person holds both intrinsic and extrinsic valence beliefs simultaneously with respect to the same interest object. This assumption is in line with research findings showing that intrinsic and extrinsic motivation may be present within individuals at the same time (e.g., Buff, 2001; Pintrich, 2000).

According to Krapp's (2002, 2005) person-object theory of interest, the two components of individual interest represent two fundamental regulation systems, namely a rational (or explicit) and an experiential (or implicit) system (cf. Epstein, 1990). The rational system operates at the conscious, cognitive level, whereas the experiential system operates at the subconscious, emotional level. Value-related valence beliefs are associated with the rational system, feeling-related valences result from emotional experiences. The development and maintenance of individual interests are only facilitated if both forms of valences are positive and coincide. In fact, empirical data confirm that feeling- and value-related valence beliefs tend to be highly correlated (Schiefele, 1996). Despite this close relation, it seems reasonable to expect that some individual interests are based stronger either on the experience of feelings or on the attribution of personal significance (see also Wigfield & Eccles, 1992). A similar argument may apply at the personal level: some persons are more guided by emotions when they develop interests, whereas others more strongly refer to their (conscious) values and goals.

Individual interest as a value concept resembles the notion of task value as it is proposed by Eccles, Wigfield and their colleagues (e.g., Eccles, 1983; Wigfield et al., 2006). Four motivational components of task value were defined: attainment value (importance of doing well on the task), intrinsic value (enjoyment while working on the task, or subjective interest in the task), utility value (instrumentality of the task to reach important current or future goals, engaging in the task for confirming or disconfirming salient aspects of one's self-schema), and cost (negative aspects of engaging in the task, such as amount of invested effort). Obviously, there is a conceptual overlap between feeling-related valence beliefs and intrinsic task value. In addition, individual interest seems to cover an aspect of utility value, namely the function of a task (or interest object) for confirming crucial aspects of one's self. This aspect of utility value appears to be more intrinsic than extrinsic or instrumental and coincides with the definition of value-related valence beliefs which refer to reasons for the personal importance of a domain.

Several studies have investigated the effects of *topic interest* on text learning (e.g., Alexander, Kulikowich, & Jetton, 1994; Schiefele, 1999; Schiefele & Krapp, 1996). In these studies, topic interest was used as an example of individual interest. However, this may be criticized when using interest ratings of unfamiliar topics, which do not represent enduring individual interests. As such, ratings of topic interest provide at best approximate indices for enduring individual inter-

ests. If interest is measured, for example, with respect to university students' major, then, clearly, individual interests are addressed. However, when students are asked to rate their interest in a relatively unfamiliar but appealing topic, such as Black Holes and Quasars, then these ratings can be regarded as examples of situational interest (cf. Hidi, 2000). In the latter case, the title may, for example, represent novel or incongruous information and, thus, facilitate situational interest (see above). Ainley, Hidi, and Berndorff (2002) have suggested that topic interest may be both influenced by enduring individual interests and situational factors.

Individual Interest as a Combination of Knowledge and Value

A somewhat different definition of individual interest has been offered by Renninger (2000; Renninger et al., 2002). In her view, individual interest includes two interrelated components: stored knowledge and stored value. The stored-knowledge component refers to a person's "understanding of the procedures and discourse (structural) knowledge of subject content" (Renninger, 2000, p. 376). According to Renninger (2000), individual interest only develops if a person has enough knowledge to organize new content information and, thus, becomes able to raise curiosity questions. These questions are important for creating new challenges that result in knowledge gains.

Stored value refers to feelings of competence and other positive or negative feelings that derive from the engagement with a particular subject content. More specifically, the feelings related to stored value are the result of figuring out what is understood and what still needs to be clarified (Renninger et al., 2002). As such, the stored-value component seems to be largely dependent on the process of (successfully) creating stored knowledge. When compared with the concept of feeling- and value-related valence beliefs, it becomes obvious that Renninger's value component focuses on feeling-related valence beliefs and seems to neglect value-related valence beliefs.

As noted earlier, in their qualitative empirical work, Renninger et al. (2002) distinguished between well-developed and less-developed interests. Well-developed interests involve high levels of both stored knowledge and value, whereas less-developed interests are characterized by high levels of stored knowledge and low value. This distinction seems useful when research aims at testing the role of value (or interest) by controlling for amount of knowledge. However, this approach fails to acknowledge that people vary widely with respect to the strength of their subject-related value and knowledge components and neglects combinations of low knowledge with either low or high value (Alexander et al., 1994; Tobias, 1994).

A major disadvantage of Renninger et al.'s (2002) position refers to the measurement of interest and the analysis of linear relations between individual interest and learning or achievement. Based on Renninger's approach, the measurement of interest as a continuous variable becomes difficult for two reasons. First, the construction of knowledge tests requires extensive work. Second, Renninger's work implies the exclusion of individuals with low knowledge because she has solely focused on differences among students exhibiting high knowledge and either high or low value scores. Therefore, a (continuous) measure of individual interest can only be provided for persons with high knowledge and varying levels of value. It remains unclear how individuals with low knowledge (and low or high levels of value) are to be treated within that research approach. The analysis of linear interest-achievement relations is further obscured because knowledge and value are differently related to achievement. It is to be expected that knowledge contributes more strongly than value to later achievement. In addition, different processes mediating the effects of knowledge and value have to be assumed (e.g., quality of information processing vs. investment of effort). Thus, it seems to be more parsimonious and straightforward to conceptualize interest as

a value concept and to treat content-related knowledge as a separate variable. This coincides with prior research and allows for clearer research findings with respect to the influence or effectiveness of motivational vs. cognitive variables (cf. Alexander et al., 1994; Tobias, 1994).

Relations Between Situational Interest, Individual Interest, and Intrinsic Motivation

Several authors have made the attempt to clarify the relations between interest-arousing situational characteristics, situational interest, individual interest, and intrinsic motivation (cf. Byman, 1995; Deci, 1998; Hidi, 2000; Krapp, 1999; Renninger, 2000). Based on this literature and the conceptualizations presented above, a model of interrelations is proposed (see Figure 10.1). The model assumes that situational characteristics involving novel and/or complex stimuli with moderate or high coping potential generate situational interest. For example, a person with no particular individual interest in art photography reads an exciting report about a famous photographer and starts feeling stimulated, absorbed, or excited. Situational interest, in turn, facilitates intrinsic motivation to learn more about the subject content being involved in that situation (e.g., to learn more about the photographer and his art or about art photography in general).

In case of an already existing individual interest (e.g., interest in biology), it is assumed that novel or complex information (e.g., reading about the discovery of a new species) not only arouses situational interest but also activates the respective individual interest. The latter presumably contributes to the strength of experienced situational interest. The model takes into account that individual interest can also be activated by internal cues (e.g., thoughts about an interest-related event) or external cues (e.g., reading the announcement of a new book about one's interest domain) that do not involve novel or complex information and, thus, are not able to create situational interest. When an individual interest is activated, it may either indirectly (via situational interest) or directly lead to intrinsic motivation (e.g., intending to buy the new book about one's interest domain).

In addition, three reciprocal paths are included in the model. Two of these paths are based on the assumption that both situational and individual interest may lead the person to actively look for situations with novel and/or complex stimuli referring to his or her situational or individual interest. For example, a person with an individual interest in philosophy intends to watch a philo-

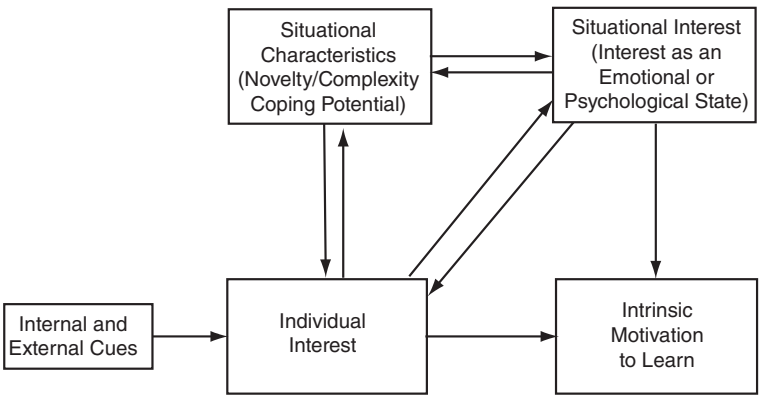

Figure 10.1 Interplay between situational interest, individual interest, and intrinsic motivation.

sophical debate on TV because he or she expects some new and exciting viewpoints. Similarly, a person who has experienced situational interest while viewing an inspiring talk show on television may decide to watch that show again because he or she expects the same interest-arousing features, even though a different topic is being discussed. Finally, the third reciprocal path refers to individual and situational interest. As was outlined above, the repeated experience of situational interest may affect object-related value cognitions and, thus, contributes to the development of individual interest.

Measurement of Interest

A review of current methods to measure interest suggests that there is a great need to develop reliable and valid instruments for assessing *situational* interest. Studies on situational interest usually asked their respondents to rate the interestingness of text segments (see below). Thus, in this work no direct measures of situational interest were taken. Instead, it was assumed that ratings of interestingness correspond with the experience of situational interest. To develop elaborated and more direct measures of situational interest, existing theories about the nature of situational interest should be used. According to Silvia's (2006) and Hidi's (2000) definitions of situational interest, an instrument measuring situational interest should include ratings of attention and persistence, positive affective involvement, and curiosity.

As pointed out already, a large part of interest research has been conducted with respect to text learning. In that area, usually quite simple measures of individual or topic interest were used (e.g., rating one's interest in a given topic on a single response scale). Only a few studies have employed more differentiated measures. For example, in our own research (e.g., Schiefele & Krapp, 1996) we have measured topic interest by means of a highly reliable scale including 10 items referring to feeling- and value-related valences (e.g., While reading the text on topic A, I expect to feel stimulated; To me personally, the topic A is meaningful).

In the past, individual interests were usually assessed by means of questionnaires. The existing inventories fall into two major categories: vocational interest and academic interest measures. The first category consists of instruments such as the Strong-Campbell-Interest-Inventory or the Kuder Preference Record (see overview by Walsh & Osipow, 1986). In these inventories, respondents are asked to indicate how much they like or prefer particular vocations, vocational activities, school subjects, or leisure activities. Individual items are allocated to subscales that represent domains of vocational interest, such as scientific, artistic, engineering, or social interests. Vocational interest inventories are designed to facilitate decisions with respect to one's vocational choice. In fact, they are well-suited for identifying broad interest domains that are preferred over other domains by a particular person. However, they are less appropriate for measuring the strength of a *specific* individual interest. This goal is better accomplished by academic interest questionnaires. Typical instruments are designed to assess individual interests in school or university subjects, such as science (Harty & Beall, 1984), physics (Hoffmann & Lehrke, 1986), biology (Tamir & Gardner, 1989), or social studies (Ataya & Kulikowich, 2002).

In developing the Study Interest Questionnaire (SIQ), we made the attempt to apply our concept of interest, as presented above, to the assessment of interest in one's university subject (Schiefele, Krapp, Wild, & Winteler, 1993). Consequently, the items of the questionnaire were supposed to measure one of three different aspects of interest: feeling-related valences (e.g., Being involved with the subject matter of my major affects my mood positively), value-related valences (e.g., It is of great personal importance to me to be able to study this particular subject), and intrinsic

character of valence beliefs (e.g., I chose my major primarily because of the interesting subject matter involved). These three aspects of interest do not form separate factors. Instead, the SIQ proved to be a highly homogeneous and consistent instrument. It is noteworthy that the SIQ is not restricted to a particular subject area but may be applied to all kinds of subjects taught at the university.

Instead of referring to broad subject areas, such as mathematics or biology, and regarding them as unitary domains, some have argued that we should conceptualize interest in school subjects as being multidimensional (e.g., Gardner, 1985). In fact, most instruments designed to assess interest in a specific subject area (see above) distinguish between several dimensions. For example, Tamir and Gardner (1989) developed a questionnaire to assess interest in biology that consists of nine topical dimensions (e.g., molecular biology and biotechnology, maintaining human health) and four activity dimensions (e.g., intellectual inquiry activities, observing natural phenomena). Similarly, Hoffmann and Lehrke (1986) have measured interest in physics by differentiating between eight domains (e.g., optics, acoustics, electronics) and four activity dimensions (e.g., practical-constructive activities). In addition, these authors proposed seven different contexts for engaging with physics topics (e.g., physics as a science, physics in everyday life). Items were constructed for each combination of topic, activity, and context (e.g., I am interested in learning more about how the colors in the sky develop), thus enabling a highly differentiated picture of students' physics interest.

Although these multidimensional instruments are more differentiated than the SIQ (or similar instruments) with respect to the number of aspects of the interest domain, they are less differentiated with respect to the assessment of *interest intensity*. The SIQ uses 18 items referring to different intrinsic feeling-related and value-related valences in order to measure interest in a specific domain. In contrast, multidimensional instruments usually ask respondents to rate a variety of topics or activities on a single rating scale (e.g., How much are you interested in topic A?). The choice for a specific assessment method should depend on the nature of the domain to be investigated (e.g., simple vs. complex structured domains) and the purpose of the respective study (e.g., examining the effects of a specific interest on learning vs. the effects of instruction on interest in various aspects of a school subject). It would be also possible, of course, to combine the two methods.

In the past, only a few multidimensional instruments have been developed in order to assess school-related interests. Most of these instruments were published about two decades ago, and revised or updated versions are lacking. Instead of using multidimensional interest questionnaires, many studies that have measured interest in school subjects have employed self-constructed simple ratings of interest (Schiefele, Krapp, & Winteler, 1992). Therefore, it could be useful to intensify research on the development of multidimensional interest questionnaires. In addition, researchers who consider including interest variables in their research should not use simple or single-item measures but use more sophisticated existing instruments.

Development of Individual Interest

Past research on the development of individual interest has focused on three major issues: (a) ontogenetic development of occupational interests, (b) changes of interest in school subjects during the course of schooling, and (c) the transition from situational to individual interest. In the following section, we focus on academic interests and, thus, deal with changes in school-related interests and the transition from situational to individual interest. With respect to the development

of occupational interests, see also Gottfredson (2002), Krapp (2002, 2005), Todt and Schreiber (1998), and Tracey (2001).

Changes of Interest in School Subjects

Several studies have investigated changes of (individual) interest in school subjects. The existing evidence suggests that interest in most school subjects decreases continuously during the course of schooling (cf. Hidi, 2000; Krapp, 2002). This coincides with research showing that attitudes toward school, task-value beliefs, and intrinsic motivation tend to deteriorate when children get older (e.g., Anderman & Maehr, 1994; Gottfried, Marcoulides, Gottfried, Oliver, & Guerin, 2007; Harter, 1981; Watt, 2004; see Wigfield et al., 2006, for a review). As has been summarized by Krapp (2002), the decrease of interests is particularly strong in the natural sciences (mathematics, physics, chemistry). It should be noted, however, that a decrease in interest is not always found for all topics within a given subject area. In addition, the development of interests depends on context conditions, school type, and gender. Todt, Arbinger, Seitz, and Wildgrube (1974) report that girls' decreasing interest in biology during secondary school only refers to zoological and botanical topics, whereas biology interest increases for topics related to human beings and ecology. Hoffmann, Lehrke, and Todt (1985; Hoffmann & Lehrke, 1986) showed that interest in physics is low for both girls and boys when physics is taught primarily within a scientific context (with an emphasis on the validity of general physical laws). In contrast, physics interest is rather strong (for both girls and boys) when the teacher is able to relate physical principles and facts to practical problems and the students' everyday life.

There are several possible reasons for the general decline of interest in school subjects (cf. Baumert & Köller, 1998). One attempt to explain this decline refers to a mismatch between the curriculum and the general interests of students. With respect to science education, for example, it is assumed that the strong scientific emphasis of instruction neglects students' everyday life experiences (see above). Other explanations maintain that interest development outside of school becomes increasingly important with students' age and that students' increasing desire for self-determination conflicts with the restrictive learning environment of schools (Eccles et al., 1991).

Baumert and Köller (1998) proposed that the decline of interest in academic domains over the course of secondary level I (grades 5 to 9) may also result from a process of differentiation (Todt, 1990; Todt & Schreiber, 1998). In late childhood and early adolescence, students become more and more aware of their specific strengths and weaknesses. The process of comparing one's strengths and weaknesses affects the development of interests. Students tend to show stronger interest in those domains for which they have a higher self-concept of ability (cf. Denissen, Zarrett, & Eccles, 2007; Köller, Schnabel, & Baumert, 1998; Rottinghaus, Larson, & Borgen, 2003). In addition, the transition from school to vocational education and the labor market leads students to select and intensify specific interests while abandoning others. In line with these considerations, it was found that correlations between different interest domains (e.g., English, mathematics) decrease over time (Köller et al., 1998).

In line with Baumert and Köller's (1998) proposition, Krapp and Lewalter (2001) were able to demonstrate both a general decline of interest in vocational education and the selective development of new and specific job- or training-related interests. In a longitudinal study with insurance business students, Krapp and Lewalter found that students' general interest in vocational training contents dropped significantly during the 2-year training program. However, interview

data revealed a positive developmental trend: all students in the sample reported that they had discovered new areas of training-related interest. The authors concluded that a process of selection or differentiation was taking place. Probably, the students were focusing only on few selected aspects of their vocational training and, thus, reduced their interest in other training contents. This process results in a decline of students' general interest in the training program and, at the same time, in the development of new specific interests.

Although the decline of school-related interests is well-documented, the reasons for this negative development still need to be clarified. The present evidence suggests two different processes. On the one hand, a number of factors such as the neglect of students' everyday life experiences, the development of interests outside of school, and the restrictive character of learning environments contribute to low interest levels. Thus, instructional programs to increase interest in school subjects emphasized students' everyday life experience, referred to their general interests, and allowed for self-determination (e.g., Hoffmann, 2002; see also below). On the other hand, average interest scores may decrease because of a process of interest differentiation. From that point of view, the decline of interests at least in part reflects a positive development, namely the selective focusing on specific interests. However, more direct evidence for the effect of interest differentiation on the development of school-related interests is needed.

From Situational to Individual Interest

Research on general stages of interest development (e.g., Gottfredson, 2002) and on changes in school-related interests does not explain how a particular individual interest develops. Hidi and Renninger (2006; see also Krapp, 2002) described the development of an individual interest as a four-phase process that starts with a first experience of situational interest and results in a well-developed individual interest.

The *first phase* of interest development consists of triggered situational interest and is defined as an emotional state (see above). Typically, situational interest is initiated by external factors in a given learning environment. In school, for example, situational interest may be created by an exciting and vivid lesson that contains novel and surprising information. In addition, the triggering of situational interest can be supported by instructional conditions that include group work, puzzles, or computers (Mitchell, 1993).

The *second phase* of interest development—maintained situational interest—involves the repeated and increasingly persistent experience of situational interest. Maintained situational interest is facilitated by tasks that are personally meaningful and involving. In addition, project-based learning, cooperative group work, or one-to-one tutoring contribute to the maintenance of situational interest.

Maintained situational interest may initiate the development of an individual interest. Therefore, the *third phase* of interest development is characterized by emerging individual interest. From the theoretical perspective expressed in the present chapter, it is assumed that the repeated and persistent experience of situational interest only leads to emerging individual interest when value cognitions referring to feeling- and value-related attributes are involved and when these repeatedly occurring cognitions transform into enduring valence beliefs (see above). For example, when a student repeatedly experiences situational interest in the science classroom, he or she will form associations between science and positive feelings and values. The emerging formation of stored valence beliefs may motivate the person to seek out opportunities to reengage in science activities providing the experience of interest.

The *fourth phase* refers to well-developed individual interest. According to Hidi and Renninger's (2006) definition, a well-developed individual interest is characterized by stronger valence beliefs and more stored knowledge as compared to an emerging interest. As has been argued above, stored knowledge should not be an integral part of the interest concept. However, it is likely, that content knowledge increases with interest development (Tobias, 1994). In my view, the most important feature of a well-developed interest refers to the intensity and variety of valence beliefs. It is to be assumed that a well-developed interest consists of strong associations between the interest object and several feeling- and value-related attributes. Compared to an emerging interest, these associations are presumably easier to activate by internal or external cues and, consequently, exert more influence on the regulation of behavior. For example, individuals with a well-developed interest more often than others choose interest-related activities, sustain long-term constructive and creative endeavors, and persist when interest-related tasks or activities are difficult (cf. Hidi & Renninger, 2006).

The four-phase model of interest development offers a useful framework for research on the transition from situational to individual interest. However, past research on interest development has been mostly descriptive and, thus, empirical support for the proposed four-phase model is limited. Recently, Guthrie et al. (2006) have provided evidence that a high number of stimulating tasks related to reading (during several weeks of integrated reading and science instruction for third-grade students) increased longer term intrinsic reading motivation. Stimulating tasks involved mainly hands-on observations and experiments and were supposed to create situational interest (which was not directly measured, however.) Although intrinsic reading motivation should not be equated with individual interest in a particular subject content, the findings of Guthrie et al. are in line with Hidi and Renninger's (2006) assumption that the repeated experience of situational interest may lead to individual interest.

Interest and Learning

Interest and Text Learning

The greatest amount of research on academic interest concerns studies on the relation between interest and learning from text. Given the long tradition of that research and the multitude of studies (cf. Schiefele, 1996, 1999), it seems obvious that interest has been considered to be a major motivational condition of text learning (Alexander et al., 1994; Tobias, 1994).

Prior studies have either investigated the effects of *interestingness* of text materials (as an indicator of situational interest) or *topic interest* (as an indicator of individual interest) on text learning (cf. Schiefele, 1996, 1999). In studies on situational interest, subjects usually were asked to rate the interestingness of text segments (sentences or paragraphs). In most cases, intraindividual comparisons between lowly and highly interesting sentences were performed (e.g., Anderson, 1982). Although empirical tests are lacking, this research assumes that ratings of interestingness correspond with the experience of situational interest.

In order to measure topic interest, respondents had to rate their level of interest in the text topic before reading the text. However, as was mentioned above, topic interest may not always be equated with individual interest. This is especially true when individuals have to rate their interest in unfamiliar topics. In this case, their ratings are not based on stable valence beliefs.

Situational Interest Earlier reviews of the literature on situational interest (e.g., Alexander & Jetton,

1996; Hidi, 1990; Schiefele, 1996, 1999; Wade, 1992) yielded similar results as were obtained for individual or topic interest (see below). Schiefele (1996) analyzed 14 relevant studies and found an average correlation of .33 between situational interest and text learning. Findings suggested that the relation between situational interest and text learning is independent of factors such as text length, readability, importance of text or text segments, unit of analysis (sentence vs. passage vs. whole text), nature of text (narrative vs. expository), method of learning (e.g., recognition vs. recall), age (or grade level), and reading ability (or intelligence).

In a recent study, Guthrie et al. (2006; see also above) compared four classes with high versus low numbers of stimulating tasks that were designed to increase situational interest. All four classes were part of an intervention program (Concept-Oriented Reading Instruction) in which teachers linked reading fiction and nonfiction books to science activities. The number of stimulating hands-on science activities varied between classes. This enabled the authors to select two classes with high numbers and two classes with low numbers of interesting activities. A comparison between the students in the two types of classes not only revealed differences in students' intrinsic reading motivation (see above) but also in their reading comprehension. Students in the two classes with high numbers of stimulating activities exhibited significantly higher means in a standardized reading comprehension test than the students in the other two classes.

An important research issue refers to the role of attention as a mediator of the effect of situational interest on text learning. In a sample of school children, Anderson (1982) found that interestingness ratings of sentences were positively associated with persistence of attention (reading time), intensity of attention (secondary task reaction time), and sentence recall. Only reading time, in contrast to reaction time, was positively related to sentence recall. Contrary to expectations, neither indicator of attention could mediate a significant portion of the effect of interest on learning.

Shirey and Reynolds (1988) obtained different results by using a sample of university students. In their study, interestingness of sentences was *positively* correlated with learning and *negatively* with both persistence and intensity of attention (see also Bernstein, 1955; Wild & Schiefele, 1994). In accordance with Anderson (1982), a mediating effect of attention could be ruled out. Based on interview data, Shirey and Reynolds (1988) assumed that adult readers are more strategic and efficient than younger readers. They tend to allocate more attention to less interesting information because this information is harder to learn. An alternative explanation has been offered by Hidi (1990, 1995). She argued that attention may be either understood as automatic and spontaneous or controlled and effortful. Hidi suggested that interesting learning materials evoke spontaneous, involuntary, and effortless engagement with these materials, whereas less interesting materials require voluntary, active, and effortful engagement. Therefore, learning less interesting text elements leads to stronger involvement of attentional resources. According to Hidi, situational interest should increase spontaneous, involuntary attention and, thus, result in faster reading and secondary task reaction times. In fact, McDaniel, Waddill, Finstad, and Bourg (2000) were able demonstrate that secondary task reaction times were significantly slower for low interest narratives than for high interest narratives.

Topic Interest In an earlier meta-analysis (Schiefele, 1996), an average correlation of .27 between topic interest and text learning was found. Furthermore, the findings suggested that the relation between topic interest and text learning is not affected by factors such as text length, nature of text, method of learning test, age (or grade level), reading ability, and text difficulty. In addition, the reviewed studies support the conclusion that interest and prior knowledge do have independent effects on text learning. However, the effects of prior knowledge were stronger than those of topic

interest. Usually, only low to moderate correlations between topic interest and prior knowledge were found.

There is some evidence that topic interest better predicts indicators of deep-level than of surface-level learning. For example, Groff (1962) was able to show that topic interest was more strongly related to outcomes from a multiple-choice test referring to text organization, inferences, and conclusions than to outcomes from a multiple-choice test referring to explicit details in the text. In accordance with these findings, Kunz, Drewniak, Hatalak, and Schön (1992) found higher correlations between topic interest and performance at an application task (transfer of text content to a concrete example) than between interest and standard indicators of text learning (free recall and multiple-choice comprehension questions). Both studies reported higher correlations for prior knowledge and ability factors than for interest and all indicators of text learning.

In two of our own studies, the attempt was made to test the differential effect of topic interest on deep-level and surface-level indicators of text learning (Schiefele, 1990; Schiefele & Krapp, 1996). In the first study (Schiefele, 1990), three different indicators of levels of learning were assessed (by means of free-response questions): recall of simple facts, recall of complex facts, and deep (or inference-based) comprehension. Schiefele and Krapp (1996) created several different indicators of free recall, such as number of main ideas, elaborations, and coherence of recall (of idea units and main ideas). The findings of both studies showed that topic interest was most highly related to outcome measures indicating deep levels of learning, such as deep comprehension, recall of main ideas, elaborations, and coherence of recall of main ideas. The associations between topic interest and other indicators of learning were lower or not significant. All of the relations between topic interest and learning were independent of prior knowledge and cognitive ability. The stronger associations between interest and deep-level text learning as opposed to surface-level text learning may be explained by two assumptions: (1) deep-level indicators require more cognitive effort than surface-level measures, and (2) interested readers are more willing than less interested readers to invest effort in order to answer challenging and complex questions.

Andre and Windschitl (2003) reported a number of studies that were aimed at facilitating the understanding of electric current flow. In these studies, college students received either a conceptual change text (designed to challenge alternative conceptions and promote conceptual change) or a regular science text (or, alternatively, an augmented science text with additional explanatory diagrams). Across various studies, conceptual change texts led to superior conceptual understanding. The authors also assessed students' interest and prior experience with physics and electricity as well as their verbal ability. By means of multiple regression analyses, a significant relation between interest and conceptual understanding was revealed. That relation proved to be independent of text type, gender, verbal ability, and prior experience. Moreover, interest was found to affect posttest understanding even when a measure of pretest understanding was taken into account. Thus, in line with earlier findings, Andre and Windschitl (2003) were able to demonstrate significant effects of interest on conceptual understanding that were independent of ability and prior knowledge. As an explanation of the effects of interest on conceptual change, the authors argued that interest facilitates the degree of involvement that leads to deeper processing.

The measures of levels of learning used in earlier studies (see above) were not based on a specific theory. Therefore, we created theoretically based text learning indicators by referring to the text processing theory of van Dijk and Kintsch (1983; Kintsch, 1998). This theory assumes that a given text is processed and represented at different levels: the verbatim, the propositional, and the situational level. The verbatim representation contains the text's superficial structure. The proposi-

tional representation refers to the meaning of the text, and the situational component is a model of the situation described by the text (e.g., people, objects, actions) that may also include analogical or pictorial information. The situation model represents the deepest level of text learning. The strength of the different types of text representation is usually determined by means of sentence recognition or sentence verification tests. For example, a strong situational representation is indicated by a good differentiation between correct and false inferences (e.g., Schmalhofer & Glavanov, 1986).

The attempt to demonstrate effects of topic interest on the situational text representation was not particularly successful. In two earlier studies (Schiefele, 1991, 1996), no significant relation between topic interest and situational text representation was found. The same result was obtained in a more recent study (Schaffner & Schiefele, 2008) with a large sample of 15-year-old students. A complex model was tested that revealed direct and significant effects of prior knowledge, intrinsic reading motivation, cognitive ability, and metacognitive strategy knowledge on the situational text representation. However, topic interest was not found to be a significant predictor of text learning.

Schaffner, Schiefele, and Schneider (2004) reported similar results. However, they used different text materials and different measures of text learning. For two of the texts, standard comprehension tests were administered consisting of several multiple-choice and free-response questions. The two tests were used as manifest indicators for a latent variable. In accordance with prior studies, this standard measure of reading comprehension was significantly and directly predicted by topic interest, although relevant cognitive predictors (see above) were part of the structural equation model.

In sum, these findings suggest that topic interest will not exert effects on the situational text representation, at least not if relevant cognitive predictors are taken into account. Obviously, text learning indicators based on multiple-choice or free-response comprehension items are more predictable and more strongly affected by motivational variables such as interest.

There is almost no *experimental* research on the effects of topic interest on text learning. This is in contrast to studies on intrinsic motivation which have demonstrated that it is possible to induce intrinsic and extrinsic motivation through appropriate instructions (cf. Schaffner & Schiefele, 2007). Recently, we conducted an experiment (with ninth-grade students) and examined the effects of experimentally induced intrinsic and extrinsic motivation (as compared to a neutral condition) on topic interest, test anxiety, and text learning (Schaffner & Schiefele, 2007). The intrinsic motivation instruction was aimed at increasing interest in the text's topic, whereas the extrinsic motivation instruction emphasized the evaluation of students' learning skills. Text-related interest and test anxiety were assessed before and after the experimental instruction as well as after the text has been read. An inference verification test was administered to assess students' situational text representation. The results showed the expected effects of type of instruction on interest and test anxiety when measured directly after the treatment. With respect to the situational text representation, no significant main effects were obtained. Instead, an interesting interaction between type of instruction and pretest interest was observed: Only students with high pretest interest exhibited the expected difference between the intrinsic and the extrinsic motivation instruction, i.e. they showed stronger situational text representations when they received an interest-enhancing instruction as compared to the neutral and the extrinsic motivation instruction. The reported interaction effect can be explained by Sansone's *goal congruence model* (Sansone, Sachau, & Weir, 1989; Sansone & Thoman, 2006). According to that model, a specific motivational context affects intrinsic motivation or interest positively only if that context is congruent with a person's goal orientation. In our study, obviously, the intrinsic motivation instruction was congruent with high

interest students' motivational orientation. Therefore, only high interest students' learning from text was enhanced by the intrinsic motivation instruction.

Interest, School Achievement, and Academic Choices

There is ample evidence that individual or subject matter interest and school achievement (grades, standardized tests) are positively correlated. In a review of relevant research, Schiefele et al. (1992) reported that, on average, the strength of subject area interest accounts for about 10% of observed achievement variance. Both grade level and nature of subject area did not influence that relation. However, it was found that male students' achievement is more strongly associated with their interest level than was the case for female students. Schiefele et al. (1992) concluded that the strength and causal nature of the interest-achievement relation cannot be definitively determined unless other relevant predictors are taken into account and unless longitudinal data are available. For example, most of the reviewed studies did not include indicators of cognitive ability or prior achievement. Earlier studies, however, suggest that interest and ability are not strongly interrelated and contribute independently of each other to the prediction of achievement (cf. Schiefele et al., 1992; Schiefele & Csikszentmihalyi, 1995).

Another unresolved issue pertains to the causal relation between interest and achievement. On the one hand, it may be argued that the perception of successful performance leads to positive affect and enhanced interest. On the other hand, interest may contribute to high levels of achievement because it facilitates effort, elaborative processes, and strategy use (e.g., McWhaw & Abrami, 2001). In a longitudinal study, Köller, Baumert, and Schnabel (2001) were able to show that a reciprocal relation between interest and achievement is likely. A large sample of students from academically selected schools (*gymnasium*) in Germany was tested at three time points: end of Grade 7, end of Grade 10, and middle of Grade 12. The focus of measurement was on interest and achievement in mathematics (as measured by a standardized test based on items from the TIMSS study). In the German *gymnasium*, students have the opportunity at the end of Grade 10 to either choose a basic or an advanced mathematics course. Structural equation analyses showed that interest in Grade 7 had no significant effects on achievement in either Grade 10 or Grade 12. In contrast, achievement at the end of Grade 7 did significantly affect interest in Grade 10. High achievers expressed more interest in mathematics than low achievers. There were, however, significant direct and indirect effects of Grade 10 interest on Grade 12 achievement, although Grade 10 achievement was taken into account. The indirect effect of interest was mediated by *course selection*: Highly interested students were more likely to choose an advanced course (ß = .54). Course selection, in turn, affected Grade 12 achievement significantly (ß = .20).The direct effect of Grade 10 interest on Grade 12 achievement (ß = .19) was somewhat weaker than the direct effect of Grade 10 achievement (ß = .43).

The findings from this study, as well as those from other studies (see Baumert & Köller, 1998; Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005), suggest that at least at the lower secondary school level interest is either a nonsignificant or weak antecedent of achievement. Köller et al. (2001) argue that in German lower secondary schools students' motivation is mostly regulated by extrinsic incentives and values (e.g., regular written tests, parental reinforcements). Consequently, interest only plays a marginal role in initiating and maintaining academic activities. In upper secondary school classes, the frequency of written examination and, thus, the impact of extrinsic incentives decreases. Therefore, interest is gaining more influence on the regulation of learning activities. This assumption is supported by the significant direct effect of Grade 10 interest

on Grade 12 achievement. Moreover, highly interested students more often chose an advanced mathematics course, resulting in higher achievement levels at the end of Grade 12. This is in line with research on academic choices by Eccles (1983) who presented evidence that the effects of motivational characteristics on academic choices are more substantial than those on achievement or learning (see also Schiefele & Csikszentmihalyi, 1995). Moreover, in Köller et al.'s (2001) study, earlier achievement (as measured by a standardized test) did not predict choice behavior. This corresponds to findings by Wigfield and Eccles (2000) and Marsh and Yeung (1997) suggesting that academic choices are mainly influenced by subjective measures such as self-concept of ability and interest (see also Bong, 2001; Lapan, Shaughnessy, & Boggs, 1996).

Contextual Influences on Interest

In the past, motivation theory and research has helped to develop instructional practices and programs that foster student motivation. Most of this research was based on the different constructs tied to achievement motivation (e.g., self-efficacy, achievement goals, values), and intrinsic motivation (cf. Brophy, 2004; Maehr & Midgley, 1991; Stipek, 1996). According to Stipek (1996), "although different factors have been emphasized at different times in the history of research on achievement motivation, all are assumed to play a role. Thus, teachers who want to provide an educational program that maximizes student motivation must attend to all of these sets of factors" (p. 86). In my view, the same applies to interest: most of the factors that have been found to increase motivation to learn and to achieve, should also—more or less—exert influence on interest. For example, programs to enhance achievement motivation typically focus on realistic goal setting, effort attributions, positive self-evaluation, and expectation of success (or self-efficacy). Such interventions strongly support a person's need for competence and, as such, represent also effective means to increase individual interest (e.g., Krapp, 2005). Despite these associations between various instructional methods and interest development, I will put a focus here on methods that have been more closely linked to the enhancement of *individual* interest or habitual intrinsic motivation. Conditions to promote *situational* interest mostly referred to text-related characteristics and will not be reiterated here.

Prior research on fostering interest and intrinsic motivation (e.g., Bergin, 1999; Deci, Vallerand, Pelletier, & Ryan, 1991; Prenzel & Lankes, 1989; Stipek, 1996) suggests four categories of interest-enhancing interventions: competence, self-determination, social relatedness, and personal meaning (cf. Schiefele, 2004). Interest-enhancing interventions are directed at the formation of subject-related valence beliefs. By means of facilitating the experience of competence, self-determination, and social relatedness, this goal is reached only *indirectly*, through satisfaction of basic psychological needs (see also Eccles et al., 1991, and Krapp, 2005). Contrastingly, interest is more *directly* facilitated by interventions addressing the meaningfulness of a given subject area (e.g., by emphasizing its significance for everyday life).

The advancement of *competence perceptions* aims at emphasizing the relation between competence gains and one's effort and strategic behavior. Thus, the major goal involves strengthening students' confidence in their abilities. This goal may be accomplished by means of positive competence feedback and encouragement (e.g., reinforcing even small progress, evaluation based on mastery rather than on social norms), active participation (e.g., hands-on activities, transforming a short story into a play), well-structured and concrete presentations (e.g., using examples), and appropriate task difficulty (i.e. challenging tasks that can be completed with a reasonable amount of effort; e.g., Bergin, 1999; Guthrie et al., 2006; Hannover, 1998).

The positive association between perceptions of competence and motivation has long been established (e.g., Schunk, 1991). Recently, strong evidence was presented for a positive relation between self-concept of ability and individual interest. Denissen et al. (2007) conducted a longitudinal study in which they examined the intraindividual coupling between academic achievement, interest, and self-concept of ability in a large sample of school students between grades 1 and 12. They found the strongest coupling between interest and self-concept of ability. In addition, the degree of coupling increased across time. The results from Marsh et al.'s (2005) longitudinal study suggest reciprocal effects between interest and academic self-concept. However, the causal path from interest to self-concept was found to be lower than the reverse path (see also Mac Iver, Stipek, & Daniels, 1991, and Rottinghaus et al., 2003).

The facilitation of *self-determination* aims at increasing feelings of autonomy. Intrinsic motivation and interest can only be developed when individuals have choice and perceive themselves as the cause of their own behavior (cf. Assor, Kaplan, & Roth, 2002; deCharms, 1984; Deci & Ryan, 1985). In order to increase autonomy, students need to have more control over their learning activities. Several methods are available to achieve this goal. First, students may participate in determining the goals and content of what is being taught in school (e.g., at the beginning of a school week, students and teachers agree on topics, tasks, goals, and a time- and work-schedule). Second, students should be given more flexibility for determining when and how they complete assignments. This may be realized by instructional methods that allow for more self-regulation (e.g., project-method, cooperative learning). Third, students are taught techniques for assessment and documentation of their learning progress (e.g., scoring their own written work, constructing learning curves).

Recently, Kunter, Baumert, and Köller (2007) examined the effects of classroom management strategies (rule clarity and teacher monitoring) on the development of interest in mathematics. The authors argued that pre-structured and well-organized learning environments should foster the experience of autonomy and competence in class and, thus, support students' interest. Accordingly, the results showed that both rule clarity and monitoring affected subject matter interest, and these effects were partially mediated by the experience of autonomy and competence (need satisfaction).

Social relatedness encompasses the need to feel securely connected to other persons in the social context and to be "worthy and capable of love and respect" (Connell & Wellborn, 1991, p. 51). The facilitation of social relatedness aims at increasing students' feelings of relatedness to their teachers and classmates. Presumably, this helps to make these activities and the related subject content more meaningful. Skinner and Belmont (1993), for example, proposed teamwork and involvement with teachers as appropriate methods to enhance social relatedness. Teamwork is characterized by small groups of students working on a personally meaningful project, having extensive social exchange, and taking responsibility for one's own contribution to the project. Involvement with teachers is facilitated when the teacher expresses liking, understanding, or sympathy for his or her students, shows interest in their learning progress, and is available in case of need (Skinner & Belmont, 1993).

The factors discussed so far affect students' interests indirectly, primarily by influencing their perceptions of competence, self-determination, and social relatedness. Even when students feel competent, self-determined, or socially related, however, they will not be interested in subject content that is boring, repetitive, or meaningless (Stipek, 1996). Therefore, we now turn to interventions that are apt to influence individual interest more directly. The main goal of these interventions is to enhance the *meaningfulness and value of subject content* for the learner. Several

methods have been proposed and discussed in the past (e.g., Bergin, 1999; Krapp, 2005; Stipek, 1996; see also Guthrie, Wigfield, & Perencevich, 2004, for discussion of a reading comprehension instruction program that focuses on enhancing students' motivation for reading along with their comprehension):

1. Meaningfulness may be facilitated when the teacher expresses his or her own interest in the subject being taught (Bergin, 1999; Schunk et al., 2008). It is assumed that interest is contagious and can best be conveyed if the teacher functions as an interested model and expresses enthusiasm about a given topic or domain. For example, the teacher may tell students how he or she became interested in his or her subject area, what he or she feels when working on a task or a problem in his or her domain, or how excited he or she is about a particular topic. This may be further supported by expressive teacher behaviors, such as physical movement, eye contact, and humor (Perry, Magnusson, Parsonson, & Dickens, 1986).
2. Probably one of the most important and effective means to induce individual interest consists in highlighting the practical implications of subject content and its relation to students' everyday life. As has been mentioned above, Hoffmann and her collaborators (Häussler & Hoffmann, 2002; Hoffmann et al., 1985; Hoffmann & Lehrke, 1986) found evidence that interest in physics is strengthened by relating physical principles and facts to practical problems or activities (e.g., constructing a technical device, exploring something). Therefore, problem-based and constructivist teaching methods should help to increase students' interest (Hickey, 1997).
3. New subject content may become more interesting to students if that content is associated with already existing individual interests (e.g., Assor et al., Meece, 1991). Thus, it is to be recommended to assess students' interests or to refer to surveys of students' interests. For example, girls' interest in physics could be heightened by relating physical laws to examples which refer to girls' natural interests (e.g., explaining the principles of a pump by referring to the human heart; cf. Hoffmann, 2002). Also with respect to physics lessons, it has been found that those topics that are most interesting to students (e.g., astrophysics, aviation, electronics, nuclear energy) are rarely dealt with in school (Hoffmann & Lehrke, 1986). Including these topics to a larger degree could help to foster students' general interest in physics. Similarly, students are interested in certain contexts of physics, such as particular technical applications, but they dislike contexts favored by the standard curriculum (e.g., the description and explanation of physical experiments and phenomena). Again, taking into account students' already existing interests to a larger degree could help to maintain or even increase their interests in school subjects across time.

In a recent study, Durik and Harackiewicz (2007) were able to show that catch facets (e.g., appealing visual stimuli, cartoons) designed to increase situational interest in a specific math technique were only effective for students with low individual interest in math, whereas task interest of students high on individual interest was undermined. In addition, the authors tested the effects of a hold facet on task interest by emphasizing personal utility. Here, they found that task interest was promoted among participants with high individual interest and reduced among those with low individual interest. These findings are important because they suggest that strategies to increase interest depend on the already existing interest levels. A similar conclusion was drawn by Schaffner and Schiefele (2007; see above). Obviously, students with low individual

interest respond positively to catch facets fostering immediate involvement with a task. Students with higher individual interest do not require external stimulation in order to become involved with the task. For them, information pertaining to the personal utility of the task strengthens already existing valence beliefs. In contrast, individuals with low interest "might be especially cautious when presented with the opportunity to become personally invested in a domain that is new or threatening" (Durik & Harackiewicz, 2007, p. 608). Consequently, information designed to infuse a task with personal meaning threatens these individuals und causes them to reduce their interest.

Concluding Comments

The present chapter reviewed conceptualizations and measuring instruments of interest, aspects of interest development, the role of interest in learning, and contextual influences on interest. The literature proved to be relatively consistent with respect to the distinction between a temporary, state-like and an enduring, dispositional form of interest. However, there is some disagreement as to how these forms of interest should be defined. It was argued to conceptualize situational interest as an emotion for three reasons: First, situational interest can be defined according to empirically validated components that are typical for emotions, namely facial expression, physiological state, subjective experience, behaviors, and goals. Second, Silvia's (2005) proposed appraisal structure of interest provides a straightforward theoretical framework for integrating the multitude of assumed sources of situational interest. Third, by defining situational interest as an emotion, it can be distinguished more clearly from intrinsic motivation (see also Fig. 10.1).

The different conceptions of individual interest disagree mainly with respect to the role of knowledge. Renninger (2000) maintains that individual interest is evoked only when a person has both high value and high knowledge of an activity or subject area, whereas others (e.g., Tobias, 1994) argued that value is orthogonal to prior knowledge and that individual interest may be accompanied with both lower and higher levels of knowledge. Although the disagreement on conceptualizing individual interest is of considerable theoretical importance, it may be less relevant with respect to its practical, research-related consequences. As far as concrete research is concerned, the two conceptions possibly complement each other. For example, Renninger's (2000) construct of individual interest is appropriate when research aims at examining the specific effect of value (or interest) on learning processes *when learners exhibit high levels of knowledge*. It is most likely that only a terminology problem will remain: Renninger theorizes about value when others speak of interest. A fruitful coexistence of these deviating approaches depends, however, on the use of separate and both reliable and valid measures of knowledge and value. As long as high quality measures of the involved variables are available, the findings may be interpretable within different theoretical frameworks.

The model presented in Figure 10. 1 represents the attempt to clarify the relations among situational interest, individual interest, and intrinsic motivation. For the sake of simplicity, only one state of interest is proposed. Thus, it is assumed that the experience of interest is basically the same, no matter how it is created (through situational characteristics or the activation of individual interest). However, empirical research is needed to justify this assumption. The model further implies that intrinsic motivation plays a key role in mediating the effects of both situational and individual interest on learning and achievement. Another important implication of the model relates to the development of interests. As was outlined above, situational interest may result in (intrinsic) motivation to seek conditions that again lead to the experience of situational interest.

If this cycle of causal interrelations is repeated and value cognitions are involved, the development of an individual interest becomes more likely.

Past research on the development of individual interests was focused on temporal changes with respect to interest in school subjects. Because of the general decline of interests during the school years, numerous studies analyzed the potential causes of that negative developmental trend. Some authors argued that the well-documented decline of subject matter interests does not necessarily represent a negative outcome. By contrast, it may be the result of a process of differentiation. This process happens because adolescents adapt their interests to their abilities. In addition, they face occupational decisions and are forced to select and intensify specific interests while eliminating others. More research on the relative importance of the different causes of the decline of school-related interests is needed.

Hidi and Renninger's (2006) four-phase model of interest development represents the attempt to describe the process from the first experience of situational interest to the development of a well-developed individual interest. As such, the model is not restricted to a particular category of interests (e.g., interest in school subjects) but applies to all possible forms of interest. Although the model has high plausibility, direct empirical tests of its validity have not been accomplished yet. Illustrations of the model by individual cases (see Hidi & Renninger, 2006, pp. 116–117) only provide preliminary evidence. Future work in that area should address, for example, the following questions: Is the assumption of four phases sufficient to describe the process of interest development? What are the relevant conditions that facilitate the transformation from repeated experience of situational interest to emerging individual interest? How does the model account for the finding of a strong coupling between interest and self-concept of ability?

There is relatively strong evidence for a substantive relation between both situational and individual interest and indicators of learning, particularly with respect to text learning. Although interest effects on learning are on the average only of small or medium size, it is noteworthy that interest effects are even observable when relevant cognitive variables are taken into account. Despite these positive findings, there is a need for more experimental research, for clarifying the relation between interest and different learning indicators within more complex models, and for identifying relevant mediator variables.

A particularly interesting and important finding refers to the impact of interest on academic choices. Köller et al. (2001) suggested that interest becomes more influential if students are allowed to self-regulate their learning activities to a larger degree. This influence becomes even larger when students have choices, such as the choice between regular and advanced courses (see also Wigfield & Eccles, 2000; Schiefele & Csikszentmihalyi, 1995). It follows, that an important task for future research would be to further substantiate Köller et al.'s proposition that choice and self-regulation enhance the importance of (individual) interests (see also Deci, 1998).

Finally, contextual influences on individual interest were reviewed. Indirect and direct effects on interest facilitation were distinguished. Indirect effects occur mainly through satisfaction of basic psychological needs, such as competence, autonomy, and relatedness. Direct effects are based on enhancing the meaningfulness of subject content, e.g., by expression of teacher interest, emphasis on practical implications, and reference to existing or natural interests of students. Future research on the facilitation of interest should take into account, that (a) specific interventions may interact with pre-existing levels of individual interest (e.g., Durik & Harackiewicz, 2007; Schaffner & Schiefele, 2007), and that (b) instructional practices depend on each other and are more effective in combination (Stipek, 1996). Thus, an important goal for the future development

of interest enhancing environments consists in designing comprehensive approaches to classroom intervention that include both indirect and direct methods to promote individual interest.

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