

Interest, motivation and learning: An educational-psychological perspective

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Within the last few years, researchers have shown a renewed interest in "interest". Especially in the field of educational psychology many studies have been conducted to analyze how learning and achievement are influenced by motivational and cognitive factors, which are connected with individual and/or situational interests. In this paper, results from empirical research will be presented besides theoretical considerations concerning the interest-construct. Interest has typically been studied as an independent variable. Dependent variables have been either some aspects of learning outcome (knowledge structure, academic achievement) or hypothetical mediators, which probably can be used to explain the interest effects (e.g., learning strategies, attention, emotional experiences). There is also a growing number of studies which try to explore the conditions of interest development within educational settings. Future lines of research will be discussed in light of the demands of educational theory and practice.

Introduction

The concept of interest plays a predominant role in everyday-thinking, as well as in professional considerations of teachers about inter- and intraindividual differences in learning and achievement (Todt, 1978; Travers, 1978). At the beginning of this century, famous psychologists advocated that interests were the most important motivational factors in learning and development (Claparède, 1905; Dewey, 1913; Thorndike, 1935; Lunk, 1926; Berlyne, 1949; for a summary see Arnold, 1906). However, in the middle of the century there was a noticeable decline in research devoted to this topic. As a result, the overarching theories on interest were excluded from scientific discussion. The development of more discrete research approaches and theories in the field of learning and motivation (e.g., curiosity, attention achievement motivation, intrinsic motivation, flow) rendered the concept of interest superfluous. Yet, within the last 10-15 years it has become clear that concepts and theories developed in these specialized fields of research do not adequately account for all important aspects of the traditional concept of interest (Schiefele, Krapp, Prenzel, Heiland, & Kasten, 1983; Nenniger, 1987; Prenzel, 1988; Renninger, 1990; Todt, Drewes, & Heils, 1991). As a result, researchers have shown a renewed interest in "interest" as an explanatory

construct in the field of learning and development (Krapp & Prenzel, 1992; Krapp, Hidi, & Renninger, 1992; Hoffmann, Krapp, Renninger, & Baumert, 1998).

Basic conceptualizations in recent research approaches

In general, researchers refer now to the concept of interest with the following ideas: firstly, interest emerges from an individual's interaction with his or her environment (Valsiner, 1992; Oerter, 1995). It represents a specific relationship between the developing person and some topic or content of his or her life-space (Lewin, 1951) or behavioral world (Nuttin, 1984). This idea is variously referred to as "person-object relationship" (cf., below). An important aspect is its object-specificity. Secondly, interest is characterized by affective as well as cognitive components. Even though interest-based actions are mainly associated with positive emotional experiences, interest is not synonymous with enjoyment. It also implies the notion of personal relevance and a readiness to engage, with high level effort, in interest-related tasks. Interest is not simply a construct linking the affective and cognitive domain: it becomes part of a synthesis of these domains (Gardner, 1998; Rathunde, 1993, 1998).

In spite of these common assumptions about the psychological meaning of interest, researchers use different conceptualizations, each of which reflects different metatheoretical and methodological beliefs, general theoretical orientations, and paradigms of empirical research (Krapp, Renninger, & Hoffmann, 1998). Krapp, Hidi, and Renninger (1992) have identified three conceptualizations of interest which play an important role in contemporary discussions on motivation and interest: (1) interest as a dispositional characteristic of the person, (2) interest as a characteristic of the learning environment (interestingness), and (3) interest as a psychological state. As depicted in Figure 1, these concepts are related to each other. Especially, the state-concept is closely connected to both the individual dispositional characteristics and the situational factors responsible for the "interestingness" of the learning environment.

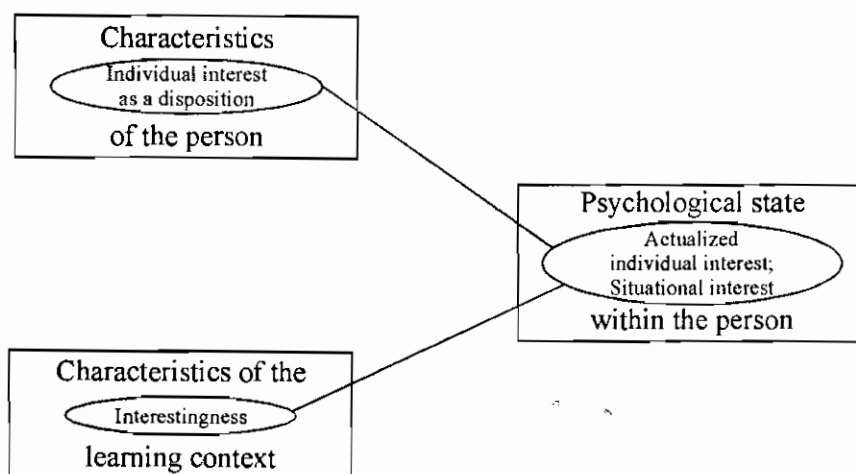


Figure 1. Three approaches to interest research (Krapp, Hidi, & Renninger, 1992).

A first line of research interprets interest as a personality trait or *motivational disposition* (e.g., a long-lasting preference for a certain topic). Most research approaches which refer to such a concept of individual interest ask questions from a structural perspective. According to the paradigm of differential psychology (Anastasi & Foley, 1949; Amelang & Bartussek, 1985), their main concern is to describe and explain interindividual differences with respect to learning and development. Individual interests are seen either as dependent or independent variables within a network of interrelated factors.

There are also researchers who consider interest as a specific psychological state rather than as a disposition or trait. They focus on the cognitive and affective states and processes

which are evoked while experiencing an “actualized interest”. According to the paradigm of general psychology, empirical research is primarily concerned with universal aspects of interest-related phenomena (Renninger, 1992). It is this lens of scientific inquiry which characterizes Dewey’s (1913) early thoughts on the role of interest in learning and development.

It is important to realize that research on individual interest is mainly concerned with the subjective side of the “person-object-relationship”. This approach contrasts with research approaches that are primarily engaged with the “objective” side of this relationship and explore the conditions and effects of *interestingness* of educational settings and materials. For example, reading researchers have often been trying to understand how different aspects of texts can generate and sustain interest on the part of the reader. Features of the text that can generate “text-based interest” are novelty, character identification, imagery value, life themes, and intensity of action (Anderson, Shirey, Wilson, & Fielding, 1987). Hidi and Anderson (1992) note, however, that situational interest is different from arousal or curiosity (Berlyne, 1960). *Situational interest* may be tied to very specific contents and not only structural features, implying that it may last longer than simple arousal and may develop into a personal interest (Hidi, 1990; Hidi & Berndorff, 1998). Like individual interest, situational interest can be described from the perspective of either the situation-specific (objective) conditions which induce interest, or from the perspective of the experiences of a person who is being engaged in an interest-based activity. It is important to note that interest as a psychological state can be traced back either to “interesting” factors of the context (situation) or to an already existing (dispositional) interest. As a rule, we assume that such a state always results from an interaction between individual and situational factors. On the other hand, we have to take into account that interest can be created in some cases primarily by the context and in other cases primarily by a disposition.

An educational-psychological approach: The person-object-theory of interest

New concepts and research approaches stem from diverse disciplines and empirical traditions, such as developmental psychology, motivation, text-learning, reading and literacy, science education, gender differences and giftedness. In most of these studies, interest is only a subordinate factor. Researchers seldom refer to a specific theoretical aspect of the interest construct. In contrast to the situation at the beginning of this century, overarching theories which try to integrate the results from different lines of research are still missing. Some educational psychologists have begun this major venture and proposed models in which different components or meanings of the construct are specified (e.g., Todt, 1985; Nenniger, 1988; Schiefele, 1991; Gardner, 1998; Krapp, Hidi, & Renninger, 1992). One attempt to develop a conceptual model and an outline of an educational theory of interest has been made by Hans Schiefele and his colleagues (Schiefele et al., 1983; Prenzel, Krapp, & Schiefele, 1986; Prenzel, 1988, 1992; Krapp, 1992, 1993).

Basic ideas

The basic ideas of this theoretical approach are summarized in the following statements:

- (1) The theoretical framework is based on *metatheoretical premises*. They refer, for example, to the question of ultimate aims of an educational theory on motivated learning. With respect to educational practice, it seems to be necessary not only to describe and explain the motivational aspects of single learning episodes (Boekaerts, 1996, this volume), but also to describe and explain the role of motivation in the course of human development.
- (2) In accordance with ideas of Lewin (1951), Nuttin (1984), Renninger (1990, 1992), Deci and Ryan (1985, 1991), Oerter (1995) and many others, it is postulated that the individual, as a potential source of action, and the environment as the object of action, constitute a bipolar unit. Therefore, the interest-construct is conceptualized

- as a relational concept. An interest represents or describes a specific relationship between a person and an object of his or her "life-space" ("Lebensraum"; cf., Lewin, 1951). It can be interpreted as a specific "person-object-relationship".
- (3) It is assumed that an individual experiences and cognitively represents his or her environment in a meaningful structure. The cognitively represented environment consists of units that are separated from one another to a greater or lesser extent. We refer to these units as "*objects*". To some of these objects a person will develop an interest for a shorter or longer period of time. An object of interest can refer to concrete things, a topic, a subject-matter, an abstract idea, or any other content of the cognitively represented life-space.
 - (4) The most important *characteristics of an interest-specific relationship* refer to one's values and feelings. From this point of view, an interest is composed of value-related and feeling-related valences (Schiefele, 1991; Krapp, 1992, 1993). The value-related valences refer to the assumption that any interest has the quality of personal significance. The feeling-related valences refer to positive experiential states while being engaged in an interest-based activity, for example joy, optimal arousal or feelings of competence, autonomy and social relatedness. Thus, interest-based interactions with the environment are characterized by optimal experiential modes that combine positive cognitive qualities (e.g., thoughts on meaningful goals) and positive affective qualities (e.g., "good mood"; cf., Rathunde, 1998). Under extremely optimal conditions flow may be experienced (Csikszentmihalyi, 1988). Flow can be thought of as "the paradigmatic case of interest" (Rathunde, 1993, p. 73). A further essential feature of interest is its intrinsic character. Interest-based activities meet the criterion of "*self-intentionality*" which means that an interest-related goal is compatible with one's preferred values and ideals of the growing self (Deci & Ryan, 1985; Markus & Wurf, 1987). There is no gap between what a person has to do in a specific situation, and what the person wishes (or likes) to do (Dewey, 1913; Rathunde, 1993).
 - (5) An interest-based person-object-relationship can be investigated on two levels of analysis: on a first level, interest refers to the dispositional structure of an individual. Here, interest is interpreted as a relatively stable tendency to become occupied with an object of interest (individual interest; cf., Figure 1). On a second level, interest refers to current engagements – for example during an interest-based learning activity (actualized individual interest).
 - (6) Referring to a dynamic concept of self (Markus & Wurf, 1987) and basic ideas in Deci and Ryan's (1985, 1991) theory of self-determination, we assume that the emergence and development of an individual's central structure of (individual) interests is often related to the changes in the motivational structure of a person's self. Developmental changes can be understood in terms of the developmental processes of identification and integration. Over the course of development a person encounters new opportunities and objects, some of which come to be assimilated to the self as enduring interests, whereas others are not. These processes are not only (or foremost) a matter of cognitive reflections and rational consideration (e.g., goal-setting, intention-formation) but also a matter of feeling-related experiences while being engaged with objects and activities. Therefore, cognitive approaches to motivation (e.g., expectancy-value models, cf., Heckhausen, 1989, 1991; Bockaerts, 1992; Nenniger, 1993; Pintrich & Schunk, 1996) are not sufficient to reconstruct all important aspects of interest development. In addition, concepts and models about subconscious functions and feeling-related psychological processes have to be included (Epstein, 1990). For example, the concept of *basic psychological needs* (Nuttin, 1984; Deci & Ryan 1985) provides a basis for describing important experiential aspects which can be used to explain the origin and basic functions of motivational dynamics.

Interest and intrinsic motivation

The concept of interest, as defined here, can also be used to specify the meaning of

intrinsic learning-motivation. Many authors have criticized the intrinsic-extrinsic dichotomy as misleading, unless it is clarified on the basis of a model of motivated learning (Rheinberg, 1997; Nenniger, Eigler, & Macke, 1993; Rathunde, 1993). If we take only aspects of intentional (goal-oriented) learning into consideration, the general concept of learning-motivation refers to the fact that a learner has an actualized wish or intention to engage in a specific learning activity (Schiefele, 1996a). One possibility to identify qualitative differences is the distinction between extrinsic and intrinsic motivation, which plays an important role in the field of educational psychology (Schiefele & Schreyer, 1994). With respect to goal-oriented learning, we suppose that the experience of intrinsic motivation always results from a more or less obvious connection between the learning-task and an individual's objects of interest (Krapp, 1993; Schiefele, 1996a). Because the learner has identified him- or herself with these objects, the related learning-goal fulfills the criterion of "self-intentionality", and the realization of an interest is (by definition) accompanied by the experience of being intrinsically motivated. In Boekaerts' (1996) theory of "Personality and Learning" (PaL) this optimal learning situation is referred to with the term "learning episode". It differs from other learning opportunities in the sense that the students favorably appraise the learning situation and experience personal meaningfulness while being engaged in the learning activity.

Empirical approaches

Interest as an independent variable

Research approaches that have examined interest as an independent variable rely to a great extent on models and procedures that analyze the interrelations between individual interests and academic achievement. This is in contrast to research lines which focused on the influence of situational interest on learning and achievement. Next, I will briefly discuss the main research lines.

Individual interest and academic achievement. Studies which investigated the relation between individual interest and learning-outcome have often used a correlational approach. Dependent variables are mostly grades or test scores. In a meta-analysis covering all studies of the last 3 decades (Schiefele, Krapp, & Winteler, 1992) it was found that across all school types, grade levels, and subjects, the best (average) correlative estimate of the "interest-achievement-relation" is approximately .30. This relationship appears to be a function of sex, age or grade level, and school subject. Specifically, interest has a greater effect on the grades of male students than on those of female students. There also seems to be a closer relationship between interest and academic achievement at higher grade levels. This might be the result of reciprocal effects: With growing age, specifically after puberty, students begin to identify more seriously with selected fields of knowledge and competence and tend to reject others (Todt, Drewes, & Heils, 1991; Fend, 1994). As a consequence, learning efforts are concentrated on selected topics and yield better learning results.

If we compare the interest-achievement correlations with the results of prediction studies in which other measures of motivation are used, for example measures of achievement motivation, the correlations are more stable, and mostly higher (Schiefele, 1996a). However, the critical question is what they can tell us about the role of interest in learning. Teacher-ratings of achievement are very poor measures of what really has been learned. Better indicators are measures of cognitive changes during learning, e.g., changes in the representational structure of domain-specific knowledge.

Individual interest in specific subject areas and acquired knowledge. A few studies have tried to investigate the interest-achievement-relation at this level of analysis. Most of them have been done in the domain of text-learning (cf., Schiefele, 1990, 1991; Schiefele & Krapp, 1996). In these studies high-interest and low-interest students were compared with regard to

different indicators of text comprehension. In a first step, students were asked to fill in a questionnaire to measure topic interest in a field outside the content area of their major. A series of tests to measure verbal intelligence, prior knowledge and other learner variables were also administered. In a second step, subjects had to read a text of about six pages length. Finally, after reading the text, subjects were given a test to assess their knowledge structure.

All studies displayed significant effects of interest on text comprehension, even after controlling for previous knowledge, intelligence or text readability. Interest did not simply enhance the *quantity* of the recalled text information but had its most remarkable effect on the *quality* of learning. Specifically, the results suggest that interest motivates the reader to go beyond the text's surface and try to understand the underlying meaning and the main ideas (for a summary see Schiefele, 1996a).

Situational interest and learning outcome. Naive as well as formal theories of instruction suggest that interestingness plays an important role in learning and academic achievement (Travers, 1978; Todt, 1985). It is assumed that a high level of interestingness will automatically lead to a high degree of attention and will foster the readiness of a student to get involved with this object, thus raising the probability of successful learning. There are some correlational studies in natural school settings and a few experiments in the domain of text-learning, which have tried to investigate these assumptions. Empirical research on interestingness and text-based learning has been summarized by Hidi (1990), Hidi and Anderson (1992), Hidi and Bernsdorff (1998) and Schiefele (1996a). The research methodology has usually involved the following steps. First, the stimulus text under investigation is rated for interestingness. Second, subjects read the text. Finally, the relationship between the rated interestingness and performance is determined. In these studies interestingness turned out to be a powerful determinant of children's learning. In some of the experiments it was found that text-based interest was much more powerful than other factors (e.g., readability) to explain the differences of text comprehension.

Interestingness, however, can also have unwanted "positive" effects. This has been shown in experimental studies on "seductive details" (cf., Garner, Brown, Sanders, & Menke, 1992). The background of these experiments is the well-known strategy to increase the interestingness of learning material (e.g., text books) by adding attractive pictures or anecdotes, which are nice to look at or to read, but are not really important for understanding the basic information in the text. Some of these experiments were designed to assess the influence of importance and interestingness on text-learning. Accordingly, importance and interestingness were rated by a group of experts before the subject of the experimental groups were asked to read a text. One group received a text with seductive details which were operationally defined as text-segments, presenting very interesting but totally unimportant information. Another group had to read the same text but without seductive details. Learning effects were measured by recall-tests, administered immediately after the reading-session and, in addition, some days later to measure delayed recall. For example, in an experiment reported by Garner, Gillingham, and White (1989), the performance in recalling merely the important information differed dramatically between the experimental groups: adult readers who read the text without the "seductive details" recalled an average of 93% of the ideas rated as most important. Adult readers given "seductive details" recalled an average of only 43% of these ideas. In a related study, Wade and Adams (1990) asked college students to read and recall information from a biographical text. Again, interestingness was found to have a powerful effect on immediate as well as delayed recall. The authors conclude that interest plays a key role in text-learning. When importance and interestingness diverge, interestingness is the better predictor of which information will be recalled – even if this information is of no relevance for the content to be learned.

Studies referring to process-variables

Relatively few studies have tried to explore the effects of individual and situational interest by analyzing the relationships between interest and possible mediator variables, such

as attention, learning-behavior, flow, and other emotional experiences during learning. The scarce studies that have been conducted will be briefly reviewed here.

Attention. Interesting as well as important information tends to be learned more readily than uninteresting and/or unimportant information. Researchers have hypothesized that increased learning is due to the allocation of extra attention (Anderson, 1982; Shirey & Reynolds, 1988). This hypothesis is the basic premise of the Selective Attention Strategy Model (SAS; Reynolds, 1992; Hidi, 1995). Based on the assumption that the capacity of our information processing system is limited, it is predicted that a reader pays more attention to the interesting portions of a text and hence needs more time for these portions. However, experiments designed to test this assumption failed to confirm this hypothesis. Contrary to the prediction of the SAS, adults tend to take less time to read interesting text segments than uninteresting ones, although children do take longer to read interesting information – as predicted by SAS. Causal analysis of the data revealed that no causal relations exist among interest, attention, and learning outcome (Hidi, 1995; cf., Reynolds, 1992, for a detailed presentation of the data). Shirey and Reynolds (1988) and others concluded that attention plays no causal role in readers' increased learning of interesting information. However, taking into consideration that attentional control is a complex phenomenon, this might be a somewhat premature conclusion. Modern theories of attention postulate different attentional components and functions. They have led to a re-examination of the role of attention in learning (Hidi, 1995). Some theoretical models distinguish between two different systems of cognitive control. One system requires conscious and voluntary acts of concentration. A second system is working automatically, without the need of conscious control. Hidi (1995) argues that interest-based learning is connected with the second system. This is especially true for the early stages of a "learning episode" as opposed to a mere learning opportunity (cf., Boekaerts, 1996). As a consequence, interest-based forms of reading and learning require less effort, and are, at the same time both, faster and more effective.

Learning Strategies. Learning strategies can be conceptualized and classified in many ways. Entwistle (1988) and others distinguish between deep-level processing strategies and surface-level strategies. Students who tend to use deep-level processing strategies analyze the subject-matter from different angles; they establish diverse relationships, recognize problems and solve difficulties on their own. In contrast, students who rely on surface-level processing strategies are satisfied to memorize facts and prefer those aspects of the subject-matter that can easily be mastered. Empirical studies have demonstrated that, although students are able to work with deep-level processing strategies, they often do not use them. Among the motivational factors that have been shown to influence the use of learning strategies, interest-related variables turned out to have an important influence (Schiefele & Schreyer, 1994; Wild, 1996).

In one of our own studies we were able to demonstrate that, at the university level, study interest affects students' attitude towards different kinds of learning strategies as well as their specific use of learning strategies in concrete learning situations (Schiefele, Wild, & Krapp, 1995). A total of 144 university students with different majors participated in the study. All students were involved in courses with educational or psychological topics which were part of the requirements in their first year. In the middle of the semester, students had to complete a number of questionnaires assessing the following variables: interest in the course topic, extrinsic motivation to learn (e.g., learning to get good grades), the amount of time per week devoted to course-related work and general use of learning strategies. Three months later, namely at the end of the semester, all students took exams in their courses. Right after having completed their tests, these students were asked to give an indication of the learning strategies they actually used when preparing for the exam. In addition, they had to indicate how many hours they spent learning during the two weeks before the exam. The relations between motivation, study time, and learning strategies are shown in Table 1.

Table 1

Zero-order correlations between motivation, study time, and learning strategies (Schiefele, Wild, & Krapp, 1995)

Dependent Variables	Interest	Extrinsic Motivation
<i>Study Time</i>		
During Semester	.52**	.09
Week before Exam	.17	.14
<i>General Strategy Use</i>		
Elaboration/Forming Relations	.29**	.02
Elaboration/Critical Thinking	.27**	.14
Rehearsal	.16	.23**
Metacognition	.08	.18*
<i>Specific Strategy Use</i>		
Elaboration/Forming Relations	.33**	.14
Elaboration/Critical Thinking	.33**	.14
Rehearsal	.05	.33**
Metacognition	.19*	.31**

Note. $n=144$; ** $p<.01$ (two-tailed tests)

Interest was highly related to study time during the semester but weakly related to study time before the exam. In contrast, extrinsic motivation was not significantly related to study time during the semester. When looking at the relations between the two aspects of learning motivation (interest vs. extrinsic motivation) and strategy use, we found nearly the same pattern for the general as well as for the specific dimension of learning: interest was closely related to elaboration strategies which are aspects of deep processing approach. Extrinsic motivation was associated with rehearsal (and metacognitive) strategies, but not with elaboration strategies. Even though it is well established that interest as well as other motivation factors play an important role in selecting and using specific kinds of learning strategies, we still do not know to what degree learning-strategies mediate the causal relationship between interest and learning outcome (Schiefele & Krapp, 1996; Schiefele, 1996a; Wild, 1996).

Feeling-related states and experiences. The effectiveness of learning is not only a matter of cognitive factors; feeling-related states and the quality of experience during a learning episode also play an important role (Csikszentmihalyi, 1988; Christianson, 1992; Boekaerts, 1995). Quality of experience is a multidimensional construct. According to Schiefele (1996b), the core dimensions of this construct include activation or arousal (e.g., feeling vigorous), affect (e.g., feeling happy), and concentration. Measuring feeling-related variables retrospectively is a problem, because the quality of emotional experiences changes very quickly and subjects do not always correctly remember their emotional states during the process of an activity. Therefore it is important to use methods which provide valid information about the emotional states experienced during an interest-related action.

In a recent study Schiefele (1996b) asked high school seniors, what kind of feelings and experiential states they had while reading a text. The quality of the subjective experience was assessed by means of rating-scales that were inserted into the text at different points. Topic interest was found to be significantly related to involvement (activation), enjoyment (happiness) and concentration.

Another empirical approach is the "Experience Sampling Method" (ESM; Csikszentmihalyi & Larson, 1987). Subjects are provided with an electronic pager which is individually programmed with randomly selected signal-times. Whenever the subject receives a signal he or she is asked to respond immediately to a small number of self-report

items (e.g., rating-scales). By collecting many situation-specific assessments, the relation between learning-conditions and the occurrence of experiential states can be studied systematically. ESM has successfully been used in different psychological research-fields. Only recently, educational psychologists have tried to transfer this methodology to the domain of motivation and interest. For example, Schiefele and Csikszentmihalyi (1994) investigated the relation between interest in four different subject areas and the quality of experience in class during the period of one week. The results demonstrate that interest is a good predictor of various dimensions of experience in class. Across subject areas, interest was most strongly associated with the experience of intrinsic motivation, positive affect, concentration, and “potency” (feeling active, strong and exited). Controlling for ability and achievement motivation did not decrease the strength of these relations.

Continuing this research line, we have started a longitudinal study in the domain of vocational education (Wild & Krapp, 1996; Wild, Krapp, Schreyer, & Lewalter, 1998). One aim of this study was to investigate the role of emotional experiences connected to the basic psychological needs for autonomy, competence and social relatedness. As stated above, it is assumed that the emergence of a new interest-oriented person-object-relationships as well as changes in already existing interest-patterns depend on the perceived possibility to fulfill one’s basic needs.

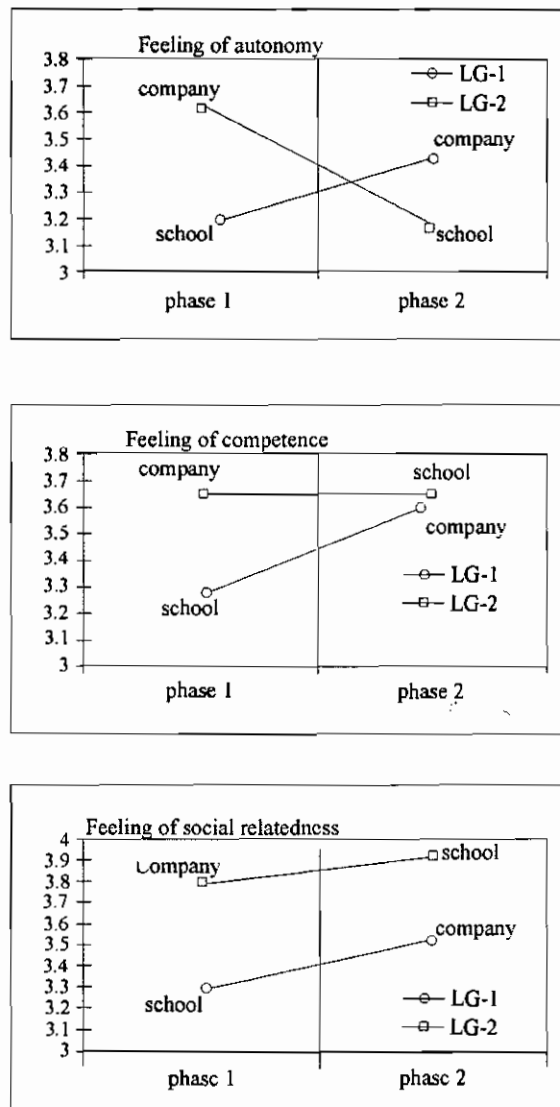


Figure 2. Experience of autonomy, competence, and social relatedness in dependence of learning context and sequence of learning (Wild, Schiefele, & Krapp, 1996)

Results from the first year show that the probability of experiencing positive need-related feelings is highly influenced by the conditions of the concrete learning situation. For example, there are large differences between and within educational settings. It should be noted that the "dual system" is a well established form of vocational education in Germany. Professional training includes periods of formal schooling in a special type of school (Berufsschule) and periods of training on the job in a company. Apprentices change between these two settings several times during their first year. In our study, one group of subjects (LG-1) started in a school setting (phase 1) and then went to their company (phase 2). Another group started in the company and then went to school. As is shown in Figure 2, the average ratings of situation-specific feelings with respect to the needs for autonomy, competence and social relatedness do not only depend on the setting (school vs. company) but also on whether subjects started their training at school or in the company. We also found a close relationship between the level of being interested in the actual learning task and these need-related indicators of the quality of experience in educational settings. The next step of analysis will refer to the question whether these experiential factors can be used to explain developmental changes in the structure of an individual's topic interests during vocational education (cf., below).

Interest as a dependent variable: Development of interest

Findings on empirical relations between interest, learning and achievement indicate that interest-based motivation has favourable effects on both the process and the outcome of learning (Schiefele, 1991, 1996a; Krapp, Hidi, & Renninger, 1992; Krapp, 1998). From this perspective, it seems worthwhile to reflect on individual (or topical) interests as important educational goals. It seems clear that educational research should investigate how an individual interest develops, and under which conditions contents (or topics) offered in school can become an integrated part of a student's individual interest structure.

Descriptive studies. Research on the development of interests has been primarily descriptive. For example, frequencies of subject-related interests have been studied in different groups, and the average scores have been used to identify developmental trends.

Findings from studies in kindergarten and preschool (Krapp & Fink, 1992; Renninger, 1992) indicate that all children can be identified as having individual interests. Even at this young age interests are relatively stable, although they become progressively more differentiated over time (Renninger & Leckrone, 1991). Changes in school-related interests have been studied using cross-sectional as well as longitudinal studies. These often reflect a negative trend. Helmke (1993) reports a decline of interest among elementary school-aged children. This negative tendency is most obvious in secondary school, starting around age 11 (cf., Todt, 1978; Lehrke, Hoffmann, & Gardner, 1985). Average interest scores decrease at this time, especially in the domains of physics, chemistry and mathematics. To a lesser degree, a similar decline occurs in social sciences and biology.

Cross-sectional studies analyzing the course of interest development in different age groups can only show the general trend in a population, however. There are considerable differences and sometimes even opposite trends in the developmental course of subgroups, caused by individual and/or contextual moderator variables. Completely different results can be found when one considers the relation between interest and the context in which interest-related information is conveyed. Gender really is the only moderator variable that has been carefully studied (cf., for a summary, Hoffmann et al., 1998). Many suggest that the decline of subject-matter-interest in the natural sciences is most apparent among female students. For example, in biology, girls' interests have been found to increase in anthropology and ecology, while they decrease in zoology and botany. Differential effects of this kind have also been found in other domains, such as sociology, politics and physics (Birnstengel, 1989; Todt & Schreiber, 1998). In an extensive study of 5th to 10th graders developing interests in physics (cf., Hoffmann & Lehrke, 1986), both the different subject areas of physics (e.g., optics,

mechanics) and the contexts within which the topics were covered (e.g., focus on general laws of physics vs. the application of these laws to real-world problems) were taken into account. An undifferentiated (global) data-analysis revealed a general negative trend which was more distinct for girls than it was for boys. Separate consideration of the topic areas and the types of contextual integration resulted in a more differentiated picture of interest (Hoffmann, Häußler, Peters-Haft, 1997). In classes primarily organized to convey and demonstrate general rules in physics, the interest for topics in physics was relatively small for both boys and girls. A much stronger interest can be seen within the same content areas, however, if cross-references are made to the students' interest (e.g., the function of medical devices). This effect is particularly pronounced for girls.

Explanatory approaches. How can different aspects of interest development be explained? Several researchers have tried to identify variables that affect interest development in diverse learning contexts (e.g., kindergarten, family, school, college). These factors are used to predict the emergence of inter-individual differences. In general, only a small amount of variance could be explained (Todt, 1978, 1985; Gardner, 1998).

These results have sometimes been interpreted as if school had hardly any influence on the stimulation and keeping of school interests (Todt, 1978). Or, as Travers (1978, p. 128) has put it even more graphically: "The school is more likely to be a killer of interest than the developer". Is such a far-reaching inference justified? Results from descriptive studies do not give any indication in what way the influence could be increased by a deliberate revision of the curriculum or the teaching behaviour in specific domains. That the kind of teaching must have an influence can be derived from the fact that there are strong differences in many areas of school-related interests between students of comparable school classes (Lehrke, 1988). Results from experimental studies in natural settings provide even stronger evidence. A thoroughly planned study with 5th-graders compared the effects of a traditional curriculum in physics with a new curriculum developed on the basis of theoretically founded considerations about how to foster student's interest in this area. Special attention was devoted to how teachers could deal with the negative attitudes of girls. It turned out that, at the end of the school year, girls reached a much higher level of achievement and also their topic-related interest could be influenced positively (vgl. Hoffmann, Häußler, & Peters-Haft, 1997). Prenzel, Eitel, Holzbach, Schoenheinz, and Schweiberer (1993) could find a similarly positive effect of a curricular revision on the interest development with students of medicine in the area of surgery training.

Studies of this kind can demonstrate that the formation and change of interests can be influenced to a considerable extent by the arrangement of the learning environment. But how do these effects come about? What do we know about the underlying psychological processes? Is it possible to identify functional principles, which provide an explanation at the level of causal hypotheses? It is important to note that this is a search for a somewhat different kind of explanation. Instead of exploring the predictability of inter-individual differences of the developmental outcome, the focus is on general psychological processes and mechanisms, which are principally valid for all individuals in the same way.

Krapp (1998) has supplied some considerations on how to develop a "functional theory of interest genesis". Both the explanation for keeping up a situational interest that has been newly "produced" by interestingness factors and the explanation for the developmental changes in an individual's already existing structure of individual interests have to consider two components of action control. The first component concerns the cognitive-rational processes of intention formation or the deliberate selection of learning goals. Theoretical and empirical questions connected with this component of action-control have been studied very thoroughly in traditional motivation research, based on (cognitive) expectancy-value-models (Heckhausen, 1989, 1991; Pintrich & Schunk, 1996; Nenniger, this volume). The second component of action-control refers to processes of immediate emotional feedback and the quality of subjective experiences during action has found only comparatively little attention in recent research. However, in accordance with Deci and Ryan (1985, 1991), Boekaerts (1996, this volume) and many other motivation researchers we assume that these factors play a crucial role in human behavior and development.

With respect to interest development it is postulated that a person will only engage continuously in a certain topic area ("object of interest", see above) if he or she assesses it, on the basis of rational considerations, as sufficiently important (value-related valency) *and* if he or she experiences the course of interactions on the whole as positive and emotional satisfactory. Referring to the theory of self-determination (Deci & Ryan, 1985, see above) we assume that emotional feedback concerning the three basic psychological needs for competence, autonomy and social relatedness is especially important among the wealth of possible emotional aspects that might have a positive or negative influence on the quality of experience during motivated learning. In fact, several studies have revealed significant relationships between empirical indicators of such experiences and developmental changes with respect to academic and/or vocational interests (Prenzel, Kramer, & Drechsel, 1998; Wild & Krapp, 1996; Lewalter, Krapp, Schreyer, & Wild, 1998).

Perspectives for future research

The theoretical and empirical work presented in this paper represents a cross-section of current research on interest, motivation and learning that has implications for educational psychology. It was shown that the expansion of this field of research within the last decade has led to an increase in the variety of theoretical and empirical approaches. Given that interest-related research was largely overlooked for a long period of time, this development is encouraging and exiting. However, it also causes a problem, because researchers from different disciplines (e.g., psychology, science education, reading) use divergent conceptual frames and different theoretical concepts and operational definitions (see, Krapp, Renninger, & Hoffmann, 1998; Boekaerts, Nenniger, this issue). This problem is neither new (cf., Berlyne, 1949) nor is it specific to the domain of interest research. The same difficulty characterizes other growing fields of educational and psychological research as well (e.g., memory, learning strategy). There is some benefit in this, since new conceptual and methodical approaches can serve to specify and refine the aims of interest-related research. It is fraught with difficulty, however, when the use of a term such as "interest" is extended to a point where various definitions refer to totally different aspects of reality.

How can this problem be overcome? Krapp, Renninger, and Hoffmann (1998) argue that it is neither necessary nor desirable to limit the meaning of interest to only one specific aspect in order to have a single commonly shared definition. Instead, a theoretical framework should be developed that refers to different aspects of interest-related phenomena. Such a framework would provide a basis for discussion not only within the field of educational research but also across fields in which interest is studied in different ways and for different reasons.

Another problem refers to the question of how to operationalize the construct of interest. The criterion of object-specificity requires measures which take not only the qualitative characteristics of an interest-relationship into account (emotional and value-related valences), but also the content-structure of the interest-domain. Standardized tests or questionnaires provide valid measures only in those cases where the object area can be defined rather narrowly (e.g., specialized field of knowledge). In all other cases, rather complex methods have to be used in order to cover relevant aspects of the content-structure (cf., for example the procedures used in the IPN-studies on physics). Several researchers have proposed to rely on qualitative measures instead (e.g., interviews or observations in natural settings; Krapp & Fink, 1992; Lewalter et al., 1998; Prenzel, Kramer, & Drechsel, 1998). Since qualitative as well as quantitative methods have their own problems, it is reasonable to assume that a combination of both approaches would be the best choice.

As long as individual or situational interests have to be operationalized with respect to their structural or dispositional components many well-known procedures are available. But what about measuring processes, experiential states and situation-specific cognitive as well as affective components of interest-based actions? I agree with Boekaert's statement that future research on motivation should focus much more on context-sensitive behavior, and

that it is essential to record the unique ways in which students experience everyday learning opportunities. To measure relevant parameters that students use to judge a given learning situation, Boekaerts and colleagues have developed an "on-line motivation questionnaire". In some of our studies, we have tried to apply the Experience-Sampling-Method (ESM) to attain empirical indicators of the quality of experience during teaching in vocational education. Other researchers have used observation-techniques, retrospective interviews or diaries (Prenzel, Kramer, & Drechsel, 1998).

Frequent discussions of the empirical methods used by various researchers are important to improve research. With respect to the goals of educational-psychological inquiry, the quality of research is, first of all, a matter of how phenomena of learning and development are theoretically reconstructed and empirically tested. The ultimate evaluation criterion of research is its applicability and the extent to which it can be used to solve fundamental problems in educational settings. But what are the real central problems of teaching and education? In empirical research on motivation, literally hundreds of studies explore the relationship between motivational predictors and variables indicating learning outcome and academic achievement. Most of these studies use correlation-methods and other statistical tools to describe and explain (interindividual) differences. There can be no doubt that educators and teachers have to be informed about the extent and the sources of achievement-related differences. However, more central targets of the educational endeavour include building up enduring motivational dispositions (values, goal-orientations; individual interests) or fostering the development of a realistic and satisfactory self-concept, which is the basis of well-being and psychological health in the course of life. From this point of view, the research on interest, motivation and learning has to enlarge its theoretical and empirical perspectives. On the one hand, future research should focus on theoretic models which try to integrate concepts and theories of learning with those of individual development and the growing self. That is a challenge which can be met by the proposed person-object-theory of interest but also by other theoretical conceptualization that receive more and more attention in motivation research, such as Boekaerts' (1996) theory of "Personality and Learning" (PaL) or Deci and Ryan's (1985, 1991) motivational theory of self-determination. On the other hand, motivational analyses have to go beyond the paradigm of prediction research. What is needed are empirical approaches that explore the mediating effects in short-term as well as long-term learning situations (Nenniger, Straka, Spevacek, & Wosnitza, 1996; Schiefele & Rheinberg, 1997).

Therefore I would applaud experimental studies and empirical approaches that can analyze developmental processes over a longer period of time in natural settings.

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Au cours des dernières années, la problématique de l'“intérêt” a connu un renouveau d'intérêt auprès des chercheurs. En psychologie de l'éducation, en particulier, beaucoup de travaux ont été effectués pour étudier comment l'apprentissage et la réussite scolaire sont influencés par des facteurs motivationnels et cognitifs en liaison avec des intérêts individuels et/ou situationnels. L'auteur présente des résultats de recherches empiriques à partir de considérations théoriques concernant le construct d'intérêt. L'intérêt a classiquement été étudié comme une variable indépendante, les variables dépendantes étant, de leur côté, soit certains aspects des résultats de l'apprentissage (structure de connaissance, réussite scolaire), soit des médiateurs

hypothétiques pouvant être invoqués pour expliquer les effets de l'intérêt (par exemple, les stratégies d'apprentissage, l'attention, les réactions émotionnelles). Il y a aussi un nombre croissant d'études qui essaient d'explorer les conditions du développement de l'intérêt en environnement éducatif. Les perspectives de recherche à venir sont discutées par référence aux questions théoriques et pratiques posées par l'éducation.

Key words: Achievement, Interest, Learning, Motivation.

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Current theme of research:

The role of interest in learning and human development.

Most relevant publications in the field of Psychology of Education:

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