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Interest and the Quality of Experience in Classrooms

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This study investigated the relation between interest in four different subject areas (mathematics, biology, English, history) and the quality of experience in class. The strength of interest as a predictor of experience was contrasted with that of achievement motivation and scholastic ability. A total of 208 highly able freshmen and sophomores completed interest ratings, an achievement motivation questionnaire, and the Preliminary Scholastic Aptitude Test (PSAT). These assessments were followed by one week of experience sampling. In addition, grades were available for the subject areas involved. The results showed that interest was a significant predictor of the experience of potency, intrinsic motivation, self-esteem, and perception of skill. Controlling for ability and achievement motivation did not decrease the strength of these relations. Achievement motivation and ability proved to be considerably weaker predictors of the quality of experience than was interest. In addition, interest contributed significantly to the prediction of grades in mathematics, biology, and history, but not English. The main results and some limitations of the study are discussed, and suggestions for future research are made.

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Introduction

The significance of motivational concepts in education relies heavily on their power to predict academic achievement (e.g., Elliott & Dweck, 1988; Ryan, Connell, & Deci, 1985). Not surprisingly, concepts of *achievement motivation* (see Heckhausen, Schmalt, & Schneider, 1985; and Nicholls, 1984, for reviews) have dominated our understanding of student motivation for more than two decades (Brophy, 1983; Weiner, 1980, 1990). It is only recently that motivation research has broadened its scope and complemented the focus on extrinsic or performance goals by a stronger consideration of intrinsic or learning goals (e.g., Ames & Archer, 1988; Dweck, 1986; Lepper, 1988). Despite this extension, the one-sided concern with cognitive outcome measures still prevails.

It is evident that results showing that intrinsic as opposed to extrinsic motivation leads to enhanced conceptual learning (e.g., Benware & Deci, 1983; Lepper, 1988; Ryan et al., 1985) are of considerable importance. They not only deepen our understanding of the interplay between motivation and cognition but may also have consequences for teaching and classroom organization in the future (Corno & Rohrkemper, 1985; Ryan et al., 1985). It is noteworthy that during the last decade the scope of cognitive outcome measures has been widened. Instead of merely looking at students' performance in school, research in motivation has included variables such as use of learning strategies (Nolen, 1988; Pintrich & De Groot, 1990), selection of courses (Eccles, 1983; Meece, Wigfield, & Eccles, 1990), self-regulation of learning (Corno & Mandinach, 1983), attributions for success and failure (Ames & Archer, 1988; Elliott & Dweck, 1988), self-efficacy (Ames & Archer, 1988; Gottfried, 1990), task-choice, and mastery behavior (Elliott & Dweck, 1988).

The need to investigate experiential correlates of motivation

Despite their major importance, cognitive variables should not be the only criteria for the usefulness and worth of a motivational concept (see also Nicholls, 1989; Weiner, 1990). An increasing number of researchers have acknowledged the significance of affective outcome measures and have examined the effect of motivation on achievement-related emotions (e.g., pride or shame; Weiner, 1986), emotions occurring during a learning activity (e.g., enjoyment or tension; Matsumoto & Sanders, 1988; Ryan et al., 1985), anxiety (Gottfried, 1982; Meece et al., 1990), self-esteem (Ryan et al., 1985), satisfaction (Nicholls, Patashnick, Chung Cheung, Thorkildsen, & Lauer, 1989), and attitudes (Ames & Archer, 1988).

In the present study, we focused on the quality of subjective experience in class as an outcome measure of motivation. Quality of experience is a multidimensional construct that consists of emotional, motivational, and cognitive aspects of experience (Csikszentmihalyi, 1982, 1988a). The core dimensions of this construct include affect (happy, cheerful, etc.), potency (alert, active, etc.), cognitive efficiency (concentration, self-consciousness, etc.), and (intrinsic) motivation (wish to do the activity, involvement, etc.) (Csikszentmihalyi & Larson, 1987). Depending on the domain under study (e.g., sports, leisure, or school), additional dimensions addressing unique aspects of experience not shared by other domains may be assessed (e.g., the experience of risk or danger when climbing a mountain).

The following reasons highlight the importance of investigating the quality of experience in class as a possible outcome of motivation:

1) Recent research indicates that positive emotions are highly relevant to the successful completion of tasks that involve creative problem solving, the development of new ideas, and deep comprehension of complex facts (e.g., Amabile, 1983; Csikszentmihalyi, 1988b; Isen, Daubman, & Gorgoglione, 1987; Schiefele, 1992).

2) The experience of positive affective states during learning processes may have a significant impact on the strength of the motivation to learn in the future (e.g., Harter, 1981; Matsumoto & Sanders, 1988). This is especially true for intrinsic motivation to

learn. Intrinsic motivation differs from extrinsic forms of motivation in that the process of learning itself is valued and enjoyed (e.g., Ames & Archer, 1988; Deci & Ryan, 1985). Thus, positive feelings while learning are necessary to maintain high levels of intrinsic motivation.

3) Finally, the quality of students' experience is an outcome measure in its own right. Psychological well-being in school should be sought even if it does not contribute directly to the enhancement of academic performance. The educational value of instructional interventions that decrease the quality of experience would certainly be doubtful (e.g., Deci & Ryan, 1985).

Domain-specific and general motivational orientations

The present paper intends to investigate the experiential correlates of two different motivational concepts: subject-matter-related interest and general achievement motivation.

Achievement motivation was included as a potential antecedent of quality of experience because of its importance for school learning ascribed by many authors (e.g., Atkinson, 1974; Heckhausen et al., 1985; Rand, 1987; Weiner, 1967). Different definitions of achievement motivation as an individual difference variable have been put forward in the past (see Heckhausen, 1989, for a review). Two aspects seem central to most of these definitions: (1) Preference for high standards of performance, and (2) willingness to invest effort to reach these standards (e.g., Murray, 1938; McClelland, 1987).

The concept of interest has a long tradition in psychology (e.g., Dewey, 1913; Thorndike, 1935) that came to an end with the onset of behaviorism. However, there are recent efforts to revive interest as a motivational concept (Hidi, 1990; Renninger, Hidi, & Krapp, 1992; Schiefele, 1991). These efforts are based partly on the belief that current conceptions of intrinsic motivation cannot cover all of the important characteristics originally attached to the concept of interest (Krapp, Hidi, & Renninger, 1992). An important difference between both conceptions pertains to the aspect of *domain-specificity*. A look at those measures designed to tap intrinsic versus extrinsic motivational orientations (e.g., Amabile, 1987; Harter, 1981; Lloyd & Barenblatt, 1984) shows that the underlying theoretical concepts are based on the idea that students are either intrinsically or extrinsically motivated regardless of the content to be learned. It is believed that some students simply like to learn, and enjoy improving their skills, be the subject matter English or chemistry. On the other hand, the concept of interest is based on the idea that people develop specific relationships with different subject areas. The subjective representation of this *person-object relationship* as part of the enduring cognitive structure of a person is called interest. The use of the interest concept enables us to acknowledge the fact that some students are interested in, say, mathematics, while they dislike learning a foreign language or chemistry. This view is supported by Gottfried (1985, 1990), who found evidence that academic intrinsic motivation is differentiated into school subject areas. Similarly, other researchers have adapted general measures of motivational orientation to assess subject- or task-specific orientations (e.g., Boekaerts, 1986; Nicholls, 1989; Nolen, 1988; Pintrich & De Groot, 1990).

Schiefele (1991) defined interest as a relatively long-term orientation of a person toward an object (e.g., an area of knowledge) or an activity. This orientation or relationship is composed of *feeling-related* (emotional) and *value-related* valences that are stored in long-term memory. Feeling-related valences refer, for example, to the association of object-related activities (e.g., solving math problems) with positive feelings (e.g., activation). If personal significance is ascribed to an object or activity, one speaks of a value-related valence. In addition to these components, a third important feature of the interest concept is its *intrinsic character*. This means that interest-based involvement with a certain object is not instrumental for the achievement of goals being external to that object (e.g., passing an exam) or for receiving positive rewards.

It is believed that general (domain-unspecific) motivational orientations and specific interests are not mutually exclusive (see also Brophy, 1983; Gottfried, 1985). It seems plausible to assume that a person has both more general orientations (e.g., achievement motive) *and* specific motivational orientations. Specific motivational orientations may include a person's interests as well as subject-matter-specific goal orientations (e.g., performance goals, see Dweck, 1986). Empirical research is necessary to determine whether general or specific motivational orientations are more important in the field of school learning. Therefore, a direct comparison of both conceptions was provided in the present study.

Goals of the Study

The central question of the study concerns the relation between interest, achievement motivation, and various dimensions of subjective experience in four different subjects (mathematics, biology, English, and history). For example, we investigated whether students who expressed high interest in English were more concentrated, happy, activated, and intrinsically motivated in English class than students expressing lower levels of interest. Furthermore, we explored the relation between interest, achievement orientation, and semester grades. In order to control for individual differences in academic ability, the students' PSAT scores were included in all analyses.

The empirical evidence of the present study comes from a large-scale longitudinal study conducted at the University of Chicago (Csikszentmihalyi, Rathunde, & Whalen, 1993). The study began in 1985 and was originally designed to trace the development of talented students over a period of about four years. A wide array of measuring instruments, including personality tests, questionnaires, interviews, and the 'Experience Sampling Method' (ESM), were applied.

The use of the ESM is central to the present study. Its development (Csikszentmihalyi, Larson, & Prescott, 1977) has greatly facilitated the measurement of people's thoughts and feelings in everyday life (e.g., Hormuth, 1986). It consists of providing respondents with an electronic pager and a block of self-report forms with open-ended and scaled items. Usually, respondents wear the pager for a week and are paged about 56 times at random intervals. Whenever the respondent is signaled, he or she fills out a page of the booklet, indicating activity, location, and companionship, as well as describing the quality of his or her experience on a variety of dimensions (see below).

The following research questions will be addressed in this paper:

1) Is quality of experience in class more dependent on ability or motivational characteristics?
2) Are subject-matter-specific measures of motivation more predictive of experience and achievement than general measures of motivation?
3) Do motivational characteristics predict achievement independently of ability?

On the basis of theoretical considerations and prior empirical evidence, the following hypotheses were derived:

1) Ability is a better predictor of the quality of experience in class and achievement than either interest or achievement motivation. In accordance with prior research (e.g., Meece et al., 1990; Reynolds & Walberg, 1992), we assumed that ability factors are the most powerful predictors of affective experience and cognitive performance in achievement settings.

2) Interest is a better predictor of quality of experience and achievement than achievement motivation. This hypothesis is based on the assumption that subject-matter-specific variables are more predictive of affective and cognitive outcomes than more global variables (e.g., Gottfried, 1985).

3) Both interest and achievement motivation were supposed to predict quality of

experience and achievement independently of ability. Prior research has shown that motivational variables can predict emotional and achievement outcomes independently of ability factors (e.g., Meece et al., 1990; Schneider & Bös, 1985).

Method

Sample

The sample consists of 208 freshmen and sophomores from two Chicago suburban high schools. The majority of the participants came from white middle-class families. About 44% of the sample were male (n = 92; 40 freshmen, 52 sophomores) and 56% (n = 116; 47 freshmen, 69 sophomores) were female. All students were nominated by teachers as being talented in one or more of five subject matters: mathematics, science, music, art, and athletics. 74% of this sample were nominated as talented in one area only, while 26% were nominated in two or more areas. Altogether, 70 students (34%) were nominated in mathematics, 48 (23%) in science, 79 (38%) in music, 28 (13%) in art, and 58 (28%) in athletics.

Originally, 228 students participated in the study. However, only 208 provided a sufficient number of valid responses on the ESM (see below).

Independent Measures

Interest. As part of a larger questionnaire on student variables (e.g., biographical information) the students were asked to indicate, using five-point rating scales, the extent to which each of their current subjects was their favorite. The resulting measures were used as indicators of subject-area-specific interest. Two sources of evidence were available to confirm that the single-item measure of interest used here is valid. First, a subsample of 56 students were tested with a questionnaire that taps a number of both intrinsic and extrinsic reasons for why they chose a course in math (n = 37) or science (biology or chemistry, n = 19). The intrinsic reasons were: '*I enjoy it*' and '*It's interesting to me*'. Among the (more numerous) extrinsic reasons were: '*It's required*', '*It's something that will be useful for earning a living*', '*It's something I get good grades in*'. A correlational analysis showed that the interest ratings were related positively to the intrinsic reasons ('enjoy': r = .31, n = 56, p < .01; 'interesting': r = .46, n = 56, p < .001) and correlated negatively with 'required' (r = -.40, n = 56, p < .001) and 'It's something that impresses other people' (r = -.23, n = 56, p < .05). All other correlations (with extrinsic reasons) were not significant. These results support the validity of the present interest measure. Since all subjects involved in this analysis were nominated as talented in either math or science, the variance of ratings of intrinsic and extrinsic reasons was quite small. As a consequence, even higher correlations between interest and intrinsic orientation would have been obtained with a normal sample of students.

It is maintained that interest is a motivational characteristic that applies only to a certain subject area. Therefore, the level of interest in one domain should not predict interest in another domain. To demonstrate this, for all pairs of subject areas, correlations were computed between the respective interest scores. The results showed that different interest scores were not significantly correlated with one another. Thus, it can be inferred that knowing a student's interest in one domain does not allow prediction of interests in another domain. Obviously, students develop differential patterns of interests.

Achievement Motivation. Two subscales from the 'Personality Research Form' (PRF; Jackson, 1984) were used to generate a measure of achievement motivation. The construction of PRF scales followed closely Murray's (1938) theory of personality. Specifically, the *Achievement* subscale of the PRF is intended to measure what Murray has called the 'need for

achievement' (*n* Ach). According to Murray's definition (see also McClelland, 1987), it captures an individual's tendency to adopt high standards of performance (e.g., '*I seldom set standards which are difficult for me to reach*', scored reversely) and the readiness to invest intensive effort in one's work (e.g., '*In my work I seldom do more than is necessary*', scored reversely).

We found that another subscale of the PRF, namely *Endurance*, that is not included as a separate need in Murray's list of needs, indeed captures an important aspect of achievement motivation, namely the level of persistence a person shows when working on a task (e.g., '*I am willing to work longer at a project than are most people*'). Therefore, we decided to combine the two scales into a single indicator of achievement motivation. Our decision was further justified by a number of studies that have repeatedly reported strong correlations between the Achievement and Endurance subscales. In addition, analyses of the factor structure of the PRF revealed that Achievement and Endurance have high loadings on the same factor (Jackson, 1984).

For both the Achievement and Endurance subscales high (i.e., greater than .80) test-retest, parallel form, and internal consistency reliabilities have been obtained. In addition, extensive research has provided ample evidence for the validity of all PRF scales (see Jackson, 1984). For example, a number of studies found that Achievement and Endurance predict significantly indicators of academic success (e.g., Clarke, 1973; Harper, 1975; Rothman & Flowers, 1970; Schneider & Green, 1977). In a comprehensive review of measures of achievement motivation, Clarke (1973) strongly recommended the PRF Achievement scale because of its superior construction, psychometric properties, and validation.

In the present study, Achievement and Endurance were highly interrelated ($r = .69$, $n = 171$,[1] $p < .001$). For the combined achievement motivation scale a coefficient alpha of .86 was obtained. Individual measures of achievement motivation were computed by adding the values from the two subscales.

Scholastic Ability. As a measure of general ability, the students' PSAT (Preliminary Scholastic Aptitude Test) scores were used. The PSAT is a widely applied test of scholastic aptitude especially designed for high school sophomores and juniors. It is comprised of two parts: mathematics and verbal. The mathematics part requires examinees to apply basic mathematical reasoning skills. Specific knowledge of mathematical subject matter past elementary algebra and geometry is not necessary (Becker, 1990). The verbal part measures, for example, knowledge of grammar, understanding of sentence structure, and rhetorical skills.

The PSAT is a reliable predictor of academic achievement. In the present study a correlation of .46 ($n = 143$,[2] $p < .001$) between PSAT and grade point average (GPA) was found.

Although the PSAT has proven to be a valid indicator of scholastic ability (e.g., Benbow, Arjmand & Walberg, 1991; Linn, 1982), a certain extent of overlap (that cannot be attributed to ability factors) between PSAT scores and measures of achievement is to be expected. Separating ability and achievement is difficult in domains where people have received formal training of knowledge and skill (Carroll & Horn, 1981).

Dependent Measures

Experience Sampling Form. Students carried electronic pagers for one week and answered questions of the 'Experience Sampling Form' (ESF) whenever they were signaled. Seven to nine ESFs were filled out per day by every student. The ESF in the present version consists of six open-ended questions and 30 rating scales. Open-ended questions refer, for example, to what the person is currently thinking, where he or she is, and what he or she is doing. The rating scales measure a few basic dimensions of experience as well as a number of single aspects of experience. They are written either in a seven-point semantic differential format or in a ten-point unipolar format. The classification of rating scales is based on factor

analyses (see Csikszentmihalyi & Larson, 1987; Larson & Delespaul, 1990). As mentioned, the following basic dimensions are usually distinguished: Potency, affect, cognitive efficiency, and intrinsic motivation. In addition to this set of experience dimensions, ratings of self-esteem, perceived importance of the current activity, and perceived level of skills in the current acitivity were included in the present investigation. These additional dimensions were considered to be important aspects of school-related activities.

The correspondence between dimensions of experience and individual items is based on prior studies that were using factor analyses to classify the various ESF rating scales (see Csikszentmihalyi & Larson, 1987). The following grouping of items was obtained: *potency* (active-passive, strong-weak, alert-drowsy, excited-bored), *affect* (happy-sad, cheerful-irritable), *concentration* ('How well were you concentrating?'), *intrinsic motivation* ('Do you wish you had been doing something else?'), *self-esteem* ('Were you living up to your own expectations?', 'Were you satisfied with how you were doing?', 'Were you succeeding at what you were doing?'), *importance* ('How important was this activity in relation to your overall goals?', 'Was this activity important to you?'), and *skill* ('Your skills in the activity:' low-high).

Contrary to prior analyses, no composite score for cognitive efficiency was derived because the corresponding items ('How well were you concentrating?', 'Was it hard to concentrate?', clear-confused) were not significantly correlated. Instead, we decided to include only the item asking for amount of concentration. This item seemed to be most adequate to capture the meaning of cognitive efficiency.

To estimate the reliability of the ESM, Csikszentmihalyi and Larson (1987) compared the means of various dimensions of experience obtained in the first half of the week with those obtained in the second half. First, they found only small and nonsignificant differences between mean values. Second, correlations between means in the first and the second halfs of the week were all significant. The median correlation coefficient ranged from .60 for adolescents to .74 for adults. Even over a two-year period the stability of responses ranged from $r = .45$ to $r = .75$.

The final sample ($n = 208$) consists only of students who filled out at least 15 ESFs. Only those forms completed within 30 minutes after the signal were included. 70% of the ESFs were filled out immediately after the signal and 88% were completed within 5 minutes of the signal. The average reported latency between receiving the beeper signal and beginning to fill out the ESF was about 2.5 minutes. A total of 7224 valid responses was given. The average number of completed ESFs per student was 34.73 ($SD = 9.97$, range: 15-63). *During regular class time*, 2274 responses were obtained ($M = 10.93$, $SD = 4.44$, range: 1-29). All other ESFs were filled out in other locations (e.g., at home, library, friend's house).

In the present study, the quality of experience was examined in four different subject areas, namely mathematics, biology, English, and history. It was only for these subject areas that a large enough number of students (> 60) provided at least one complete experience sampling form. It is important to note that the sample size in the four subject areas varied because different numbers of students were enrolled in these subject areas. Therefore, different portions of the total sample were represented in the four subject areas. The largest numbers of students provided ESFs in math ($n = 155$) and English classes ($n = 150$), while fewer students responded in biology ($n = 60$) and history classes ($n = 72$). These samples are partially overlapping. In each subject area, individual students contributed between 1 and 7 ESFs with means ranging from 2.19 ($SD = 1.14$, for math) to 2.48 ($SD = 1.34$, for biology). Altogether, in the four classrooms included here, a total of 997 ESM responses were obtained.

Because of the relatively small number of 'beeps' on which individual scores of subjective experience were based, it seemed necessary to provide additional evidence for the reliability of these scores. Since the majority of subjects provided two or more ESFs, it was possible to compare values taken at different times of the week in each subject area and for each dimension of experience. For those students who filled out exactly two ESFs, the values obtained at time 1 were compared with those obtained at time 2. For those students who had available three or more ESFs, composite scores were calculated to arrive at two different

measures for each dimension of experience. For example, in the case of students with five complete ESFs, the values of the first and second ESFs and the values of the third, fourth, and fifth ESFs were aggregated and compared to one another.

First of all, the reliability analysis revealed no significant differences between means at time 1 and time 2 for all ESM variables. Second, correlations between ratings at time 1 and time 2 were all significant, and ranged from .40 to .63 in mathematics (n = 102; mean r = .47), .35 to .52 in biology (n = 50; mean r = .43), .41 to .58 in English (n = 110; mean r = .48), and from .36 to .67 in history (n = 52; mean r = .53). In sum, the size of mean correlations was somewhat lower than the median value reported by Csikszentmihalyi and Larson (1987) for adolescents (.60). This is not unexpected because in their study scores for experience at times 1 and 2 were based on a considerably larger number of responses (on the average there were about 15 responses for each half of the week).

Scholastic Achievement. Semester grades were used as an indicator of school achievement. In order to get more precise values of the actual achievement, the difficulty level of courses has been taken into account. Two levels of difficulty ('regular' vs. 'advanced') were distinguished in all subject areas.[3] For example, the mathematics courses 'Foundations of Algebra' and 'Plane Geometry' were rated as regular while 'Advanced Algebra' and 'Analytic Geometry' were regarded as advanced. A score for the combined levels of grade and course difficulty was computed according to the following scale: 0 = failure/regular course, 1 = failure/advanced course, and grade 'D'/regular course, 2 = 'D'/advanced and 'C'/regular, 3 = 'C'/advanced and 'B'/regular, 4 = 'B'/advanced and 'A'/regular, and 5 = 'A'/advanced.

Procedure

Each student was scheduled to meet with a member of the research staff three to four times in an office at the school. During the first meeting, the use of the pager and the items in the ESF were explained. In addition, a questionnaire was filled out by the students including the interest rating described above.

The ESFs were bound in small pads (5.5 in. x 8.5 in.), each consisting of 15 forms. One week after the first meeting, the paging procedure started. The first day of paging was always a weekday. There were seven to nine random signals per day, between 7 a.m. and 10 p.m. on Sunday through Thursday, 9 a.m. and 12 p.m. on Friday and Saturday. On weekdays twice as many beeps were received before 3 p.m. in order to get a more representative sample of the classes the students took. Immediately after every signal the students had to fill out one form of the ESF.

Having completed the ESFs for one week, the students returned for a second meeting. During this meeting they were debriefed and asked to describe their experience during the week and the problems they had had with the pager. The ESM data were collected over a nine month period (October 1985 to June 1986). About 10 students were tested at a time.

It is also noteworthy that each subject area included in the present study was represented by four to six different teachers. Thus it seems unlikely that the results were biased by the prevailing influence of individual teachers.

Data Analysis

All analyses were carried out at the subject-level, i.e., using the individual student as the unit of analysis. Therefore, for each student, aggregated scores for all ESF variables were computed. As a consequence, it seemed unnecessary to use z-scores as is usually recommended for beep-level analyses (Larson & Delespaul, 1990). Data were analyzed by means of Pearson product-moment correlation coefficients and multiple regression analyses. Pearson product-moment correlations were used to demonstrate the strength of the association between the predictors and the dimensions of experience. Multiple regression analyses served

to assess the unique contributions of each predictor to the prediction of the dependent measures.

Because of the large number of correlations that were calculated, we adjusted the level of significance within each subject area according to a procedure developed by Holm (1979). Within each subject area, 24 correlation coefficients were obtained (three predictors were correlated with seven ESM variables and grades). To generate adjusted levels of alpha, the corresponding p-values were first ranked according to their size. Then the smallest p was tested against alphas of .05/24 (= .0021) and .01/24 (= .0004), the second smallest p was compared to alphas of .05/23 and .01/23, and so on. No alpha adjustment was made in the case of regression analyses. Their main purpose was to examine the independence of the predictors, and they were performed only for those ESM variables for which a significant correlation was obtained.

For the present analyses, we had available 155 students in mathematics, 60 in biology, 150 in English, and 72 in history. Deviations from these numbers are due to the fact that not all students took the PSAT and the achievement motivation test. In addition, not all students made their grades available.

Results

In this section, we first present the results for the correlations between interest, achievement motivation, ability, and the quality of experience. Next, we examine whether the obtained relations are independent of one another. Finally, we analyze the relations between interest, achievement motivation, ability, and achievement.[4] Before we turn to the main results of the study, descriptive statistics for some of the variables are reported.

Descriptive Statistics

Interest was measured on a scale ranging from 1 (low interest) to 5 (high interest). The mean values for interest in math, biology, English, and history were 2.54 (SD = 1.31, n = 155), 3.10 (SD = 1.23, n = 60), 2.95 (SD = 1.21, n = 150), and 3.17 (SD = 1.23, n = 72). While these values are all close to the scale's midpoint (3.0), students seemed to be less interested in math than in other subjects. Indeed, a significant effect of subject area on interest was obtained ($F_{(3, 433)} = 5.73$, $MSe = 1.57$, $p < .001$)[5].

Specifically, a Scheffé, test revealed that interest in math was significantly lower than interest in any other subject area ($p < .05$).

It is well-known that boys show stronger interest in mathematics and science than girls do (Lehrke, Hoffmann, & Gardner, 1985). In the present study, boys were significantly more interested in math (boys: M = 2.97, SD = 1.28, n = 66; girls: M = 2.23, SD = 1.25, n = 89; t = 3.62, $p < .001$) and significantly less interested in English (boys: M = 2.71, SD = 1.11, n = 63; girls: M = 3.12, SD = 1.26, n = 87; t = 2.06, $p < .05$) than girls. In accordance with this result, it was found that girls experienced lower levels of intrinsic motivation in math (M = 1.97, SD = 2.01) than boys (M = 3.41, SD = 2.56; t = 3.94, $p < .001$).

The overall mean value for the achievement motivation scale was 9.75 (SD = 3.17). The mean values for the Achievement and Endurance subscales were 10.15 (SD = 3.41) and 9.36 (SD = 3.49), respectively. These values are only slightly below a percentile score of 50 (college students were used as the normative sample). Additional normative data indicate that the present sample was not different from the underlying population of high school students. Students in the four academic contexts did not differ with regard to their level of achievement motivation. No sex differences were obtained.

The average PSAT verbal and math scores for the whole sample were 46.48 (86th percentile rank of all U.S. juniors and 72nd percentile rank of college-bound juniors) and 52.51 (87th percentile rank of all U.S. juniors and 77th percentile rank of college-bound juniors),

respectively. Thus, as a group, the aptitude of students in this study was considerably above the average of normal U.S. adolescents. Nevertheless, PSAT scores exhibited a normal distribution and considerable variance (PSAT total: $M = 49.49$, $SD = 9.68$). No differences between subject area groups were observed. While boys ($n = 61$) and girls ($n = 86$) did not differ with regard to their PSAT verbal scores they showed significantly different PSAT math scores ($M = 56.18$ vs. $M = 51.83$, $t = 2.36$, $p < .05$). This finding is consistent with previous research (e.g., Aiken, 1987).

The analysis of ESM variables did not reveal significant differences among subject areas. Specifically, mean values[6] for potency ranged from 4.30 (math) to 4.56 (history), for affect from 4.43 (math) to 4.80 (biology), for concentration from 4.84 (biology) to 5.48 (history), for intrinsic motivation from 2.58 (math) to 3.09 (English), for self-esteem from 5.38 (math) to 5.94 (biology), for importance from 4.64 (biology) to 5.21 (math), and for skill from 5.64 (math) to 6.29 (history). Whereas most of the mean values centered around the scales' midpoints, the average level of intrinsic motivation was very low in all classrooms.

A median correlation coefficient of .30 was found for the relation between ESM variables across subject areas. From that, it can be concluded that students tend to exhibit different levels of experience in different classrooms.

In sum, the above analysis revealed two major effects. First, math was perceived as less interesting. Second, boys and girls showed a few differences, pertaining mainly to math. Girls were obviously less interested in math, showed less ability,[7] and exhibited lower levels of intrinsic motivation when they were in math class. In addition, boys seemed to be less interested in English than girls. It is important to note, however, that boys and girls did not differ with regard to their grades in all four subject areas.

Predicting the quality of experience: Correlational analyses

To test the relation between subject-matter-interest and subjective experience in class, zero-order correlations were calculated (see upper half of Table 1). The pattern of correlations shows some similarities and some differences across subjects and experience dimensions. On the average, interest was most strongly correlated with potency, intrinsic motivation, self-esteem, and perception of skill (see weighted means in Table 1). No significant correlations were obtained for history. Interest was not related significantly to the experience of positive affect. For concentration and importance, only one significant relation was observed.

On the whole, the size of the obtained correlations is fairly impressive. One should bear in mind that the students were paged at random points in time, no matter what they were actually doing in class. Obviously, there are several factors besides interest that could have influenced the various dimensions of experience.

A measure of achievement motivation was included in the present study to compare the strength of the relation between interest in subject matter and subjective experience with the influence of a general, domain-unspecific measure of motivation. The results of a correlational analysis of the association between achievement motivation and quality of experience are displayed in the lower half of Table 1. It can be seen that achievement motivation was less highly correlated with experience in class than was interest. Only two significant correlations were obtained.

It seems reasonable to argue that the amount of interest varies with the level of cognitive capacity. Not surprisingly, some authors (e.g., Steinkamp & Maehr, 1983) are convinced that high ability leads to the experience of success and competence and, thus, induces interest in the subject. It may be asked then, whether the positive relationship between interest and experience is a mere epiphenomenon of the dominant influence of ability on both interest and subjective experience. In order to give a preliminary answer to this question, we analyzed the zero-order correlations between ability (PSAT total scores) and experience.[8] The results are quite consistent. Surprisingly, ability was not significantly correlated to any of the dimensions of experience. The largest positive correlation was obtained for the relation between ability and perception of skill in history ($r = .23$, *ns*).

Table 1

Zero-order correlations between interest, achievement motivation, and quality of experience

Experience in class	Math (n=155)	Biology (n=60)	English (n=150)	History (n =72)	M^a
			Interest		
Potency	.28**	.19	.28**	.06	.23
Affect	.18	.23	.20	.27	.21
Concentration	.11	.25	.23*	.09	.17
Motivation	.39**	.27	.34**	.28	.34
Self-Esteem	.33**	.46**	.25*	.27	.31
Importance	.19	.38*	.16	.24	.21
Skill	.27**	.50**	.26*	.22	.29
	(n = 128)	(n = 47)	(n = 133)	(n = 65)	
			General achievement motivation		
Potency	.16	.16	.14	-.13	.10
Affect	.17	.26	.11	.36*	.19
Concentration	.19	.32	.15	.01	.16
Motivation	.25*	.04	.11	.31	.17
Self-Esteem	.11	.22	.12	.24	.15
Importance	.17	.07	.02	.02	.08
Skill	.15	.29	.11	.24	.17

Notes. * $p < .05$ (corresponds to an adjusted level of .005), ** $p < .01$ (corresponds to an adjusted level of .0006). [a] Weighted mean.

Predicting the quality of experience: Regression analyses

In order to test whether interest predicts experience independently of achievement motivation and ability, regression analyses were conducted only for those experience variables and subject areas for which significant zero-order correlations were obtained. Interest, achievement motivation, and ability were entered simultaneously as predictors into the regression equation. No interaction terms were included.[9]

First, it should be noted that interest and achievement motivation were only slightly correlated. Significant correlations were obtained only for English ($r = .19$, $n = 133$, $p < .05$) and history ($r = .28$, $n = 65$, $p < .05$). Similarly, interest was not significantly related to ability, with the exception of the history group, in which a correlation coefficient of .31 ($n = 62$, $p < .01$) was found. These results do not support the assertion that interest is merely an outcome of ability. Finally, it was shown that achievement motivation and ability were not significantly correlated. Altogether, these correlational results suggest that interest, achievement motivation, and ability are independent dimensions, at least in the present sample.

The regression analyses (see Table 2) clearly confirmed the correlational findings. With only two exceptions (concentration in English, importance in biology), interest remained a significant predictor of experience, independently of achievement motivation and ability. All changes that occurred are due solely to the smaller sample sizes and the resulting change of zero-order correlations.

The same analysis was repeated using semester grades instead of ability as a predictor. The results obtained were almost exactly the same. The strength of the association between interest and quality of experience was found to be independent of the students' achievement level.[10]

Table 2

Regression of experience on interest, achievement motivation, and ability

Experience in class	R	Interest				Achiev. Mot.				Ability			
		r	b	F	p	r	b	F	p	r	b	F	p
Potency (M)	.37	.25	.25	6.44	*	.17	.20	4.13	*	-.18	-.23	5.44	*
Potency (E)	.31	.26	.24	6.05	*	.18	.14	2.06		.09	.08	.73	
Affect (H)	.42	.31	.20	2.08		.37	.30	4.70	*	.12	-.00	.00	
Concentration (E)	.23	.16	.14	1.89		.17	.15	2.32		-.08	-.08	.70	
Motivation (M)	.39	.33	.31	10.42	**	.24	.20	4.26	*	.09	.03	.10	
Motivation (E)	.34	.34	.33	12.12	***	.08	.03	.12		-.02	-.02	.03	
Self-Esteem (M)	.37	.35	.33	11.69	***	.15	.10	1.10		.10	.06	.37	
Self-Esteem (B)	.55	.55	.54	12.22	***	.07	-.01	.00		.15	.05	.08	
Self-Esteem (E)	.28	.22	.19	3.91	[a]	.20	.16	2.79		.06	.05	.26	
Importance (B)	.47	.19	.27	2.71		-.00	.01	.01		-.38	-.44	7.05	*
Skill (M)	.37	.31	.29	9.24	**	.13	.07	.48		.20	.17	3.05	
Skill (B)	.54	.53	.54	11.55	**	.12	.07	.18		.01	-.10	.39	
Skill (E)	.27	.21	.20	3.98	*	.16	.12	1.54		.12	.12	1.40	

Notes. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$, [a] $p = .051$. M: Math: ($n = 96$), B: Biology ($n = 34$), E: English ($n = 102$), H: History ($n = 55$).

Predicting achievement: Correlational and regression analyses

Although it was not a major concern of the present paper to deal with achievement outcomes, it seemed desirable to investigate the relation between interest and grades. For almost every student, grades were available for all four subject areas. Only grades from the second semester were included in the analysis. Since interest ratings took place either in the first or second semester, it is only for grades from the second semester that we are able to claim a predictive relationship between interest and achievement.

As described in the method section, grades were coded according to the difficulty level of the course. Results did not differ, however, when no weighing for difficulty was used. Thus, the following analyses are based on simple grade points.

The results show that, with the exception of English, relations between interest and grades were fairly strong. Specifically, for mathematics the correlation between interest and grades was .31 ($n = 146$, adjusted $p < .01$), for biology .44 ($n = 57$, adjusted $p < .01$), for English .14 ($n = 140$, ns), and for history .49 ($n = 65$, adjusted $p < .01$).

In each subject area, level of interest for about half of the subjects was measured during the first semester and for the other half during the second semester. A correlational analysis revealed that these two groups did not differ with regard to the strength of the interest-achievement-relationship.

Achievement motivation proved to be a significant predictor of grades only for English ($r = .27$, $n = 124$, adjusted $p < .05$). Correlations of achievement motivation with grades in other subject areas were moderately high (math: $r = .22$, $n = 120$; biology: $r = .29$, $n = 45$; history: $r = .27$, $n = 59$), but did not exceed the adjusted significance level. As was expected, ability contributed significantly to the prediction of grades in math ($r = .50$, $n = 112$, adjusted $p < .01$), biology ($r = .43$, $n = 44$, adjusted $p < .05$), and English ($r = .27$, $n = 110$, adjusted $p < .05$), but not history ($r = .30$, $n = 58$, *ns*).

Again, to examine the independent contributions of each predictor to the prognosis of grades, regression analyses were performed. Generally, the results (see Table 3) suggest that interest, achievement motivation, and ability were independent predictors of grades. With only one exception (the relation between interest and grades in biology), all of the significant zero-order relationships were confirmed by the multiple regression analyses.

Interestingly, the results in Table 3 suggest that grades in different subject areas depend on different factors. Math grades were mainly correlated with ability and interest, biology grades with ability, English grades with achievement motivation and ability, and history grades with interest.

Table 3

Regression of Grades on Interest, Achievement Motivation, and Ability

		Interest				Achiev. Mot.				Ability			
Subject area	*R*	*r*	*b*	*F*	*p*	*r*	*b*	*F*	*p*	*r*	*b*	*F*	*p*
Math	.59	.31	.27	9.53	**	.21	.09	1.05		.52	.48	29.43	***
Biology	.58	.36	.26	2.85		.31	.25	2.63		.44	.37	5.75	*
English	.37	.02	-.01	.01		.28	.26	7.23	**	.27	.25	6.43	*
History	.51	.49	.41	8.99	**	.27	.08	.33		.28	.14	1.18	

Notes. * $p < .05$, ** $p < .01$, *** $p < .001$; Math: $n = 92$, Biology: $n = 34$, English: $n = 97$, History: $n = 52$.

Discussion

The present study is built on the assumption that the quality of subjective experience is an important criterion for evaluating motivation to learn. Two different motivational factors were compared with each other: interest and achievement motivation. While interest is conceptualized as a domain-specific variable, achievement motivation is a general construct, supposed to be effective in different academic domains.

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 potency, intrinsic motivation, self-esteem, and skill. The strength of these relationships was not diminished by the inclusion of ability and achievement motivation as additional predictors. It is especially noteworthy that the influence of interest on self-esteem and feeling skilled was found to be independent of the students' level of ability.

In accordance with expectations, achievement motivation proved to be a weaker predictor of the quality of experience than interest. Only two significant correlations were obtained. This result suggests that general motivational orientations are not apt to predict the quality of experience in specific subject areas.

Contrary to our hypothesis, level of scholastic ability was an even weaker predictor of the quality of experience than achievement motivation. Not a single dimension of experience was affected by ability. It could be argued that the variance of ability scores in the present sample of talented students was rather restricted, and, consequently, high correlations were not possible. However, the present data are not in agreement with such an alternative explanation. First, PSAT scores were normally distributed and exhibited considerable variance (see section on descriptive statistics). Second, PSAT scores were at least moderately correlated with grades. However, it cannot be ruled out that a more representative assessment of experience, i.e., applying the ESM for a longer period of time, may lead to significant correlations between objective test scores and quality of experience.

There is considerable evidence suggesting that objective measures of competence or ability are in fact not strongly related to emotional and motivational states experienced in achievement-related situations (Bandura, 1986, 1990; Dweck, 1986). However, emotional and motivational reactions were found to depend significantly on *subjective perceptions* of ability. Perceived ability, in turn, is not always as closely related to objective assessments of ability as

one would expect. For example, Phillips and Zimmerman (1990) reported a correlation of .36 between achievement test scores and perceived competence for ninth-graders. In sum, this line of research lends credit to our finding that ability tests do not predict significantly subjective perceptions of skills and emotional and motivational aspects of experience in class. Obviously, the quality of experience in academic settings is mainly determined by motivational factors. This is an important finding because it underlines the independent and significant role motivational variables can play for learning in school.

In addition to quality of experience, grades were examined as a dependent variable. The findings were consistent with our hypothesis. Ability was the strongest predictor of grades, followed by interest and achievement motivation. Interest correlated significantly with grades in math, biology, and history, but not in English. Achievement motivation was significantly related to achievement only in biology. The interest-achievement relation proved to be independent of levels of ability and achievement motivation. The average correlation between interest and grades (weighted $M = .30$) is in accordance with results of a recently conducted meta-analysis on the relation between measures of subject matter interest and achievement (Schiefele, Krapp, & Winteler, 1992), where an average correlation coefficient (based on 121 independent samples) of .31 was found. Thus, it seems justified to conclude that interest is moderately but consistently related to academic achievement, independently of differences in ability.

The pattern of regression results suggests that grades in difficult subjects, such as math or physics, are relatively more influenced by ability, whereas grades in easier to learn subjects, such as history, English, biology, or social science, are relatively more dependent on motivational factors.

Regressing grades on interest, achievement motivation, and ability produced a lower multiple correlation coefficient for English than for other subject areas. This is probably due to the fact that English grades exhibited little variance. 80% of all students had either A's or B's, and only 2% had D's or failures.

The results of the present study have important implications for the conceptualization of interest and its validity (Schiefele, 1991, 1992). As outlined at the beginning of this article, interest is defined as consisting of a value-related and a feeling-related component. The value-related component consists of attributing personal significance to an activity or content. In accordance with this definition, we found that high interest students rated their subject-related activities as being more important. This suggests that, in fact, value-related valences are central to the concept of interest. The second component of interest was defined as consisting of feeling-related valences, especially feelings of involvement and enjoyment. The present results partially confirm and extend this assumption. Feelings of involvement are best represented by the ESM scales potency and motivation. Clearly, the results showed significant relations between interest and levels of potency and motivation. However, the results were less positive for feelings of enjoyment that are represented by the ESM scale affect. It follows that, at least in the context of school learning, interest for subject matter does not significantly influence the experience of positive affect or enjoyment.

Interestingly, results suggest that there is a relatively close link between interest and the experience of self-esteem and competence or skill. There are two alternative interpretations of this result. On the one hand, it is possible that the experience of being competent is responsible for high interest in subject matter (see Bandura, 1990). On the other hand, it is also conceivable that interest facilitates feelings of competence and self-esteem. The latter viewpoint is consistent with Deci and Ryan's (1985) self-determination theory of intrinsic motivation. For example, Deci, Nezlek, and Sheinman (1981) found that classrooms supportive of self-determination (and thus fostering intrinsic motivation) increased the students' perceived competence and self-esteem (see also Ryan & Grolnick, 1986). Similarly, Nicholls et al. (1989) reported evidence that satisfaction with school learning was positively related with task- but not ego-orientation. In our view, it is to be expected that interest and perceived competence influence one another in the long run.

In the past, different motivational orientations have been compared by looking at

cognitive outcomes, like information processing strategies and creativity (e.g., Nicholls et al., 1989). The present study demonstrated that measuring dimensions of experience may also be useful to differentiate between motivational orientations (see also Matsumoto & Sanders, 1988). It is suggested by our results that only those forms of motivational orientation that are directed at the content of learning itself facilitate positive experience. Motivational orientations, such as achievement motivation, that are directed at getting good grades or reaching certain standards of performance, and thus are not inherently associated with a particular content area, do not result in positive experience. In addition, these considerations imply that interest in subject matter can only be maintained as long as learning activities provide positive experiential states.

There are at least four problems associated with the present study that suggest caution in generalizing from the results. The first problem concerns the composition of the sample. All students came from two good high schools, and they were selected as talented in at least one of five areas. As a consequence, the present sample showed rather high mean ability scores and cannot be regarded as representative of the corresponding age group. Whether the conclusions from our study can be generalized to less able students has yet to be shown.

A second problem has to do with the interest measure used in the study which was based on a single item. It seems desirable for future studies to include a more differentiated measure of interest which tries to capture a student's interest in a certain subject area more directly. In addition, it might be useful to have a greater time lag between the measurements of interest and experience.

This leads directly to a related problem, namely the question of causal relations. The present study does not allow conclusions beyond correlational evidence. It remains unclear whether interest causes positive experience or whether it is just an outcome of positive experience, which itself is dependent on, for example, the quality of instruction. The same holds true for the relation between interest and grades. In order to gain more knowledge about causal relationships, carefully designed longitudinal studies are necessary.

The fourth problem concerns differences between subject areas. The results suggest that the strength of relations between interest and experience varies from one subject area to the next. The reason for this effect could not be explored within the present study. This would require data on relevant content-specific differences between subject areas (e.g., difficulty level, degree of abstraction) and subject-area-specific teaching practices (e.g., Stodolsky, 1988). However, the domain-specific analysis of experience and achievement should prove to be a very fruitful research endeavour.

In sum, the study provided some evidence for the importance of subject-area-specific motivational orientations. In the present case, a specific motivational orientation, namely subject-matter-interest, outperformed a general motivational orientation, namely achievement motivation, not only in predicting the quality of experience in class, but also in predicting the level of achievement at the end of the school year. These results may have some implications for instructional practice. One could argue that teachers and parents should encourage students to value academic performance not only for its own sake. Rather, adults should make clear why learning in a specific subject area is meaningful, enjoyable, and important (Nicholls, 1990). This can only be accomplished by referring to the qualities which are inherent in a specific subject matter. In other words, we would need teachers who like the content of what they teach at least as much as they like good grades.

Notes

1 The smaller sample size is due to the fact that not all students completed the PRF.

2 PSAT scores were available from 181 students, GPA from 143 students.

3 This distinction is based on a content analysis of the respective high school curricula.

4 All of the following correlation and regression analyses were exploratively examined for gender differences. No significant effects of gender were found.

5 Although the four subject area groups consist of overlapping subsamples, they have been treated as if they were independent. Otherwise, too few subjects would have remained for a statistical comparison.

6 Note that potency and affect were measured on seven-point scales, while the assessment of concentration, motivation, self-esteem, importance, and skill was based on ten-point scales.

7 It should be noted that there is considerable evidence that the lower ability test scores often found for girls reflect differences in socialization processes (Willms & Jacobsen, 1990).

8 In addition, for every subject area, correlations between experience and PSAT verbal and PSAT math scores were examined. The results were in no case noticeably different from those using PSAT composite scores.

9 Exploratory analyses did not reveal any significant interaction effect for any dependent variable.

10 Significant zero-order correlations between the quality of experience and semester grades were observed for self-esteem in math ($r = .17$, $n = 146$, $p < .05$) and history ($r = .24$, $n = 65$, $p < .05$), importance in math ($r = .17$, $n = 146$, $p < .05$), and skill in math ($r = .22$, $n = 146$, $p < .01$), biology ($r = .30$, $n = 57$, $p < .05$), and history ($r = .29$, $n = 65$, $p < .05$).

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Relations among study motivation, learning strategies, and achievement; Effects of interest on text learning.

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