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ABSTRACT

The impact of interest on specific quantitative and qualitative measures was studied by examining the relationship between interest in research methodology by education students and knowledge in the area. The "Study Interest Questionnaire" (Winteler and Sierwald, 1987) and a questionnaire on interest in empirical research methodology were administered to 21 freshmen education students with little prior knowledge of methodology and 17 control subjects. Students who had a high degree of interest at the beginning of the semester had a greater proportion of technically appropriate word associations in response to subject matter stimulus terms. Qualitative differences in knowledge existed, confirming that topic interest has an impact on knowledge acquisition. The methodology interest questionnaire is presented; and the results are provided in two tables, two graphs, and three flowcharts. (SLD)

THE IMPACT OF INTEREST ON QUALITATIVE AND STRUCTURAL INDICATORS OF KNOWLEDGE

by

Ulrich Schiefele & Andreas Krapp

Paper presented at the Annual Meeting of the American Educational Research Association (AERA), New Orleans, USA, April 5 - 9, 1988

1. INTRODUCTION

The relationship between interest and achievement is an issue with a long tradition in psychology (e.g., Thorndike, 1917, 1944; Frandsen, 1947; Frandsen & Sessions, 1953; Barrilleaux, 1961; Lavin, 1965; Sjöberg, 1984). Most of the previous work done on this topic has involved a number of different interest measures (e.g., tests, questionnaires, rating scales) relating to unspecific achievement criteria (e.g., grades, achievement tests; for a review see Schiefele & Winteler, 1988). Consequently, emphasis was placed primarily on the results or end products of already completed and often longterm learning processes rather than upon the cognitive processes or structures preceding longterm learning. Thus, it is not suprising that only weak to moderate correlations could be found between interest and achievement.

Specific measures of cognitive performance have recently been applied in studies examining the relationship between interest and reading comprehension (cf. Schiefele & Winteler, 1988). Reading comprehension and learning from texts are areas in which interest appears to play a major role. In previous studies, reading comprehension has generally been assessed through quantitative indicators (e.g., comprehension tests with multiple choice items; e.g., Baldwin, Peleg-Bruckner, & McClintock, 1985). However, qualitative indicators of reading comprehension (e.g., the interpretation of the intentions of a text by the reader), aspects of text processing (e.g., inferences) and measures of structure (e.g., number of relations between different parts of the text) received little attention. Yet, inclusion of these indicators seems essential to a differentiated evaluation of the way in which interest influences reading comprehension and the acquisition of knowledge.

The objective of the study outlined below was to examine the impact of interest on specific quantitative and qualitative cognitive measures. These measures can be divided into two groups: those related to information processing and those related to the representation of knowledge. Our study focuses particularly on the latter by examining the relationship between the extent of interest in research methodology (for education students) and knowledge in this area. Although the learning of texts was not directly investigated, our results seem to be applicable to this area. In addition we plan an analogous investigation with regard to text learning.

In an earlier study (Schiefele, Winteler, & Krapp, in press), the relationship between interest and representation of knowledge has been already investigated. Interest was measured with the "Study Interest Questionnaire" (SIQ) developed by Winteler & Sierwald (1987; see also Schiefele et al., in press). Educational science served as the object of interest. Cognitive aspects were

assessed with the help of a word association test involving nine key concepts (e.g., learning, socialization, education). In this way, the extent (number of associations), content (quality of associations), and structure (associative relations between the presented concepts) of acquired knowledge can be determined. Results revealed that although interest is unrelated to the extent of knowledge, it is related to the quality and structure of knowledge.

The present study attempts to differentiate and extend this pilot study. First, a specific object of interest, "empirical research methodology", was chosen. In addition to the SIQ used in the first study, the present study employed a questionnaire on specific interest in empirical research methodology (see Table 1). Employing two interest measures was necessary, since education students may show a discrepancy between general interest in education and specific interest in research methodology, resulting in relevant interaction effects between both areas of interest.

In order to control for possible alternative explanations, several additional variables were assessed (e.g., number of semesters of study, areas of concentration, subject-related activities). It was particularly important to determine the extent of prior knowledge related to methodology. For this purpose, our sample included freshmen who had neither attended any lectures or seminars on research methodology, nor had busied themselves with this topic in any other way.

The strength of the individual achievement motive was assessed as an additional independent variable. In the past, this variable has received great attention in the area of academic achievement (e.g., Eccles, 1983; Heckhausen, 1968; Heckhausen & Rheinberg, 1980). It was included for comparison purposes in substantiating independent effects of interest.

The following hypotheses, with respect to different aspects of knowledge, were tested:

- (1) Extent of knowledge: High interest subjects associate more words with the presented concepts than low interest subjects. Thus, the concepts should reveal greater meaning (i.e., a higher frequency of associations) for high interest subjects.

- (2) Content of knowledge: The associations of high interest subjects are more technically adequate than those of low interest subjects, whose associations are more related to every day language.

- (3) Structure of knowledge: The associative structure of high interest subjects is characterized by a higher degree of organization (i.e., a higher degree of interrelation between concepts) and/or coincides better with the knowledge structure of a group of experts.

It is assumed that the predicted differences in all three areas of know-

ledge (extent, content, and structure) are due to the more intensive involvement of high interest subjects with the tested concepts (cf. the detailed examination of this assumption by Schiefele, in press). Involvement in this sense applies to both observable object-related behaviors (e.g., attending a seminar, reading assigned literature) and cognitive processes of knowledge acquisition (e.g., making inferences). Cognitive processes were not directly investigated in the present study; rather the extent of object-related behavior was assessed.

Weaker effects were expected with respect to the achievement motive, as compared to interest. Earlier studies on the relationship between the achievement motive and academic achievement (e.g., grades) yielded inconsistent results (cf. for example, Heckhausen, 1980; Kühn, 1983). Particularly the studies conducted by Entwistle & Ramsden (1983) suggest that achievement motivated students can, in fact, reach a deeper understanding of assigned topics, yet nonetheless tend to acquire selective, examination-specific knowledge. Thus, one may conclude that these students might be high achievers, but with an underlying knowledge structure that is not much better than that of other students.

2. METHOD

(1) Overview

The major independent variables - (general) study interest, (specific) interest in methodology, and the achievement motive - were measured at the beginning of a seminar on research methodology for education students at the University of Munich. Several additional variables (e.g., prior knowledge) were also assessed. After eight weeks, a word association test was conducted containing the key terms and concepts covered during the course of the seminar. In order to test the hypothesis on whether the scores of high interest subjects (as opposed to low interest subjects) are more comparable to the scores of experts, four teaching assistants for educational psychology served as the expert group. Comparing the results of the expert group with those of the subjects (high versus low interest group) is especially interesting and necessary for the evaluation of resulting knowledge structures.

(2) Subjects

Specific and general interests as well as the achievement motive were measured in a sample of 38 subjects. Twenty-one of these 38 subjects served as the actual sample, for whom the dependent variable (word associations) was

also measured. The majority of these students (19) studied education, and the remaining 2 special education. 17 of the students were female and four were male. 16 students were studying in the 2nd semester, 2 in the 4th and 5th semester, and 1 in the 10th semester. The students' average age was 23.9.

Both lecturers, as well as two additional methodologically qualified educational psychologists served as experts.

(3) Assessment methods

As mentioned above, interest was measured with two different instruments. General study interest was measured with the SIQ (i.e., the interest scale of the SIQ). The "Methodology Interest Questionnaire" (MIQ, see Table 1), especially developed for the present study, is based on the SIQ, with a reliability coefficient of .90 (alpha coefficient; $\underline{n} = 38$). It correlates with the SIQ at the level of $\underline{r} = .18$ ($\underline{n} = 38$, $\underline{ns}$).

Insert Table 1 here

The strength of the individual achievement motive was assessed with the help of the "Achievement Motive Scale" (Gjesme & Nygard 1970; translated by Göttert & Kuhl, 1980). This questionnaire consists of two subscales, "hope for success" and "fear of failure" (each containing 15 items). Total scores for the strength of achievement motive were formed by computing the difference between the two subscales.

Supplemental information was obtained on age, sex, number of semesters completed, previous majors (if any), and topics of focus within the education major. An additional question addressed possible past activities or experience in methodology or statistics (e.g., books studied, lectures or seminars attended).

In order to assess acquired knowledge, the method of free and continued associations was employed (cf. Marx, 1984; Szalay & Deese, 1978). Nine stimulus concepts, each written on a separate piece of paper, were presented to each subject in random order. The concepts were as follows: validity, hypothetical construct, operationalization, experiment, prognosis, hypothesis, theory, test, and variable. Subjects were allowed one minute per word for free association.

One advantage of the word association method is that it provides a multitude of possibilities for evaluating individual knowledge and knowledge structure (e.g., Arbinger, 1980; Marshall & Cofer, 1963). According to Tergan (1986), association tests are especially useful for revealing the relationships among different concepts in declarative knowledge structure, based on comparison of similarities and differences among features characterizing individual concepts.

Association tests have also been frequently employed in studies examining the impact of instruction on the cognitive structure of students (e.g., Geeslin & Shavelson, 1975; Preece, 1976; Shavelson & Stanton, 1975; Thro, 1978). More recent studies in knowledge psychology (e.g., de Jong & Ferguson-Hessler, 1986; Hoffmann, 1986; Koriat & Melkman, 1981) are also making increased use of association tests.

Finally, subjects were asked to indicate the number of times they were absent from the seminar (held a total of 15 times during a period of 8 weeks) and the tutorial (held a total of eight times). In addition, they were asked to rate (on a five-point scale) the extent to which they actually read the assigned literature. Subjects also indicated whether they had read any other texts in addition to the assigned literature.

During the seminar's first meeting, the questionnaires MIQ, SIQ, and AMS and the supplementary questions were handed out. Eight weeks later, the association tests were conducted and the extent of object-related activities (attendance, studying the literature) during those eight weeks was assessed.

Median splits were performed in subsequent analyses, separating subjects into groups of high and low interest in methodology, high and low study interest, and high and low achievement motivation. The main focus of the analysis was placed on the possible impact of different degrees of interest in methodology.

The expert group, consisting of only four subjects, was not included in the statistical evaluation. Their scores were intended primarily as comparison scores in order to facilitate the interpretation of differences among subjects.

3. RESULTS

(1) Control variables

The analysis of the control variables (age, sex, number of semesters, prior knowledge) revealed no differences between the low and high interest (in methodology) groups. One subject, who had previously attended a seminar on research methodology was excluded from the analysis.

(2) Quantity of knowledge: The meaningfulness of technical terms

The function of the frequency of associations as an indicator of the meaningfulness of a term has been adequately demonstrated (e.g., Marx, 1984). Interest in methodology, study interest, and the achievement motive were tested for possible effects on the frequency of associations (for the individual stimulus terms) by means of a three-way analysis of variance. No significant effects were found for either study interest, methodology interest or achievement motivation (for total: $F = 1.26$, $df = 1$, ns). For most terms, however, the frequency of associations was distinctly higher for the experts than for the experimental groups, replicating the results found by Schiefele et al. (in press). Thus, we assume that interest does not simply lead to more knowledge. Whether or not a relationship exists between interest and the quality of learning will be reported below.

(3) Quality of knowledge: The technical appropriateness of the associations

The qualitative aspect of knowlege was determined by the quality of the associations. In evaluating the content of the associations, the criterium was the affinity of each association to either everyday or technical language. Three experts assigned the associations to one of four categories. The first category consisted of words having a predominantly technical relation to the respective stimulus term (e.g., "control group" in response to experiment). Associations

considered to be both every day as well as technical terms (e.g., "examination") were contained in the second category. The third category included terms found primarily in every day language (e.g., "success"). A prerequisite for all three categories was that the associations are in some way meaningfully related to the stimulus terms. The fourth category was a residual category containing associations not meaningfully or only remotely related to the stimulus term (e.g., "car").

Whenever rater's categorizations deviated by one category (e.g., if two raters chose category 2 and one rater category 1 or 3), the association was assigned to the category picked by the two (majority) raters. If raters deviated by two categories (e.g., if two raters pick category 2 and one rater picks category 4), then the raters discussed their choices and assigned the association to one category by consensus.

The inter-rater reliability (cf. Friede, 1981) results from the proportion of concurrent ratings with respect to the total number of evaluated associations (N = 705). Whenever two raters assigned an association to the same category (e.g., category 2) and the third rater deviated by only one category (e.g., by choosing category 1 or 3), the ratings were considered concurrent. Under this condition, the inter-rater reliability reached 78.2%.

Figure 1 and Table 2 depict the results for interest in methodology. The scores indicate the percentage of total associations (for each term) that were assigned to the individual categories. In the second part of the table, categories 1 and 2 (technical associations) as well as 3 and 4 (non-technical associations) are combined.

Insert Table 2 here

Insert Figure 1 here

The distribution of associations across categories 1 through 4 for the experimental groups differ significantly ($Chi^2 = 13.60$, $df = 3$, $p < .01$). Thus, the HMI (high methodology interest) students produce a distinctly greater proportion of technical associations than the LMI (low methodology interest) group.

In calculating the average frequency of associations (across all stimulus terms) within the individual categories, the greatest differences between experimental groups were found for the categories 3 and 4. In the combined category 3/4, the number of associations for the HMI group averaged 23.1 and for the LMI group 25.5. The frequency of associations per stimulus term, however, reveals that equal differences occurred between high and low interest subjects for five of the nine stimulus terms in the categories 1/2 and 3/4. It appears that high interest subjects differ from low interest subjects because the former associate technical stimulus terms less with everyday and irrelevant concepts and somewhat more (for five of the presented stimulus terms) with technically

relevant terms.

The results for general study interest are not elaborated in the present article. However, it is important to note that general study interest also had a significant impact on the quality of associations. Surprisingly, high study interest actually produced worse results than low study interest.

The level of achievement motive was found to have no significant impact on the quality of associations. However, our results approached an interesting (but not significant) interaction effect (see Figure 2). High versus low achievement motivation tends to have an effect only when interest in methodology is low; when interest in methodology is high, achievement motivation seems to be irrelevant. On the other hand, if interest in methodology is low, achievement motivation could partially compensate for this deficit. Thus, the effects of interest could not be explained by differences in achievement motivation.

Insert Figure 2 here

In summary, our results clearly substantiate our hypothesis with respect to the relationship between level of interest in research methodology and quality of the associations produced.

(4) Knowledge structure: Relations and the formation of clusters

An extended analysis of the word association data was conducted in an attempt to determine knowledge structures for the individual groups. In the first step of this analysis, so-called relatedness coefficients (RCs, Garskof & Houston, 1963) between all pairs of stimulus terms were calculated for each subject. The RC is a measure of the degree of intersection between two distributions of associations and is computed by adding the products of the sequence number of common elements and relating this sum to the highest possible sum.

The RC is generally interpreted as a similarity measure and is subjected to a cluster analysis or to a multidimensional scaling procedure. The use of this method is, however, controversial in some cases (Preece, 1976; Reitman & Rueter, 1980). Waern (1972) has developed a rather simple graphic method in order to overcome the many methodological problems associated especially with multidimensional scaling. According to this method, the stimulus terms are represented as dots and the distance between them as lines. Here, two alternative procedures can be applied. In the "one-step technique", the matrix of distance measures (in our case the matrix of RCs) is reduced by establishing an appropriate cut-off point. The remaining distance measures are then represented in a graph. This procedure can be repeated for each individual subject. In order to represent the knowledge structure of an entire group, the subjects' RCs per pair of terms are averaged.

A greater proportion of the metric information available can be used in the "multi-step-technique" by determining several cut-off points. The cut-off

point is continually reduced in gradual steps until no additional information can be gained. Relations which would be added in the event of a lower cut-off point are only taken into account if their inclusion would add a new concept to the structure not yet considered due to a higher cut-off criterion. Thus, one obtains chains which are easy to interpret with regard to underlying dimensions.

Waern has presented examples of a number of studies, which indicated that both her method and multidimensional scaling yielded similar results. Preece (1976) and Arbinger (1980) also successfully applied this procedure.

Since the RC values were relatively low for all experimental groups, the one-step technique proved adequate. The RC values varied among the experimental groups from .00 to .22 and in the expert group from .00 to .29. These scores clearly correspond to those of other studies (e.g., Arbinger, 1980). The cut-off score for the experimental groups was set at the RC value of .05 and for the expert group at RC value of .09. Cut-off scores were selected to include as many terms as possible within the structure without creating too many redundant relations among terms, which are already (directly or indirectly) connected.

Interest and knowledge structure

The resulting structures for the HMI and LMI group, as well as the expert group, are depicted in Figures 3, 4, and 5. These structures are based on the RC means of the individual RC scores.

Insert Figure 3 here

Insert Figure 4 here

Insert Figure 5 here

The knowledge structure of the LMI group contains the fewest number of relations (6) between concepts. The LMI structure is divided into two parts or "clusters". The first cluster with the terms test, experiment, and validity could be described as "empirical"; the second cluster with the terms hypothesis, theory, hypothetical construct, and prognosis could be described as "theoretical". Tests and experiments serve to evaluate theories and hypotheses, to make prognoses, and to assess hypothetical constructs. Validity is an important criterion of psychological tests. The concept operationalization (as well as variable) takes on a middle position, since it fits into the empirical cluster as well as the theoretical cluster.

HMI students differ from LMI students especially with respect to their higher number of relations (10). In addition, the empirical and theoretical clusters are related and the theoretical concepts have a greater degree of associa-

tion with one another in the HMI structure. Thus, there are distinct differences between the structures of LMI and HMI students. A direct comparison of both groups reveals that the structure of the LMI group is more incomplete than the structure of the HMI group. Yet, the concept variable is not included in either of the two structures.

The expert structure cannot be directly compared to the structures of the experimental groups, since all concepts within the expert group are related to one another. In correspondence with the experimental group structures, the concepts theory, hypothesis, and hypothetical construct are closely related as theoretical concepts. The marginal position of the term prognosis is also found in both groups. Despite the higher cut-off point, the expert structure contains the highest number of relations (11) and the greatest degree of interconnection among the empirical and theoretical concepts. In this regard, the expert structure is more similar to the structure of HMI students than of LMI students.

Results obtained with the help of Waern's graphic method were also compared to the results of cluster analyses and multidimensional scaling. Correspondence between the results of each method was high. The details of this methodological comparison are reported elsewhere.

Another possibility for testing the similarity among the different structures is to compare the RC scores underlying the structures. For this purpose, the RC scores between experimental groups are correlated (see Table 3)[1].

Insert Table 3 here

The correlations between HMI and the expert group (EXP) and those between LMI and EXP are not significantly different from 0. However, the trends of difference correspond to the above structure analysis. Even though the HMI subjects coincide more with the experts, a visual comparison of the structures suggests that the comparability of the expert structure is limited for both experimental groups.

Achievement motive and knowledge structure

What impact does the level of achievement motive have on the structure of the stimulus concepts? In order to answer this question, the association structures for the HAM (high achievement motive) and LAM (low achievement motive) group were determined in a manner analagous to the above procedure.

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[1]In accordance with the number of possible relations among the nine stimulus terms, there are 36 mean RC scores for each experimental group. The correlations reported in Table 3 are based on these values.

The differences proved to be exceptionally small. The structures of both groups contain 8 relations each, 7 of which are identical. Additionally, there was no indication that the RC scores for high achievement motivation were more similar to expert scores than those for low achievement motivation. The corresponding (non-significant) correlations ($r_{NLM,EXP}$ = .09; $r_{HAM,EXP}$ = -.01) even suggest the inverse relation. Thus, the level of achievement motive does not provide an alternative explanation for the obtained effects of interest.

(5) The frequency of involvement with a topic are as a possible explanation for the observed differences

Possible reasons for differences between high and low interest subjects are the frequency of attendance in the seminar and tutorials, as well as the extent to which assigned texts were studied. Table 4 depicts the respective scores for interest in methodology and study interest, as well as the achievement motive.

None of the differences is significant, as revealed by a three-way analysis of variance. Thus, they cannot be taken as an explanation for the qualitative and structural differences found. Even the directionality of the trends does not coincide with these differences. An additional question (not shown in Table 4) revealed that only one HMI subject read other literature (namely parts of a statistic book) in addition to the assigned texts during the course of the seminar.

Insert Table 4 here

These results may be interpreted as an indication that differences in represented knowledge between high and low interest subjects are not due to differences in the frequency of involvement with the topical area, but rather to the way in which subjects become cognitively involved with the topic.

4. DISCUSSION

In the past, cognitive effects of different degrees of interest have generally been determined by employing unspecific achievement criteria (e.g., grades). The present study was designed to supplement traditional achievement criteria with more substantiable measures. The results obtained suggest that subjects who at the beginning of a seminar show high interest in the subject taught (as opposed to those with low interest) produce a higher proportion of

technically appropriate associations in response to presented stimulus terms. This result confirms and extends the results of an earlier study (Schiefele et al., in press). Furthermore, since each study included different topics of interest and drew on samples from relatively heterogenous populations (i.e., students at the University of the Armed Forces and students at the University of Munich), the results gain in validity.

The achievement motive had little impact on the nature of the word associations. One reason might be that the strength of the assessed domain-unspecific achievement motive did not correspond with the level of the achievement motive in a specific topical domain. A second reason might be that the achievement motive has a more positive impact on achievement (in terms of grades and test results) than on the quality of underlying knowledge. Because of their strategic orientation (cf. Entwistle & Ramsden, 1983), achievement motivated persons selectively acquire only the knowledge which is relevant for certain examinations. Thus, high achievement may be the end product, even though basic knowledge structures remain deficient. Another plausible explanation for the results obtained is that the achievement motive requires situational stimuli in order to become activated. Thus, activating the achievement motive would depend on the degree to which subjects regard the word association test as an achievement-related situation (cf. Heckhausen, 1980; Kuhl, 1983). Finally, the debate with respect to operant (or projective) vs. respondent (or questionnaire-based) procedures of measuring the achievement motive (e.g., Halisch, 1985; Kuhl, 1983; McClelland, 1985) demonstrates that the former possesses little construct validity.

The objective of our study was, above all, to gain a better understanding of the role of specific and qualitative cognitive measures in the examination of the interest-achievement-relationship. The prevalence of qualitative differences in knowledge is the most important result of the present study. Thus, high interest does not simply increase the quantity of learning, but also effects they way in which a person approaches the topics to be learned, particularly with respect to deeper cognitive processing of these topics (Craik & Tulving, 1975). A further indication that the differences in knowledge were due to the quality of information processing is that the differences between high and low interest subjects did not correspond to differences in the frequency of attendance in the seminar and the tutorial and the extent to which the literature was studied. Thus, how often one becomes involved with a topic is only of secondary importance. Of greater relevance is how a person goes about occupying him/herself with the topic at hand, and what level topic-related cognitive processing actually reaches (cf. Schiefele, in press). For this reason one of the next experimental steps should concentrate on the relationship between

motivational factors and knowledge acquisition processes.

Our interpretation is consistent with the results found by Marton & Säljö (1984). These authors examined the impact of different degrees of personal involvement (as a variation of text related interest) on cognitive processes during text learning and on topical aspects of text related knowledge structures. Students who were personally affected[2] established more relations between different parts of the text as well as between the text and its actual content or topic. As a result these students also had a better understanding of the author's intention and his/her conclusions. The less "interested" students concentrated more on the superficial structure of the text and tended to memorize it. They showed clear deficits in comprehending the author's intentions and conclusions. In reference to van Dijk & Kintsch's model of knowledge representation (1983; cf. also Perrig & Kintsch, 1985), it can be assumed that personally affected students developed a situational model based on the text, i.e., that the topic of the text (which exists in reality) was reflected in their knowledge structure. In contrast, students who were not personally affected formed a propositional model of the text, i.e., they simply stored the text as such. Thus, one can differentiate between the representation of the text itself and the representation of "situations" described by the text.

Similar results were also found by Säljö (1981) and Watkins (1983). They demonstrated that comprehension-oriented students processed a given text at a higher level than reproduction-oriented students. Furthermore, comprehension-oriented students were better able to link individual parts of the text and draw general conclusions. In contrast, the responses of reproduction-oriented students were related to fewer parts of the text, which were usually less essential and not integrated within a coherent structure. Quantitative differences were not observed in the free recall of the text.

Future research of the interest-cognition relation must still resolve several problems, especially in methodological terms. An important initial task is to control prior knowledge, which was done only indirectly in the present study. A second future task is to develop improved methods of assessing structural aspects of knowledge. For this purpose, specific topical domains with an a priori identifiable criterion structure should be selected, thus allowing for an unambiguous and objective evaluation of empirical knowledge structures.

Our results will have significant consequences for education, if they remain stable even upon application of new and improved methodological procedures. They confirm that topic related interest has an impact on knowledge

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[2]The text addressed the examination system in the educational science program. Education students were personally affected, while sociology students served as unaffected subjects.

acquisition, and may therefore play an important role in teaching-learning contexts. Furthermore, they demonstrate that the impact of interest (at least in certain circumstances) is qualitative in nature (cf. also Marton & Säljö, 1984; Säljö, 1981; Watkins, 1983). This means that examinations or tests, which do not account for qualitative and structural aspects of knowledge, but only for quantifiable aspects, may conceal interest-specific effects on knowledge. However, assuming that higher mental activities, e.g., creative thinking, the transfer of prior learning to new contexts, or the application of skills to problem solving, are highly dependent on qualitative features of stored knowledge, the need for a more differentiated learning or achievement diagnosis in the school and university setting is evident. In the past, examinations in the school and university setting have typically fostered an achievement-orientation in students, while simultaneously inhibiting topic- and comprehension-oriented learning.

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Table 1

Methodology Interest Questionnaire (MIQ)

Items
1. I would attend a seminar on research methodology even if it were not obligatory.
2. As far as the seminar on methodology is concerned, I am only interested in passing the exam.
3. I will not limit myself to examination requirements alone in studying problems and issues with respect to empirical research methodology.
4. I feel relatively indifferent about methodological and statistical issues.
5. The areas in my major which I enjoy have little to do with statistics and methodology.
6. I believe that I would enjoy more intensive study of methodological problems in education.

Table 2

The impact of interest in methodology on the quality of associations (percentages)

Category	LMI (n = 11)	HMI (n = 9)	EXP (n = 4)
1	16.6	20.7	68.2
2	27.7	33.5	24.3
3	33.3	31.1	7.1
4	22.3	14.8	0.4
1/2	44.4	54.2	92.5
3/4	55.6	45.8	7.5

Notes. Category 1: purely technical associations; category 2: technically as well as everyday associations; category 3: everyday associations; category 4: irrelevant associations.

Table 3

Correlations between average relatedness coefficients

	LMI	HMI	EXP
NMI	-	.50*	.06
HMI		-	.16
EXP			-

notes. *$p < .01$.

Table 4

Extent of study-related activities depending on methodology interest, study interest, and achievement motivation

Experimental groups	Absence in the seminar[a]	Absence in the tutorial[a]	Reading of literature[b]
LMI (n = 11)	2.0	1.3	3.9
HMI (n = 9)	2.0	1.5	3.6
LSI (n = 10)	1.6	1.4	4.0
HSI (n = 10)	2.4	1.4	3.5
LAM (n = 10)	1.5	1.0	4.0
HAM (n = 10)	2.5	1.8	3.5

Notes. [a]Average number of absences; self-evaluated frequency of studying assigned literature (5 = "always," 4 = "often," 3 = "occasionally," 2 = "rarely," 1 = "never").

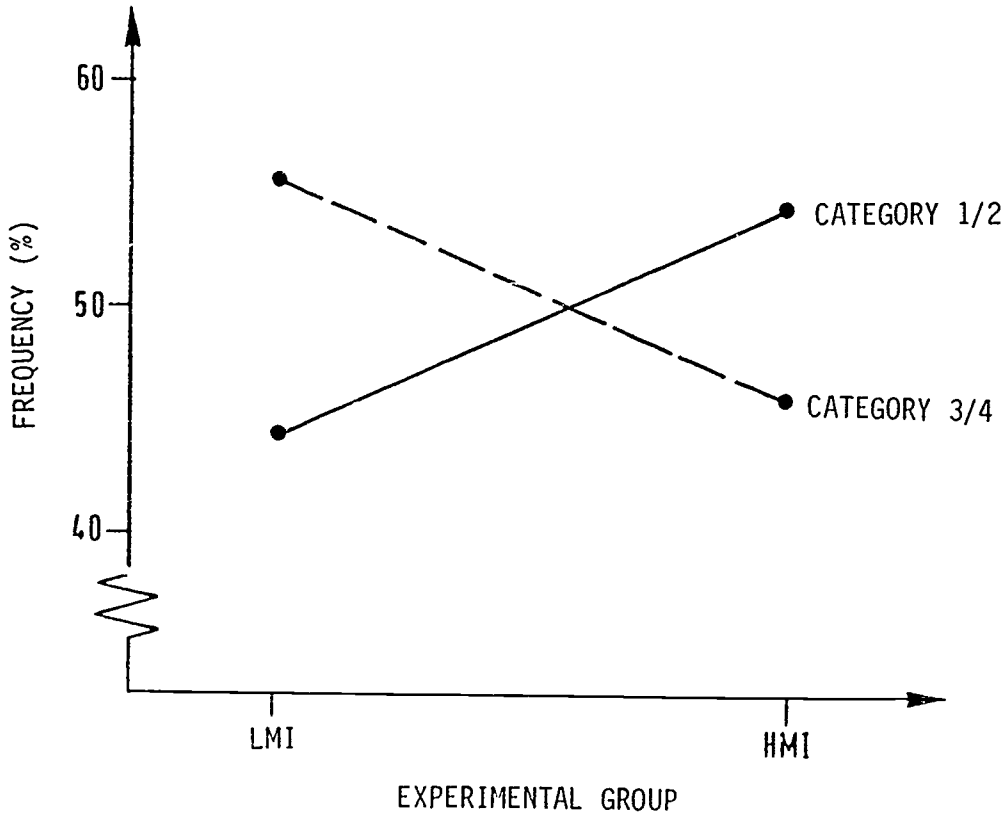

Figure 1

Distribution of associations in categories 1/2 (technical terms) and 3/4 (everyday terms) as a result of interest in methodology

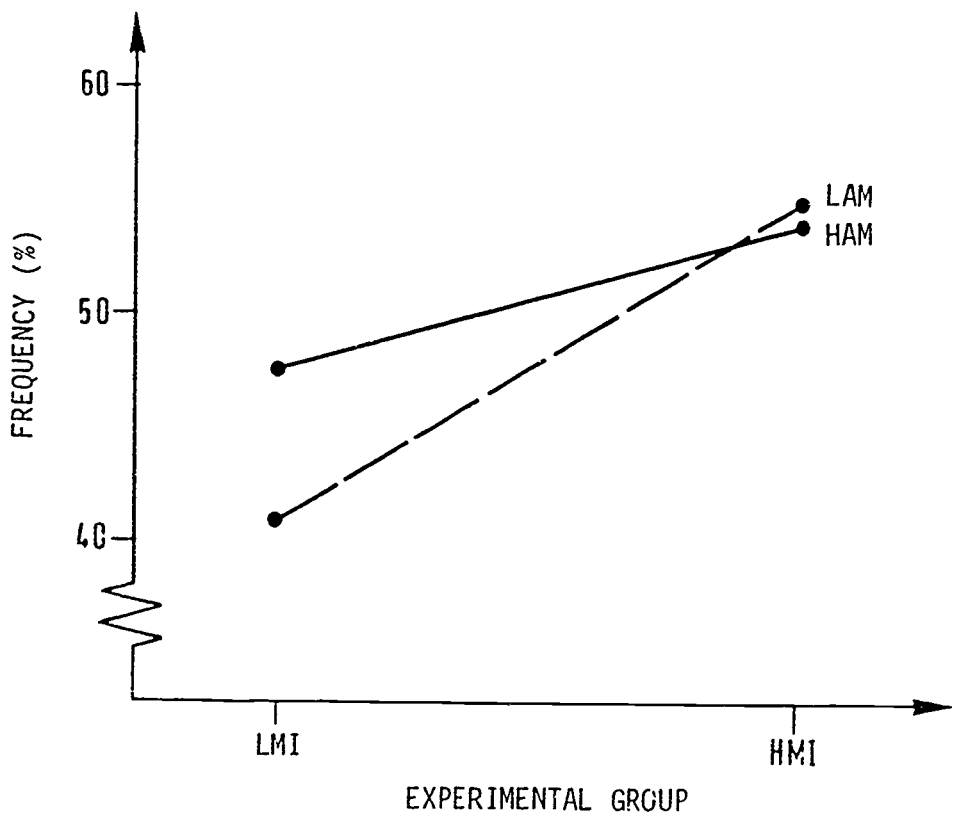

Figure 2

The impact of achievement motive on the frequency of technical associations in dependence of high versus low interest in methodology

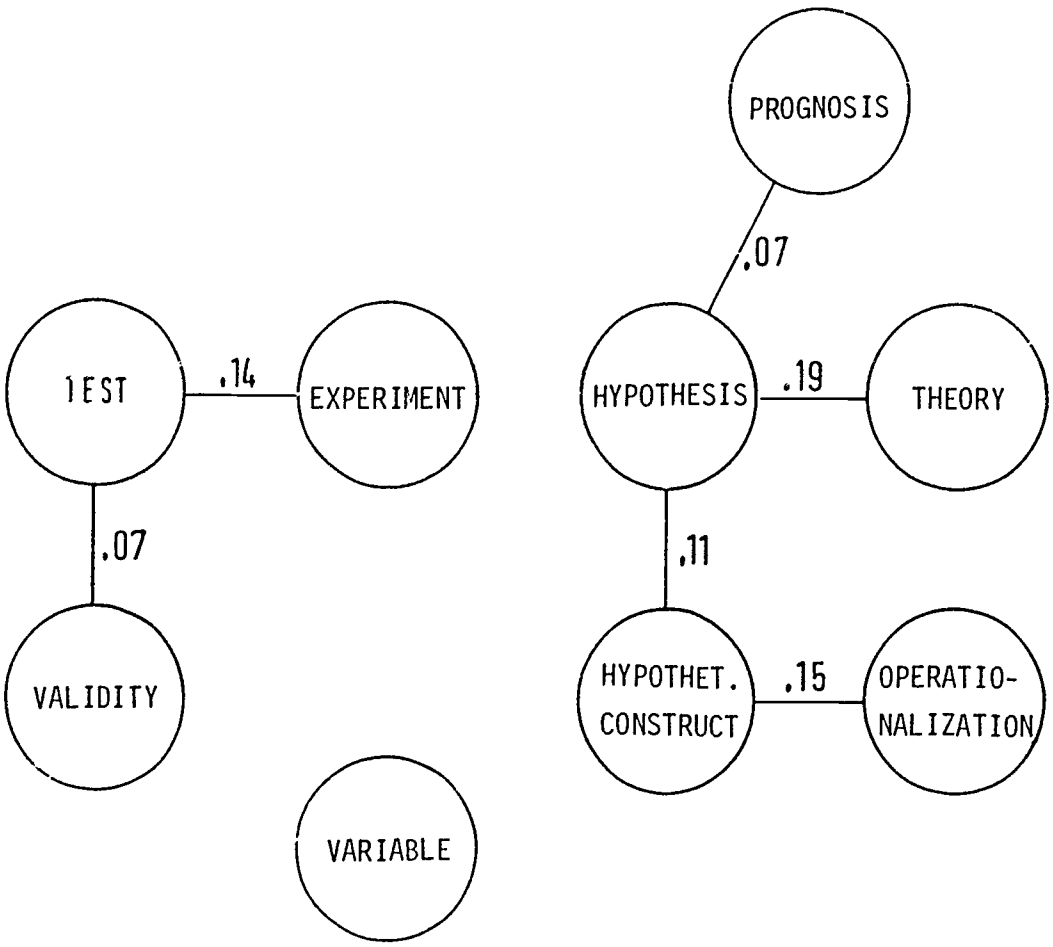

Figure 3

Associative structure of low methodology interest subjects (LMI)

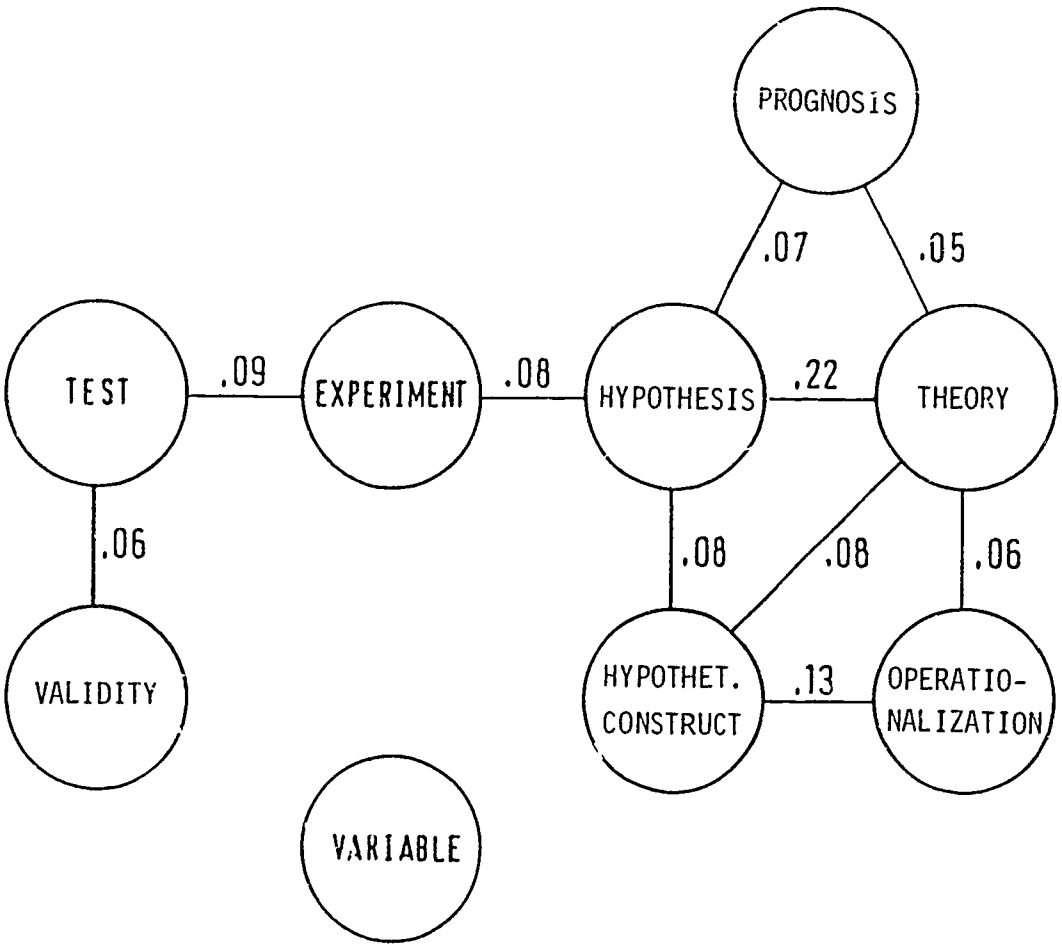

Figure 4

Associative structure of high methodology interest subjects (HMI)

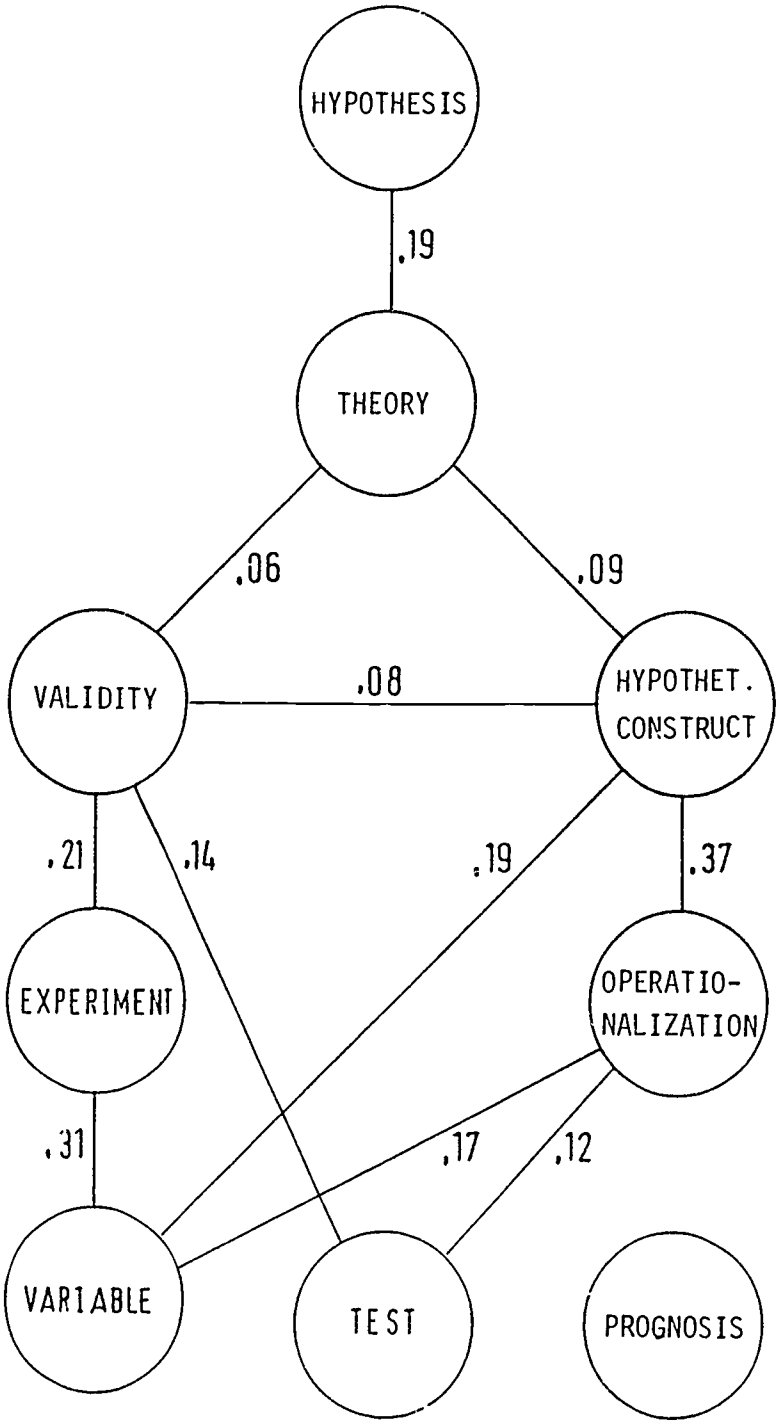

Figure 5

Associative structure of experts (EXP)