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ABSTRACT

In a field experiment it was tested whether teachers change their behavior when they receive student ratings as feedback on their own behavior and on the behavior of a fictitious ideal teacher from the students' perspective. The researchers believed that theories of cognitive balance do not adequately explain such behavioral changes; therefore the Achievement Motivation Theory was used in the test. The student ratings referred to 14 modes of teacher behavior which, according to Berlyne's theory of epistimic curiosity, can be assumed to provoke curiosity behavior on the part of the students. Forty-four German language teachers, teaching seventh to tenth grades, were assigned randomly to the experimental and control groups. The major hypothesis, that the teachers in the experimental group would approximate their behavior more to the ideal behavior than the teachers in the control group, was tested by the interaction in a two way analysis of variance with repeated measures on one factor. The effectiveness of feedback on the behavioral changes in teachers was not estimated as especially high. The teachers in the control group changed for the worse, while the teachers in the experimental group improved only slightly as an average. It was assumed that the students did not perceive their teachers in a very "accentuated" way, so that teachers would have to change their behavior to a large degree before students perceived it. It was recommended that teachers should use the feedback technique in combination with other methods. (SK)

BEHAVIORAL CHANGES IN TEACHERS AS A FUNCTION OF STUDENT FEEDBACK: A CASE FOR THE ACHIEVEMENT MOTIVATION THEORY?

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ABSTRACT

In a field experiment it was tested whether teachers change their behavior when they receive student ratings as feedback on their own behavior and on the behavior of a fictitious ideal teacher (from the students' perspective). Explanation of such behavioral changes in the form of theories of cognitive balance, as suggested by various other authors, has been criticized. As an alternative explanation the Achievement Motivation Theory has been considered, from which a series of additional hypotheses has been deduced.

The student ratings referred to 14 modes of teacher behavior which could, according to Berlyne's theory of epistemic curiosity, be assumed to provoke curiosity behavior on the part of students.

It has been shown that the behavior of those teachers who received feedback approximated highly significantly more -in one item- the ideal behavior than did the behavior of teachers who received no feedback. Another item as well as the overall behavior (i.e. all 14 items) came close to significance. The remaining hypotheses concerning achievement motivation could not be confirmed.

The 14 items correlated to a large extent significantly in the expected direction with students' self-descriptions regarding their curiosity behavior.

INTRODUCTION

As soon as teachers become permanently incorporated into the school structure, they have very few opportunities to change effectively their behavior. Often they are aware of the inadequacies of their own behavior. In such cases, current teacher education offers courses (behavioral training, microteaching, minicourses etc.), methods which are characterized by low accessibility, high effort on the part of the organizers, and high costs for the participants. All these procedures rely on the important principle of feedback and correction of one's behavior by others. Gage et al. (1960) have, for the first time, outlined a simple method of feedback that any teacher, at any time, can carry out, and that, moreover, transfers the corrective function to the student, the teacher's most important partner.

There is some empiric research on the question of whether or not teachers change their behavior as a function of their students' feedback. Gage et al.(1960) instructed students in each class to judge their teachers' behavior on a rating scale (see also Gage, 1972). In addition, the students coded the behavior of a fictitious ideal teacher on the same rating scale. After several weeks, the teachers were again judged by the students on the rating scale. It was shown that those teachers who received student ratings as feedback changed their behavior significantly more in the direction of the ideal teacher than did those teachers who did not receive feedback.

This result has been replicated in another experiment with the same design, in which principals had received feedback from teachers (Daw and Gage, 1967).

In a similar experiment by Tuckman and Oliver (1968) teachers received only student ratings on their actual behavior. As a result, the teachers changed their behavior in the direction of the positive end of the rating scale.

Centra (1973a) arrives at somewhat modified results. Behavioral changes took place only in those teachers who in a self-report rated themselves better than they were rated by their students.

Negative results are reported by Bartz (1973). In this case, however, it was the superintendant who received the feedback.

A case study of four teachers (Edwards, 1973) suggests that an interaction between relatively long-term teacher characteristics and the feedback treatment has to be considered when predicting feedback effects.

THEORETICAL EXPLANATION OF THE BEHAVIORAL CHANGES AND HYPOTHESES

Gage et al. (1960) did not limit themselves to the investigation of a purely praxeological question, but also proposed an explanatory model for the process. They, as well as the authors of subsequent experiments, have deduced the hypothesis, that teachers change their behavior as a result of discrepant feedback, from various theories of cognitive balance (e.g. Heider, 1964). According to these theories,

a cognitive imbalance arises for teachers when they learn through feedback that their actual behavior does not correspond to ideal teacher behavior as perceived by students. Positive self-judgment is then dissonant with negative student judgment. Since individuals strive for cognitive balance, teachers will change their behavior in such a way as to correspond to ideal behavior.

A somewhat modified deduction is presented by Centra (1973b), which need not be detailed in this context.

There is, however, no empiric evidence for the validity of these theories.

Moreover, in our opinion the theories on cognitive balance arrive at false predictions in the following two cases: assuming that a teacher judges himself negatively in regard to a specific teaching style, and that the students, too, judge this teaching style negatively; in that case there is no cognitive imbalance, because both teacher self rating and student rating are negative. Consequently, according to the theories on cognitive balance, no behavioral changes will take place. The teacher, though, can change his behavior, and he will do it exactly when he (as well as the students) holds the ideal behavior as desirable.

A different case can be made for cognitive dissonance. Despite imbalance the teacher will not change his behavior, when the ideal behavior is not in consonance with his level of aspiration.

Hence, it results that the behavioral changes have to be explained by a theory which thematizes the variable "Level of Aspiration". The Achievement Motivation Theory can be regarded in this light. Heckhausen (1965) defines achievement motivation as "the tendency to increase or maintain as high as possible one's personal ability in all those activities in which one regards a standard of excellence as binding and whose execution can therefore succeed or fail". The actual achievement motivation consists of a discrepancy between a present and an anticipated state. Such a discrepancy (between the actual and the ideal behavior) is induced by feedback; and it is balanced by approximating the actual behavior to the ideal behavior.

Our major hypothesis reads as follows:
(1) A discrepant feedback induces achievement motivation; and the increased effort connected with achievement motivation leads to behavioral changes.

In order to examine stringently the intervening variable of this hypothesis one would have to compare the actual achievement motivation between teachers with and without feedback. The only instrument presently available to measure actualized achievement motivation is the TAT. Because of primarily technical reasons we unfortunately had to refrain from administering the TAT to the teachers of our sample. Thus the mediating mechanism could not be subjected to a direct attempt at falsification.

Nevertheless it is possible in our experiment to test some hypotheses that follow from achievement motivation theory. Such hypotheses can explain the fact that feedback is effective only with certain teachers and certain items.

According to Heckhausen's (1965) definition, achievement motivation sets in when a binding standard of excellence is present for a specific behavior, i.e. when a specific behavioral goal is aspired. The liability of the standard of excellence can be conceived as a characteristic of the teacher as well as of the item. Hence our second hypothesis follows:

(2.a) A teacher changes his behavior the more, the more desirable the ideal behavior (defined by the students' perspective) is for him.

(2.b) A teacher changes his behavior more in items of high standard of excellence than in items of low standard of excellence.

Another condition for the occurrence of achievement motivation is the discrepancy between a present and an anticipated state. Teachers perceive feedback as discrepant only when their judgment of their own actual behavior corresponds with the students' judgment, or at least is not more positive than the latter. This leads to the third hypothesis, which again refers to teacher and item characteristics:

(3.a) The more a teacher believes to be correctly judged by his students, the more he will change his behavior.

(3.b) A teacher changes his behavior in items, in which he believes himself to be correctly judged, more than in items in which he does not believe himself to be correctly judged.

Achievement motivation and thus the effort invested in an activity depends not only on situational variables but also on the relatively long-term achievement motive. Consequently our fourth hypothesis reads as follows:

(4) High scorers in achievement motive change their behavior more than low scorers.

Achievement motivation is induced only when the solution or non-solution of tasks permits an inference about one's own ability. This ability can be tested optimally only on tasks of medium difficulty, since in such tasks it is obvious to attribute the solution/non-solution to one's own ability and/or effort (internal attribution). On the contrary, the solution/non-solution of very difficult or very easy tasks is more likely to be attributed to task difficulty and/or chance, in any case, externally (Weiner, 1972).

Moreover the tendency to prefer medium difficult tasks and to try hardest on them depends on the long-term achievement motive (Atkinson, 1964). Hence the three parts of the fifth hypothesis:

(5.a) High scorers in achievement motive change their behavior more on items of medium difficulty (in order to realize the ideal behavior) than on items of high or low difficulty.

(5.b) Low scorers in achievement motive change their behavior less on items of medium difficulty than on items of low or high difficulty.

(5.c) High scorers in achievement motive change their behavior more on items of medium difficulty than do low scorers.

In hypotheses (5.a) and (5.b) one has to consider that the predictions are wrong to the extent to which behavioral changes are determined by the difficulty of objective realizing the ideal behavior. In this case behavioral changes depend not on the effort connected with medium task difficulty, but on the objective task difficulty. Since one can assume that objective and subjective levels of difficulty correlate, in such a case the greatest behavioral changes will occur in items with subjectively (and objectively) low levels of difficulty.

The causal attribution is not only determined by task characteristics, but it can also be conceived of as a relatively long-term personality trait. From Causal Attribution Theory (Weiner, 1972) the sixth hypothesis is derived, which likewise consists of three parts:

(6.a) The more teachers attribute their successes internally, the more they change their behavior.

(6.b) The more teachers attribute their successes as internally variable, i.e. to their effort, the more they change their behavior.

(6.c) The more teachers attribute their failures as internally stable, i.e. to their lack of abilities, the less they change their behavior.

Our last hypothesis refers to the connection between teacher and student behavior. Hypothesis seven reads as follows:

(7) There are connections between selected variables of teacher behavior and specific, theoretically predictable student variables.

PROCEDURE

In the selection of items for the independent variable we have purposely not drawn upon a teacher behavior whose direct impact on student achievement would be obvious, because we hold an unmediated cause-effect model to be too simplistic. We believe that teacher behavior produces intervening processes in students, which in turn have a mediating effect on scholastic achievement.

The items for the feedback belong to a class with theoretically uniform characteristics. According to Berlyne's (1960) theory of epistemic curiosity stimulus characteristics such as novelty, change, incongruity, and surprise provoke cognitive conflicts in the receiving individual, which produce curiosity behavior such as search for new information. The teacher behavior addressed in our items contains such stimulus characteristics either directly, or it leads with a certain probability to stimulus situations which have these characteristics.

Moreover, items were preferred whose curricular relevance has already been demonstrated through empiric research (see e.g. Rosenshine, 1971, Kounin, 1970).

Finally, each item should possibly describe directly observable resp. low inferent behavior (see Rosenshine, 1970).

The following three of the 14 items are listed as examples:

> When a certain topic shall be discussed, the teacher first presents opposing viewpoints and then asks the students for their opinion on the tonic (No.7).
>
> The teacher responds to funny remarks made by students; the teacher shows that he enjoys them, he laughs about them or makes corresponding remarks (No.10).

When dealing with a specific topic, the teacher encourages the students to look for contributions to the topic in various journals, books, encyclopaedias etc. (No. 14).

44 German language teachers, teaching 7th to 10th grades, were randomly assigned to the experimental and control groups. All teachers were judged at time t_1 by their students on the 14 items. The items were rated on 9-point rating scales, that ranged from "never (0)" through "often (4)" to "always (8)". The students coded how often, in their opinion, their own teacher displayed the corresponding behavior, and how often an ideal teacher would do so.

The teachers of the experimental group received, one day after t_1, histograms of the judgment of their class as feedback. For each item the histograms showed the mean of the class's judgment as well as the percentages of the responses for each category of the rating scales.

In order to exclude that behavioral changes would derive solely from a knowledge of the items, the teachers in the control group received a list of the items.

After four weeks (t_2) all teachers were again rated by their students on the 14 items. The differences between the student ratings were used as a measure for behavioral changes.

In order to test the hypotheses derived from Achievement Motivation Theory, the following measures were additionally taken:

As a measure of their accountability to standard of excellence (Hypothesis 2), the teachers were presented with the mean of their students' judgments of the ideal teacher. The

teachers stated on an 8-point rating scale, how desirable they held this ideal behavior to be.

The degree to which the teachers believed themselves to be judged correctly by their students (Hypothesis 3) was measured in the same way. The teachers checked on a 7-point rating scale how correct the mean of the students' judgments of their actual behavior appeared to them.

The long-term achievement motive (Hypotheses 4 and 5) was measured using a questionnaire developed by Mehrabian (1968, 1969).

In order to measure the subjective difficulty in attaining the ideal behavior, the teachers were again presented with the mean for the ideal behavior. On an 8-point rating scale they listed how difficult they held the realization of the ideal behavior to be.

In order to grasp the relatively long-term individual attribution tendency (Hypothesis 6), a questionnaire on "Intellectual Achievement Responsibility (IAR)" was administered for our purposes in the form of Weiner and Potepan's (1970) modified version.

To examine the connection between teacher behavior and the curiosity behavior of students, the students responded at time t_2 to three more items on their own curiosity behavior (again on a 9-point rating scale; e.g., "In the German lesson I listen attentively.").

All measures referring to achievement motivation were taken after time t_2 in order to exclude their effect on the behavioral changes.

RESULTS

The difference between experimental group (E) and control group (K) in approximating actual teacher behavior (R) to ideal behavior (I) was established using the students' ratings.

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insert Table 1 about here
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Since the means for the "ideal teacher" ($E\ I_1$, $E\ I_2$, $K\ I_1$, $K\ I_2$) are generally higher than the initial values for actual teacher behavior ($E\ R_1$ and $K\ R_1$), the differential approximations to the ideal behavior can be calculated by establishing whether or not the average differences between R_1 and R_2 are larger in E than they are in K.

Despite randomization the initial values of all but two items are higher in the control group than they are in the experimental group.

The major hypothesis, that the teachers in the experimental group approximate their behavior more to the ideal behavior than the teachers in the control group do, has thus been adequately tested by the interaction in a two-way analysis of variance with repeated measures on one factor. The problem of statistical regression does not appear since the teachers have not been assigned to the groups because of extreme values.

Factor 1 is represented by Experimental vs. Control group, Factor 2 is the First vs. Second Judgment of the actual teacher behavior (repeated measure). The hypothesis can be held as being confirmed if (1) the interaction in

the analysis of variance is significant, i.e. the increase from R_1 to R_2 is significantly different between E and K (see e.g. Kirk, 1968), and if (2) the increments from R_1 to R_2 are larger in E than they are in K.

For each item an analysis of variance was calculated.

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insert Table 2 about here
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Item 14 differentiates highly significantly between E and K, and item 10 barely missed the 5% level of significance. With the exceptions of items 3 and 4 the differences are larger in E than in K and thus follow the predicted direction.

The major hypothesis can in addition be tested in a single analysis of variance by calculating the overall behavior of each teacher on all 14 items as a sum of the item means given by his class. The interaction of this analysis of variance has a probability of .08 ($F=3.15$, $df_1=1$, $df_2=42$). The increment in E (=.06) is larger than the increment in K (=.10); the difference is close to the 5% level of significance.

The following achievement motivation hypotheses were also tested by interactions in two-way analyses of variance. The Ss resp. items were divided into two groups by the median of their achievement motivation scores (standard of excellence, accepting of student judgments, achievement motive, task difficulty, and attribution). These two groups make up one factor in each analysis. The other factor was again R_1/R_2.

If the hypothesis is tested not with an analysis of variance but with a sign test (in 12 our 14 items the teachers in E change more than those in K) the 5%-level of significance is reached.

By examining the interactions one can establish whether or not the behavioral changes (difference between R_1 and R_2) discriminate significantly between groups with high vs. low indicators of achievement motivation.

Since in Hypotheses 2 (accepting of student judgments) and 3 (accountability of standard of excellence) the indicators of achievement motivation can be interpreted as characteristics of individuals as well as of items, it can be tested (1) whether teachers with high scores in the behavioral changes differ significantly from teachers with low scores; (2) whether differential changes occur in items with high scores as opposed to items with low scores.

In testing the differences between teachers the item sums of the achievement motivation indicators were used. Depending on their scores, the teachers were then assigned to the group above or below the median and it was checked whether the overall behavioral changes were larger in teachers with high scores than in teachers with low scores.

In order to test the differences between items, they were divided into two groups according to their value and it was tested whether the behavioral changes differ between these two groups.

With the exception of Hypothesis 3 in all hypotheses the scores of the control group Ss were included; it can be assumed that they, too, change their behavior because of implicit self-judgments, even though that may be less the case than with the Ss in the experimental group.

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insert Table 3 about here
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From Table 3 it is evident that with the exception of Hypothesis 2.b there was no 5% significance. Hypothesis 3.a barely missed this significance level. In both cases, though, the behavior did not change in the expected direction. It is conspicuous that in both hypotheses the first measure (R_1) shows a significant superiority of the group with high achievement motivation scores as compared to the low-score group, which could of course be the starting point of a regression effect.

The three subhypotheses of Hypothesis 3 (task difficulty and achievement motive) were tested by the AxBxC-interaction of a 2x2x3 analysis of variance with repeated measures on two factors. The first factor was R_1/R_2, the second one was high vs. low achievement motive, and for the third the items were divided into three groups according to their difficulty.

insert Table 4 about here

The AxBxC-interaction is not significant.

In order to test Hypothesis 6 (relationship between teacher behavior and student variables) The judgment on the 14 items of the actual teacher behavior were correlated with the students' self-ratings of curiosity behavior on the three items. Out of 42 correlation coefficients, 25 were significant on the 5% level in the direction of the hypothesis (With n=44 and df=41 a correlation of over .30 is significant).

DISCUSSION

The effectiveness of feedback on the behavioral changes in teachers cannot be estimated as especially high. Still, one effect could be established: In the overall behavioral changes the significance was barely missed in an analysis of variance ($p=.08$), as was the case in one item ($p=.06$), and in another item there was a highly significant difference between E and K. Moreover, a sign-test over the 14 items reached the 5% level of significance. The results should be considered in the light of a rather small sample of 44 teachers. Since in such a case extreme values become very conspicuous, large error variances result which make it difficult to reach a significance level.

The following finding should be emphasized: the teachers in the control group changed for the worse, whereas the teachers in the experimental group improved only slightly as an average. There is empiric evidence that the Ss of a control group generally deteriorate from the first to the second measure. Such tendencies occurred in the experiments conducted by Gage et al. (1960), Daw and Gage (1967), and Tuckman and Oliver (1968). Possibly this can be explained by the fact that the students have become more "critical" at the second measure.

One can assume that students do not perceive their teachers in a very "accentuated" way so that teachers supposedly have to change their behavior to a large degree before students perceive that. Because of that the factual

behavioral changes in teachers are probably larger than one tends to assume judging from the rating scales (The teachers in E, e.g., improved only by .06 scale units on the overall behavioral changes, and the teachers in K deteriorated by .10 scale units.).

Besides, a certain weakness in the method as such has to be taken into account. The various current developments in teacher training (microteaching, minicourses) seem to indicate that a change in teacher behavior requires intensive training methods which address a series of processes with the help of exercise, illustration, imitation, up to the development of skills in cognitive discrimination (e.g. Wagner, 1974).

Consequently, massive behavioral changes as a consequence of feedback may not be likely offhand. Teacher behavior is relatively constant over various situations and curricular conditions (see, e.g., Tausch and Tausch, 1971). Feedback, in a sense, has to "assert itself" against a tendency toward constant behavior.

Internal emotional and cognitive processes that are connected with letting oneself be rated by others, have not been considered so far. Defense and fear of judgment (see Glass, 1975) certainly play an influential role even when the teachers participate in the experiment as volunteers and show great interest.

In our opinion the question whether it should be recommended to teachers to use the feedback technique can

be answered positively. In any case it should be implemented in combination with other methods, because it is economical and fosters the emotional relationship between teacher and student.

Possibly the feedback effects could be further enhanced when teachers and students are conceded a larger part in its planning and implementation. Finally, teachers could be given additional information on the effect of teaching styles.

In order to improve the feedback technique and to offer a theoretical explanation of the process we tried to find differential predictors that discriminate between different behavioral changes in different teachers. The attempt at a differential prediction with hypotheses that had been deduced from Achievement Motivation Theory, has, however, not been successful. The behavioral changes were either insignificant or went against the predicted direction. Supposedly the differences can also be the result of a statistical regression, because Ss have been assigned to groups because of their extreme scores.

Nevertheless it may be appropriate not to drop prematurely the Achievement Motivation Theory as an explanatory attempt. As already mentioned, we could not compare the actualized achievement motivation of experimental vs. control groups. Thus the assumption that discrepant feedback produces achievement motivation should not be considered rejected.

In opposition to the theories on cognitive balance we had emphasized the acceptance by teachers of behavioral goals as defined by students. Now it turned out that the behavior viewed as ideal by students has been aspired to by almost all teachers on all items to almost the same degree. In replicating the experiment it would thus make sense to include items on which teachers and students differ largely regarding the ideal behavior. Possibly in such cases the critical variable "Acceptance of the students' ideas as level of aspiration for one's own behavior" becomes noticeable.

Another hint at the relevance of Achievement Motivation Theory can be deduced from Centra's (1973a, b) results. In this study, behavioral changes occurred only in teachers that had rated themselves better than they had been perceived by their students. In the context of Achievement Motivation theory, this result can be interpreted in the following way: Because of the information on their actual behavior these teachers corrected their present state "downwards" so that a motivating discrepancy between their present state and the aspired behavior arose.

The last part of our study dealt with the relationship between teacher and student behavior. It has been shown that the teachers' modes of behavior selected by us correlated to a large degree significantly with the students' curiosity behavior. These correlations, though, may be somewhat exaggerated in that both variable groups have been

scored by the same Ss. A strict causal interpretation is not possible in any case, since both variable groups possibly correlate with a third critical variable, e.g. the popularity of the teacher concerned.

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Table 4

Means for each item over the teachers of the experimental group (E) and the control group (K). Means are listed for the actual teacher behavior (R) and the ideal behavior (I), as well as for the measures at time t_1 (R_1 and I_1) and at time t_2 (R_2 and I_2).

Item	E R_1	E R_2	E I_1	E I_2	K R_1	K R_2	K I_1	K I_2
1	[illegible]	3,05	[illegible]	5,44	3,79	3,85	5,67	5,46
2	1,78	2,14	3,99	4,17	2,38	2,56	3,91	4,42
3	3,93	4,13	6,06	5,91	3,82	4,07	5,93	5,99
4	4,79	4,70	6,03	5,93	4,49	4,55	5,85	5,94
5	4,45	4,13	6,37	6,21	4,70	4,43	6,49	6,17
6	4,14	4,00	5,49	5,41	4,48	4,14	5,44	5,63
7	5,40	5,60	5,14	5,31	3,77	3,84	5,29	5,42
8	5,17	5,20	6,33	6,29	5,22	5,26	6,21	6,25
9	4,27	5,10	6,58	6,45	5,45	5,03	6,55	6,45
10	4,77	4,81	5,95	6,02	4,89	4,58	5,84	5,91
11	1,33	1,28	4,48	4,51	2,01	2,07	4,71	4,69
12	3,41	3,56	5,48	5,46	3,85	3,70	5,56	5,59
13	5,55	5,15	6,98	6,89	3,51	5,14	7,09	6,86
14	5,28	5,54	5,08	5,20	3,68	3,47	5,28	5,27
total	55,10	55,05	79,56	79,33	57,16	56,74	79,93	80,05

Table 2

Mean differences for each item from R_1 to R_2, separately for experimental group (Diff.E) and control group (Diff.K); F-ratios of interactions, error probabilities for interactions (p), and mean standard deviation over all cells (s).

Item	Diff.E	Diff.K	F	p	s
1	-0,10	-0,12	0,02	0,88	0,78
2	0,30	0,18	0,79	0,37	0,95
3	0,20	0,20	0,07	0,78	0,96
4	-0,09	0,00	0,81	0,37	1,20
5	0,02	-0,27	2,51	0,13	1,34
6	-0,14	-0,28	0,87	0,35	0,89
7	0,11	0,07	0,04	0,83	0,88
8	0,12	0,04	0,32	0,57	1,30
9	-0,14	-0,37	1,72	0,19	1,03
10	0,04	-0,31	3,63	0,06	1,25
11	0,25	0,00	0,76	0,38	1,23
12	0,09	-0,15	2,40	0,12	1,05
13	-0,15	-0,37	2,16	0,14	1,05
14	0,20	-0,21	5,94	0,019	1,08

Table 3

Results of Hypotheses 2,3,4 and 6

hypotheses on achievement motivation +)

		M_{R_1}	M_{R_2}	s++)	p+++)	F	df_1	df_2
2a	stand. excell. (teach)+	4,13	4,07	0,75	0,54	0,37	1	40
	stand. excell. (teach)-	3,93	3,93					
2b	stand. excell. (items)+	4,70	4,65	0,86	0,03	5,37	1	2
	stand. excell. (items)-	3,43	3,50					
3a	acceptance (teach)+	4,41	4,33	0,69	0,66	3,95	1	20
	acceptance (teach)-	3,43	3,60					
3b	acceptance (items)+	3,79	3,48	1,14	0,92	0,00	1	12
	acceptance (items)-	4,33	4,37					
4	achievm. motive+	4,11	4,09	0,73	0,86	0,02	1	42
	achievm. motive-	3,96	3,95					
6a	int. attr. success+	4,04	4,00	0,74	0,52	0,41	1	40
	int. attr. success-	3,99	3,95					
6b	int. attr. suc. eff.+	4,19	4,19	0,69	0,88	0,02	1	42
	int. attr. suc. eff.-	3,82	3,81					
6c	int. attr. fail. ab.+	4,12	4,11	0,74	0,90	0,01	1	40
	int. attr. fail. ab.-	4,00	3,89					

+) + = achievement motive score above the median,
- = achievement motive score below the median,

++) mean standard deviation over all variance analysis cells.

+++) error probability of the interaction.

Table 4

Means of cells of the 3-way analysis of variance

	R_1			R_2		
	ld++	md+++	hd++++			
High AM+	3.94	3.53	2.85	3.96	3.32	2.66
Low AM	3.83	3.55	2.83	3.86	3.33	2.67

+ Achievement motive, ++ Items with low difficulty, +++ Items with medium difficutly, ++++ Items with high difficulty.