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Young Teachers' Implicit Theories about Individual Factors of School Achievement¹

Abstract

Key subject of this empirical study are implicit theories about individual factors of school achievement. German trainee teachers were interviewed in a qualitative pilot study that revealed openness to be a surprisingly strong concept applied by the interviewees to explain school achievement. Ability seems to play almost no role at all. The extracted categories have formed the basis for an online questionnaire being applied in the main investigation. Generally speaking the findings indicate a rather dynamic image of students implying good opportunities for educational intervention. The thesis that young teachers of natural sciences have a stronger believe in natural giftedness than their colleagues of other subjects has been falsified.

According to the model of Educational Reconstruction (Kattmann et al., 1997) implicit theories of trainee teachers are considered as learners' concepts, which have to be interrelated to scientific perspectives. Consequently, the present study aims to establish educational guidelines for teacher training as a result from negotiating between experts' theories about attribution and determinant factors for school achievement and teachers' implicit theories.

1 Introduction

Effort and ability are frequently emphasized as dominant causes assigned in achievement-related contexts (Weiner, 1986). The comparison of school-achievement in terms of literacy was aimed at by international studies like TIMSS and PISA. In search of possible reasons for the low performance of German students the authors of TIMSS argued, that many German teachers of mathematics had a particular strong believe in something like natural giftedness (Baumert et al., 1997). Although they have not given any references a couple of older studies support this thesis (Chaudhuri et al., 1992; Ries & Heinen, 1979; Meyer & Butzkamm, 1975; Hofer, 1975).

The question if teachers' implicit theories about individual factors of school achievement rather refer to effort or ability has a strong impact. First, the educational élan might be inhibited if the success of her/his educational work is regarded to be mainly determined by the student's intra-individual dispositions. Second, the teachers' expectations and their feedback might evoke an adverse student's attributional behaviour and unfavourable academic self-concept. Groundbreaking research traditions focus on these aspects to explain motivation.

The present study aims to investigate young teachers' images of their students. How do they attribute their school achievement? Stevenson and Stigler (1994) compared Asian and American education and identified two different paradigms: an American emphasis on ability vs. an Asian emphasis on effort. They empirically distinguished between teachers' believes and put them into a cultural context. Accordingly the object of the present research also has been put into context: Do young teachers' different subject areas produce distinguishable implicit theo-

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ries about individual factors of school achievement? Especially the above-mentioned thesis of the German TIMSS authors is to be verified: Do implicit theories of young teachers of natural sciences and mathematics refer to a stronger extent to static concepts like giftedness?

Implicit theories

In contrast to explicit theories founded on scientific findings and aiming at inter-subjective validity, implicit theories organize our subjective concepts and guide us how we act. Various academic traditions – mainly based on constructivistic epistemology – focus on those non-scientific theories denying a constituent qualitative difference between them and scientific theories. Many of them refer to G. A. Kelly (1963) who valorised the individual personal constructs as the basis for his psychological approach. In this academic field similar terms occurred describing different non-scientific theories such as *naïve theories* (Laucken, 1974) and *subjective theories* (Gröben et al., 1988). Whereas *naïve theories* denotes a general term *implicit theories* can be distinguished from *subjective theories* by their lower grade of consciousness. Consequently their rather indirect approachability demands different methods of investigation (Oldenbürger, 1987).

Bruner and Tagiuri (1954) used the term *implicit personal theories* to denote the assumed relations between traits influencing our perception and characterisation of other people. Applied to an educational context, implicit theories play a material role in how teachers perceive and discriminate their students and how they estimate their ability to intervene for the purpose of their educational aims.

Considering the impact on the students' achievement goals, self-concept and achievement behaviour Carol Dweck (1986) developed an approach in educational psychology which is based on two different types of implicit theories about the malleability of intelligence. People who see intelligence as a fixed attribute of their personality are labelled as *entity theorists* in contrast to *incremental theorists*, who regard their intelligence rather to be something malleable and subject to change.

2 Qualitative pilot study

The research of Implicit Personal Theories in educational contexts, decisively initiated by Manfred Hofer (1969, 1986), was accompanied by a methodological discussion doubting its validity. Huber and Mandl (1979) questioned if the raised teachers' estimations about their students represent their Implicit Personal Theories or rather standardised questionnaires. Inspired by this critical consideration the present study is composed of two parts: First, a qualitative pilot study aims to analyse inductively the concepts which are really used by teachers to discriminate their students. These extracted categories then form the basis for the questionnaire applied in a quantitative online-study.

2.1 Participants and Method

Six trainee teachers of Lower Saxony, three women and three men in their second trainee year, were interviewed about their images of their students. All of them were qualified for the German Gymnasium (upper secondary school). These participants were chosen because of the assumption that, compared with their colleagues in the German Realschule (middle secondary school) and the Hauptschule (lower secondary school), their subject areas are more specialised. With regard to the above-mentioned thesis they are supposed to identify themselves with their subjects to a higher degree.

During the interviews the probands were asked to explain their students' school achievement and to weigh the importance of the attributed individual factors. Due to the requirement, that the raised concepts have to be applicable to the perception and discrimination of their students and have to have relevance in daily work six Repertory Grids (Kelly, 1963) were developed. This method aims to approach the individual bi-polar personal constructs by comparing concrete persons.

2.2 Findings

Corresponding with the Repertory Grids, a Qualitative Content Analysis (Mayring, 2000) of the interviews revealed eleven individual factors for school achievement. Contrary to our expectations openness appeared to be a particular strong concept used by young teachers to explain school achievement. Comments of the interviewees clarified that this term rather denotes intellectual than social openness. Close to the notion of adaptableness this cognitive and affective habitus is clearly distinguished from social extraversion. The dominance of this category is remarkable because of the deficiency of any matching equivalent in the academic discourse of educational psychology.

Ability or giftedness is hardly mentioned at all, possibly due to social desirability. Instead openness seems to play the role of an internal and fairly stable factor. Is this the opportune substitute to ability with similar functions and connotations?

Motives and motivation are, likewise, regarded to be barely malleable. This implication extremely contradicts the academic view. Long traditions (Rheinberg, 1980) have developed various approaches to intervene and to increase students' motivation for the purpose of their successful school performance. Whether or not these statements of the interviewees indicate a substantial discrepancy between the teachers' implicit and the experts' explicit theories is to be verified in the quantitative online-study.

3 Quantitative online-study

3.1 Participants

Trainee teachers for the German Gymnasium (upper secondary school) from every federal state who had already assigned marks to their students were invited to participate in an online-study. From end of January to end of April 2003 907 visitors opened the [www-form](http://www.uni-oldenburg.de/refbefragung)². 357 filled in questionnaires (39 %) were returned.

3.2 Results

Importance, Substitutability and Malleability of individual factors of school achievement

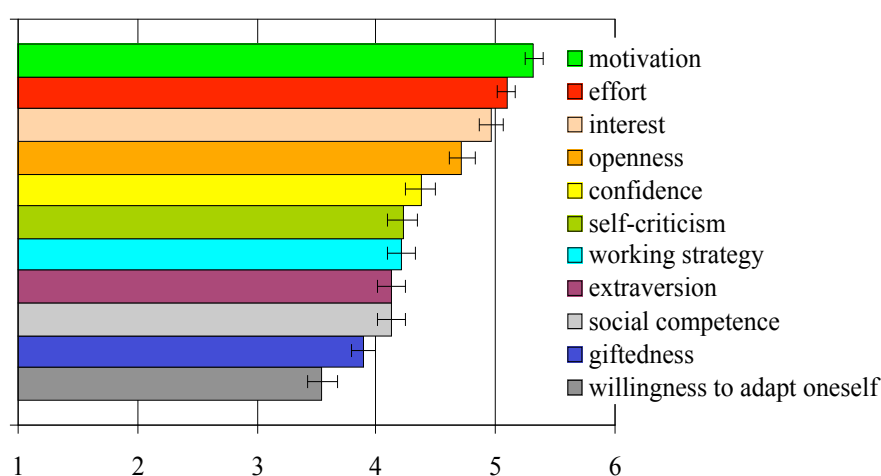
In the central segment of the questionnaire the eleven individual factors for school achievement raised by the qualitative pilot study were to be estimated. The items had been designed according to an assumption of Birgit Spinath (2001): It is not sufficient to estimate only the importance of an individual factor for the student's school achievement but also its malleability. Applied to intelligence Dweck (1986) insists that the ascribed malleability has a fundamental impact on the subject's achievement goals, self-concept and achievement behaviour. The psychological approach of inter-individual comparison corresponds with a sociological view on changeable connotations of concepts being embedded in their cultural and historical contexts. For the German usage not only the attracted attention to giftedness was dependent

² www.uni-oldenburg.de/refbefragung

on social vogues but also its attached malleability quite changed: From a fairly active and dynamic denotation (“jemanden begaben”) it more and more shifted to a passive and static conception (Finck 1999).

In addition the importance of a factor would be seen in relative terms if it is regarded at the same time to be easily substitutable. For instance the following will show that the interviewees consider the students’ diligence to be generally important for their school achievement. But at the same time they agree to a given statement that a student can perform successfully even though he/she is not very hardworking. Therefore the eleven factors of school achievement were to be estimated in the dimensions *importance*, *substitutability* and *malleability*.

Figure 1: Attached importance of individual factors of school achievement (means and 95% confidence intervals; n=357)



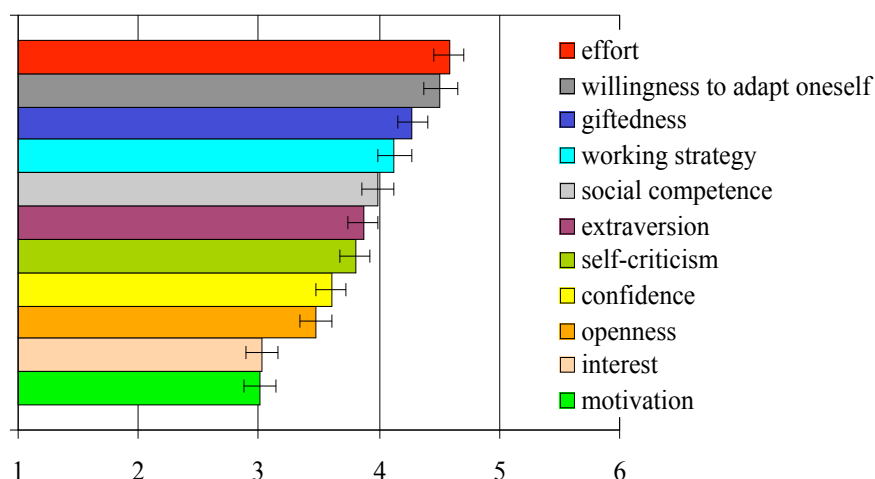
Note: The answer scale ranged from 1 to 6. Scale value 6 represents the estimation that this individual factor is very important for school achievement; scale value 1 represents the view, that this factor is not important at all.

Motivation (green bar), effort (red bar) and interest (pink bar) are considered to be the most important factors for school achievement. Remarkably openness (orange bar) ranges right behind them with a rather high value of 4,7. This verifies the finding of the qualitative interviews which revealed this trait to be a particular strong category. To prevent this concept from being mixed up with a social category like extraversion the item contained the phrase “open for new aspects”.

In opposition to those four categories willingness to adapt oneself and giftedness are regarded to be the least important factors for school achievement. Nevertheless all of these eleven factors are considered to be rather important if you dichotomise the scale at its half (3,5). Despite of the range between self-criticism and social competence every position is at least to the level $\alpha = .05$ significant.³

³ Measured by an adjusted α -level according to Bonferoni the paired samples t-tests would reveal also the differences between effort – interest and confidence – self-criticism not to be significant. But due to the fact that these variables are not independent this adjustment would be by far too conservative. (Bortz, 1993)

Figure 2: Attached substitutability of individual factors of school achievement (means and 95% confidence intervals; n=357)

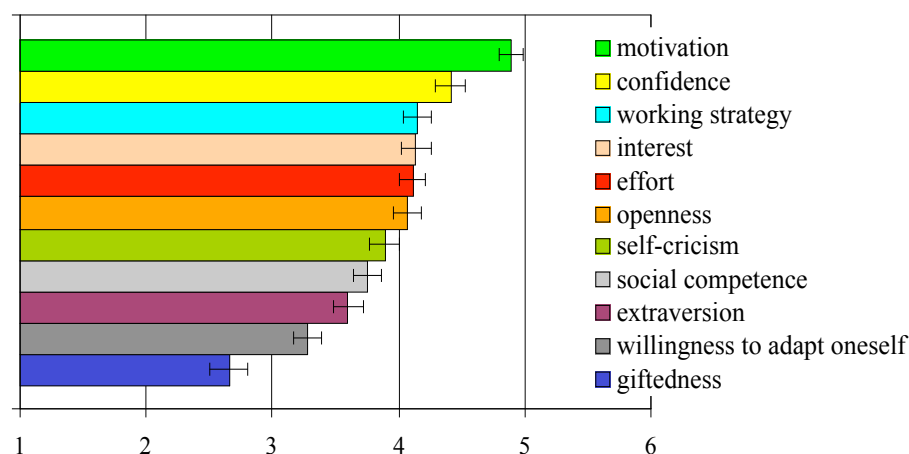


Note: The answer scale ranged from 1 to 6. Scale value 6 represents the opinion that the interviewee perfectly agrees with the statement that even though a student does not dispose of this attribute, he/she (the student) still could perform successfully. Scale value 1 represents that the interviewee absolutely disagrees with this statement.

According to expectation this ranking list is, despite of the red bar representing the substitutability of effort, almost perfectly symmetrical to the one showing the attached importance of the individual factors. In the above diagram (Figure 1) the green bar shows that motivation is regarded to be the most important factor for school achievement. The second ranking list, however, indicates that in the eyes of the interviewees lacking motivation can't be substituted. Similarly, interest appears, represented by the pink bar. Without an adequate amount of motivation and interest the interviewed young teachers would not expect successful school performance. In analogy the two factors with the ascribed lowest importance for school achievement are considered to be comparable easily substitutable. But surprisingly they are exceeded by the attached substitutability of effort. In the eyes of the interviewees it is quite possible that a student performs successfully even though he/she does not work very hard.

When you dichotomise the scale at its half (3.5) only motivation and interest are significantly regarded to be rather not substitutable.

Figure 3: Attached malleability of individual factors of school achievement (means and 95% confidence intervals; n=357)



Note: The answer scale ranged from 1 to 6. Scale value 6 represents the interviewee's estimation that he/she could positively exercise a strong influence on a student who does not dispose of this attribute. In opposition scale value 1 represents the opinion that in this case he/she had no influence at all.

With the estimated malleability of the individual factors of school performance a rather optimistic – from the educational point of view – attitude of young teachers towards their students is composed. Again, the outstanding category is the student's motivation. With the score of 4.9 this important trait is regarded to be very malleable. This result contradicts the findings from the qualitative interviews: in comments this concept was described to be rather static. In the face to face situation the interviewees expressed their perceived helplessness when they were confronted with an unmotivated class. One solution to this contradiction might be that the interviewees in the qualitative study had a rather extraordinary opinion. This judgement would be supported by one of the interviewees' diffuse understanding of the term motivation mixing up intrinsic and extrinsic motivation. Another interpretation would be that the standardized questionnaire of the online-study demands an estimation of a concept detached from any practical context. On the one hand the interviewee might, in this situation, rather refer to an abstract conception of motivation being shaped by a theoretical discussion in which this term appears to be emphasized as a key for educational intervention. On the other hand the narrative elements of a qualitative interview are an approach to contextualized concepts. Bound into practical circumstances the dynamic implication of motivation is not regarded to be verified. Applied in everyday work the chances for intervention are considered to be rather limited so in qualitative interviews young teachers report a rather static implication of this concept. So, one term might have right opposite connotations either as a theoretical or as an applied concept. Maybe we do not have contradictory findings of young teachers concepts but findings of contradictory concepts.

In opposition to motivation the willingness to adapt oneself and the student's giftedness are regarded to be rather not malleable. But this static connotation does not reduce the generally optimistic appearance of the young teachers' implicit theories because those two categories are considered to be less important than the others and – above all – easily substitutable.

The qualitative pilot study revealed openness to be a particular strong category applied to explain school achievement. Ability and giftedness were hardly mentioned at all. It was supposed that due to social desirability openness might have taken over the role of ability as an internal and fairly stable factor with similar implications and functions. But by the ascribed malleability now openness and giftedness appear clearly distinct (paired samples t-test to the

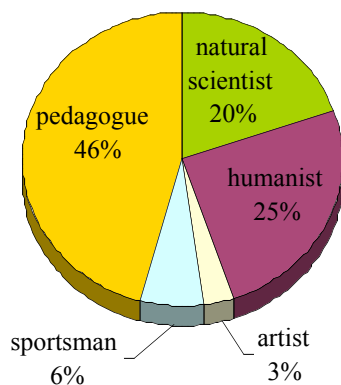
significance level $\alpha=0.01$). The interviewees consider themselves to be able to positively intervene rather in a case, in which a student does not show appropriate openness, than in a case of lacking giftedness. In the same manner and according to the findings in the qualitative study it becomes evident that the interviewed young teachers clearly distinguish between openness and extraversion demonstrating that the intellectual category was not mixed up with the social category.

Young teachers' professional self-concepts

While qualifying to become a teacher at the German Gymnasium (upper secondary school) every participant is trained in at least two subjects. And of course the subjects do not have to be all natural sciences or all humanities. Therefore an external division of the sample would be interpretative. According to the theoretical background of implicit theories the self-assessment suggests itself:

Figure 4: Young teachers' professional self-concepts; n=357

"In the first place I consider myself as a ..."



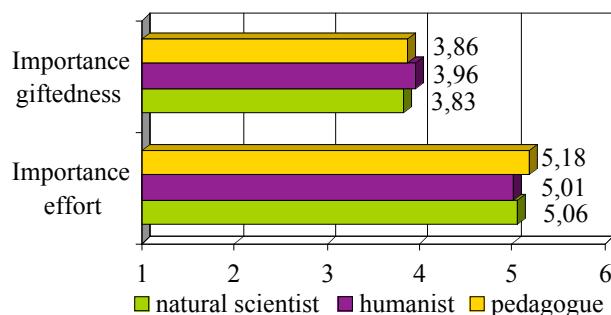
One-fifth consider themselves as natural scientists, one-fourth as humanists and almost half of the interviewed young teachers see themselves in the first place as pedagogues. Particularly the high percentage of self-confident pedagogues is remarkable: It contrasts extremely with the findings of Briedis et al. (1998). Their research of motivation and situation of students for teaching profession revealed, in particular for those who specialized for the Gymnasium (upper secondary school), interest in their subjects to be the predominant motive why they had decided to become a teacher. This group showed the lowest insight into the necessity of educational elements in their studies. Now they consider themselves in the first place as pedagogues. Another scale of the present online-study revealed that the interviewed young teachers regard the educational elements to be indispensable. In retrospect they even demand a higher proportion of educational studies at university.

Obviously the estimated importance of educational elements varies on the way to become a teacher. The insight into the necessity of educational studies arises by the confrontation with practical educational work. Correspondingly the professional self-conception changes from a high identification with the subjects to a self-image as a pedagogue. To verify this thesis further research by a panel study is needed.

Attached importance of giftedness in comparison

This study focuses on the hypothesis whether or not young teachers of natural sciences ascribe a higher importance to the giftedness of their students than their colleagues do.

Figure 5: Attached importance of giftedness and effort in comparison (means)



The upper group of bars represents how the interviewed young teachers who consider themselves as natural scientists, as humanists and as pedagogues estimate the importance of giftedness of their students for their school achievement. In contrast to our hypothesis the interviewed natural scientists regard giftedness to be less important than their colleagues do. As mentioned above effort is theoretically discussed to be diametrically opposed to concepts like ability or giftedness (Weiner, 1986; Stevenson & Stigler 1994). Therefore the lower group of bars was applied to represent how the interviewees estimate the importance of this category. With this in mind at least the comparison of the self-assessed natural scientists and humanists reveals a consistent conception: The group of young teachers who regard giftedness less important consider effort to be more weighty and vice versa.

A one-way analysis of variance (ANOVA) was calculated to test if the estimations were significantly different.

Table 1: One-way ANOVA

| Importance of ... | Natural scientist | | Humanist | | Pedagogue | | Sportsman | | Artist | | F (df) | η^2 |
|-------------------|-------------------|-----|----------|-----|-----------|-----|-----------|------|--------|------|-----------|----------|
| | M | SD | M | SD | M | SD | M | SD | M | SD | | |
| ... Giftedness | 3,83 | ,99 | 3,96 | ,95 | 3,86 | ,92 | 3,96 | 1,15 | 4,00 | 1,18 | ,281 (4) | ,00 |
| ... effort | 5,06 | ,83 | 5,01 | ,83 | 5,18 | ,69 | 5,09 | ,67 | 4,73 | 1,01 | 1,415 (4) | ,02 |

Note: * $p < .05$; ** $p < .01$

The ANOVA reveals that there are no significant differences between the groups. Consequently the above-mentioned hypothesis is concluded to be falsified: Young teachers of natural sciences do not believe in giftedness to a stronger extent than their colleagues of other subjects do.

Applied Attribution

Probably the biggest threat for the data's validity is a social desirability when an estimation of a – from the educational point of view – delicate category like giftedness is demanded. In a special section of the questionnaire an approach to this difficulty was attempted: Semantic differentials were to be filled in for concrete students. The rather abstract data should be tested by application. Under consideration of empirical findings about the dependence of attributional behaviour from the object's gender (Rustemeyer, 1999) and his/her school per-

formance (Seel, 1981) each interviewee was asked to develop semantic differentials for four students differentiated by gender and school performance.

Table 2: Intercorrelations between attributes and assigned marks (n=1428)

| | interest | motivation | giftedness | effort | self-criticism | openness | working strategy | confidence | social competence | willingness to adapt oneself | extraversion |
|------|----------|------------|------------|--------|----------------|----------|------------------|------------|-------------------|------------------------------|--------------|
| mark | .78** | .76** | .73** | -.71** | .67** | .66** | .52** | -.49** | .45** | .25** | .23** |

Note: ** correlation is significant at level $\alpha = 0.01$ (2-tailed)

The table above shows the intercorrelations between the eleven individual factors applied in the semantic differentials and the assigned marks. Corresponding with the general estimations that all of these factors are considered to be rather important for school achievement (see figure 1) it now becomes evident that also in practical application they are correlated with the estimated performance at a high level of significance. As expected the highest correlation can be observed between interest and assigned mark and motivation and assigned mark. But surprisingly giftedness ranges right behind them. This finding extremely contradicts the general statements considering giftedness to be one of the least important factors. It supports our above-mentioned worries that the social desirability might seriously distort the general estimations. Does the usage of the concept giftedness follow double standards? Further research is desirable but the approachability to this difficulty seems to be limited.

4 Discussion

As reported at the beginning some studies (Chaudhuri et al., 1992; Ries & Heinen, 1979; Meyer & Butzkamm, 1975; Hofer, 1975) supported the thesis that teachers in mathematics and natural sciences had a particular strong believe in giftedness. These results contrast our findings. Due to the age of their research this discrepancy could be interpreted as another indication of the above-mentioned bias because meanwhile the standards of a certain “political correctness” might have increased. Beyond this, these studies, except for the one of Ries & Heinen (1979), investigated the conceptions of experienced teachers. Most of our participants, however, only left university just recently so they are supposed to be more aware of the academic standards and may be particularly sensitive to social desirability.

But this does not have to be the only possible interpretation of the contrast between the generally considered importance of giftedness and the applied attribution. A high correlation between the estimated giftedness of a concrete student and the assigned mark in the semantic differentials does not necessarily mean that the given mark is simply determined by the perceived giftedness. During the daily educational work the interviewed young teachers might focus their attention according to their general statements. A concentration on malleable concepts supplies them with better approaches to their students for educational intervention. Therefore the attached importance of the eleven factors might have been weighed by their effect on the students’ every day performance. But the assigned marks also include results of written tests, for instance, so the high correlation between them and the estimated giftedness might be retrospective. The individual rankings of the students’ traits might not only be determined by the perceived causality between them and the final achievement but also to a certain extent normatively oriented: Not necessarily consciously, the young teachers might

have a teleological view on their students and focus their attention on malleable constructs. In the first place implicit theories need to be rather viable than empirically correct.

Prospect: Educational Reconstructon

To prevent the findings from being detached from any practical relevance the further work aims to develop educational guidelines for teacher training. Embedded in the graduation program Didaktische Rekonstruktion (Kattmann et al., 1997) this aspiration follows the underlying model of Educational Reconstruction. Its key assumption is that the successful arrangement of meaningful learning needs to take the learners' concepts into particular consideration. They are to be analysed empirically. To develop an educational structure the learners' perspectives are to be interrelated to scientific perspectives. Accordingly the raised young teachers' implicit theories are regarded as learners' conceptions. The educational guidelines for teacher training result from negotiating between them and the experts' theories about attribution and determinant factors for school achievement. They shall encourage the young teachers' educationally sensitive conceptions of individual factors of school achievement and shall preserve their revealed optimistic image of their students.

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