

## The Pedagogic Signature of the Teaching Profession

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### Abstract

Lee S. Shulman deplors that the field of education as a profession does not have a pedagogic signature, which he characterizes as a synthesis of cognitive, practical and moral apprenticeship. In this context, the following study has three goals: 1) In the first theoretical part, the basic problems of constructing a pedagogic signature are depicted. 2) In the empirical part, based on a multi-method approach, teachers' and teacher educators' beliefs and attitudes about a pedagogic signature are identified and ranked. It is argued that beliefs are of particular importance because they have a filter effect on how teachers deal with scientific knowledge. 3) The third part, the discussion, explains the findings, particularly the fact that moral aspects and aspects referring to a particular attitude play an overwhelming role. The explanation leads to some basic considerations on how to construct a pedagogic signature and on how such a signature can be turned into a viable concept for teacher education.

**Keywords:** belief, implicit structure, multi-method approach, pedagogic signature, teaching profession

### 1. Introduction

Which values should a teacher have? How should a teacher practice his/her profession? What beliefs should a teacher hold? How does one encourage teachers to develop values, behavioral practices and thought patterns during teacher training? Lee S. Shulman, the former president of the Carnegie Foundation for the Advancement of Teaching, claims that questions such as these are much more difficult to answer for professions in education than for other professions such as law or medicine (Shulman, 2005a, 2005b). Shulman argues that a profession must have something like a *pedagogic signature*. Such a signature “is a synthesis of three apprenticeships—a cognitive apprenticeship wherein one learns to think like a professional, a practical apprenticeship where one learns to perform like a professional, and a moral apprenticeship where one learns to think and act in a responsible and ethical manner that integrates across all three domains” (Shulman, 2005b, p. 3).

Why do we need such a signature in the teaching profession? On the one hand, we have the comparative argument introduced by Shulman that other domains with a scientifically guided practice already have something like a pedagogic signature. On the other hand, there is the current state of teacher education. After an analysis of relevant passages in the journal *Teaching and Teacher Education* from the years 2000-2010, Avalos (2011) comes to the conclusion “that teacher learning and development is a complex process that brings together a host of different elements and is marked by an equally important set of factors” (p. 17). Leinhardt, Young and Merriman (1995) describe the teaching profession “as a coherent whole” (p. 404) with “multiple, interrelated strands of teaching” (p. 405), which cannot be divided into separate, individual attributes. Similar statements apply to Germany too (Fend, 2001; Rothland, 2013).

To deal with this particular situation, a pedagogic signature initiates novices into the thinking, performing and values of a profession by providing patterns that guide the perception and interpretation of situations in their professional life. Moreover, it helps the experts of a profession to reflect on their actions, to give reasons for their actions or to create obligations that have to be fulfilled by peers or novices. Both novices and experts can improve their professional preparation, their teaching and their educational practices relying on a signature like the one Shulman proposes. Unfortunately, in the context of teacher professionalization, there is no clear conceptualization on how a pedagogic signature should be constructed.

## 2. Frameworks for Conceptualizing a Pedagogic Signature

In order to construct a pedagogic signature, the body of research in education is broad and extremely diverse, particularly if one looks at it from an international perspective. The authors decided to briefly sketch three possible frameworks that could serve as a fundamental basis for the task of construction. The selection criteria are either to refer to frameworks that are discussed internationally or the international discussion is linked to the discussion in Germany, either by choosing German references in addition to references in the English language or by mentioning theories like the “Bildungsgangdidaktik” (educational background didactics). This particular body of research is a phenomenon in the German-speaking world but closely linked to the Anglo-Saxon context via the concept of developmental tasks introduced by Havighurst (1972). This not only broadens the scientific horizon but seems to be necessary, because the following research took place in Germany with German teachers and teacher educators who are at least, to some extent, initiated into the German scientific discourse.

### 2.1 The Professional Identity

One candidate for a conceptualization of a pedagogic signature is the powerful metaphor of a “professional identity”, sometimes also termed “professional self” or “professional vision” (Bauer, Kopka, & Brindt, 1999; Godwin, 1994; van den Berg, 2002). Although these terms are not identical and stem from different scientific contexts, they share a common meaning: If one tries to summarize the different conceptualizations in the frameworks of this metaphor, a professional identity can thereby be understood as a personal core of values, knowledge, attitudes and skills, which must be adapted through effort to the demands made by the professional situation. In the Anglo-Saxon world historically, the proposal of a professional identity relates closely to the term “reflective teaching” (see Pollard, 2002). The term is used in the tradition of Dewey’s works *Democracy and Education* and *How We Think*, and has found worldwide attention. In these books, Dewey defines reflective teaching as the ability to operate in unclear situations characterized by perplexity, confusion and doubt.

In the German-speaking world, aspects regarding a professional identity are heavily discussed in the area of “Bildungsgangdidaktik” (educational background didactics), as it is called in German. The German educational theorist Hericks (2006), referring to Havighurst (1972), claims that the reflective teacher should be aware that the following aspects will never reach a conclusion and are in need of life-long development:

- Recognizing, uncovering and managing the contradictory demands placed on a teacher;
- Clarifying anew one’s role as a subject expert and negotiator of content knowledge;
- Realizing that students are lay people in regard to the subject matter, and that the information will be processed differently by them than by specialists in the field; and
- Understanding that the practice of teaching is institutionally bound, and it is continuously necessary to fathom anew which possibilities in the teaching practice are in place.

### 2.2 Research on Effective Teaching and Learning

Other possible candidates for the conceptualization of a pedagogic signature originate from the empirical research on effective teaching and learning. In recent years, meta-analyses have influenced the thinking about the teaching profession heavily. Seidel and Shavelson’s meta-analysis (2007) on modern teacher effectiveness research developed a model emphasizing the interdependence of the domain of learning, time for learning, organization for learning, social context orientation, goal setting, execution of learning, evaluation, regulation and monitoring. John Hattie’s well-known meta-analysis, recently translated into German and extremely well received in German teacher education, does not offer a model of teacher actions with interdependent factors like Seidel and Shavelson, but for some he “Reveals Teaching’s Holy Grail”, as stated by the *Times Educational Supplement* and quoted on the cover of Hattie’s study. Based on 50,000 studies with many millions of students he identifies—grouped around six topics (the student, the home, the school, the curricula, the teacher, the approaches to teaching)—138 factors supposed to be effective in teachers’ professional practice (Hattie, 2009).

A further possible candidate for providing a conceptualizing structure in this empirical framework is the expert-novice paradigm. This research deals, on the one hand, with findings that transcend the profession, and that differentiate experts from novices; on the other hand, the research deals with specific findings relevant to the teaching profession (Berliner, 2001). Gruber and Stöger (2011) even talk about a “Signature of the Expert Teacher”. This signature is characterized by “a great deal of stored experience and usable knowledge for the core duties of a teacher; profound, domain-specific insight as well as efficient problem-solving” (Gruber & Stöger, 2011, p. 257). Expert teachers interpret situations better, are more flexible, have more automatic routines and can

deal effectively with unforeseen events. Their problem understanding is more oriented towards students' needs and classroom environment (Gruber & Stöger, 2011, p. 257).

### *2.3 Teachers' Beliefs and Attitudes*

A last group of research that might provide a reference structure for formulating a pedagogic signature for the teaching profession is the research on teachers' beliefs and attitudes. Usually those beliefs and attitudes have a subjective evaluative and/or explanatory component. They concern subjective conceptualizations about a teacher's role, the nature of teaching and learning, the educational system and cultural or societal values (cf., Fischer, 2014; Kunter & Pohlmann, 2009; Pajares, 1992; Woolfolk Hoy, Davis, & Pape, 2006). Beliefs are supposed to:

- have an emotional and normative evaluating character;
- have a filter effect, i.e., they influence the perception and interpretation of events in educational practices;
- have a motivating effect, i.e., they influence the decision making regarding specific actions;
- have a regulating effect, i.e., they influence the reactions to other people's actions; and
- reflect a collective habitus.

If one relates this body of research on beliefs and attitudes to the group of research here called research on effective teaching and learning, one is confronted with an interesting effect. The subjective beliefs and attitudes are very powerful, since they work as a filter on how scientific knowledge is perceived and used. For example, the Organisation for Economic Co-operation and Development (OECD) Teaching and Learning International Survey (TALIS) identifies the particular beliefs of teachers on the nature of learning. Some have a constructivist view of good teaching, others a direct instruction view. Due to the effects described above, those with a direct instruction view, as reported in the TALIS survey, and particularly teachers in Italy (TALIS, 2009, p. 93), who receive content from the realm of constructivism are most likely to be less open-minded or will not consider research of this kind as guidance for their actions.

Of particular importance in the framework of this article is the evaluating and normative character of beliefs. If one looks at theories on values and norms, one has to accept that we must discuss pedagogical beliefs not just as a consistent specification of isolated filter variables. Theories on values usually claim that "values are ordered by importance relative to one another. People's values form an ordered system of priorities that characterize them as individuals" (Schwartz, 2012, p. 3). Theories on norms argue in a similar direction. Norms could be legally appointed, but they also emerge from a common appraisal. Independent from the fact whether norms are legal norms or social norms, they are quite often supposed to work via a hierarchy (Shelton, 2006, p. 291). From the perspective of jurisprudence, on top of a normative hierarchy, usually there are more abstract norms that influence the norms at the lower levels in the hierarchy. Constitutions, for example, represent high level norms. This idea of dependent or interdependent hierarchies is also popular in theories about learning objectives, e.g., Bloom claims that in different domains of learning objectives, learning on higher levels requires the attained prerequisite knowledge from lower levels (Bloom, 1956; cf., Gagné, 1985).

If we broaden our view and look at the reception of scientific knowledge by teachers in general, the particular importance of beliefs increases. Research in Germany shows that teachers display attitudes against scientific knowledge. They consider the scientific guidance of their actions as not being in tune with their professional real life problems. Czerwenka (2002) has investigated the knowledge base that teachers use when they are confronted with a problem in their field of action. He found out that teachers in difficult situations prefer to rely on subjective theories and experiential knowledge. This is a well-known effect in science education. Even competent students turn to subjective theories instead of scientific concepts when under pressure (Johnson-Laird & Byrne, 1991).

This sketch of problems conceptualizing a pedagogic signature is not complete. A book can be written about it. However, it demonstrates the importance of teachers' beliefs for constructing a pedagogic signature. The construction of a signature needs to answer the question: what are teachers' and teacher educators' beliefs and attitudes about a cognitive, practical and moral apprenticeship? We consider those beliefs as an important starting point for the construction of a signature since they moderate how concepts from science and from normative institutions like national educational standards are perceived and put into action. This is the central question of the research presented here.

The authors try to give an answer to this question in the framework of a mixed-method approach (see Cohen, Manion, & Morrison, 2007). An instrument borrowed from the Fleishman Job Analysis Survey of industrial and

organizational psychology will be applied. The Fleishman Job Analysis Survey is a tool used to survey experts from a profession, and consists of predetermined questions regarding the demands specific to the respective workplace in the form of general abilities and characteristics one needs to achieve success in the field. Group discussions will validate the findings and provide vivid examples for the abstract categories of the quantitative part.

### 3. Background and Research Questions

The following study aims to *identify a pedagogic signature* for the teaching profession based on teachers' and teacher educators' beliefs. Up to now, the theoretical approaches, paradigms and findings in regard to such a signature may be characterized as follows:

- 1) They frequently focus only on instrumental rationalities and tend to neglect values and dispositions guiding professional action. A good example is Hattie's popular meta-analysis, which identifies 138 factors of effective professional teacher actions. In contrast to Shulman's professionalization theory, Hattie argues in terms of an instrumental rationality. In our opinion, this also applies to elaborated models of teacher effectiveness as presented by Seidel and Shavelson (2007) and for the expert-novice paradigm.
- 2) For the most part, the aspects of a pedagogic signature are simply named, or can be inferred through various findings and theories; a scale of different aspects or a ranking based on normative evaluations, as in a scale of importance, is seldom found.
- 3) Quite often, the focus of research that could be the base for a pedagogic signature is on teacher effectiveness (cf., Seidel & Shavelson, 2007). This body of research, going back to Robert Mills Gagné and Robert Glaser during the Second World War, investigates professional action in order to make students learn more. This powerful paradigm does not ask what is important for teachers beyond the demand to impart knowledge effectively.
- 4) A direct comparison of the different aspects of a signature within the various types of schools is rare. Existing publications concentrate mostly on schools such as elementary schools or middle schools, and a scientific comparison with other schools is lacking.

Based on these deficiencies in the research, this study maintains as its goals:

- 1) To not only name the aspects of a pedagogic signature, but to rank them based on importance; stating which abilities and qualities are deemed more important than others will be part of the study.
- 2) A comparison of the different aspects of a signature found in the various types of schools will follow; the consideration as to whether there are universal aspects regardless of type, and which differences among the types of schools are stated.
- 3) Aspects of a pedagogic signature originating from representatives of the professional practice will be ascertained.
- 4) To provide guidelines for the construction of a pedagogic signature.

This will be created by using the following research questions:

- 1) What does a pedagogic signature for the teaching profession look like?
- 2) Which aspects especially typify the pedagogic signature? Which aspects are deemed as particularly important, in the sense of "central" aspects, and how can they be scaled?
- 3) Does the pedagogic signature differ between the various types of schools?
- 4) If there are multiple pedagogic signatures, can we find common aspects within all the pedagogic signatures of the various types of schools; is there a comprehensive area of aspects?
- 5) How do the pedagogic signatures for the various types of schools differ from one another?

## 4. Methods

### 4.1 Project and Research Context

The following study is part of research projects *Demand Analyses for the Teaching Profession* and *Risk-Check for Prospective Teachers* at the Chair of School and Teacher Research at Ludwig-Maximilians University in Munich, which cooperates with the German Aeronautics and Space Research Centre (DLR). The goal of the project is to establish school type specific demand profiles with an emphasis on traits and qualities, based on data collected from various groups of experts. This project is supposed to be the base for a Realistic Job Preview—an

instrument that will support teacher trainees *before* and *during* their studies and assess their individual expectations, motives and wishes with regard to their studies and future profession, thereby providing empirically founded evidence for the career choice.

#### 4.2 Random Sampling

Experts from various levels of the education sector were recruited, including those involved in teacher education and those working in the field of practice. The criteria for the random sample were as follows:

- Only those experts who had been active in the teaching profession and teacher education for six years were asked to participate (completion of the stabilization phase, Huberman, 1989).
- Experts from all types of schools and school specific teacher education were asked in order to recognize the aspects that were unique to the differing school types, or those that were common to all types.

The recruitment was initiated through an announcement made by the Chair of School and Teacher Research and was then forwarded to the relevant departments in the German state Bavaria. The total sample included 167 experts with the following distribution:

- 59 experts from elementary schools
- 61 experts from middle schools
- 47 experts from grammar schools

Half of the experts in each school type were teachers involved in the training and mentoring of novice teachers; the other half were not. The collection of teachers' and teacher educators' beliefs was school type specific.

For the group discussions, the experts were divided into homogenous discussion groups according to school type. In total, twenty-one discussion groups were created. The distribution of the participants in the discussion groups is illustrated in Table 1.

Table 1. Distribution of the discussion groups

	gr 1	gr 2	gr 3	gr 4	gr 5	gr 6	gr 7
elementary school	7	7	7	10	11	11	6
middle school	8	9	10	9	9	10	6
grammar school	7	7	7	7	6	7	6

#### 4.3 Measuring Instruments and Procedure

In socioscientific research, assessing the importance of aspects in a defined subject area through expert opinion is a great challenge. As a rule, mere quantitative investigation is not adequate and a communicative process is seen as essential. As a result, the literature includes a multitude of diverse, largely qualitative approaches, such as expert interviews (Gubrium & Holstein, 2002), group discussions (Lindlof & Taylor, 2002) or the Delphi method (Hsu & Sandford, 2007; Lindstone & Turoff, 1975; Oser, 2001). In this study, the strengths of both qualitative and quantitative methods (completeness, weighted evidence, communicative process, generation of new ideas) were used in a multi-method approach (Cohen et al., 2007) to the data by considering the following:

- 1) Can commonalities be found in the two methodical, yet different approaches?
- 2) Are there differences in the results of qualitative and quantitative investigations? How can these differences be explained?
- 3) Are there aspects that were not incorporated into the qualitative measurement?

##### 4.3.1 Quantitative Data Collection and Analysis

###### a) Development of the Measuring Instruments

Up to now, the predominant professional analyses have been found mostly in fields in which the tasks are well defined and able to be functionally conceptualized (e.g., for military personnel or operating staff at a nuclear reactor). One of the best researched of these groups are pilots, whose demand profile was compiled by the German Aeronautic and Space Research Center (Deuchert & Eissfeldt, 1998).

The findings in this research tradition have built the basis for the development of quantitative instruments. Worldwide, one of the most applied instruments is the Fleishman Job Analysis Survey (F-JAS) (Fleishman, 1998). In order to modify this instrument for use in the education profession, two pre-tests with a total of twelve teacher education experts were conducted before the study began. In these expert rounds, items that were comprised exclusively of technical content (e.g., the operation of several control levers simultaneously) were eliminated, and items that, according to the majority opinion of the experts, were especially relevant to the teaching profession were added. As a result, the instrument of quantitative assessment comprises 98 items. The techniques used by the F-JAS were applied to the survey: the experts rated the different aspects of carrying out instruction on a scale from one to seven.

*b) Analysis*

A total of 16,366 ratings were collected in a paper and pencil test from the 167 experts (elementary school: n=5,782, middle school: n=5,978, grammar school: n=4,606). These individual ratings were computed into a score value (numerical medium for the ratings). The analysis of these expert ratings with the significance of the individual items of the modified F-JAS shows the following results regarding the estimation of importance:

- The instrument contains occupational aspects only, and avoids correction or reference items, therefore all items have a negative skewness (median of skewnesses=-0.51; range of skewnesses=[-1.89; 0.12]).
- For the same reason, with the help of the quartiles and the probability density estimator, a clear ceiling effect can be verified for most items.
- In answering the first few items, the individual expert established an implicitly individual frame of reference, to which he or she adjusted his or her further estimations (individual intercept). Experts who rated the initial items relatively highly tended to compare all aspects that followed to their previous estimations and to correspondingly adjust the resulting estimations of importance. This phenomenon is related to the individual rating strictness in recommender systems (Koren, Bell, & Volinsky, 2009) and can be handled by using mixed linear models (Pinheiro & Bates, 2010). Table 2 compares the mixed model with the linear model described before.

Table 2. Comparison of the linear models to estimate the importance of aspects

Formula	df	F	p	R <sup>2</sup>
$y = \beta_0 + \beta_1 x_1 + \epsilon;$ <i>y=Estimations of importance</i> <i>x<sub>1</sub>=Item values</i>	97.17 375	56.65	<.001	.23
$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \epsilon;$ <i>y=Estimations of importance</i> <i>x<sub>1</sub>=Item values</i> <i>x<sub>2</sub>=Experts (random intercept)</i>	178.17 179	24.51	<.001	.38

df=degrees of freedom; F=F-Value; p=probability; R<sup>2</sup>=proportion of explained variance

In unbiased estimates of a value through models in which constant (here: item estimation) as well as incidental effects (here: experts) are significant, the use of a mixed linear model is recommended in the literature (Fahrmeir, Kneib & Lang, 2009; Pinheiro & Bates, 2010). Used here is the random intercept model

$$y = \beta_0 + \beta_1 x_1 + v + \epsilon$$

with

$$y = \text{Estimations of importance}$$

$$x_1 = \text{Item values}$$

$$v = \text{Random intercept (expert)}$$

which approaches the expert with regard to his or her individually set norms as an incidental estimator, adding an individual bias (SD=.46) to the results, which is adjusted as a correction factor in the estimation of the score

values and produces a more adequate unbiased estimator for the favored initial model  $y = \beta_0 + \beta_1 x_1 + \varepsilon$ . The necessary additional calculations are conducted using the statistical tool *R* and the library *lme4*.

Nevertheless, even after the adjustments are made, a negative value remains for practically all items in the distribution skew (median of skewnesses=0.41; range of skewnesses=[-1.19; 0.13]).

The Intraclass Correlation Coefficient (ICC) (average, 2-factorial, adjusted) is ICC (3,k)=.96, which is good due to the range of the skewness being nearly 2; since various negative skewnesses have a negative influence on the estimation of the ICC, which is a minimum estimator.

Further findings were examined using distribution-free procedures.

#### 4.3.2 Qualitative Data Collection and Analysis

##### a) *Qualitative Procedure*

According to Lamnek (2010), the opinions and attitudes of a whole group (i.e., a collective pattern for orientation) may be garnered through investigative group discussions. This approach allows the creation of a pedagogic signature in the sense of a collective pattern of orientation. In contrast to the quantitative approach, group discussions permit verbal legitimation and clarification by experts. Furthermore, more opinions surface in group discussions than in solely quantitative inquiries as a result of mutually stimulating conversation. Results collected by conjointly determining a pattern of orientation are deemed valid.

The course of the discussion was thematically structured with reference to the following key questions:

- Which qualities and skills should a teacher possess in order to carry out his or her work?
- Which qualities and skills are especially important?

The statements and opinions were initially compiled in writing (using moderation cards) and made visible to all participants. During the discussion, attempts were made to highlight opinions through mutual conversation and to reach a consensus through collective mind-mapping. Each discussion group was monitored by experienced individuals currently active in teacher education.

##### b) *Analysis*

The analysis was oriented toward the theory of qualitative content analysis according to Mayring (2010): The goal of an analysis is to reduce the material so that the fundamental content remains and to obtain through abstraction a straightforward corpus which remains an image of the raw material (Mayring, 2010). The statements from the participants were ordered into categories with the help of the MAXQDA program. The categories were integrated and the results ordered and analyzed thematically. Therefore, a theoretically based category system was developed from the material. Without being asked, the overwhelming majority of the discussion participants made reference to the well-established differences regarding the abilities and traits in the categories of subject, method, and social and personal competences.

The inter-rater reliability was calculated in order to verify the quality criteria. In addition, the aspects specified by teachers were completely doubly encoded. Consensus was reached when at least 90% of the relevant passages were identically coded. In the literature, a reliability coefficient of .70 overall is seen as satisfactory (Bos, 1989, p. 62).

## 5. Results

### 5.1 *Aspects of a Pedagogic Signature—Quantitative Analysis*

The expert rankings were adjusted according to intercepts and arranged into a table. There were no great gaps between the score values in the overall ratings or in the differentiation of the estimations of importance. Thus, the description of importance was reference-free and established solely according to place ranking. The following formulation was used:

- |                           |                     |
|---------------------------|---------------------|
| • Very important          | Place ranking 1-10  |
| • Important               | Place ranking 11-20 |
| • Worthy of consideration | Place ranking 20-35 |
| • Of average importance   | Place ranking 36-74 |
| • Rather unimportant      | Place ranking 75-98 |

For the quantitative analysis (score), using the described approaches, a maximum of 16,366 ratings from 167 experts and 98 items were yielded (elementary school: n=5,782, middle school: n=5,978, grammar school: n=4,606). Table 3 shows the ten most important aspects for all school types.

Table 3. The ten most important aspects for all school types (individual and overall appraisals)

All school types taken together	Elementary School	Middle School	Grammar School
1. Child-centeredness	1. Child-centeredness	1. Child-centeredness	1. Child-centeredness
2. The creation of learning opportunities	2. The creation of learning opportunities	2. Resistance to stress	2. The ability to express oneself
3. The ability to express oneself	3. The ability to express oneself	3. The creation of learning opportunities	3. Reliability
4. Resistance to stress	4. Social sensitivity	4. A caring leadership style	4. Attentiveness and focus
5. A caring leadership style	5. Resistance to stress	5. Authenticity	5. A caring leadership style
6. Social sensitivity	6. A caring leadership style	6. Social sensitivity	6. Resistance to stress
7. Attentiveness and focus	7. Approach to heterogeneity	7. Ability to express oneself	7. The creation of learning opportunities
8. Reliability	8. Ability to balance private life and work	8. A demeanor of confidence	8. Ability to pass on knowledge
9. Approach to heterogeneity	9. Flexibility	9. Reliability	9. Authenticity
10. Flexibility	10. Reliability	10. Attentiveness and focus	10. Preparation and treatment of learning material (subject matter)

For a differentiated view of the similarities and differences between the individual school types, the entries will be itemized below according to the various school types. The significance of the differences between the individual school types will be verified with the help of the Kruskal-Wallis test. This verification will not be made according to place ranking, but rather with the actual score values of each item. This method provides more conservative estimates (due to the ceiling effect) than testing the differences of the place rankings would.

#### 5.1.1 Similarities between the School Types

The following aspects, which are found in all school types, were listed among the ten most important:

- 1) Child-centeredness (Getting a feeling of enjoyment when interacting with children and youth);
- 2) Resistance to stress (The ability to stay healthy and reach one's pre-set goals during difficult, wearing and stressful situations);
- 3) The creation of learning opportunities (Preparing and putting into practice child-appropriate learning opportunities);
- 4) A caring leadership style (Recognizing each person present, taking the person's needs and emotions seriously, and showing interest in the person); and
- 5) The ability to express oneself (Using the spoken word so that others can understand).

Table 4 shows the differences between the individual rankings. The significance of the differences for the aspects child-centeredness and the creation of learning opportunities is due to the high variance of the estimation of importance, thereby resulting in the place ranking of these items. All in all, both items are found among the top ten rankings in all school types taken together, in the rankings of the school types considered individually, and in the resulting score values.

Table 4. Ranking of the aspects that were considered very important in all school types

Label	ES	MS	GS	$\chi^2$
Child-centeredness	1	1	1	15.0; $p < .01$
Resistance to stress	5	2	6	5.7; n.s.
The creation of learning opportunities	2	3	7	13.8; $p < .01$
A caring leadership style	6	4	5	3.1; n.s.
The ability to express oneself	3	7	2	9.2; $p < .05$

ES=elementary school; MS=middle school; GS=grammar school;  $\chi^2$ =chi-square value

Figure 1 shows the rankings respectively the importance of the aspects once again.

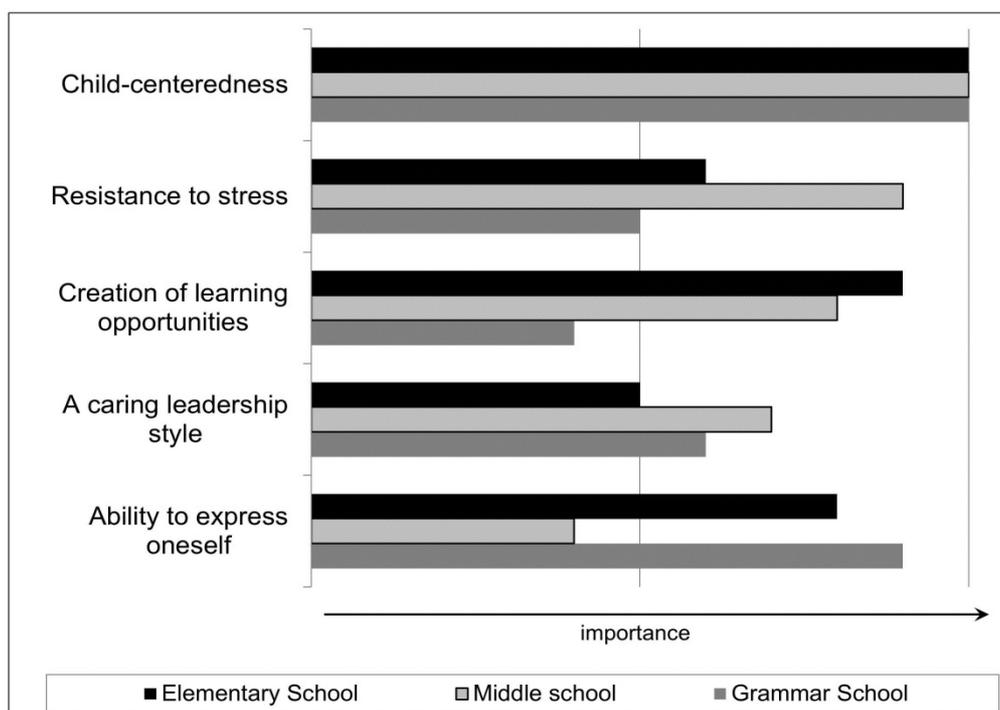


Figure 1. Ranking of the aspects that were considered very important in all school types

Six other items were not found in the top ten lists of the most important aspects in every school type; they were, however, found in every top twenty list:

- 1) Attentiveness and focus (Remaining equally attentive to various aspects of the environment, person and behavior, and to show one's attentiveness and awareness of these aspects to the greatest extent possible);
- 2) Reliability (Acting with trustworthiness and integrity; this includes dependability and diligence in carrying out one's duties and obligations);
- 3) Flexibility (Adapting to suddenly changing, unplanned situations; this includes grasping and appraising new situations in as short a time as possible);
- 4) Ability to pass on knowledge (Transmitting the facts and context of a particular subject in a way that is suitable to the target group);
- 5) Authenticity (Showing an overall cohesion of one's rational, emotional, verbal, non-verbal, visible and non-visible signals and information); and
- 6) A demeanor of confidence (Showing and communicating self-confidence in social situations).

Table 5 shows the differences between the score rankings of the different school types. The differences are not important.

Table 5. Ranking of the aspects that were considered very important or important

	ES	MS	GS	$\chi^2$
Attentiveness and focus	11	10	4	0.9; n.s.
Reliability	10	9	3	1.6; n.s.
Flexibility	9	14	13	5.7; n.s.
Ability to pass on knowledge	19	18	8	2.7; n.s.
Authenticity	13	5	9	1.8; n.s.
A demeanor of confidence	12	8	15	2.7; n.s.

ES=elementary school; MS=middle school; GS=grammar school;  $\chi^2$ =chi-square value

### 5.1.2 Differences between the Individual School Types

In addition to the similarities, the aspects that differ between the school types are interesting. Noteworthy are the aspects with top rankings that the experts of only one school type reported as being of prominent importance. These consist of the following two aspects, which differ greatly from one another:

1) Ability to balance private life and work (Attaining long-term satisfaction from a balanced relationship between work and private life; this includes managing stressful situations at work with partnerships, family or free-time activities).

This aspect was deemed as most important by the experts of the elementary school (Rankings: ES=8, MS=17, GS=17;  $\chi^2=14.3$ ;  $p<.01$ ).

2) Giving instructions (To make expectations clear, giving specific instructions and coordinating responsibilities precisely; this includes checking results and proceedings).

This aspect was deemed as most important in the middle school, and to a lesser degree in the elementary school; the grammar school teachers did not assign it prominent significance (Rankings: ES=15, MS=11, GS=36;  $\chi^2=15.5$ ;  $p<.01$ ).

Figure 2 illustrates the differences between the school types once again.

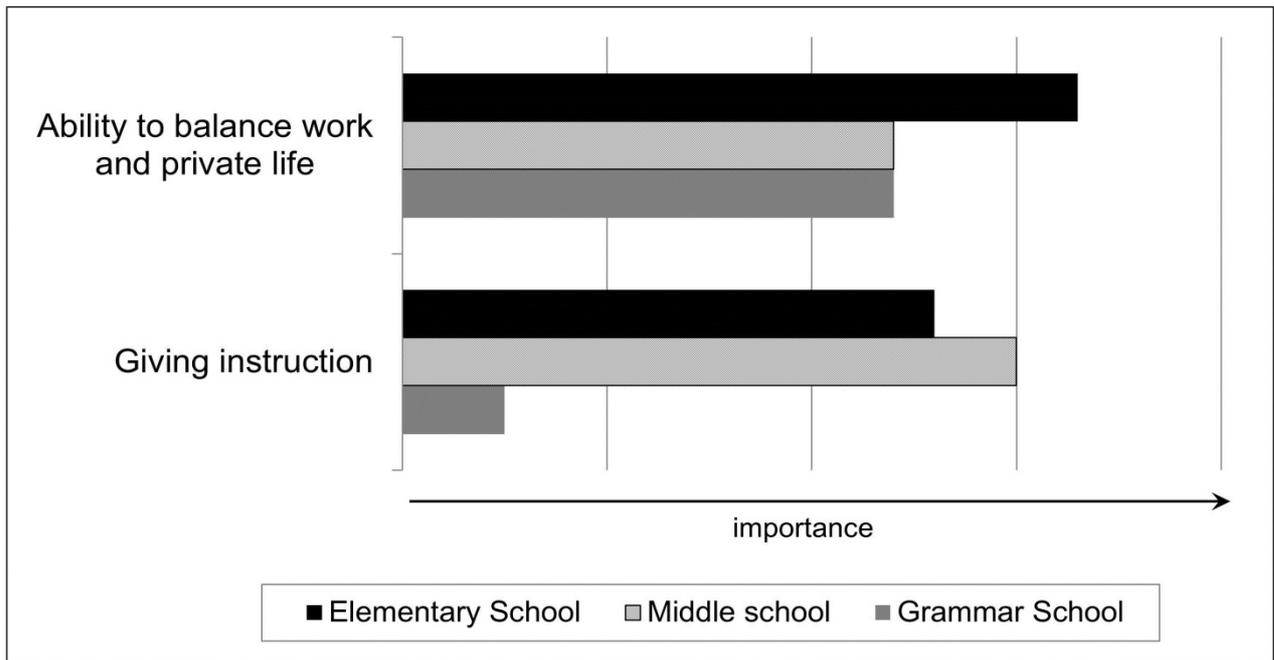


Figure 2. Differences between the school types

In addition, aspects that the experts of only one or two school types judged as especially important were considered; however, the rest of the experts did not share this view:

1) Approach to heterogeneity (To be able to work with the differences of the group members; this includes being able to use the diversity and distinctiveness of the group to advantage in order to work productively).

The experts of the elementary school, and to a lesser extent those of the middle school, view the ability to deal with heterogeneity as important (Rankings: ES=7, MS=12, GS=31;  $\chi^2=25.5$ ;  $p<.01$ ).

2) Social sensitivity (To respect and understand the feelings and views of others, and to estimate the consequences of actions on others).

The experts of the grammar school give this aspect a rating of relatively lesser importance, while those of the other school types see this aspect as having prominent importance (Rankings: ES=4, MS=6, GS=30;  $\chi^2=25.0$ ;  $p<.01$ ).

3) Preparation and treatment of learning material (To plan and create situations of knowledge transfer, so that the content may be understood and grasped by others).

This aspect finds acceptance in grammar school; the experts of the other school types report no special importance here. With this aspect, however, the difference in the score values is not significant, even when considering the difference in ranking (Rankings: ES=26, MS=24, GS=10;  $\chi^2=0.6$ ; n.s.).

### 5.2 Aspects of a Pedagogic Signature—Qualitative Analysis

Table 6 provides the system of categories obtained from the qualitative analysis of the shared group discussions and the mentions according to school type. The categories will then be clarified and illustrated using contributions from the discussions.

Table 6. System of categories for the aspects of the pedagogic signature

Categories	Mentions *		
	ES	MS	GS
<b>Subject aspects</b>			
→Subject knowledge	4	8	32
→Enthusiam for one's subject	0	1	13
<b>Methodological aspects</b>	6	10	12
<b>Social aspects</b>			
→Leadership competence	13	16	9
→Authenticity	5	6	13
→Sensitivity in social situations	15	9	12
→Empathy	6	14	7
→Enjoyment of interaction with children and youth	20	8	23
→Conflict-solving competence	3	6	5
→Communicative competence	4	5	10
<b>Personal aspects</b>			
→Resistance to stress	11	8	11
→The ability to balance work and private life	13	3	6
→The ability to keep a distance	12	4	5
→Self-assuredness	4	1	1
→Openness and ability to change	10	9	8
→Flexibility	6	5	6
→Ability to reflect	5	2	4
→Attentiveness and focus	11	10	10
→Ability to self-organize	2	9	3

ES=elementary school; MS=middle school; GS=grammar school

### 5.2.1 Subject Aspects

The clearest difference between the school types is found in the estimation of subject competence, which is seen as either a domain-specific competence in the subject, as in grammar school, or in the sense of a wide, generalized basis of knowledge.

For those employed by grammar schools, subject competence in the sense of domain-specific knowledge is the most important aspect above all. The importance of subject competence is frequently not viewed as an isolated aspect; on the contrary, it is viewed together with the enjoyment of interacting with children and youth: "Without enjoying the interaction, I can't be a teacher; the rest in contrast can be acquired". In addition, enthusiasm for one's subject is important: "In cases where the teaching profession is seen as an emergency solution for someone, there can be no success in the profession", it is claimed "only one's own enthusiasm for the subject matter can motivate pupils".

In the middle schools, the experts do not define subject competence as domain-specific knowledge; rather, it is seen as a wide basis of knowledge in the sense of comprehensive general knowledge. The main focus of

attention during the discussion concerns the relationship between this general knowledge and method competence, whereby “the learning content must be adequately prepared in order for its transmission to the students”. In the elementary schools, the discussion of subject competence takes place in very limited contexts. Subject knowledge is cited only in isolation and in the sense of the creation of learner-appropriate learning opportunities.

### 5.2.2 Method Aspects

The experts consider method competence in the tradition of German teacher training as didactic competence, that is, the ability to organize teaching and learning. Overall, there is agreement between the school types, which is reflected in the number of mentions. The participants in the middle school discussion emphasize the ability to transmit subject matter adequately through the use of a variety of teaching methods. The grammar school experts see didactic competence as a connection between subject and social competences, although they make their case from a different perspective. For them, didactic competence means “to take care, on the basis of subject competence, that information which is transmitted is well-received and understood”. Likewise, the interaction with students must take priority: “Professionals often have difficulties in making the necessary changes in perspective while explaining—they are unable to put themselves in the child’s or youth’s place”.

### 5.2.3 Social Aspects

The spectrum for social competences is extensive and broad, and shows several school type specific characteristics. At the core for all school types, lies *leadership competence*. Underlying this is the balance of a healthy amount of distance and closeness to the students: “You can’t be afraid of not being loved by the students”. Experts from grammar school mention leadership less frequently. Leadership ability was defined as “the ability to guide a group” or “the ability to make decisions”. It is noteworthy that these groups connect leadership competence to a great extent with authenticity. An authentic manner secures authority and credibility for the teacher: “Whoever doesn’t manage to be authentic will eventually fail”.

Other aspects describe the interaction with students, which should be characterized by appreciation, *social sensitivity*, *empathy* and a *general enjoyment of interacting with children and youth*. These aspects are mentioned more frequently than any other by grammar school teachers and elementary teachers. Elementary school teachers emphasize that only those who enjoy interacting with children and youth and can empathize with students and adjust their behavior to their students’ needs will be able to manage. At the same time, social sensitivity is seen as an across-the-board necessity: “Without it nothing works at all!” Teachers from grammar schools point out the wide-ranging age differences: “I have to be able to get along with 8th graders who are going through puberty as well as with 5th graders who would love most of all to sit on my lap”. Grammar school teachers argue as well that no transmission of knowledge is possible without the enjoyment of interaction since the perception of the material from the students’ point of view often overlaps at the relationship level. The panel participants from middle school also believe that “realizing that in the teaching profession the child stands at the center” is important. In this school type empathy stands at the forefront.

The need for conflict resolution and the ability to communicate occur together for the most part with the demand for leadership competence and empathy. The participants from middle school regard good teachers as having a strong communication style in the sense of using clear language and having adept conversation skills, which they use in the many situations where one is required to give guidance and advice in everyday school life. Being able to resist and resolve conflict is also identified as an important trait in this area: “The ability to communicate includes the readiness to support a conflict in discussion as well as seeing the needs of both of the conflicting parties instead of wanting to share something or give someone a lesson”. Grammar school teachers describe communication as the ability to transmit important subject matter at the spoken level.

### 5.2.4 Personal Aspects

Those aspects relating to the “healthy behavior” of a teacher are discussed primarily by elementary school teachers. Stress resistance, in the sense of developing strategies to manage stressful situations, is rated as most important, as well as the ability to balance private life and work. In this context, the critical trait *the ability to find a distance* is emphasized: “This includes not taking personally all that comes out of the students”. These aspects have a lower estimation among participants from the middle school. In this context, experts from the middle school add *self-assurance* to this.

Openness to new experience is mentioned in all school types as an important factor; this goes along with the ability to adapt and flexibility, which are especially important in relation to unexpected and unforeseen situations. By the same measure, and in all school types, the ability to reflect is assigned importance. This is understood as

self-reflection, and it involves “awareness of one’s own strengths and weaknesses” and a consciousness in relation to one’s self. Participants from all school types consistently mention attentiveness and focus: this involves a “confident manner”, finding “the right attitude towards one’s self”, and taking responsibility for one’s self and presenting oneself in front of the students as a teacher.

### 5.3 A Comparison of the Quantitative and Qualitative Data

The findings of the multi-method approach lead to the following conclusions:

- 1) There are aspects of a pedagogic signature for the teaching profession that are common to all school types.
- 2) In contrast to this, school type specific distinctions also characterize the pedagogic signature: these apply to the emphasis on the aspects, and the definition of the aspects.
- 3) The qualitative and quantitative findings differ in several respects.

(1) The pedagogic signature that describes the work that is common to all teachers is as follows:

- At the center is the *interaction* with the students, which should be characterized by a general enjoyment of interacting with children and youth, plus respect and authenticity.
- *Being attentive* and *self-assured* is also a central demand of the teaching profession.
- The same goes for a diverse, methodically manifold *creation of learning opportunities* that are suitable for the target group.
- *Stress resistance*, in the sense of setting realistic goals and protecting one’s resources in difficult and challenging situations finds overall agreement as well in all school types.

(2) The pedagogic signature is typified by the following school type specific differences:

- Work at a grammar school is typified by a high emphasis on subject knowledge and its preparation and transmission as well as enthusiasm for this knowledge; subject matter is defined as domain-specific—in contrast to the other school types, where subject competence is related to a wide, general education.
- In the elementary school profile, the task of *managing a heterogeneous student body* stood out, and aspects such as social sensitivity, the ability to maintain a distance, and “being able to tune-out” after the school day in the sense of the *ability to balance private life and work* are important.
- Essential to the job of working in a middle school is *communicating instructions clearly and precisely* according to the needs of the students as well as checking the results; therefore teachers need a high degree of empathy and self-organization.
- Some terms, as *leadership* and *communication abilities*, are defined differently by the experts. For example, in grammar school, communicative competence is seen as the transport of content, and leadership, as the guidance and structuring of a group; in middle school, these characteristics are focused on the ability to manage conflicts as well as counseling.

(3) Differences in both methodical approaches to determining a pedagogic signature can be exemplified by the following aspects:

- The *ability to express oneself* was weighted highly in the quantitative investigation; however, it found no counterpart in the group discussions.
- *Openness to new experience* in the sense of readiness to change typifies the pedagogic signature of a teaching profession considerably, at least according to the overall majority of the group discussion participants; however, this finding was unable to be confirmed by the quantitative data.

## 6. Discussion

The aim of the study presented here is to identify a pedagogic signature for the teaching profession in terms of teachers’ and teacher educators’ beliefs. In this discussion, we ask whether a pedagogic signature as developed here is a viable concept for teachers and their continuing education. In order to answer this question, first we characterize the findings according to the lines of Shulman’s arguments concerning the structure of a signature. After having done this, we draw conclusions to make the concept of a signature viable for teachers and their continuing education.

### 6.1 The Structure of the Findings According to Shulman's Theory

Transcending the quotation at the beginning of this article, Lee (2005b) describes the pedagogic signature of the teaching profession as consisting of the following dimensions: "First, it has a *surface structure*, which consists of concrete, operational acts of teaching and learning, of showing and demonstrating, of questioning and answering, of interacting and withholding, of approaching and withdrawing. Any signature pedagogy also has a *deep structure*, a set of assumptions about how best to impart a certain body of knowledge and know-how. And it has an *implicit structure*, a moral dimension that comprises a set of beliefs about professional attitudes, values, and dispositions" (p. 55).

If we look at the beliefs from the expert teachers and expert teacher educators in the study presented here, the pedagogic signature of the teaching profession, at first glance, is characterized by a general enjoyment of interaction with children and youth, respect, authenticity, attentiveness, self-assurance and stress resistance. In our opinion, these attributes belong to the implicit structure of the signature, because the first three aspects characterize either professional attitudes or values and the last ones represent professional dispositions. At a second glance, the deep structure in our findings is only represented by the target group specific creation of learning opportunities. It is apparent that surface structure plays no role in our findings.

### 6.2 Possible Causes for the Findings

Why is the implicit structure of the teaching profession of such a great importance? Why are the teachers' beliefs dominated by the implicit structure? There can be some different acceptable reasons:

1) *Domain specificity* (see Seidel & Shavelson, 2007): In our study, teachers were researched from various domains of knowledge, like mathematics, English, history, etc. In terms of Shulman's ideas on dimensions, different knowledge domains contain different surface structures. So historians pose specific questions regarding the course of a historical source analysis, mathematicians turn to other questions in order to demonstrate geometrical proofs, and creative writing in a literature lesson demands other techniques than a historical source analysis or making use of Euclidean geometry. This is similar for the deep structure. Historical source analysis or the introduction of a mathematical proof illustrate domain-specific mindsets, and are strongly connected with specific pedagogic content knowledge. These different surface structures and deep structure mindsets could not be presented in the quantitative part of the study. At German universities, there are usually more than 500 possible subject combinations one can study to become a teacher (having two subjects is a requirement for most teacher training). At the university four of the authors are from, there are more than 1,000 subject combinations a teacher student can study. As far as the qualitative part is concerned, we assume that, to some extent, the domain specificity of the surface and deep structure prevented a discussion on those structures in the small groups that were heterogeneous in terms of different subjects and knowledge domains.

2) *Motives to become a teacher*: If one looks at the international body of research concerning the motives of young adults for choosing a teacher training course of study, intrinsic motives dominate their motivation structure (e.g., Bastick, 2000; Richardson & Watt, 2005; Watt & Richardson, 2008). These intrinsic, addressee-related motives, such as "accompany and promote children's and youth development" are similar or closely linked to concepts termed in this research as "enjoyment of interaction" and "authenticity", which are supposed to be part of an implicit structure. This strong bias in their motives might be another reason for more of the participants to refer to aspects of the implicit structure in the quantitative and qualitative parts of this study.

3) *The competing models of surface structure and deep structure in education*: It may be expected that many aspects of a surface structure or a deep structure are codified in education textbooks on instructional design, or in education textbooks on general didactics, which is the equivalent of instructional design in Germany (Seel, 1999). On top of that, it should then be expected that teachers and instructors would refer to this issue, and not only in order to define their duties in their professional practice. This is not the case. The reason is due to the confusing lack of uniformity in textbooks. In instructional design, for example, issues have been raised over the number of the approximately twenty diagrammatic models of the process of teaching and learning, for example, in Reigeluth (Laurillard, 2012; pos. 1661). In Germany, in a similarly popular work, Kron (2008) identifies more than forty didactic models; Baumgartner (2011) mentions 148 methods in a taxonomy of teaching methods; and Meyer (2002) even speaks of more than 1,000 presentation techniques for the lesson. These competing models of possible deep and surface structures do not represent a strong paradigm that expert teachers and expert teacher educators can rely on, so they possibly did not refer to it.

### *6.3 Consequences for Constructing a Pedagogic Signature of Teacher Education*

From the findings of the present study, as well as from the causes just discussed above, some conclusions can be drawn about constructing a pedagogic signature for teacher education:

1) From the perspective of teachers' beliefs, a general pedagogic signature almost does not exist in terms of a surface structure. When considering surface structure, only one aspect remains that is common for all teachers—the audience appropriacy of oral communication, but this was viewed as significant only in the quantitative data as overreaching for all school types. The audience appropriacy of oral communication was not touched upon or specified in the group discussions due to its subject specificity; however, it remains important nonetheless. The fact that the surface structure differs requires us to look at a pedagogic signature as a common core based on the implicit structure and partly on the deep structure that has to be combined with domain-specific and school type specific concrete, operational acts of teaching and learning that can be called domain-specific surface structure and school context specific structures. When considering the borderlines of a common pedagogic signature, it would be desirable to undertake follow-up investigations in which the overall pedagogic signature of the teacher education field could be supplemented with school subject specific signatures, or with signatures from different school contexts.

2) Teacher education has to address teachers' beliefs. When teacher trainers educate future teachers by referring to models like the novice-expert theory, Seidel and Shavelson's model of effective learning or Hattie's 138 factors of effective teaching beliefs, this can be counterproductive for the perception and reception of scientific knowledge. Some scientists of the German "Bildungsgangdidaktik" recommend that teacher training should start with an assessment of the teacher trainee's beliefs. This assessment serves three purposes: 1) To confront the beliefs with the scientific body of research (Neuss, 2008). This is supposed to create an awareness of commonalities and dissonances of beliefs and science. 2) To use the assessment as a base to construct a group-specific curriculum. In the framework of this theory, curriculum is not a given thing, but has to be created starting with the conceptions of the teacher trainees. This is called "inductive curriculum". 3) To construct individualized developmental tasks that address the trainees' beliefs and attitudes towards professional teacher actions. Confrontation, curriculum conception and the development of individualized tasks could be part of a pedagogic signature. The process of construction based on the arguments mentioned above can be presented in the following figure:

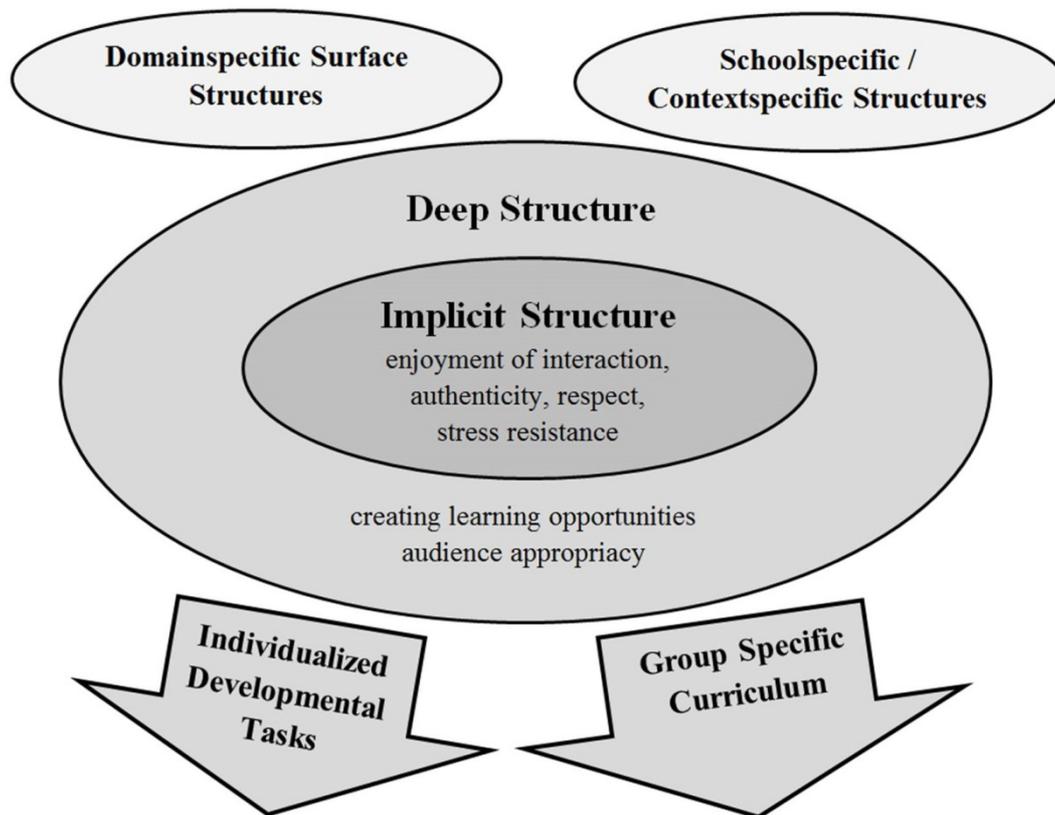


Figure 3. Construction of a pedagogic signature for teacher education

3) The impossibility of constructing a general pedagogic signature referring to all three levels Shulman mentions does not at all make his concept worthless. A pedagogic signature with its value-oriented and dispositional core in the implicit structure allows teachers of various fields to identify with a set of beliefs, attitudes and assumptions that are common to their profession. It helps teachers from differing institutions, such as elementary school, continuing education or special education teachers (who were not researched here, see authors and co-authors), work together on the basis of a common core. A signature can link science with the social practices of the organization of teaching and learning. Last but not least, such a signature gives sense to a teacher's life. In the framework of research on stress and workload, making sense of an individual's professional life is a stress preventing factor (see van Dick & Wagner, 2001).

4) Methodologically, a mixed-method approach for the construction of a signature seems to be indispensable, since a theory-driven quantitative approach will never meet all possible teacher beliefs, who are, to a large extent, experience driven.

5) Last but not least, from the angle of educational policy, the pedagogic signature obtained in this study offers an important contribution to a currently large challenge faced by many countries. With the ratification of article 24 by the UN Convention on the Rights of Persons with Disabilities, Germany -like many other countries- finds itself at the beginning of radical changes in its school system. Differentiated school systems like Germany's have been requested to develop into inclusive school systems (see OECD, 2004; see Hallahan, Kauffman, & Pullen, 2012). With such a signature, a basis for mutual understanding on common practices for a common school will be reached.

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