Z Erziehungswiss (2015) 18:713–736
DOI 10.1007/s11618-015-0628-4

ALLGEMEINER TEIL

ZfE

What affects the teaching style of German professors? Evidence from two nationwide surveys

Uwe Wilkesmann · Sabine Lauer

Received: 12 June 2014 / Accepted: 8 April 2015 / Published online: 28 April 2015
© Springer Fachmedien Wiesbaden 2015

Abstract The aim of this study is to reveal potential influences on two different teaching approaches, one that is student-focused and one that is teacher-focused. Five hypotheses were derived and tested with two representative surveys among German professors in the years 2009 and 2011. Regression analyses indicate that selective incentives for teaching have a very weak effect on the teaching approach, whereas the particular scientific disciplines seem to exert a considerable impact. In addition, the following influential factors that foster a student-focused teaching approach were identified: continuing pedagogical training (only for professors at research universities) and interaction among professors regarding teaching. In terms of gender differences, it was detected that female professors at research universities prefer a more student-focused approach to teaching.

Keywords Governance · Nationwide survey · Selective incentives · Teaching approaches

The data collection has been financed by the German Research Foundation (project-ID: WI 2052/2–1 and WI 2052/2–2). Many thanks to Christian J. Schmid who was centrally involved in both projects.
Die Datenerhebung fand im Rahmen der DFG Projekte WI 2052/2–1 und WI 2052/2–2 statt. Vielen Dank an Christian J. Schmid, der an beiden Projekten maßgeblich beteiligt war.

Prof. Dr. U. Wilkesmann (✉) · S. Lauer, M.Sc.
Lehrstuhl für Organisationsforschung, Sozial- und Weiterbildungsmanagement, TU Dortmund,
Hohe Str. 141,
44139 Dortmund, Deutschland
e-mail: uwe.wilkesmann@tu-dortmund.de

S. Lauer, M.Sc.
e-mail: sabine.lauer@tu-dortmund.de

Was beeinflusst den Lehrstil von deutschen Professorinnen und Professoren? Ergebnisse zweier bundesweiter Befragungen

Zusammenfassung In der folgenden Studie werden potentielle Einflussgrößen auf zwei verschiedene Lehrstile untersucht: studierenden- versus dozentenzentriert. Anhand zwei repräsentativer Befragungen unter deutschen Professorinnen und Professoren in den Jahren 2009 (Universitäten) und 2011 (Fachhochschulen) wurden fünf Hypothesen abgeleitet und geprüft. Regressionsanalytisch kann gezeigt werden, dass selektive Anreize für Lehraktivitäten nur einen sehr schwachen Effekt auf den Lehrstil ausüben, während die einzelnen wissenschaftlichen Disziplinen einen beträchtlichen Einfluss ausüben. Zusätzlich wurden folgende Faktoren identifiziert, die einen studierendenzentrierten Lehrstil begünstigen: Wenn eine didaktische Weiterbildung (gilt nur für Universitätsprofessorinnen) besucht wurde und wenn sich Professorinnen und Professoren über Lehrangelegenheiten miteinander austauschen. Bezüglich geschlechtsspezifischen Unterschieden wurde herausgefunden, dass Universitätsprofessorinnen

Schlüsselwörter Bundesweite Befragung · Governance · Lehrstile · Selektive Anreize

1 Introduction

Efforts to raise the status and quality of academic teaching at universities have increased dramatically in recent years. In the case of Germany, the Federal Government and the *Länder* (German for the federal states) launched a substantial joint funding program called 'Quality Pact for Teaching' to improve the quality of teaching with grants totaling approximately two billion Euros between 2011 and 2020. Closely linked to the effort to improve teaching is the question: What is the 'right way' to teach? A considerable amount of research on academic teaching has been conducted, and the studies generally distinguish between two teaching approaches: the information-transmission/teacher-focused (ITTF) and the conceptual-change/student-focused (CCSF) approach (Trigwell and Prosser 1996; Prosser and Trigwell 1999; Trigwell et al. 1999; Trigwell and Prosser 2004; Prosser and Trigwell 2006). The core ideas can be summarized as follows:

1. The ITTF approach is conducted with the intention of transmitting information to students. The professor is focused on facts that must be transmitted to the students. The relationships between the professor and students and among students are not emphasized. The professor believes that students have little to no prior knowledge of the subject and they must transmit knowledge to them as a parcel (Wilkesmann and Wilkesmann 2011). The parcel model of knowledge transfer is consistent with the Shannon and Weaver (1949) communication model. A sender will transfer information such as an object or parcel to the receiver without losing information. The students are merely passive recipients of the information: "It is assumed that students do not need to be active in the teaching-learning process"

(Trigwell et al. 1999, p. 59). This approach has two parts: information-transmission and a teacher-focus. In a qualitative study, Gonzáles (2011) emphasizes the TF approach in transmitting the basic information of the discipline and transferring the lecturers' knowledge to the students. For simplicity, ITTF is in this article abbreviated as TF.

2. The CCSF strategy is consistent with the constructivist approach of learning (Watzlawick 1976). It is an interactive model of knowledge transfer that regards learning as an active process of knowledge construction in the student's mind (Wilkesmann and Wilkesmann 2011). Therefore, professors must help students to reconstruct their prior knowledge. "The teacher is one who encourages self-directed learning, who makes time (in formal "teaching" time) for students to interact and to discuss the problems they encounter, who assesses to reveal conceptual change (not only to judge and rank students), who provokes debate (and raises and addresses the taken-for-granted issues), who uses a lot of time to question students' ideas, and to develop a "conversation" with students in lectures" (Trigwell et al. 1999, p. 58). Even though this approach includes two aspects (conceptual-change and a student-focus), we use the abbreviation SF in the following.

The aforementioned approaches differ in their relationship to teaching and learning, and these differences are the focus of this paper. Trigwell et al. (1999) indicate that a TF teaching approach leads to surface learning, whereas a SF teaching approach is associated with deep learning processes. "What adds to the significance of this result is the association between this result and the studies of student learning which, over many years, have consistently demonstrated that surface approaches to learning are related to lower quality learning outcomes …" (Trigwell et al. 1999, p. 66). Additionally, Pelletier et al. (2002), and Leroy et al. (2007) demonstrated that when teachers are more supportive of their students' autonomy and pay attention to what they are saying, as it is expected in a SF teaching approach, the students score higher on intrinsic motivation scales. Intrinsically motivated learning is also related to high quality learning results (Leroy et al. 2007).

Kember and Kwan (2002) argue that the two approaches to teaching are stable across space and time. They are results of individual long-term socialization processes, which lead to stable personal teaching habits. In contrast, Prosser and Trigwell (1999) emphasize the contextual and dynamic nature of the teaching approach, which differs for each teacher and depends on the particular teaching context (Lindblom-Ylänne et al. 2006). When professors perceive their class size as very large, their way of teaching is more teacher-focused and information-transmitting. Conversely, the perception of a small class size is associated with a student-focused approach to teaching (Ramsden et al. 2007). Most studies follow Prosser and Trigwell's basic assumptions and discuss various influences on teaching approaches (e.g., Stes et al. 2008). While several impact factors could be identified in qualitative studies (Trigwell et al. 1999; McKenna and Yalvac 2007; Gonzáles 2011) for the field of higher education, there is a lack of quantitative inquiries. This article compensates this methodological shortcoming by analyzing two representative national surveys among German professors.

As there are two types of Higher Education Institutions (HEI) in Germany—research universities and universities of applied sciences—that differ substantially, we investigated these two types separately. The differences are the following: First, to become a professor at a research university, a candidate must have the 'habilitation' (professorship examination) or a successful assistant professorship in addition to a PhD. For a professorship at a university of applied sciences, a candidate needs five years of work experience including three years in the private sector in addition to a PhD. Second, the teaching load at research universities is typically eight or nine hours per week; at universities of applied sciences, the teaching load is 18 h per week. Third, no department chairs exist at universities of applied sciences. Hence, there are typically just a few research associates employed if any at all. Additionally, more homogeneity exists among the faculty at universities of applied sciences because the organizational goal is much more teaching-directed than at research universities. Universities of applied sciences also have a smaller number of students and academic staff on average than research universities. In sum, universities of applied sciences have only one organizational goal: teaching (Wilkesmann 2013).

Hence, our primary research question is: what factors influence German professors at research universities and universities of applied sciences to adopt a more TF or a more SF teaching approach?

2 Theoretical underpinning

2.1 Monitoring and rewards

In empirical studies with schoolteachers the impact of the institutional context, like pressure or control from above, on teaching motivation and teaching approaches is well examined within the discourse of the Self-Determination Theory (SDT: Ryan and Deci 2000; for professors see Wilkesmann and Schmid 2014). Although there are some differences between school teaching and academic teaching at universities—e.g. university teaching involves more instructor autonomy, a more flexible curriculum, and older students—we can also draw some parallels. A teacher is alone with students, where the classroom door is closed and superiors cannot easily monitor the interaction in the classroom.

Leroy et al. (2007) showed that external pressure from above exerts positive influence on extrinsic motivation of schoolteachers. Roth's et al. (2007) findings about Israeli schoolteachers indicate that a teacher's perceived loss of control in regards to how to do his/her job is passed on to the students and, consequently, active student involvement in the teaching-learning process is thwarted. Pelletier et al. (2002) come to similar conclusions. In addition to Roth et al. (2007), Pelletier et al. (2002) find evidence for the relationship between perceived external pressure and the teaching approach among Canadian schoolteachers. The greater pressure from above is perceived, the smaller the sense of autonomy in teaching: "In sum, research has shown that when authorities impose restrictions about a curriculum, make teachers responsible for their students performance, and pressure or reward teachers to produce good student performance, and teachers believe that their students are extrinsically moti-

vated or possibly not motivated toward school, it is likely that teachers will become controlling with students. It is possible that these conditions may directly affect teachers' behaviors or that they may undermine teachers' motivation towards their own work that, in turn may lead them to be more controlling with their students" (Pelletier et al. 2002, p. 187). To transfer the findings from the school to the university context and to link them to the teaching approach discourse, we refer to Pelletier and Sharp (2009): "In essence, autonomy-supportive teachers are responsive (e.g. spend time listening, acknowledge the student's feelings and perspective), supportive (e.g. praise the quality of performance), explicative (e.g. provide a rationale for tasks and limits); they provide choice and opportunities for initiative taking and independent work, and they offer student discussion time. In opposition, controlling teachers essentially take charge (e.g. hold the instructional materials, use directives/commands), shape students toward a right answer (e.g. give solutions), motivate through pressure (e.g. threats, criticisms and deadlines), and don't allow students to work at their own pace or voice opinions contrary to their own" (Pelletier and Sharp 2009, p. 176). These two types of described teachers can be one-on-one transferred to the two types of teaching approaches: the description of the 'autonomy supportive teachers' are synonymous with a SF approach to teach, whereas the 'controlling teachers' are likely those who employ a TF approach to teach. These findings are in line with the results by Ramsden et al. (2007) based on their survey with university professors: "Teachers reported greater use of an approach which was conceptual change/student-focused when they experienced a degree of control over the content being taught, when their department provided support for teaching, when they had an appropriate academic workload, and when they perceived that the characteristics of the students, such as language skills and prior knowledge of the subject matter, were conducive to effective learning" (Ramsden et al. 2007, p. 141). The authors emphasize the impact of leadership on the teaching approach. "University teachers who reported more collaborative and transformational forms of leadership (…) reported adopting more conceptual change and student-focused forms of teaching in their first year classes, and those who experienced non-collaborative (more authoritarian) forms of leadership reported adopting more information transmission and teacher-focused forms of teaching" (Ramsden et al. 2007, pp. 141–142). This empirical evidence can be attributed to the introduction of New Public Management (NPM) into the governance structures of universities.

The legend of the 'lazy professor' is the starting point in the public discussion about NPM in higher education. The risk of shirking one's responsibilities is particularly high in the context of teaching as there is little hierarchical monitoring of the professorate's behavior. Therefore, selective incentives could perhaps be helpful to address laziness in academic teaching (Wilkesmann and Schmid 2012). From the vantage point of Principal-Agent Theory, incentive structures are best-suited to overcome aspects of opportunism, which are particularly problematic in organizational settings such as professional bureaucracies (Mintzberg 1989). To ensure compliance, the principal (in this case, the rectorate) provides external rewards or punishment to enforce the contractual agreement with the agent (in this case, the professor); standard solutions are monitoring, selective incentives, and punishment (Arrow 1985; Eisenhardt 1989). The idea behind these solutions is that when selective incentives are present, it is in the self-interest of the agent not to dodge one's responsibilities

(Miller 2005, p. 206). Merit pay, for example, is intended to change the professor's individual compensation and, therefore, his/her behavior (Kollock 1998). Nevertheless, selective incentives are based on monitoring and accounting. Behavior must be measured because incentives are related to the perceived performance. Bonuses, or performance-related budgeting, can only be issued if they are based on close monitoring and strict calculation. Therefore, the outcome measurement could be individually perceived as a control or external pressure mechanism. If accounting systems monitor the outcome of the action, professors who are socialized to work in 'solitude and freedom' perceive this monitoring as an alienated system. Accordingly, new selective incentives must focus on teaching because the majority of the existing incentives at universities support research activities. As a result, the leader of the university must strengthen the incentive to perform well in teaching, a core task that is often perceived as the least valuable in a university career. In Germany, four primary selective incentives have already been implemented to overcome these problems: (1) merit pay, (2) performance-related budgeting, (3) Management by Objectives (MbO) and (4) teaching awards (Wilkesmann and Schmid 2012).

1. In 2005, a new pay-for-performance system (W salary scale) was introduced that replaced the old seniority wage rule (C salary scale). All professors who were appointed after January 2005 are paid within this new salary system whereas the others remain in the old seniority wage system. In the new merit pay system, two-thirds of the salary is fixed-time wage and one-third is performance-based. The last third is broken down into the following parts: (1) appointment negotiation, (2) extra salary for leading a department, (3) performance bonus for outstanding research or teaching (Wilkesmann and Schmid 2011, 2012; Biester 2013).
2. Many German universities have introduced performance-related formula-based budgets. In most cases, the performance criteria include reliable figures on third-party funding, numbers of PhDs, and student enrollments.
3. Many German universities implemented Management by Objectives (MbO) practices (Jaeger et al. 2005), where the principal sets specific objectives for the faculty and/or department chairs. If these goals cover aspects of teaching, they could have an impact on teaching behavior.
4. Almost all German universities honor individuals who are particularly committed to teaching with a teaching award. This type of award promotes a culture that enhances the status of academic teaching, but technically speaking, these awards are not selective incentives (Wilkesmann and Schmid 2010). Only one person receives the award, in a 'winner takes it all' system; all others—even if their teaching was exceptional—receive nothing. No linear correlation exists between effort and reward. The award winner will perceive the prize as encouragement rather than as a monitoring instrument.

Additionally, the 'crowding out-effect', a phenomenon well-known in motivational psychology can occur, i.e. if an intrinsically motivated person perceives external interventions (like selective incentives) to be controlling, the intrinsic motivation will be replaced by extrinsic motivation (Frey 1997).

To sum up, there is a lot of evidence from research within the scope of SDT that schoolteachers perceive monetary rewards as pressure from above which effects a

reduced perception of autonomy in teachers which in turn engenders a controlling style in teaching. In accordance with the aforementioned findings from empirical studies of the impact of perceived external pressure on teaching motivation and behaviors towards students, we postulate that selective incentives can be understood as perceived pressure from the rectorate, which in turn prompts professors to a TF approach to teach. However, teaching awards as a selective incentive have to be excluded as they will likely honor the most up-to-date teaching techniques, i.e. they will usually support SF methods.

Hence, our first hypothesis is the following:

H1: Selective incentives for teaching (without teaching awards) support the TF approach to teaching.

2.2 Disciplines (long-term socialization)

Selective incentives represent a transactional type of governance (Frost et al. 2010; Wilkesmann 2013). An alternative way of managing the agent's behavior is through transformational governance, to which our focus shifts in the next hypotheses. In this case, the agents are led by visions, long- and short-term socialization, and enculturation.

Teaching styles may vary between disciplines due to the different types of knowledge that are being taught. Some empirical studies (Nevgi et al. 2004; Lindblome-Ylänne et al. 2006; McKenna and Yalvac 2007) support this assumption that when we attend classes and lectures in different disciplines, we are likely to experience different teaching approaches.

Becher (1989) and Neumann et al. (2002) classify four different categories of disciplines based on Biglan's (1973a, b) and Kolb's (1981) earlier work.

1. Pure hard disciplines: in these disciplines knowledge can be characterized as cumulative, quantitative, and atomistic. An exact definition of a phenomenon and a research-oriented community are typical for these disciplines. TF based mass lectures combined with problem-based seminars are the predominant forms of instruction. Students must focus on fact retention and solve logically structured problem scenarios. Examples are mathematics, physics, and chemistry.
2. Pure soft disciplines: knowledge here is holistic and qualitative. Teaching methods include primarily in-class discussions because the students must learn creative thinking. Therefore, not TF lectures but SF discussions are the dominant form of education. Knowledge will not become outdated as quickly as in the pure hard disciplines. Typical examples of these disciplines are the humanities, psychology, and the social sciences.
3. Applied hard disciplines: knowledge here is based on linearity in sequence and on factual understanding. Even though teaching methods focus primarily on simulations and case studies for master programs, in bachelor programs TF mass lectures are very common. As in the pure hard disciplines, students must also learn by focusing on practical competencies. Examples are medicine and engineering.

4. Applied soft disciplines: in these disciplines, knowledge is based on a reiterative process of accumulation. The teaching methods in use are close to the methods in pure soft disciplines because the learning targets are personal growth and intellectual breadth. SF in-class discussion is the most popular form of lesson. Theory and research methods are linked to problems in society. Examples are education, economics, and law.

There are some doubts regarding the justification for this classification. Is the reason for this difference ontologically caused by different types of knowledge or does this classification represent diverse histories in respect to different socialization-processes? Neumann et al. (2002) prefer the first statement. From a theoretical point of view, pure hard and applied hard sciences could be taught with teaching methods of the soft sciences. Engineering students could also learn by discussing problem-based cases without mass lectures. Even if a common knowledge base exists, the teaching methods can be different. Nevertheless, if we find differences in teaching approaches between the above-mentioned classifications, this could be an indicator for different long-term socialization processes. Today's professors are former students who were socialized in teaching approaches by their professors. From this point of view, the long-term socialization process would be consistent with Kember and Kwan (2002), who classified the teaching approach as more or less stable over space and time (Lindblom-Ylänne et al. 2006; for Germany Lübeck 2010). Even a lecture may utilize SF and conceptual-change elements. Conversely, a seminar could be taught using a TF and information-transmission approach. The findings from Ramsden et al. (2007) that professors associate a large class or lecture with a TF approach and a small class with a SF approach could also be interpreted as a lack of innovative pedagogy and is likely a result of the professor's own socialization as student. Thus, one's approach to teaching does not depend on the format (lecture or seminar) of a course but depends on one's socialization. Therefore, our second hypothesis (divided into two partial hypotheses):

H2a: Being socialized in the soft sciences increases the use of a SF approach.
H2b: Being socialized in the soft sciences decreases the use of a TF approach.

2.3 Educational training (medium-term socialization)

In addition to the long-term socialization effects on teaching approaches, medium-term socialization effects also exist and are transmitted through institutional learning processes (Postareff 2007). Educational training also influences the teaching approach (Stes et al. 2008). In a longitudinal study, Gibbs and Coffey (2004) found evidence that teachers became more SF and less TF after 18 months of training as compared to the beginning of the training. Postareff (2007) observed an interesting effect: professors with medium-length pedagogical training (between 10 and 30 European Credit Transfer System, ECTS) scored lower on the SF scale than absolute beginners. After pedagogical training of more than 30 ECTS, they scored significantly higher than at the beginning of the training. What could be the reason for this u-shaped development? Postareff provides the following explanation: "Thus,

the training makes teachers more aware of the problems they have with their teaching, and after a longer training process they become more aware of an ideal way to teach. When teachers have not participated in any type of pedagogical training organized for university teachers, they might not be aware of better teaching practices and might therefore evaluate themselves as student-centered teachers" (Postareff 2007, p. 49). Nowakowski et al. (2012) and Johannes and Seidel (2012) confirm these findings in the German case. Pedagogical training often triggers self-reflection (Nowakowski et al. 2012, p. 267; Johannes and Seidel 2012, p. 247), which in turn causes a more critical self-assessment regarding the SF teaching approach. Due to the cross-sectional design of our surveys, we cannot measure changes in self-assessment but only the effect of the training after the u-shape. Therefore, we simply take the self-perception of interviewees into account with a prolonged training course. The effects of medium-term socialization from educational training are consistent with the findings of Prosser and Trigwell (1999) who emphasize the dynamic nature of the teaching approach. Therefore, the third hypothesis is as follows:

H3: If a professor attends pedagogical training for more than three days, the professor is more likely to use a SF approach to teaching (medium-term socialization).

2.4 Interaction (with colleagues)

Aside from educational training, a professor's approach to teaching could be influenced by peers. A discussion with colleagues regarding teaching and pedagogical methods could help to reflect on one's own teaching behavior (Metz-Göckel et al. 2012). Until recently, the vast majority of German professors—particularly at research universities—have not been willing to talk about their teaching (Wilkesmann and Schmid 2011). Vogel (2009) used a network approach to investigate under which circumstances informal collegial teaching among professors at a small German university of applied sciences took place. Another study (Sanchez 2012) investigated motivational triggers that lead to a change in teaching practice and also took a closer look at the various relationships that emerge within academia (student, collegial, mentoring, institutional and personal relationships). In comparison, there is a large body of extant research on schoolteachers and their interactions related to teaching (Leithwood 1992). Evidence exists, for example, that effective school principals encourage teachers to talk and explore new ideas together. Innovative techniques are easier to develop in groups than individually. Several studies found that discussion and mutual cooperation had a positive impact on approaches to teaching (Beare et al. 1989; Leithwood 1992). Such interaction, if it is voluntary, could be interpreted as environmental support. According to crowding-out theory (Frey 1997), such communication is helpful if it is perceived as support and not as control. Therefore we suspect that collegial interactions promote a SF approach. These considerations are summarized in hypothesis four:

H4: The more professors are engaged in interactions related to teaching methods with their colleagues, the more they use a SF approach to teaching.

2.5 Gender

Gender is a standard control variable. In our case, there is some evidence that supports the existence of a relationship between gender and teaching approach. Nevgi et al. (2004) report that men score significantly higher on the TF scale than women. According to Lacey and Saleh (1998), female professors provide students with more freedom in what and how to learn. However, Stes et al. (2008) found no existence of a gender effect on one's teaching approach. Although the empirical findings do not unanimously support our suspicion, the fifth hypothesis (divided into two partial hypotheses) is as follows:

H5a: Male professors score higher on the TF approach to teaching than female professors.

H5b: Male professors score lower on the SF approach to teaching than female professors.

3 Methodology

All hypotheses were tested with two national surveys using ordinary least squares (OLS) regression analysis. The first survey was conducted with professors of research universities between May and July 2009 (Wilkesmann and Schmid 2012). The second survey was conducted with university professors of applied sciences and was carried out between March and April 2011 (Wilkesmann 2013).

3.1 Sample

For the first survey, which was conducted at research universities (Wilkesmann and Schmid 2012), 8000 professors were selected from the e-mail distribution list of the 'German Association of University Professors (DHV)'. The professors paid according to the new pay-per-performance salary are of special theoretical interest to the study. A disproportionate stratified sampling was used, differentiating between two strata according to the salary-categories (merit pay versus age-related seniority scheme). A total of 1119 professors completed the survey. The response rate was 14 %. For our statistical analyses, we excluded the cases where the information about the university affiliation was missing; therefore the revised data set comprises 891 valid cases.

Table 1 provides an overview of the representativeness of the sample; it shows differences between respondents (sample) and the general population of the research universities (Federal Statistical Office 2012).

For the second survey, conducted at the universities of applied sciences, professors were selected from an e-mail list of the 'German Association of University of Applied Sciences Professors (hlb)', which covers all deans of all German universities of applied sciences (Wilkesmann 2013). An e-mail was sent to the deans with a link to the online questionnaire and the request to forward the e-mail to all professors of their faculty. A total of 942 professors completed the questionnaire. From this distri-

Table 1 Comparison sample—population (survey 1, research universities)

Variables		Percentage within population	Percentage within sample
		%	%
Payment scheme	Old wage system C (C3 + C4)	52.2 (n = 10591)	43.7 (n = 388)
	Old wage system C (C2)	3.0 (n = 615)	–
	New wage system W (W2 + W3)	45.0 (n = 9151)	55.5 (n = 503)
Gender	Male	81.3 (n = 18309)	80.5 (n = 746)
	Female	18.7 (n = 4218)	19.5 (n = 181)
Age (mean)		50.0	50.5
Scientific discipline (without research centers and schools)	Linguistics and Cultural Studies	24.1 (n = 5337)	29.2 (n = 255)
	Law, Economics and Social Sciences	16.9 (n = 3750)	19.9 (n = 174)
	Mathematics and Natural Sciences	28.3 (n = 6285)	27.9 (n = 244)
	Medicine, Veterinary Medicine and Pharmacy	14.5 (n = 3157)	10.9 (n = 95)
	Forestry, Agricultural Science and Nutritional Science	2.1 (n = 466)	1.6 (n = 14)
	Engineering	10.7 (n = 2379)	0.1 (n = 79)
	Science of Art	2.6 (n = 587)	0.6 (n = 6)
	Sports	1.0 (n = 214)	0.8 (n = 7)

bution method, nothing can be said about a response rate, but the sample covers 6% of the population. Here, we also excluded the cases where the information about the university affiliation was missing; therefore the revised net sample comprises a total of 639 cases.

As in Table 1, Table 2 shows differences between respondents (sample) and the general population for the universities of applied sciences.

Both surveys are representative in terms of the gender and age of the faculty members but not with regard to their payment scheme. Therefore, we integrated the payment scheme as a control variable in the OLS-regression models.

3.2 Measurements

3.2.1 The dependent variables

To measure the teaching approach, Prosser and Trigwell's (2006) *Approaches to Teaching Inventory* (*ATI*), which measures dimensions of CCSF and ITTF and encompasses a total of 16 items, was translated into German (see Table 3).

Parallel to our study, another survey was conducted in Germany with almost the same questions (Braun and Hannover 2009; Braun and Leidner 2009). Due to the length of the questionnaire, we only selected 10 items (4 from SF, 6 from TF) from the original 16 items in the first survey with professors at research universities. Because the four items for the SF scale did not reach the desired reliability (Cronbach's Alpha = 0.552), we did not use this scale as explanatory variable in our regression models. One reason why Cronbach's Alpha is not very reliable for the SF scale is that a short-scale version of four items (instead of the original eights items) was used. Any short version of an inventory is sub-optimal because of sheer test-length

Table 2 Comparison sample—population (survey 2, universities of applied sciences)

Variables		Percentage within population	Percentage within sample
		%	%
Payment scheme	Old wage system C (C2)	27.7 ($n=4335$)	20.1 ($n=132$)
	Old wage system C (C3+C4)	33.3 ($n=5211$)	31.1 ($n=204$)
	New wage system W (W2+W3)	39.0 ($n=6118$)	47.0 ($n=303$)
Gender	Male	81.4 ($n=13161$)	78.7 ($n=741$)
	Female	18.6 ($n=3017$)	21.3 ($n=200$)
Age (mean)		51.8	49.7
Scientific discipline (without research centers and schools)	Linguistics and Cultural Studies	3.3 ($n=526$)	2.5 ($n=16$)
	Law, Economics and Social Sciences	35.5 ($n=5660$)	27.7 ($n=181$)
	Mathematics and Natural Sciences	13.6 ($n=2172$)	16.6 ($n=108$)
	Medicine, public health	1.6 ($n=268$)	1.7 ($n=11$)
	Forestry, Agricultural Science and Nutritional Science	3.4 ($n=545$)	4.6 ($n=30$)
	Engineering	37.9 ($n=6036$)	43.7 ($n=285$)
	Science of Art	4.5 ($n=722$)	3.4 ($n=22$)
	Sports	0.0 ($n=6$)	–

(Schmitt 1996). Instead, we chose item v_20_5 ("I set aside some teaching time so that students can discuss among themselves ideas in this subject") as a proxy for the SF teaching approach as the best model fit could be obtained in terms of explained variance with this single item. Nevertheless, the index for the TF scale can be seen as reliable (Cronbach's Alpha=0.655) in the case of research universities. In the second survey with professors at universities of applied sciences, we can use both the TF (Cronbach's Alpha=0.651) and SF (Cronbach's Alpha=0.779) indices. The reliability of SF is better than in the first survey because four more items for SF were added (due to the reliability issues in the first survey). In addition, two confirmatory factor analyses—separated by research universities and universities of applied sciences—were calculated to test the model fit of the latent variables TF and SF in our population. In the model for the research universities (Fig. 1), the factor loadings for TF range from 0.39 to 0.68, whereas the factor loadings for SF range from 0.38 to 0.62; the model fit is acceptable with CFI=0.0881 and RMSEA=0.062. Figure 2 shows the model for the universities of applied sciences: here the factor loadings for TF range from 0.35 to 0.68, and the factor loadings for SF range from 0.36 and 0.65; the model fit is slightly better with CFI=0.902 and RMSEA=0.058.

The mean of TF at research universities is 3.29 and at universities of applied sciences 3.55 (t-test, sig 0.000; SE 0.036). We cannot compare the index SF because we used only one item as a proxy for SF in the case of research universities. A comparison of the difference in means for this single item is 3.09 at research universities and 3.24 at universities of applied sciences (t-test, sig 0.030; SE 0.069).

3.2.2 The independent variables

To test hypothesis *H1*, the following dummy variable was included in the regression models: "*Are you receiving merit pay for teaching?"* ("yes/no").

Table 3 Inventory for TF and SF

	TF
v_20_1	Studierende sollten sich beim Lernen auf das konzentrieren, was ich ihnen vorgebe. (In this subject students should focus their study on what I provide them.)
v_20_2	Ich versuche Lehrinhalte so vorzustrukturieren, dass sie abprüfbar sind (z. B. in Klausuren). (I structure my teaching in this subject to help students to pass examinations.)
v_20_4	Ich versuche Lehrinhalte so zu präsentieren, dass die Studierenden wissen, was sie für dieses Fach zu lernen haben. (I present material to enable students to build up an information basis in this subject.)
v_20_6	In meiner Lehre schaue ich darauf, dass das Themengebiet so aufbereitet ist, wie es in einem Lehrbuch stehen könnte. (In my teaching I try to cover the subject in a way it might as well be presented in key readings and textbooks)
v_20_8	Ich sollte in meiner Lehre möglichst die Antworten auf alle Fragen kennen, die die Studierenden zu diesem Fach stellen könnten. (I should know the answers to any questions that students may put to me concerning the content of my courses)
v_20_13	Ich versuche meinen Studierenden Musterlösungen zur Prüfungsvorbereitung zu geben. (It is important to present a lot of facts to students so that they know what they have to learn for this subject.)
	SF
v_20_10	In meiner Lehre versuche ich viel Zeit dafür zu verwenden, mich mit den inhaltlichen Vorstellungen der Studierenden zu befassen. (In my teaching I invest a lot of time, to concern myself with the knowledge creation on the side of my students.)
v_20_5	Ich versuche in meiner Lehre Zeit dafür zu reservieren, in der Studierende untereinander Veranstaltungsinhalte diskutieren können. (I set aside some teaching time so that students can discuss, among themselves, ideas in this subject.)
v_20_9	Die Studierenden sollten während meiner Lehre besser eigenständige Notizen anfertigen, als meine Ausführungen/Notizen nur "abzuschreiben". (It is better for students in this subject to generate their own notes rather than copy mine.)
v_20_12	Meine Lehre sollte die Studierenden zum selbstgesteuerten Lernen befähigen. (My teaching should enable my students for self-directed learning processes.)
v_20_14[a]	Ich versuche, im Dialog mit den Studierenden den Gegenstand der Lehrveranstaltung zu erarbeiten. (I try to develop the subject matter of the course in dialogue with the students.)
v_20_15[a]	In der Lehre kommt es mir darauf an, Debatten und Diskussionen zu initiieren. (In teaching sessions it is important for me to initiate debates and discussions.)
v_20_16[a]	Ich gebe den Studierenden die Möglichkeit, ihr selbst entwickeltes Verständnis des Gegenstandes vorzubringen. (I offer opportunities for students to create their own self-developed understanding of the subject.)
v_20_17[a]	In meiner Lehre versuche ich viel Zeit dafür zu verwenden, die Denkweisen der Studierenden zu hinterfragen. (In my teaching sessions, I try to dedicate a lot of time to question students' ways of thinking.)

[a]Universities of applied sciences only

To measure MbO, a dummy variable was constructed (with 1 = "yes", 0 = "no" or "don't know"): *"Does your agreement on objectives [with the dean/rectorate] include any statements on the advancement of teaching activities?"*. To collect data on the use of teaching awards, the following items were used: *"Does your university promise a teaching award that you could potentially win?"* and *"Have you ever won a teaching award?"* (both 1 = "yes", 0 = "no" or "don't know" or "n/s").

To test hypotheses *H2a* and *H2b*, the courses of studies were classified into four disciplines according to Biglan (1973b): pure soft disciplines (humanities, social sciences, art history, geosciences); applied soft disciplines (sports, law and economics, architecture, music, theater, film, fine arts); pure hard disciplines (mathematics, biol-

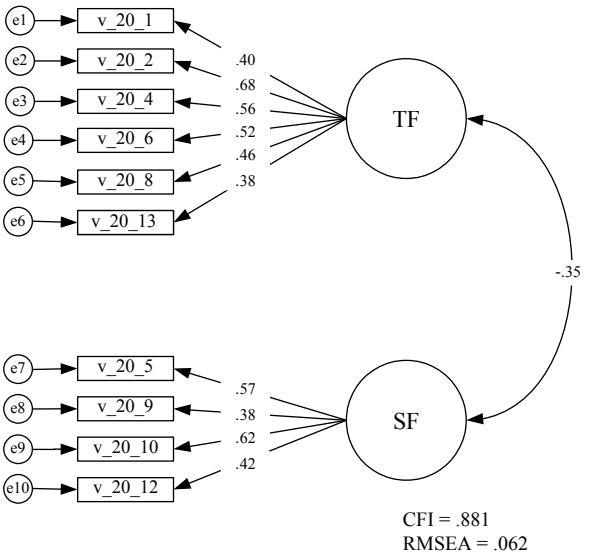

Fig. 1 Confirmatory factor analysis—teaching approach (research universities)

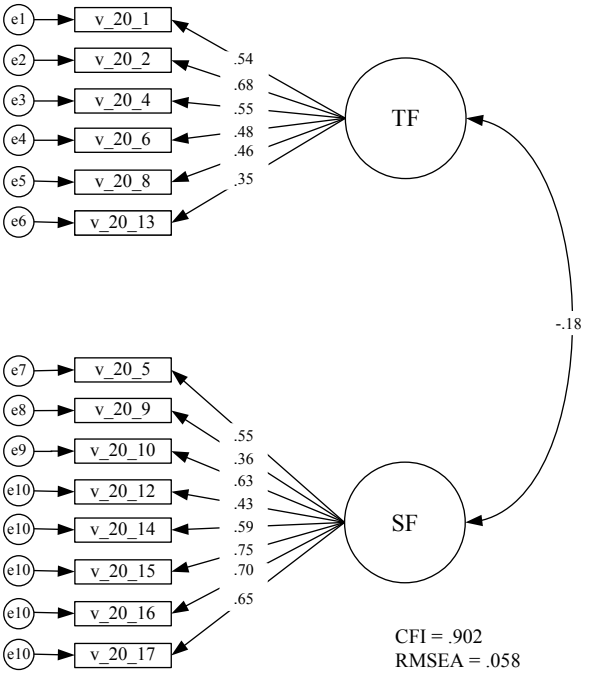

Fig. 2 Confirmatory factor analysis—teaching approach (universities of applied sciences)

ogy, chemistry, physics); applied hard disciplines (medicine, health care and nutritional sciences, agricultural sciences, forestry). The distribution of the disciplines in our sample is 27% pure soft sciences, 19% applied soft sciences, 19% pure hard sciences and 35% applied hard sciences. For the sake of simplicity, we only distinguished between pure/applied soft disciplines and hard disciplines in our analyses.

To measure pedagogical training for hypothesis *H3*, two dummy variables were integrated into the regression models. The first variable asked if the professor attended pedagogical training for *more* than *three* days, and the second asked if the professor made use of pedagogical coaching from professionals. Both variables were measured with open questions: *"How many days did you attend a pedagogical training (pedagogical coaching) in the last four years?"*

To test hypothesis *H4*, the following item was measured on a five-point-Likert scale: *"A frequent interaction with colleagues exists regarding teaching experience"*.

The last hypothesis addressing gender effects (subdivided in *H5a* and *H5b*), is measured by a dummy variable (with 1 = "male", 0 = "female"). Multicollinearity between gender and the disciplines does not exist (VIP between 1.11 and 1.34 or 1.55).

As control variables, age, wage system, and a 'taste for teaching' were integrated in the regression analysis. The last variable controls if teaching is considered as an important part of one's job (or not) and represents an additive index (with Cronbach's Alpha = 0.601) of five items that cover aspects of the significance of teaching preparation (including integration of recent research results, updating new examples, continuing revision of the content, and restructuring of the syllabus).

4 Empirical results and findings

In the following section, the results from a total of four OLS-regression models are presented, where separate analyses for each university type were performed (research university versus university of applied sciences).

As illustrated in Table 4, which shows the OLS-regression models for research universities, there are 829 valid cases for the TF model and 827 valid cases for the single item SF (v_20_5) model. The explained variance for the TF regression model is 15.0 % (adjusted $R^2 = 0.150$) and 20.1 % (adjusted $R^2 = 0.201$) for the SF regression model (Table 5).

The explained variance for the TF regression model in the universities of applied sciences case is 8.2 % (adjusted $R^2 = 0.082$), which is lower than in the research university case. However, the same amount of explained variance—20.2 % (adjusted $R^2 = 0.202$)—can be observed in the SF regression model. In both analyses, 593 valid cases are included. It is important to note that the interpretation of the hypothesized covariate effects typically occurs under control of the remaining covariates.

For hypothesis *H1*, the results reveal significant effects for selective incentives at the 5 %-significance level. Whereas receiving merit pay for teaching has a significant positive influence on TF at research universities, this is not the case at universities of applied sciences. An agreement on objectives that includes teaching has no influence at all in the four calculated models. The existence of a teaching award also positively influences a SF teaching approach at universities of applied sciences. Against our prediction, the winning of a teaching award also seems to positively influence the adoption of a TF approach. These two teaching award-related variables are not influential, however, in the models calculated for the subsample of research universities. In other words, hypothesis H1 is for the most part rejected.

Table 4 OLS regression models (research universities)

Teaching approach			
		Teacher-focused Beta	Student-focused (one item) Beta
H1 Selective incentives	Recipient of merit pay for teaching (1 = yes; 0 = no) *(H1_1)*	0.07[b]	−0.04
	Agreement on objectives includes teaching (1 = yes; 0 = no) *(H1_2)*	0.05	0.03
	Teaching award at university (1 = yes; 0 = no) *(H1_3)*	−0.03	0.00
	Teaching award winner (1 = yes; 0 = no) *(H1_4)*	−0.01	0.03
H2 Discipline (reference: Hard sciences)	Pure Soft Sciences *(H2_1)*	−0.33[a]	0.28[a]
	Applied Soft Sciences *(H2_2)*	−0.09[b]	0.06
H3 Pedagogical continuing training	Pedagogical continuing training (1 = more than 3 days; 0 = 3 days and less) *(H3_1)*	0.01	0.11[b]
	Pedagogical coaching (1 = yes; 0 = no) *(H3_2)*	−0.00	0.06
H4 Interaction	Frequent interaction with colleagues about teaching experience *(H4)*	−0.03	0.06[b]
H5 Gender	Gender (1 = male; 0 = female) *(H5)*	−0.02	−0.10[b]
Control variables	Significance of teaching preparation *(C_1)*	0.12[a]	0.21[a]
	Age (C_2)	−0.04	−0.07
	Payment scheme (1 = new merit pay) *(C_3)*	−0.17[a]	0.06
	N	829	827
	Adjusted R^2	0.150	0.201

[a]Level of significance 1 %

[b]Level of significance 5 %

Hypothesis *H2a* is perfectly supported for the universities of applied sciences. In comparison to the hard sciences, both types of soft sciences have a highly significant influence on SF. In the case of the research universities, a student-focused teaching approach is more likely only in the pure soft sciences. Hypothesis *H2b* is perfectly supported for the research universities. Here, a TF approach is less likely when the professor is socialized in either the pure or applied soft sciences. In the case of the universities of applied sciences, being socialized in the pure soft sciences has a negative influence on the use of TF.

Additionally, hypothesis *H3* is only supported for SF in the case of the research universities. Here, pedagogical training for more than three days significantly increases the likelihood that a professor will use a SF approach, but the training has no significant impact on TF. Pedagogical training has no significant impact in our regression models.

The same is true for hypothesis *H4*. Frequent interaction related to teaching with colleagues significantly increases SF, where no influence can be concluded for TF.

A significant gender difference exists in terms of a SF teaching approach and for professors at research universities. Female professors score significantly higher on

Table 5 OLS regression models (universities of applied sciences)

Teaching approach			
		Teacher-focused Beta	Student-focused Beta
H1 Selective incentives	Recipient of merit pay for teaching (1 = yes; 0 = no) *(H1_1)*	−0.00	−0.06
	Agreement on objectives includes teaching (1 = yes; 0 = no) *(H1_2)*	−0.04	−0.02
	Teaching award at university (1 = yes; 0 = no) *(H1_3)*	0.01	0.10[b]
	Teaching award winner (1 = yes; 0 = no) *(H1_4)*	0.10[b]	−0.06
H2 Discipline (reference: Hard sciences)	Pure Soft Sciences *(H2_1)*	−0.27[a]	0.32[a]
	Applied Soft Sciences *(H2_2)*	−0.06	0.18[a]
H3 Pedagogical continuing training	Pedagogical continuing training (1 = more than 3 days; 0 = 3 days and less) *(H3_1)*	−0.14[b]	0.05
	Pedagogical coaching (1 = yes; 0 = no) *(H3_2)*	−0.00	0.08
H4 Interaction	Frequent interaction with colleagues about teaching experience *(H4)*	0.08	0.04[b]
H5 Gender	Gender (1 = male; 0 = female) *(H5)*	−0.02	−0.07
Control variables	Significance of teaching preparation *(C_1)*	0.07	0.22[a]
	Age (C_2)	0.01	−0.02
	Payment scheme (1 = new merit pay) *(C_3)*	−0.04	0.07
	n	593	593
	Adjusted R^2	0.082	0.202

[a]Level of significance 1 %

[b]Level of significance 5 %

SF, therefore, hypothesis *H5b* is supported in this case, whereas no significant gender effect can be found for hypothesis *H5a* in the case of TF for both types of universities.

The control variables indicate that a 'taste for teaching', or the perception that teaching preparation is important, has an impact on both the TF and SF teaching approaches in the case of research universities and on the SF approach in the case of universities of applied sciences. This positive effect can be easily explained. If teaching is an important part of a professor's job, he or she is aware of his or her teaching approach.

Professors who are paid according to the old seniority pay scheme are more likely to use a TF approach than professors who are paid according to the new merit pay system at research universities.

Finally, age has no influence for either type of universities. In the appendix, Table 6 presents the respective bivariate correlations separated by university type, which will provide a better understanding of the particular relationships among the independent variables that are included in the regression models.

5 Discussion and conclusion

We were able to replicate the findings that a professor's discipline, continuing pedagogical training, and gender have a significant influence on his/her teaching approach.

Testing the influences of selective incentives and interaction on approaches to teaching generates new insights and has been unexplored until now.

At research universities, being externally rewarded for teaching increases the probability for a TF approach because monitoring of one's individual teaching performance is perceived as pressure and being under control. A bonus, understood as a purely selective incentive, is only linked to quantitative measurement. Consistent with the empirical evidence on the influence of the New Public Management tools at universities, teaching-related bonuses may have a negligible influence on professors' behavior (Smeenk et al. 2009; Wilkesmann 2013), lead to unintended effects (Krempkow et al. 2012), or, in the worst case, boost „academic resistance" (Anderson 2008). We can confirm a weak influence on the teaching approach, too. As a consequence, management at universities must be increasingly related to transformational governance (Ramsden et al. 2007; Wilkesmann 2013).

In line with these findings is the fact that teaching award winners score higher on the SF approach at universities of applied sciences. Awards honor innovative teaching methods, which are typically student-focused. Awards are a special and well-known 'incentive' in academia, but they are not selective incentives in the narrower sense (Frey and Neckermann 2008). One result that is not consistent with these findings and therefore cannot be interpreted is the fact that winning a teaching award at universities of applied sciences is significantly related to practice TF. This is a contradiction that requires further investigation.

Nevertheless, we can confirm the findings from other studies: disciplines are relevant to one's teaching approach (Lindblom-Ylänne et al. 2006; Ramsden et al. 2007; Lübeck 2010). From our perspective, this finding can be attributed to the long-term socialization process undergone during professionalization in a particular field; professors' ways of teaching are evidently shaped by the teaching styles they experienced as students.

There is good news for 'centers for enhancement of teaching and learning' at universities that deliver pedagogical training classes: continuing pedagogical training matters. Therefore, we can also confirm the medium-term socialization effect of such trainings (when they last four days or longer), that is consistent with several other surveys (Nowakowski et al. 2012; Johannes and Seidel 2012; Metz-Göckel et al. 2012).

Because continuing pedagogical training is up to now voluntary in Germany, most professors do not attend these programs to avoid situations where they could fail. Hence, academic teaching is primarily learned by doing. In learn-by-doing situations, people typically reproduce the environment in which they were socialized. This could be one reason for the very stable teaching approaches within the different disciplines. Another reason could be the 'faculty-teaching culture': is it possible to talk to colleagues about teaching contents and methods? If professors swap ideas on teaching issues, the development of a SF teaching approach becomes more likely. Additionally, a general 'taste for teaching' is an important factor in motivating professors to reflect on their own teaching methods.

Based on the results of our survey, a successful 'recipe' for developing faculty includes increased teaching-related interaction with colleagues, such as collegial team training which promotes a SF approach. At a small university of applied sci-

ences in the northern part of Germany, the introduction of so-called professional learning communities seems to have had a positive impact on teaching-related collegial interactions. The vice-rector for teaching at a world-class university told us in an interview that she builds communities among teachers, so that teachers can practice innovative techniques without feeling alone and colleagues can learn from each other. In this process, she identifies courses with excellent teaching and asks the lecturers to talk about their experiences in front of their colleagues. To make the good professors more visible, she encourages them to apply for the teaching award.

Our survey is limited by several facts. First, one drawback of our study is that we could only use a single item to examine the SF approach at research universities, therefore this depend variable cannot be compared to the model of universities of applied sciences where we could build an index for the SF approach with sufficient reliability. Second, the explained variance for the TF approach regression model in the case of universities of applied sciences is very poor, which needs further explanation and exploration. Third, our survey does not include variables addressing the student perspective (e.g. their motivation and demands), i.e. the data is solely based on the professorate's perception. Fourth, our study only provides evidence from cross-sectional data for the case of Germany. Further research must integrate longitudinal data to examine the impact of different governmental structures and specific interventions on the university's leadership side that promote a particular teaching style in the long run.

Appendix

Table 6 Bivariate correlations of the independent variables

Research universities													
	H1_1	H1_2	H1_3	H1_4	H2_1	H2_2	H3_1	H3_2	H4	H5	C_1	C_2	C_3
H1_1	1.000	0.079[b]	−0.007	0.089[a]	−0.030	−0.005	0.022	0.029	0.033	0.017	0.020	−0.142[a]	0.221[a]
H1_2		1.000	0.066	−0.047	−0.075[b]	0.055	0.064	0.051	0.049	0.024	0.028	0.001	−0.071[b]
H1_3			1.000	0.266[a]	−0.018	0.010	−0.001	−0.002	−0.014	−0.015	−0.011	0.077[b]	−0.082[b]
H1_4				1.000	−0.134[a]	0.007	−0.023	−0.049	−0.003	0.028	0.000	0.015	−0.033
H2_1					1.000	−0.037[a]	0.072[b]	−0.079[b]	−0.011	−0.280[a]	0.015	−0.008	0.138[a]
H2_2						1.000	−0.071[b]	−0.053	−0.044	0.088[a]	−0.029	−0.082[b]	−0.030
H3_1							1.000	0.273[a]	0.078[b]	−0.111[b]	0.063	−0.077[b]	0.095[a]
H3_2								1.000	0.022	−0.149[a]	0.089[a]	−0.097[a]	0.076[b]
H4									1.000	−0.031	0.076[b]	−0.155[a]	0.083[b]
H5										1.000	−0.143[a]	0.181[a]	−0.203[a]
C_1											1.000	0.058	−0.011
C_2												1.000	−0.676[a]
C_3													1.000
Universities of applied sciences													
H1_1	1.000	0.064	−0.008	0.021	0.069	0.072	0.109[a]	0.095[b]	0.056	−0.045	0.023	−0.163[a]	0.508[a]
H1_2		1.000	0.124[a]	0.075	−0.005	−0.026	−0.072	0.009	0.032	0.062	0.013	0.114[a]	−0.050
H1_3			1.000	0.272[a]	0.005	−0.007	0.030	0.005	0.044	0.018	0.022	0.062	−0.117[a]
H1_4				1.000	0.063	0.000	0.072	0.041	0.028	−0.050	−0.041	0.034	−0.034
H2_1					1.000	−0.196[a]	0.028	−0.038	−0.025	−0.270[a]	0.102[a]	0.049	0.028
H2_2						1.000	0.045	0.087[b]	−0.082[b]	−0.055	−0.008	−0.119[a]	0.027
H3_1							1.000	0.274[a]	0.094[b]	−0.145[a]	−0.007	−0.210[a]	0.269[a]
H3_2								1.000	0.043	−0.085[b]	0.021	−0.114[a]	0.128[a]

Table 6 (Continued)

Research universities					
H4	1.000	−0.007	0.054	−0.094[b]	0.118[a]
H5		1.000	−0.153[a]	0.128[a]	−0.063
C_1			1.000	0.023	0.033
C_2				1.000	−0.541[a]
C_3					1.000

(H1_1) Recipient of merit pay for teaching, *(H1_2)* Agreement on objectives includes teaching, *(H1_3)* Teaching award at university, *(H1_4)* Teaching award winner, *(H2_1)* Pure Soft Sciences, *(H2_2)* Applied Soft Sciences, *(H3_1)* Pedagogical continuing training, *(H3_2)* Pedagogical coaching, *(H4)* Frequent interaction with colleagues about teaching experience, *(H5)* Gender (1 = male; 0 = female), *(C_1)* Significance of teaching preparation, *(C_2)* Age, *(C_3)* Payment scheme

[a]Level of significance 1%

[b]Level of significance 5%

References

Anderson, G. (2008). Mapping academic resistance in the managerial university. *Organization, 15*(2), 251–270.

Arrow, K. J. (1985). The economics of agency. In J. W. Pratt, R. Zeckhauser, & K. J. Arrow (Eds.), *Principals and agents: The structure of business* (pp. 37–51). Boston: Harvard Business Press.

Beare, H., Caldwell, B. J., & Millikan, R. H. (1989). *Creating an excellent school*. London: Routledge.

Becher, T. (1989). *Academic tribes and territories: Intellectual enquiry and the cultures of disciplines*. Buckinghamshire: Society for Research into Higher Education and the Open University Press.

Biester, C. (2013). *Leistungsorientierte Vergütung in der Wissenschaft. Eine theoretische und empirische Analyse der neuen Professorenbesoldung* (Performance-related budgeting in science. A theorical and empirical analysis of the new salary for professors). Weinheim: Beltz Juventa.

Biglan, A. (1973a). The characteristics of subject matter in different academic areas. *Journal of Applied Psychology, 57*(3), 195.

Biglan, A. (1973b). Relationships between subject matter characteristics and the structure and output of university departments. *Journal of Applied Psychology, 57*(3), 204–213.

Braun, E., & Hannover, B. (2009). Zum Zusammenhang zwischen Lehr-Orientierung und Lehr-Gestaltung von Hochschuldozierenden und subjektivem Kompetenzzuwachs bei Studierenden (The relationship between teaching-orientation and teaching design of university lecturers and a subjective increase in competence among students). In M. A. Meyer, M. Prenzel, & S. Hellekamps (Eds.), *Perspektiven der Didaktik* (Didactic perspectives) (pp. 277–291). Wiesbaden: Springer VS.

Braun, E., & Leidner, B. (2009). Academic course evaluation. Theoretical and empirical distinctions between self-rated gain in competences and satisfaction with teaching behavior. *European Psychologist, 14*(4), 297–306.

Eisenhardt, K. (1989). Agency theory: An assessment and review. *Academy of Management Review, 14*(1), 57–74.

Federal Statistical Office (2012). *Nichtmonetäre Hochschulstatistische Kennzahlen 1980–2012* (Non-monetary statistical key figures in higher education 1980–2012). https://www.destatis.de/DE/Publikationen/Thematisch/BildungForschungKultur/Hochschulen/KennzahlenNichtmonetaer2110431127004.pdf?__blob=publicationFile. Accessed: 30 March 2014.

Frey, B. S. (1997). *Not just for the money*. Cheltenham: Edward Elgar Publishing.

Frey, B. S., & Neckermann, S. (2008). *Academics appreciate awards: a new aspect of incentives in research* (No. 2531). CESifo working paper.

Frost, J., Osterloh, M., & Weibel, A. (2010). Governing knowledge work: Transactional and transformational solutions. *Organizational Dynamics, 39*(2), 126–136.

Gibbs, G., & Coffey, M. (2004). The impact of training of university teachers on their teaching skills, their approach to teaching and the approach to learning of their students. *Active Learning in Higher Education, 5*(1), 87–100.

González, C. (2011). Extending research on 'conceptions of teaching': Commonalities and differences in recent investigations. *Teaching in Higher Education, 16*(1), 65–80.

Jaeger, M., Leszczensky, M., Orr, D., & Schwarzenberger, A. (2005). *Formelgebundene Mittelvergabe und Zielvereinbarungen als Instrumente der Budgetierung an deutschen Universitäten: Ergebnisse einer bundesweiten Befragung* (Formula-based funding budgets and target agreements as instruments of budgeting at German universities. Results from a nationwide survey). (HIS-Kurzinformation A13/2005). Hannover: HIS.

Johannes, C., & Seidel, T. (2012). Professionalisierung von Hochschullehrenden. Lehrbezogene Vorstellungen, Wissensanwendung und Identitätsentwicklung in einem videobasierten Qualifikationsprogramm (Professionalization of university teachers—Teaching approaches, professional vision, and teacher identity in video-based training). *Zeitschrift für Erziehungswissenschaft, 15*(2), 233–251.

Kember, D., & K. Kwan (2002). Lecturers' approaches to teaching and their relationship to conceptions of good teaching. In N. Hativa & P. Goodyear (Eds.), *Teacher thinking, beliefs and knowledge in higher education* (pp. 219–240). Dordrecht: Kluwer.

Kolb, D. A. (1981). Learning styles and disciplinary differences. In A. W. Chickering (Ed.), *The modern American college* (pp. 232–255). San Francisco: Jossey-Bass

Kollock, P. (1998). Social dilemmas: The anatomy of cooperation. *Annual Review Sociology, 24*(8), 183–214.

Krempkow, R., Landrock, U., & Schulz, P. (2012). Steuerung durch LOM? Eine Analyse zur leistungsorientierten Mittelvergabe an Medizin-Fakultäten in Deutschland (Steering through performance orientated funding allocation (LOM)? An analysis of performance-related budgeting at German medical faculties). In U. Wilkesmann & C. J. Schmid (Eds.), *Hochschule als Organisation* (University as Organization) (pp. 245–260). Wiesbaden: Springer VS.

Lacey, C., & Saleh, A. (1998). Teaching nine to five: A study of the teaching styles of male and female professors. *A paper presented at the Women in Educational Leadership Annual Conference, Lincoln, Nebraska, October 11–12*.

Leithwood, K. A. (1992). The move towards transformational leadership. *Educational Leadership, 49*(5), 8–12.

Leroy, N., Bressoux, P., Sarrazin, P., & Troulloud, D. (2007). Impact of teachers' implicit theories and perceived pressures on the establishment of an autonomy supportive climate. *European Journal of Psychology of Education, 22*(4), 529–545.

Lindblom-Ylänne, S., Trigwell, K., Nevgi, A., & Ashwin, P. (2006). How approaches to teaching are affected by discipline and teaching context. *Studies in Higher Education, 31*(3), 285–298.

Lübeck, D. (2010). Wird fachspezifisch unterschiedlich gelehrt? (Are there subject-specific differences in teaching?). *Zeitschrift für Hochschulentwicklung, 5*(2), 7–24.

McKenna, A. F., & Yalvac, B. (2007). Characterizing engineering faculty's teaching approaches. *Teaching in Higher Education, 12*(3), 405–418.

Metz-Göckel, S., Kamphans, M., & Scholkmann, A. (2012). Hochschuldidaktische Forschung zur Lehrqualität und Lernwirksamkeit. Ein Rückblick, Überblick und Ausblick (Didactic research on teaching quality and teaching efficiency in higher education. Retrospective, insights and outlook). *Zeitschrift für Erziehungswissenschaft, 15*(2), 213–232.

Miller, G. J. (2005). The political evolution of principal-agent models. *Annual Review of Political Science, 8*, 203–225.

Mintzberg, H. (1989). *Mintzberg on management: Inside our strange world of organizations*. New York: Free Press.

Neumann, R., Parry, S., & Becher, T. (2002). Teaching and learning in their disciplinary context: A conceptual analysis. *Studies in Higher Education, 27*(4), 405–417.

Nevgi, A., Postareff, L., & Lindblom-Ylänne, S. (2004). The effect of discipline on motivational and self-efficacy beliefs and on approaches to teaching of Finnish and English university teachers. *A paper presented at the EARLI SIG Higher Education Conference, June 18–21*.

Nowakowski, A., Vervecken, D., Braun, E., & Hannover, B. (2012). Was Hochschuldozierende aus Lehrevaluations-Rückmeldungen lernen können. Der differenzielle Einfluss prozess- versus ergebnisorientierten Feedbacks auf Lehrorientierungen (What university lecturers can learn from evaluation feedback—The differential impact of process- versus outcome-oriented feedback on teaching orientations). *Zeitschrift für Erziehungswissenschaft, 15*(2), 253–271.

Pelletier, L. G., & Sharp, E.C. (2009). Administrative pressures and teachers' interpersonal behaviour in the classroom. *Theory and Research in Education*, 7(2), 174–183.

Pelletier, L. G., Seguin-Lévesqui, C., & Legault, L. (2002). Pressure from above and pressure from below as determinants of teachers' motivation and teaching behaviors. *Journal of Educational Psychology, 94*(1), 186–196.

Postareff, L. (2007). *Teaching in higher education. From content-focused to learning-focused approaches to teaching* (Research Report 214).University of Helsinki: Department of Education.

Prosser, M., & K. Trigwell (1999). *Understanding learning and teaching. The experience in higher education*. Buckingham: Open University Press.

Prosser, M., & K. Trigwell (2006). Confirmatory factor analysis of the approaches to teaching inventory. *British Journal of Educational Psychology, 76*(2), 405–419.

Ramsden, P., Prosser, M., Trigwell, K., & Martin, E. (2007). University teachers' experience of academic leadership and their approaches to teaching. *Learning and Instruction, 17*(2), 140–155.

Roth, G., Assor, A., Kanat-Maymon, Y., & Kaplan, H. (2007). Autonomous motivation for teaching: How self-determined teaching may lead to self-determined learning. *Journal of Educational Psychology, 99*(4), 761–774.

Ryan, R. M., & Deci, E. L. (2000). Self-determination Theory and the Facilitation of Intrinsic Motivation, Social Development and Well-being. *American Psychologist, 55*(1), 68–78.

Sanchez, J. (2012). *Motivational triggers of faculty members: The process of teaching practice transformation*. University of New Mexico. http://hdl.handle.net/1928/17500. Accessed: 14 Jan. 2014.

Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assessment, 8*(4), 350–353.

Shannon, C. E., & Weaver, W. (1949). *A mathematical model of communication*. Urbana: University of Illinois Press.

Smeenk, S., Teelken, C., Eisinga, R., & Doorewaard, H. (2009). Managerialism, organizational commitment, and quality of job performances among European university employees. *Research in Higher Education, 50*(6), 589–607.

Stes, A., Gijbels, D., & Van Petegem, P. (2008). Student-focused approaches to teaching in relation to context and teaching characteristics. *Higher Education, 55*(3), 255–267.

Trigwell, K., & Prosser, M. (1996). Congruence between intention and strategy in university science teachers' approach to teaching. *Higher Education, 32*(1), 5–84.

Trigwell, K., & Prosser, M. (2004). Development and use of the approaches to teaching inventory. *Educational Psychology Review, 16*(4), 409–424.

Trigwell, K., Prosser, M., & Waterhouse, F. (1999). Relations between teachers' approaches to teaching and students' approaches to learning. *Higher Education, 37*(1), 73–83.

Vogel, M. P. (2009). Exploring the conditions for academic teachers' informal collegial learning about teaching. A social network approach. *Educate, 9*(2), 18–36.

Watzlawick, P. (1976). *How real is real? Confusion, disinformation, communication*. New York: Random House.

Wilkesmann, U. (2013). Effects of transactional and transformational governance on academic teaching—Empirical evidence from two types of higher education institutions. *Tertiary Education and Management, 19*(4), 281–300.

Wilkesmann, U., & Schmid, C. J. (2010). Ist der Lehrpreis ein Leistungsanreiz für die Lehre? (What can teaching awards really achieve in regards to teaching performance?). In P. Tremp (Ed.), *‚Ausgezeichnete Lehre!' Lehrpreise an Hochschulen* (Teaching Awards at Universities) (pp. 39–55). Münster: Waxmann.

Wilkesmann, U., & Schmid, C. J. (2011). Lehren lohnt sich (nicht)?—Ergebnisse einer deutschlandweiten Erhebung zu den Auswirkungen leistungsorientierter Steuerung auf die universitäre Lehrtätigkeit (Does teaching pay off (or not)?—Findings from a Germany-wide survey examining the impact of performance-related steering on university teaching activities). *Soziale Welt, 62*(3), 251–278.

Wilkesmann, U., & Schmid, C. J. (2012). The impacts of new governance on teaching at German universities. Findings from a national survey. *Higher Education, 63*(1), 33–52.

Wilkesmann, U., & Schmid, C. J. (2014). Intrinsic and internalized modes of teaching motivation. *Evidence-based HRM, 2*(1), 6–27.

Wilkesmann, M., & Wilkesmann, U. (2011). A framework for knowledge transfer as interaction between experts and novices supported by technology. *VINE Journal of Information and Knowledge Management Systems, 41*(2), 96–112.