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Time to teach. Revisiting teaching time in German higher education**

An important question in the study of academic work is how much time academics spend on teaching. Large-scale workload-measurements point to the fact that in nearly all cases academics spend more hours per week on teaching than they ought to. Yet in qualitative interviews academics struggle to estimate weekly worktime counts considerably. In this article we investigate the way teaching time is constructed in German universities. We argue that weekly clock-time measurements do not provide an adequate picture of teaching time compared to how it is structured and experienced by academics. Teaching time rather evolves from the time classification of the weekly contact hour (SWS) and produces different time frames depending on how courses are allocated, coordinated, conceptualized, prepared, conducted and how students are supervised or examined. By following the trajectory of the SWS through the activities of teaching we propose to concentrate less on how much time academics work but rather why time de- and inflates and how this affects teaching experience.

Key words: **teaching, higher education, academic practice, actor-network-theory, time** (JEL: I20, I22, I23)

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Introduction

How much time do academics spend on teaching? This question has been asked for several decades and resulted in various forms of working time measurement. In his historic comparison of academic working time in the UK Malcolm Tight (2010) traces such measurements back to the 1960s. He quotes the Committee on Higher Education which as early as in 1961/62 stated that "on average, full-time university teachers (…) reported working 40.5 hours per week during term" out of which "one-third (…) was spent on teaching". Similar figures exist for other countries (e.g. for the US: Ladd, 1979), and the body of research on quantifying teaching time has grown since.

In general, the task of quantifying teaching time goes hand in hand with quantifying time spent on research, administration, and more recently service. Time is expressed either as hourly clock-time measurement or as a percentage of the total workload. The German case, which we aim at developing further here, is no exception. Based on survey data, Jacob and Teichler (2011, pp. 129f) show that on average professors at universities work 56 hours per week and research associates 39 hours per week during the lecture period. Of this weekly working time, professors spend 18.5 hours on teaching and 17.3 hours on research, and research associates 10.1 hours on teaching and 18.8 hours on research. Other surveys (Kopp & Weiß, 1993; Enders & Teichler, 1995; Grühn, Hecht, Rubelt, & Schmidt, 2009; Schaeper, 1994; Schimank, 1992) frame teaching time likewise by using mean values of weekly working hours and the distribution of time between research, teaching, and administration.

In all these approaches, average working time per week has become a "metaphysical device"[1] that renders teaching trajectories homogenous and comparable. The fact that a professor spends a specific number of hours a week on teaching enables researchers to compare it to the amount of time a professor spends on research. It thereby produces a balance-sheet that can problematize both practices either within an "academic ratchet" that feeds the ever-growing demand for research time by drawing back from teaching (Massy & Zemsky, 1994) or the increasing hegemony of teaching in the university that triggers "coping strategies" (Schimank, 1995, p. 57) to 'make' time for research. The calculation of average working time can also be used to relate academic work to other public service job profiles or to the actual academic working duties, proving that academics are comparatively overworked (e.g. Grühn et al., 2009, pp. 27-38). Consequently, clock-time does more than just measure time in a specific way. Rather, it aims at representing all the work involved in teaching.

How adequate such time measurements are is questioned even by those providing such survey results. In their study of US faculty Schuster and Finkelstein (2008, p. 79) concede that such workload calculations are based on "crude self-reported estimates" (similar for Germany Enders & Teichler, 1995, pp. 47-48)[2]. Measuring then is in dan-

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1 Fraser (1990) speaks of "metaphysical device" or "machine" to describe the role of clocks in time measurement. We expand this notion to all forms of time ordering devices that produce homogenous time perspectives.

2 Scholars may differentiate teaching further into course preparation, contact hours in class, supervising, and examinations (Ipsen, 1976; Oehler et al., 1978; Schaeper, 1994; Enders &

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ger of becoming "valued as a practice for its own sake" (Glennie & Thrift, 2009, p. 91) and neglects whether academics themselves perceive these figures as appropriate and useful representations of their working practice (cf. Bourdieu, 1977, p. 106; Malcolm & Zukas, 2009, p. 500).

We aim at revisiting teaching time from a different perspective. Rather than describing teaching time through universal clock-time counts we follow how higher education's own time frame, the SWS, unfolds and relates in various ways to teaching. We maintain the perspective that time represents more than just itself but question whether clock-time is an adequate representation of teaching in German higher education. We do this by first analyzing how the time frame SWS structures teaching practice in order to then trace how further teaching practices and time perceptions develop out of and around it. The description follows seven more or less chronological phases of academic work namely the allocation (1), coordination (2), conceptualization (3), preparation (4) teaching (5) of the course and the supervision and examination (6) of students in relation to the course.

Teaching time revisited

Problems with accounting for teaching in terms of clock-time became apparent when we asked German academics directly how much time they spend on teaching and on other academic tasks per week. The answers indicated the respondents had severe difficulties in estimating their teaching time, and the survey yielded partially unrealistic results (Bloch, Lathan, Mitterle, Trümpler, & Würmann, 2014). One respondent remarked:

I have tried to fill out your survey, but failed to calculate my weekly working time as I neither own a time-punch clock, nor do I make statistics on my working hours. I would need at least one to two hours of preparation to at least provide an approximate estimation of my workload in statistical terms. (professor, humanities, translated email).[3]

The quote indicates that weekly clock-time counts are problematic artifacts in the world of German academics. They do not have such counts at hand. Rather, translating their teaching time into clock-time counts requires a special effort. Thus, clock time seems not to be the measure of academic labor (cf. Colley, Henriksson, Niemeyer, & Seddon, 2012, p. 374). While public service regulation that also applies for university personnel indeed knows weekly work-time counts, higher education law is silent on time-specific work measures and rather defines academic roles by task. The only visible time measure is set by the regulation of teaching obligations (*Lehrverpflichtungsverordnungen*) that defines the teaching load through the amount of weekly semester teaching hours, *Semesterwochenstunden* (SWS).

Teichler, 1995; Jacob & Teichler, 2011) or ask questions concerning the availability of a secretariat, staff, and information technology (Kopp & Weiß 1993). Nevertheless, these components of teaching are neither inquired further nor do they form separate categories for quantification.

3 All teaching-staff quotes within this article have been translated from German to English by the authors. There will be no further indication.

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Academics can pretty easily provide an account of the number of SWS they have to teach during a semester as their course hours remain rather stable during a semester and are materially connected to their presence at a specific place at a given time[4]. The number of SWS is inscribed in and related to their work contracts, and is reported at the end of a semester in special teaching load forms (*Lehrerhebungsbögen*).

Such inscriptions normally do not arise from individual contract negotiations but are derived from an administrative number of positions aligned to the faculty. Each position is linked to a specific number of SWS[5]. The positions can be divided between multiple academics, retransformed, or held vacant while the total faculty teaching obligations in SWS remain stable (Mitterle, Bloch, & Würmann, 2015). For instance, splitting up a full research associate position equally in two part-time positions results in dividing the SWS-teaching obligations in the same manner. Reductions of the teaching load to compensate for administrative obligations are possible but imply the reallocation of teaching to other faculty. The SWS therefore goes beyond being just a simple contact hour measure and functions as a universal and moveable work time object that can be employed everywhere in the university. Administration uses it as category around which to plan student numbers, coursework, and room distributions, and thereby "achieve ordering of practice at a distance" (Fenwick & Edwards, 2010, p. 85; cf. Nespor, 2006, p. 59). Faculty uses it as the framework of their teaching. Time as SWS functions as what Bowker and Star (1999, p. 232) have called a "manageable" work classification. It is a device that serves as a useful ordering category for administration and it provides sufficient flexibility – even "intimacy" – for teachers to transform it into their teaching practice.

Thus, from our perspective time is not an ordering device that operates separately of and linear to academic space and materiality. Rather, we see time as a part of socio-material practice and it can only be understood in relation and association to this practice (cf. Massey, 1999, p. 33). Time is a social construction of a specific type that signals duration in association with and within specific space: "time depends on associations" (Latour, 1993, p. 141). Such associations form the specific but multiple functions and meanings a time classification has within different constellations (cf. Friese, 1993; Glennie & Thrift, 2009, p. 97) and the time classification itself produces specific ways in which socio-material practice is ordered (Bowker & Star, 1999). In other words: Time is *not* clock-time, but it can become clock-time if a clock is used as a measure or a point of reference. Indeed we do not challenge the fact, that daily life is predominantly observed through watches, alarm-clocks and other time measuring devices but we doubt whether it is an adequate representation of teaching in higher education.

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4 Clark (1987, p. 72) makes a similar point for the US.

5 Usually Professors and full time permanent research associates teach 8-9 SWS, full time temporary research associates 4 SWS. In making decisions on student intake numbers – for which the SWS load is relevant – courts have regularly neglected weekly working hours of civil servant positions in favor of SWS-counts.

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Methodological remarks

To understand how teaching time evolves in academic practice we follow how the SWS performs various time frames in university teaching. It functions as an actor. This is in line with the analytical perspective of what has become known as (After)[6] "Actor-Network Theory" (ANT) (Law, 1999; Latour, 1999). (After)-ANT is a loosely-coupled research field originating in Science and Technology Studies that aims at re-describing the world not through pre-defined sociological categories but by following human and non-human actors via their relations. It thereby can go in various directions: either by opening up "black-boxed" and naturalized entities into further actors and relations or by describing how such entities connect with others to form a diverse network. It thereby analytically assumes a symmetry between human and non-human-actors. In this paper for example the SWS associates with various non-human actors such as emails, calendar time, tables, doors, rooms, teachers, folders full of assignments, power point presentations and so on to produce a specific network of time that structures teaching. This network is represented through a specific measure, here the SWS, but this measure is always an ensemble of its relations. In other words, the SWS does not reduce complexity but represents it in a specific way. It does not function by itself but only in the way it achieves to *translate* into the teaching practice or by *enrolling* in the sense that it takes up a role, it inscribes itself into another network (Callon, 1986). It may have to change shape, function, or meaning to make an enrolment possible. At the same time the network in which it enrolls is nothing stable or bigger than the SWS, it also is dependent on the constant enrollment of all its parts.

In order to trace the multiple enrolments, translations, and transformations of the SWS we draw on problem-centered interviews with ten professors and six research associates from various disciplines (humanities, social sciences, natural sciences, pharmacy) and six interviews with deaneries[7] at one middle-sized German university. We asked the first cohort to give a time telling account of their teaching. This involved asking for the time and effort involved in the SWS, as well as inquiring further into the actors the interviewees mobilized within their narrative. This means that other forms of time experience (calendar time, clock time, counter-time) as well as qualitative perceptions can arise next to the SWS, transport it, and work within or against another evolving time frame. In a similar way we questioned the deaneries on how teaching was organized on faculty level. Through a multi-level coding process we identified seven different teaching related phases. These phases follow as far as possible chronologically the enrollment process of the SWS that usually takes the form of a course. A course refers to a distinct bundle of SWS (mostly two SWS) (s. Table 1).

We explicitly do not concentrate on a specific discipline or academic position because neither clock-time nor the SWS as a measure take these into account. The focus on the SWS allows us to explore how this specific ordering device evolves within dif-

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6 The "after" refers to the understanding that the contributors to ANT do not apply a fixed set of methodological practices but rather describe the world from a certain perspective.

7 These include deans, vice-deans for teaching, and teaching administrators working for the dean.

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ferent teaching narratives. In this way we follow an open approach to provide a thorough description of teaching through various time frames.

Table 1: Phases of teaching time

Allocation (1)	The ordering of the interrelated SWS through student time and the curriculum.
Coordination (2)	The coordination of the course within modules and among teachers.
Conceptualization (3)	The conceptualization of the course before the lecture period.
Preparation (4)	The preparation of the course as a tactical adjustment within interrelated SWS.
Teaching (5)	The explicit enrollment of the course at a specific time and place.
Supervision (6)	The supervision of students within interrelated SWS
Examination (7)	The examination as a course related practice that expands the SWS beyond lecture time

Allocating the courses (1)

Even though the SWS is central to the study of teaching time, teaching does not start with the SWS. Teaching starts with a curriculum that produces an order and a time frame in which students complete their degree program. It is this curricular time frame to which teaching time has to respond and which initially distributes the SWS. Curriculum documents usually include study and examination regulations ("*Studien- und Prüfungsordnung*") and complementary study guidelines ("*Modulhandbücher*"). The curriculum's main purpose is to codify, visualize, and distribute student learning over semester-time (Bloch, 2009, p. 251; cf. also Nespor, 2007, p. 753) it also works as a mediator between two different sets of time. Student time is based on credit points that represent the workload of a degree program. Credit points are not linked to single courses but to an interrelated bundle of courses under a given topic called 'module'[8]. In addition to in-class presence, credit points also calculate and include time needed for self-study and examinations.[9] Additional to the credit points, the curriculum also states the number of SWS for a given course and thus links student time (credit points) to teaching time (SWS). For a course to take place student time, expressed in credit points and linked to modular entities, has to be transformed into teaching time, expressed in SWS and linked to a single course.[10] This process is visualized in Figur 1.

8 For instance a political science module called "power and the state" could include a lecture on the topic (3 SWS) and a practical course (1 SWS) that uses different methods to research state power. Completion could be achieved through a paper and a multiple choice test and rewarded with a grade and six credit points.

9 Some states differentiate between LVS for teachers and SWS for students but the formal distinction very often gets lost in local translations.

10 If we use the notion of "course" it stands synonymously for a bundle of SWS (e.g. a seminar course is a bundle of two SWS). This is line with the way courses are outlined in university course catalogues and the way teaching narratives have evolved from the interviews.

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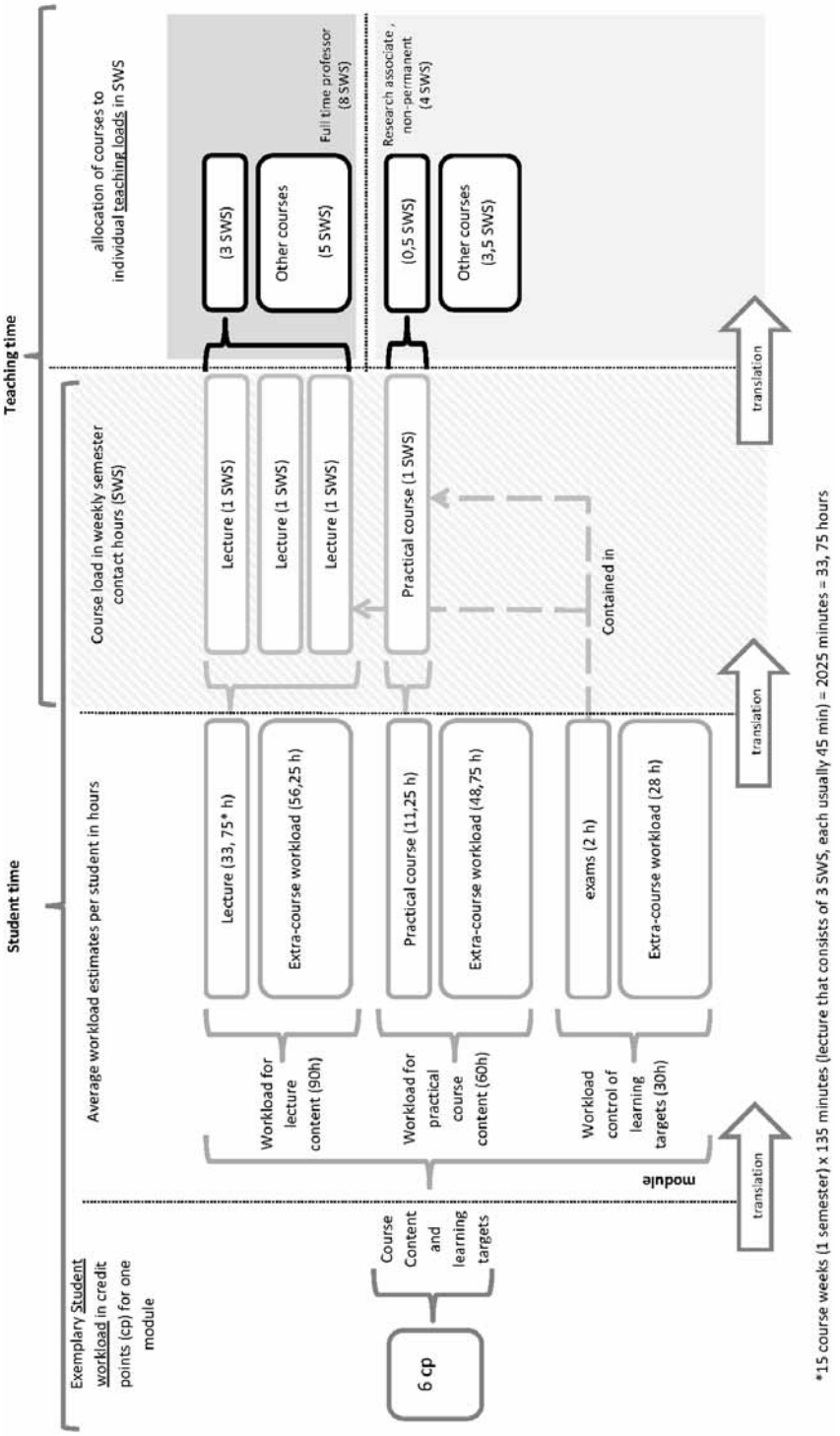
Figure 1: Exemplary translation process between credit points and teaching load SWS



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The total workload a student has to accumulate during his or her studies (e.g. for a Bachelor's degree 180 credit points) divides into small modules (here: 6 credit points). Each credit point equals an average work-time estimation that students will have to invest in learning to achieve the module's learning targets (per credit point between 25 and 30 hours). These time-measures are flat and represent clock-time counts for average learners. They show up in the fully developed curriculum but do not provide any information on how they came into being. The premises that underlie average workload calculations remain silent behind fixed numbers (e.g. 180 hours for six credit points) once a degree program has been accredited.

As a consequence of these translations, the courses that are singled out as parts of the module are – even though the study guidelines still express them to a large degree in SWS – just the spatially fixed part of the quantitative work-time calculations behind a number of credit points (e.g. 15 course weeks x 3 SWS (=3x45 minutes) = 33,75 hours for a lecture, see calculations in Figure 1).

While for students the SWS only shows up as a specific duration of clock-time they spend in class, it transforms for teachers into qualitative representations of their teaching load.[11] This transformation is a main part of the allocation task and ultimately relates the teaching load to specific modules. It thereby defines the specific SWS' place among the course offerings during one semester and the teacher's assignment options in the course (see 2). This specific place may be stabilized in the long term. Some professors reproduce the same connection between SWS and teaching load by holding the same courses one semester after another. A dean of natural sciences called these "entailed estates". Other courses are allocated every semester anew to research associates, lecturers, and professors. It involves considerable negotiations between rooms, student trajectories, and individual time rationales.

These negotiations are framed by organizational and individual imperatives alike. While teaching administration and room distribution services aim at creating fixed time tables that render planning possible and are in line with various student schedules, academics decide at different points when and where they intend to perform their teaching. As they have other activities in research and administration as well as private priorities, they work towards fitting the course into their own schedule (cf. Dressel & Langreiter, 2008). They aim at having the ordering process evolve around their time tables rather than being ordered by administration via availability of rooms or overlap with other courses.

> Professors do not want to follow a time set by some administration but want to use the time frames they define (dean social sciences).

Because course schedules are the only fixed time frames during a lecture week, specific ways of ordering the SWS can create higher flexibility. During the allocation of the course the enrolment of the SWS in the lecture period is presupposed to organize clock-time around the courses at the disposition of the teacher. One of the ways to do this is by condensing contact hour time. When we compared the time tables of our in-

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[11] Indeed as visible in the diagram, the workload estimated for a course relates to the type of course. While 45 minutes of a seminar or lecture count as 1 SWS, 45 minutes of practical courses can vary between 0.3, 0.5 and 1 SWS depending on the German *Land*.

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terviewees they showed that classroom teaching was very often concentrated on one or two days in the week, connected with consultation hours, or scheduled in bulk at early or late hours. Such practices do not increase or decrease the teaching time but provide opportunities for a longer engagement with other tasks. In a way condensing teaching can help to lose track of clock-time through longer periods of non-scheduled interference.[12] Depending on the availability of rooms and the level of autonomy to arrange one's own contact hours such condensing practices vary and relate to academic hierarchies.

Even when teachers are pretty free in timing their teaching, the resulting teaching schedules remain fragile. Faculty may be called upon to compensate for another's course that was cancelled at short notice because of someone leaving, sickness or budget cuts but which has to be offered. Even if faculty may not be required to teach more on formal grounds, they may do so for other reasons, such as upholding disciplinary standards or fulfilling informal expectations.

Coordinating the courses (2)

The relationship between student time and teaching time is visualized and codified in the university course catalogue. This is a printed or digital list of courses that aligns teachers and their SWS to rooms and clock-time frames. It also displays how teachers relate to specific modules and it builds a device for distributing students to teachers. What it does not show is how these relations take place. Various courses within a module have to be synchronized. This involves a coordination process between different teachers and student schedules that further orders teaching time by prospectively inscribing the SWS in calendar time. The course content is developed along a time axis that attaches different contents to different dates, and relates to the content of other courses in the same module. This coordination takes place before the semester starts:

> We [faculty who teach different courses in one module] also consult each other to have things arranged. That definitely requires some extra time. Before the term starts, you meet and ask: What are we going to do anyway? What is our plan? What can the teaching assistants do? (professor 1, humanities).

Coordinating the courses also includes deciding what content is to be tested and how it is to be tested. Modules usually have less assignments than there are courses to keep the student examination workload in reasonable boundaries. Within the boundaries of the examination regulations teachers have to agree on the form of the assignment and who designs it.

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12 Anderson (2006, pp. 585-586) uses the notion of "free time" designated towards "time for 'their own' research rather than time for recreation", while Ylijoki & Mäntylä (2003) speak of "timeless time". In such a picture time remains a universal category that from our perspective does not sufficiently reflect the normative effects of clock time. What we mean here is not the experience of free (clock) time but rather an experience that is free *of* (clock) time. It might be framed prospectively or retrospectively as a specific time frame but the academic's immersion into the situated associations can exclude a time frame altogether.

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Coordination is also necessary in relation to students. Modules – as bundles of SWS – very often refer to students from multiple degree programs. One module has to offer varying numbers of credit points to match the requirements of different degree programs whose students take the same module. Variations between different degree programs arise because degree programs are designed on a very local basis in departments. The initial creation of a degree program requires a considerable amount of synchronization between all the faculties and departments that may draw on courses in other degree programs than their own. Kühl (2012) describes this ordering process as a game of Sudoku in which a module originally resembles an empty field in a Sudoku puzzle. Such a field is part of a row of fields (degree programs) which vertically and horizontally have to sum up to 180 (BA) or 120 (MA) credit points. The more of these fields have been filled by specific numbers of credit points, the more determined the credit points-numbers for the remaining fields become.

In theory this would resemble a standardized model of a student workload that would apply to all degree programs alike. However, in administrative practice this is not the case. The degree structure in Germany has changed considerably during the last decade. The old diploma and magister degrees have been substituted in most disciplines through bachelor and master programs. During the transition time old and new degrees have been existing alongside each other. New degree programs are being created asynchronously depending on the pace of those drafting them. After being in place problems occur and curricula are altered and revised by faculty or at the behest of quality assurance procedures. Hence the ordering is always incomplete allowing for new combinations at different times and in different degree programs. As a result, students in one degree program may need eight credit points from a specific module, while others ask for ten.

> "You have to agree upon course requirements for students, with regard to different study programs because in there [the lecture] you have various study programs (…) and they all require different amounts of ECTS-points" (professor 1, humanities).

In order to fulfil the various demands for one course within one module, teachers either have to grant different points for the same course workload[13] or to vary the workload according to the different credit points students need to achieve. As the contact time, the SWS, is the same for all students alike, teachers can only vary the workload through introducing different forms of examination or extra-course workload (see diagram 1):

> This course offers the possibility to acquire six credit points, i.e. two for participating, two for presenting or moderating, and two for writing a paper. (…) that [the choice] is up to the student. (…) Some at least take the two [credit points] for presenting" (research associate 1, social sciences).

Modules are being translated from credit points into SWS and single courses, and back again to adjust to different degree programs. All these translations and orderings mostly take place before or at the beginning of a semester and are strongly interrelat-

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[13] Expressed in individual workloads, that basically means that students receiving eight points for a presentation and a ten pages essay are quicker workers than those receiving ten points for the same tasks.

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ed. Changes to one course may incur changes to others. Hence the SWS as an expression of teaching time is not only a time ordering device that applies to one teacher alone. Rather, it combines with all the other SWS-units and their teachers and constitutes a figuration of space/time – a network – in which teaching then unrolls. Individual teaching time fundamentally relates to all the other courses and deflates or inflates depending on *how* they relate. This can be made visible by looking at how the SWS enrols in the teaching time practices of teachers.

Conceptualizing the courses (3)

Once the SWS is projected onto the semester, the content of every single course has to be developed. That means texts have to be read and chosen, lectures have to be devised, or laboratory experiments have to be designed and assigned to concrete dates. Teachers conceptualize their courses in various ways; some do it *en bloc* during the lecture free period, others every now and then between administration and research tasks, and yet others fix their course content just in time before the course actually takes place. To get rough estimates we explicitly asked teachers to outline their investment of time in course planning. The answers we got displayed different ways of talking about time. Some used broad terms such as "a lot" or "high" while others tried to translate course conceptualization into clock-time categories. As in the previously cited email, the interviewees felt unsure about the validity of their time estimates, thereby showing that their time experience is initially disconnected from universal work time categories.

> That is really difficult. I have indeed thought about it [clock-time counts] beforehand, in reference to the effort it takes, and asked myself… okay, I don't have work-time lists or something from which I validly could give an estimate. Essentially, I would say two working weeks [for one course] (research assistant, social sciences).

Translations between different time experiences happen throughout the interviews. Some descriptions use rough time estimates, sometimes even very precise ones; others are unspecific. In other words clock-time is a common structuring principle to time yet reducing conceptualization time to precise time counts creates problems for academics. In all those time narratives teachers can however precisely explain what they do while conceptualizing their teaching and what impacts on time. In particular, they relate to past teaching experience. Conceptualizing a new course relates to "modules or parts [of modules], that already appeared earlier (…) in another, shortened, fragmented, form" (Professor, Social Sciences). Hence, previous teaching experience and knowledge are important factors in framing the time for conceptualizing a course (cf. Toews & Yazedjian, 2007, p. 118). If a course is repeated, it deflates the time needed. In a way, past SWS are encapsulated in power point slides, argumentation outlines, and course documents. These stick to teachers throughout various semesters and higher education institutions. Past course time gets codified in textbooks and can unroll – everywhere anew at any time through the individual teacher:

> When I hold my lecture, I have nothing to do for it, because the sheets already exist, and I just go there. I have a lecture at the moment where I read out my own book which I have somehow memorized and for which I have the presentations (visiting professor, social sciences).

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Interviewees, however, also report that a course does not take place as a simple repetition of former courses but rather as a variation. Holding the same course again may require less conceptualization but it nevertheless "absorbs time" to "refine and validate" the course content in the eyes of new knowledge (professor, natural sciences).

Refinement can also relate to previous experience in another way. Enrolling a course in calendar time is not a smoothly functioning process. It creates irritations; things may not work out the way they were originally planned; lectures may go overtime. Repeating a course may also inflate conceptualization depending on how students have related to the course in past semesters.

> What do you dispose of? What do you take in? How do you shorten it? How can you do it efficiently without losing the common thread for those who are willing to follow? (…) We do it for the students, not for us. That is the primary concern, to give them an understanding, to support them so that they can deal with the books independently, that they realize pretty fast which chapters they have to close-read" (professor 1, natural sciences).

Some studies indicate that the effort for conceptualization varies by discipline: "Multiple theoretical and methodological perspectives, and the fact that texts often are presented in an essay-like form, may explain why it is more time consuming to prepare teaching in the humanities and the social sciences than in the natural sciences, medicine and technology" (Smeby, 1996, p. 76). Hativa (1997, p. 11) maintains that social scientists are more oriented towards the latest research while natural scientists rely on established knowledge (cf. Neumann 2001, p. 139). Differences may also have to do with the way course structures, types and relations are constructed independent of the discipline's content (cf. Malcolm & Zukas, 2009; also Trowler, 2008). This applies especially to electives, i.e. courses students can chose from. While such courses are framed by the curriculum, they differ from compulsory courses in giving the teacher more leeway in developing their content.

> From my point of view seminars [electives] require a bigger effort [than compulsory courses], because time and again you do something different, (…) and if you want to work in depth on topics, you yourself first have to work yourself into them. (…) [you choose topics] you are familiar with or that interest you, and that are connected with your research (…) but to design this didactically and to conceptualize a seminar from this, the effort is considerably higher (research assistant, social sciences).

Here, time is ambivalent. The effort for conceptualizing electives is "considerably higher". At the same time the teacher shows a deeper "interest" as the course content relates to his or her research. Effort means more time but this time is valued because it relates to the teacher's own research and to courses he is passionate about and "puts his heart" into (professor 4, natural sciences). Teaching time hence relates to qualitative perspectives on teaching that are lost in clock time estimates.

Moreover, courses that require a higher effort are not isolated but relate to other courses a teacher offers during a semester.

> I know that I have to put in a lot. Well, that perhaps reduces itself through the fact that I have to put considerably less into other courses. (visiting professor, social sciences)

This expands the relational network of SWS beyond and out of sight of administrational arrangements: A course that needs more time because it is conceptualized the first time or is aligned to research can be made up for by "older" courses that only

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need slight adjustments. The number of courses a teacher has to offer and the degree of leeway[14] he or she has in deciding on their content then can further determine his/her time experience.

In addition to individual assemblages of teaching time and their qualitative valuing, time experience can also be a direct performative effect of the structure or type of course. This becomes visible by looking at how teachers prepare an individual session.

Preparing the single sessions (4)

With the beginning of the term the course is dissected into single sessions. As described, these are temporally and spatially set: they happen at a specified clock time in a specified room and confront the teacher with students. Enrolling the course in calendar time reconstitutes the course bottom up. Each session has to be prepared individually, and again involves the updating of knowledge, close-reading of texts as well as consulting with students on their presentations. The line between conceptualization and preparation is blurred, and in many cases these two are interchangeable. While conceptualization refers to time efforts with a strategic dimension and frames how the course should take place, preparation aims at translating the projected course content into the actual way the course takes place. This includes engaging the students and their preparations as well as managing unexpected material effects such as overcrowded lecture halls. That a lot of conceptualization also takes place as preparation between courses is visible in the changes to clock-time narratives among the interviewees when asked for time estimates on *conceptualizing* their courses:

> One sits down for preparation for around three, four hours each week (professor 1, social sciences).
>
> I would say that I need at least three hours of preparation per lecture SWS [means: course]. And at the moment it's rather five (professor 2, natural sciences).

It seems that time during the lecture-period is easier to estimate in clock-time as it has been framed by both calendar week and the interrelated teaching net of SWS-time. In some narratives teaching time transforms into disposable time frames between these SWS (see 1) that then can be used for preparation. They give a glimpse on how the net of SWS-time enrolls in calendar time:

> I have really compact lectures; that means as soon as the semester starts, I have a full program on Monday, Tuesday, Wednesday, and Friday. And on Thursday there is nothing, which means Thursday normally goes straight into preparation, so that I can at least somehow manage the week (professor 2, natural sciences).

Conceptualization is strongly connected to the lectures – at least those that are not interactive – and seems to partly take place hand in hand with preparation, single seminar sessions are less structured.

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14 This relates to how academic hierarchies play out on department level. While in some degree programs professors mostly cover the basic introductory courses and research associates get the chance to offer research-related courses, in other degree programs it is the other way round, having research associates cover especially practical courses that involve a lot of routine tasks and student surveillance.

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They need more tactical adjustment to situated interaction, may it be through discussions or vacancies. Some students do not turn up for presentations or the number of students does not match the presentations for all the sessions during a semester:

> Some [students] at least take the two credits for a presentation. It should have been some more because it is a relief if you do not have to present every session on your own because eventually it will come close to a lecture setting and will then be wearisome for everybody (research associate 1, social sciences).

In-course examinations require extra preparation time that involves special meetings with students to outline or discuss their presentations. Such extra time varies highly depending on course size and student demand.

> Generally, I meet with the students to discuss their presentation, go over the texts if they didn't understand them. And it is very, very different, how much effort is needed beyond that because the students engage differently in this. There are some who leave pretty fast, and some who seize this opportunity to discuss presentations at great length (research associate 2, social sciences).

While the administratively visible SWS time enrolls into calendar week by calendar week, administratively non-visible preparations and adjustments have to be filled in between courses. This may be another reason why teachers during the allocation phase put so much effort into controlling at what time of the day their courses take place. Next to the possibility of losing track of time, well-planned allocation is existential for sufficiently preparing for courses.

Teaching the course (5)

Teaching the course requires in most cases the physical presence of faculty and students in the same room. It is the materialization of the teaching time-frame that has been so thoroughly planned during allocation, conceptualization, and preparation. As these time frames have been brought in line with calendar time and are spatially determined, classroom teaching is the only exact clock time frame of academics from an administrative point of view (cf. Clark, 1987, p. 72).

These association of teachers, rooms, and clock-times at a certain time and place is fixed through the course-catalogue. The actual enrolment of the course may result in a different picture that translates these fixings in other ways. Depending on course type and status, faculty may delegate classroom presence. Especially in the natural sciences it is common practice that practical courses are announced in the course catalogue under the name of the responsible professor but are taught by his or her research associates.[15] The role of the administratively assigned teacher is then reduced:

> … in practical courses, I just occasionally pass by and play the mean professor (professor 3, natural sciences).

[15] At German universities, academic staff and resources are part of professorships (chairs), not departments (Kreckel, 2013, p. 71-72). Their size is negotiated when a professor is appointed and can be expanded by third-party funding.

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Yet, the professor does not necessarily teach less.[16] Rather, the delegation of teaching can be part of a discipline-specific division of labor, with professors mostly covering lectures and seminars while leaving practical courses to their staff. A chair or working group based organization of teaching may lead to professors being assigned more courses than their teaching load requires them to do. Delegating a share of the courses then brings in teachers whose teaching load is assigned by the professor, regardless of whether they have any teaching obligations at all (Mitterle et al., 2015).

The teaching venue may also duplicate teaching loads. From an administrative point of view certain student numbers meet with certain teachers in pre-defined rooms. For capacity and security reasons the given room may be inadequate to accommodate all students assigned to the course. Especially in the natural sciences, safety regulations limit the number of workplaces in the laboratory, and therefore the number of students to be taught in one laboratory course. If the number of students exceeds the limit, the course has to be offered twice or more and teaching loads increase by the number of additional extra-courses:

> You see, the big problem we have here is that we usually have one hundred students. And they are required to complete 76 hours of practical courses. But because we can only fit 30 in that one room, we right now have to offer the course four times. (…) Well, nobody cares about this. It means that the assistant doesn't only have a teaching load of 2 SWS, but he has to conduct the practical course four times, until everyone has passed (professor 3, natural sciences).

As explained earlier the SWS and students are assigned to positions and not to actual personnel (Mitterle et al., 2015). Therefore increasing individual teaching loads through material circumstances may not be reflected in the assigned SWS load by position.

Course time can also be deflated or transformed. If a course involves project or field work classroom teaching may become secondary to consultations, and then only occasionally takes place.

> Yes, I then move it [the course], I deploy it in a flexible way. This is because it is for the students, … I mean for both of us, there is so much more work to do in the project that it could not be done in addition to the contact course hour, I believe" (research associate 2, social sciences)

Time is then not just deflated but transformed from precise clock-time counts into rather vague estimates of what we have called preparation time. While the actual contact hours have been suspended, the course itself still demands teaching time: students have to be consulted and guided in achieving their in-course requirements. The clock time of classroom teaching is sacrificed for the vague felt time of student consulting in eye-to-eye contact or via email.

Nevertheless, even when clock time prevails and the course takes place regularly and brings the teacher together with all the assigned students, teachers may show up early or get involved in discussions that expand the course time beyond the fixed time

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16 Schimank (1995, p. 115) claims that shifting teaching to research associates is a strategy of professors to gain more time for research (and therefore teach less).

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counts. Likewise, they can leave early if presentations are over or they have other confronting duties (meetings, conferences etc.).

Such inflations or deflations of time, even though they relate to various changing circumstances, still treat teaching time as a flat category. Following the teacher around throughout a year, as it is common to diary-based research on teaching time, one could give precise clock-time counts on how long s/he works. It could however not provide any picture on how teachers experience their teaching time. They relate to courses differently, favoring some over others:

> Let's put it like this: It is an obligation, not freestyle, but we take obligations seriously, too. That's how I would see this course. *It is not a course I am passionate about*, but it still is important, and you fulfill your obligations as it is expected from a public servant (professor 4, natural sciences, emphasis added).
>
> I have another Masters seminar – *which is my favorite* – where I have twelve students (visiting professor, social sciences, emphasis added)

The last quote indicates that teachers are not only passionate about some courses but that student numbers seem to play a role in impacting on this positive experience. This is especially visible in the case of the colloquium, an advanced-level course type where Master and PhD-theses are presented and discussed or where the students are prepared for their final examinations:

> It [the colloquium] is something completely marginalized. It is a course that has not been completely 'Bolognized' and in which one has the time to engage with people. And where one does not constantly check on how many ECTS-points one has reached so far. The people rather come because it is about knowledge, not about credit points (Professor 4, humanities)

By positioning the credit point system as opposed to the strive for knowledge, this teacher regards the colloquium as a marginal course in the curriculum which allows him to engage with "people", rather than students. This understanding of time then transforms flat time counts pushed by credit point systems into the strive for knowledge among the attending students. Without this transformation his engagement would not be possible. He would be there the exact same clock-time counts, but it would not qualify as a "time to engage with people".

Time to engage with people may not only have positive effects on teaching. It can also be experienced as lacking or as constantly being threatened by loss of engagement, and can put the teacher under stress.

> I like to teach (…) but it is a huge effort to reach this crowd [200 students in introductory course] and to try to motivate them or at least to hold their attention. That is difficult (professor 1, humanities).

The teacher describes the relationship with the students during course time via motivation and attention as precarious: this relationship could fall apart at every second. Teachers may shield themselves by disconnecting student numbers from course experience. Teaching then becomes routinized and the perception of teaching time is rather flat.

> Well, I don't care if there are 100 or 400 [students] in my lecture as long as no exams are required (visiting professor, social sciences).

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While several studies point to the fact that "there is no linear relationship between the number of students and the use of teaching resources" (Smeby, 1996. p. 74; cf. Neumann, 2001, p. 137) they thereby concentrate on the overall clock-time counts rather than the embeddedness of time in a variying net of relations. Independent of universal time frames some courses can be more exhausting than others, thereby impacting on post-course time considerably. Studies looking at factors that influence the relationship between student and teacher seem to lead further. Schaeper (2008, p. 205) argues for the German case that the way of teaching in the natural sciences and economics is less student-centered than in the humanities. While she affirms that her survey data points to considerable differences by discipline, these results are rather the effect of "arbitrarily grown" student-teacher relationships rather than an "intrinsic, invariant, superhistorical" core to specific disciplines.

Supervising the students (6)

SWS time further involves the supervision of students.[17] By supervision we mean time-frames in which potentially every student can approach the teacher with questions concerning the courses, scientific knowledge, examinations, or anything else. Formally, supervision takes place in the office, and faculty are obliged to hold consultation hours. Quite often teachers schedule consultation hours right before or after their classroom teaching to produce longer disposable time-frames on other days. Such groupings are only set aside the SWS allocation process and do not relate directly to the SWS net. They can be changed, regrouped, expanded, or even erased completely within the disposable time-frames and at the teacher's will. Neither the students' course attendances nor the teaching or supervision times of other teachers have to be taken into account. Hence, even though consultation hours are basically fixed clock-time periods they are less stable than the SWS-time-net. Some faculty do not even schedule their consultation hours at all, thereby potentially expanding it to all non-course times.

> I have no office hours. Students can approach me at any time (professor 5, natural sciences).

Regarding supervision, several interviewees referred to their open office door as a visible sign of being approachable at any (clock-) time. The door transcends the material seclusiveness of the office by producing a direct link to the students approaching. While a 'politics of the open door' may appear as self-evident for some teachers, the door is also used to control student flows.

> I brought this [open door policy] with me from my time abroad: The door is open, when I'm there. This is not the case anymore. (…) But students do come very often outside my consultation hours. That happens all the time because they know that I will do it anyway. So if the door is not closed but [left ajar] in a way that you can see I am there from the

[17] Supervision time differs from preparation time in such a way, that student counseling done during preparation time refers to a specific session and undertaken in preparation of the course. Supervision time is more open and includes all forms of supervision demands that are directed towards the teacher without it necessarily having session-related purpose. Overlaps are however common.

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> outside, one or two people come in during the day. And indeed that happens four, five times the week (professor 4, humanities).
>
> I have no office hours, the door is always, well, it is always closed but you can always knock and I tell them [the students] to do so (professor 2, natural sciences).

Left ajar and closed doors require the students to be proactive if they wish to receive counseling, and they must know which actions are appropriate. Some may not know or try; some may not knock and leave. Policies of open and closed doors install the door as a gatekeeper. By determining who enters and when, the gatekeeper considerably influences and regulates supervision time. Different to other teaching time phases supervision is neither determined by the teacher nor is it restricted to and defined by clock-time counts such as contact hours. If not framed supervision time is mainly related to student demand at any given time. In its indeterminacy it functions as a counter-time that disperses and reduces preparation time. Gatekeepers – such as closed or locked doors – help faculty in channelling students from potentially unlimited non-course time into fixed clock-time frames.

> Well, an open door, that's how I used to handle it in earlier times, but now I tend to point to my office hours (...). There were simply too many [students]. And I didn't get around to do anything else (professor 3, social sciences).

Student demand can not necessarily be stopped by closed doors. In recent years, supervision has changed from face-to-face contact to electronic communication, most notably email. This change may unburden faculty from the former but it increases their availability via "representational technologies" (Nespor, 1994, p. 4). While already the telephone has been regarded as an "instrument of frequent distraction" (Clark, 1987, p. 71), thereby transforming secretaries and phone plugs into gatekeepers, email communication widens the office door into an unrestricted access portal. Email is not restricted to student demands but brings in requests from colleagues, the scientific community, and administration alike, while at the same time sending out the teacher's academic work, requests, and greetings. It is part of the academic's major working device – the computer – and thereby is, even more than a phone, a cause for 'frequent distraction'.

> What I think is difficult, it is indeed the fact that emails keep coming in throughout the week. (…) Students are not well aware of the fact that one is not only employed for teaching (…). And it is really difficult if students – during the whole week, throughout the day – always throw in burning and very important issues via email (research associate 2, social sciences)

Other than phone calls, emails pile up. While it helps to have "something in written form" which one "can go through and rethink" (research associate, social sciences), it also maintains the student's request beyond the time of its filing. The interviewees address email supervision in various ways. The one extreme expands the closed door into the virtual world by redirecting emailing students back to consultation hours, while the other extreme attempts to answer all requests in detail:

> I tend to clarify a lot via email. Well, at least when I talk to my colleagues I have the impression that they are more inclined to say 'Come to my office hours'. And, true, it is often easier to settle things in a personal talk. Nevertheless, I also tend to answer emails in detail if this is wanted. Sometimes I realize 'Good god, now you have been sitting for half an hour for one email' (research associate 1, social sciences).

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> I try to work through everything that comes in each day, because otherwise one produces a spillover for the next day. That isn't good… No, everything will be answered and done, yes. That's how it works (professor 1, humanities)

In a middle position, teachers try to set limits to their email supervision. Some prolong the time for answering, thereby cutting expectations of immediate availability; others may not answer at all:

> Let's say it this way. There is no specific line I draw, but sometimes an answer falls by the wayside. I mean, if there are 40 emails to answer, one sets them aside and just doesn't come back to them anymore. Most of them [the students] then come back to you again (professor 3, social sciences)

Furthermore, academic staff and tutors can likewise be used as gatekeepers, thereby redistributing the supervision load among the faculty.

> If there are problems with the students or if they have problems, I will be next to the assistants their contact person, and only after that they go to Professor [X] (research associate 1, natural sciences).

Different to other phases, supervision time is deflating or inflating mostly with reference to student demand and gate-keepers. While it may be easy to limit face-to-face supervision time to consultation hours the constant flow of emails expands it into every moment an academic opens his or her inbox. Exactly because supervision is dispersed throughout the week it resists quantitative clock-time counts and appears to be a relational effect that impacts erratically on other teaching time experiences.

Examining the students (7)

At some point in the semester the conceptualized courses have all been enrolled in calendar time and the lecture period ends. While the SWS-teaching-net dissolves and opens up calendar time for other experiences, the SWS also expands beyond its calendar frame: in order to receive credit points class attendance is usually connected to examination. In most cases, these examinations take place right after the lecture period has ended.

Examinations broadly consist of two parts: First, the phase in which the student transforms his/her ideas into words, choices, and paper, and second, the phase in which these efforts are turned into a grade. In oral examinations these two phases follow shortly after each other and take place in the same spot. Here indeed clock-time counts come closest to equating teaching time: as soon as the student leaves the room the specific oral examination is over. Depending on how many students a teacher has to examine, oral examinations can take several days and are quite often held in bulk. Written examinations are different. They can either be papers or lab protocols that students have to turn in at a certain date or sit-down written exams. The latter differ between teacher time spent on conducting the exams – a task that is very often delegated – and time spent on grading the exams. Other than in oral examinations, the first phase does not vary by student numbers. More students require bigger rooms, not more time for taking the examination.

The grading process spreads teaching time over the following weeks and relates heavily to the number of students and the type of examination. Examinations in a course vary depending on the curriculum and the choice of the teacher. With the re-

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cent introduction of bachelor and master degrees (see 3.) these examinations have become more transparent and codified: all possible examination options are listed explicitly for each module in the study documents, both delimiting and diversifying the teacher's choice.[18] They furthermore depend on disciplinary habits and the amount of credit points required. With regard to examination types, the natural sciences seem to be more prone to tests, while the social sciences oscillate between tests and papers.

In both cases the interviewees report that the marking is inflated considerably by the number of students:

> That will obviously cost me a lot of time, also (…) you have normally between 14 and 20 people and, well, I can indeed count 30 minutes per test, if I do it properly, also because I have to get accustomed to their hand writing (professor 4, humanities)
>
> After finishing three seminars I have three folders that I have to mark, and I mean full ones: papers, essays, and other seminar examinations. That indeed is time consuming [lit transl. *geht in die Zeit*] (professor 3, social sciences)

Tests, especially multiple choice tests, tend to be rather standardized by the questions and specific answering possibilities. Therefore, the marking can be rendered transparent, delegated to teaching assistants and academic staff,[19] and reduced to a fixed time frame:

> We then have 250 written exams and we all sit together at a large table, and of course also discuss the assessment criteria to ensure that everything is graded according to the same standard. Every [teaching assistant] then takes care of one question throughout the 250 exams. This is in most cases easier. (…) And then you sit there for a whole day (professor 1, humanities).

Most teachers made clear in the interviews that when teaching assistants are employed for grading "they usually go through all of them" (professor 1, Natural Sciences) again afterwards. Such assembly line visions of the grading process cannot be applied to the correction of papers and essays. Here, the interviewees tended to assume full responsibility for the correcting process. However, in modules where similar seminars were accompanying a lecture, inequalities in student numbers could be redistributed for the correction process.[20]

> We have looked at how many want to write a paper [in the different courses belonging to one module], and we have agreed to distribute these among at least those who belong to the regular faculty here. I expect to get 25 papers this semester, not 60 [number of students in the course] (research associate 2, social sciences).

Examination type and student numbers deflate and inflate the grading time. While student numbers can only to a small extent be redistributed, felt responsibilities and disciplinary traditions make the teachers stick to specific examination types. Individual

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18 One of the social sciences degree we looked at listed nearly 30 different choices of examination in its study documents, ranging from the "small written paper" (*kleine schriftliche Hausarbeit*) to the "research training task" (*Rechercheübung*). Winter and Anger (2010) report similar findings for a large share of the degree programs they have examined.

19 Uwe Schimank (1995) calls this process the "offloading of teaching".

20 This applies likewise to final papers and theses that can turn up throughout lecture and lecture free time with a multiple of pages to correct.

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changes such as condensing the number of exams are exceptions rather than the norm and are normally part of the balancing process that combines high with low workload courses (see 4.). The more grading time expands into the lecture free period, the more it collides with conceptualization time pointing to a new cycle of teaching practice to be unfolded. Teaching at German universities is usually an all-in practice. It depends on all teachers being available, making decreases in SWS-loads rather unusual[21]:

> The train rides, and it just rides. (…) You can't just go there and say, coach two and three won't be leaving, while the rest goes on. No chance. (vice-dean, natural sciences)

Conclusion

Teaching time evolves differently within the teaching activities of allocation, coordination conceptualization, preparation, supervision, and examination. For allocating, coordinating, and conceptualizing the courses we have shown that teaching time originates in the multifaceted category of the SWS. As an administrative category it relates to continuous ordering procedures between students, teachers, and administration that ultimately define how teaching time enrolls into calendar time. Depending on how the SWS net has been constructed fixed course-times produce disposable time frames for the teacher into which preparation and supervision-time expand. They form roughly quantifiable clock-time counts because the stability of the SWS-net provides the interviewees with the means to outline time frames by week. But instead of being a measure these counts are effects of relations with former semester courses, course types, and student numbers. Clock-time counts blank out that considerable time investment may go hand in hand with research and student motivation and can be an effect of enthusiasm for the course. Parallel to these course-related preparations teaching may be confronted by supervisory tasks, emails and half-open doors. The SWS hence produces various tasks that are not harmoniously in line with but distract and break into each other. Using weekly clock-time as teaching time representation hides these inter- and counter-relations and makes teaching appear like a flat category that enrolls *next* to research, administration, and service. Or, as Bowker and Star (1999, p. 47) put it, "conflict and multiplicity are often buried beneath layers of obscure representation".

In studies of academics' working time, such weekly clock-time counts are either "estimates" or very individual diary accounts (e.g Forgasz & Lederer, 2006) that nevertheless adhere to an imposed chronological order of calendar and clock-time. They only relate to individual time practices via several transformations and change the picture of the problems that are involved in teaching. Quantitative time figures point to overworked academics in the same way as to exhausted assembly line workers. However, assembly line workers pursue their rather standardized tasks at a given place for a fixed duration of clock time. In contrast, the only fixed and located time category of academics is the all-comprising time frame of the SWS. As teaching is still mostly indeterminate "handicraft" work (Massy, 1998), it is less a geographically and temporally located practice but a net of relations and tasks that define how and what has to be done in the name of teaching (c.f. Malcolm & Zukas, 2009, p. 504). Subsequently the

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21 Exceptions are administrative duties at faculty level, e.g. deans usually receive a two SWS reduction.

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interviewed teachers seem not primarily to have a quantitatively expressible workload problem (cf. Ylijoki & Mäntylä, 2003, p. 71). Rather, they are bothered by qualitative aspects: problems that arise while synchronizing the courses, matching courses and people, conceptualizing and preparing course content, supervising student numbers, and offering various forms of examination in one course due to different study degrees. In line with this view are findings that university teachers may experience high teaching time counts and be at same time satisfied with their teaching.[22]

The SWS on the other hand can enroll in teaching precisely because it does not operate with ever more delicate clock time counts. It is this indeterminacy in terms of clock-time that makes teaching part of an academic practice that is inherently non-linear and open. It also can be operationalized to describe teaching in a different way than clock time. Digital accounts of courses and SWS provide data in a new quality that is easily accessible for surveying teaching time. Combined with staff descriptions average SWS-counts per personnel category (professor, research associate, lecturer etc.) can be compared and related to structural differences between status groups, geographical locations, university types, and disciplines (Bloch et al., 2014). Such data can also show how SWS-time travels from one faculty to the next and is to a certain degree dispersed among disciplines. Digital university catalogues make it possible to go beyond such relationships. Longitudinal data can provide insights on the relationship of replicated and new courses within academic workloads, and thus how past teaching time is folded into newly enrolling SWS. With precise calendar times the dispersion of individual SWS and condensing practices can be traced. There are various ways in which the indeterminate time category SWS can represent teaching practice but it has to relate to this practice and avoid becoming an independent sideline-measure on its own. Teaching time can only function as a representation of teaching work if the measure it uses is fundamentally interwoven with what the teacher does.

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[22] This was the puzzling result of our online survey of teaching practices at four German universities (cf. Bloch et al., 2014).

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