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Workload, time-on-task, and learning outcome in online learning for beginning students

Abstract

Online learning offers great potential for higher education in terms of scalability, flexibility and instructional design. However, the suitability of open online formats for beginning students is open for discussion. In this paper, we thus describe beginning students' learning processes in an open online course within a longitudinal workload study. All in all, 238 students were surveyed continuously over one semester via diary method, which led to an overall collection of 10,540 individual activities. Results indicate that the students' actual workload was consistently lower than the intended target workload, and that it was also unevenly distributed. In line with existing research, a weak positive association between time-on-task and learning outcome was found. Implications for the course design and follow-up research are discussed.

Keywords

Online learning, beginning students, student workload, longitudinal study, diary method

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Workload, aktive Lernzeit und Lernerfolg in einem Online-Kurs zum Studieneinstieg

Zusammenfassung

Online-Lernen bietet große Potenziale für die Hochschullehre, was Skalierbarkeit, Flexibilität und didaktische Möglichkeiten angeht. Die Eignung von offenen Online-Kursen speziell zum Studieneinstieg wird jedoch kontrovers diskutiert. Vor diesem Hintergrund zeichnen wir die Lernprozesse von Studienanfängerinnen und -anfängern in einem offenen Online-Kurs in einer längsschnittlichen Workload-Untersuchung mittels Tagebuchmethodik nach (N = 238 mit 10.540 erfassten Einzeltätigkeiten). Die empirischen Befunde zeigen, dass der tatsächliche Workload durchgängig unter den erwarteten Sollvorgaben bleibt und zudem ungleichmäßig verteilt ist. Weiterhin konnte ein schwacher positiver Zusammenhang zwischen aktiver Lernzeit und Lernerfolg aufgezeigt werden. Implikationen für das Kursdesign und für die weitere Forschung werden diskutiert.

Schlüsselwörter

Online-Lernen, Studieneinstieg, studentischer Workload, Längsschnittstudie, Tagebuchmethodik

1 Introduction

Aiming at a harmonized European Higher Education Area, the Bologna Process and its implications have brought about the most far-reaching reforms in the German academic sector for decades. In line with the general "academic drift", a particular German subgoal for these reforms has been to increase the rate of first-year students within the specific age group (DESTATIS, 2014, p. 30). Increasing students numbers, however, shed more light on the challenges experienced during the first year of study (BOSSE & TRAUTWEIN, 2014) and the underlying conditions. For example, adequate support structures have not always been in place. Traditional teaching formats, such as lectures or seminars, do not work as before. "School-like teaching" at the university level has frequently been criticized. Drop-out rates have become a major point of concern. Therefore, there has been a demand for improvements in the quality of teaching, including specific measures targeted at beginning students (BMBF, 2010).

Another implication of the Bologna Process was the implementation of the "European Credit Transfer and Accumulation System" (ECTS) to every course of study or degree scheme. With ECTS, the concept of workload (the overall time involved for studying) comes into effect. While students continuously criticized the high subjective workload in the new degree schemes, objective studies revealed that the actual average workload quite often did not reach the targeted figures (SCHULMEISTER & METZGER, 2011). Hence, it seems that it is not the actual workload but rather the lack of flexibility in curricula and study processes that has to be addressed.

Against this background, we briefly illustrate how open online learning can be implemented in a course for beginning students, allowing for more flexibility and improvements in instructional design. Within this context, we focus on beginning students' learning processes with the following research questions:

1. *How far does the actual student workload in the online course match the intended target workload, and up to what extent can deviations be observed?*
2. *What kind of relationship exists between time-on-task and individual learning outcome?*

In a longitudinal study, we thus compare the actual expenditure of time as captured in learning diaries with the intended target workload. To gain a deeper insight into beginning students' working habits, we then look at the distribution of workload over the duration of the course. Finally, we analyze students' time-on-task (which may differ significantly from the actual workload) and its relationship with learning outcome.

2 Theoretical background

2.1 Teaching-learning environments for beginning students

Ideally, teaching-learning environments for beginning students should account for the specific needs of this special student group. They should enable an enculturation into the social-cultural environment of the university and, more precisely, into learning communities, which has been shown to lead to educational gains (ROCCONI, 2011). Furthermore, support structures should be on hand to mitigate the typical loss in motivation during the first semester (BRAHM & GEBHARDT, 2011). From a pedagogical perspective, this calls for small group interactions, collaborative learning and tutoring. However, the current reality looks different: in light of "massification" (HORNSBY & OSMAN, 2014) and the present imperative to increase student numbers more rapidly than teaching resources, large class sizes have become quite common for beginning students. This may lead to problems, as there are a number of associated drawbacks: large classes call for the lecture method of instruction, reduce students' level of activity, and lead to lower academic achievement and less satisfaction (CUSEO, 2007). There is some evidence that a qualitative variation in teaching toward a more conceptual change and student-focused approach may enhance student learning even in large first-year classes (PROSSER & TRIGWELL, 2014). Yet a more profound way to overcome these drawbacks in large classes is to create decentralized, open, online teaching-learning environments (SEMBILL & EGLOFFSTEIN, 2009) that allow for active student involvement.

Especially under the label of "MOOCs", online learning has become a major aspect in the recent debate about curricular and institutional change in Higher Education (O'CONNOR, 2014). Online courses provide an opportunity to enhance flexibility in terms of time and space and to address the different needs of a heterogeneous audience, as is the case with beginning students. While open online learning is held to be applicable even in transitional programs before the beginning of studies (HRK, 2014), there is no broad consensus yet on how open online formats for beginning students should be designed. Some of the present MOOC implementations even face substantial criticism (SCHULMEISTER, 2014). All in all, it is not yet entirely clear in what ways open teaching-learning environments might enhance or perhaps even impede beginning students' learning.

2.2 Analyzing student workload

Since the implementation of the ECTS, the student workload has more frequently been the subject of empirical research. Prior to that, there were only a few studies, which was also due to methodological reasons. Repetitive surveys often produce poor response rates (BURCK, HEIL & BÖHRES, 2011), and the respective studies usually involve a high research effort (BLÜTHMANN & THIEL, 2011). Present workload research thus covers a broad range of methods and approaches (DORENBUSCH & LOMPE, 2011). BURCK et al. (2011) categorize these studies according to their level of retrospectivity and the survey method used. The level of retrospectivity refers to the number of measurement points and the timeframe covered by the survey. A large retrospectivity occurs when a single survey refers to an entire past semester. An activity-based data collection on a daily basis, on the other hand, is only of small retrospectivity and thus of higher ecological validity. In this context, it has been shown that with a higher retrospectivity, the quality of the data collected decreases significantly because of variations in the daily or weekly workload and the time-lag involved (SCHULMEISTER & METZGER, 2011). In existing research, student workload often has been measured with retrospective methods, which calls into question its accuracy (SCHULMEISTER & METZGER, 2011; BRANDL & GUNZER, 2009). In order to tackle these problems of memory bias, the diary method offers an appropriate approach of data collection for a prompt recording of activities and working times (BOLGER, DAVIS & RAFAELI, 2003; RAUSCH, KÖGLER & LAIREITER, 2012).

Current research shows that German students on average do not fulfill the intended target workload of about 40 hours per week. In a retrospective study, MIDDENDORF et al. (2013) determined a weekly workload of 35 hours for full-time undergraduate students. The same applies to another survey conducted over a comparable period of time, where an average workload of 31 hours was calculated (OPPERMANN, 2009). A study by SCHULMEISTER & METZGER (2011), which was based on a cross-degree and cross-university survey over a period of five months, determined 20 to 27 hours study time per week. Based on a weekly survey, BURCK et al. (2011) come to similar conclusions: in over 30 % of the courses analyzed, the empirical workload was more than 5 hours less than the target workload.

With respect to our first research question, we thus assume that the intended target workload is generally not met. We further suppose that the workload varies distinctly over course time and that specific peaks can be observed.

2.3 Student workload and time-on-task

The concept of workload covers not only times that are directly connected to working on subject matters, but also time spent organizing, coordinating with peers and teachers and so forth. Crucial for substantial learning outcomes are the times in which students actively work on learning topics and carry out relevant activities. Especially in open, self-organized teaching-learning-arrangements, organizational and group processes occupy much space in subjective perception, which can distract the focus from the learning tasks. Relationships between workload in the form of genuine learning times and resulting learning outcomes were formally described in Carroll’s well-established model of school learning, which has also proved relevant for non-school learning processes. Thereby, spending time does not simply mean the elapsed time, but the time spent directly on the act of learning. This time is called time-on-task, active study time or engaged time, as it only includes those periods in which the learner is cognitively engaged with the study matter (CARROLL, 1989; BERLINER, 1990; BRODHAGEN & GETTINGER, 2012; SCHEERENS & HENDRIKS, 2014). Relevant activities include careful reading of scientific texts, rethinking and reflecting on content, and deliberately connecting to prior knowledge or working on given assignments. It is essential to look at what happens during time-on-task, as time can be interpreted as a “psychologically empty vessel” (GAGE, 1978 in BERLINER, 1990, p. 5) to be filled with meaningful activity (CARROLL, 1989; BERLINER, 1990). According to HELMKE & SCHRADER (1996), time-on-task is one of the strongest predictors for learning outcome in school settings and elsewhere.

A closer look at learning time suggests that a differentiated concept of workload becomes necessary when relationships to learning effectiveness or outcomes are investigated. Relevant studies show heterogeneous results regarding correlations between learning time and learning outcome, which was commonly operationalized by annual or semi-annual end grades. HATTIE (2009), for example, reports a small to moderate relationship between the active use of learning time and learning outcome. Looking specifically at higher education, HATTIE (2015, p. 82) shows a rather strong effect (d = .62) of time-on-task on student achievement. A further meta-analysis of international studies, however, reports only a weak correlation between learning time and learning outcome (HENDRIKS, LUYTEN, SCHEERENS & SLEEGERS, 2014).

With prior research being inconclusive concerning the effect sizes, we expect at least a small positive linear relationship with respect to our second research question.

3 Research context: Online learning for beginning students

In order to avoid "school-like teaching" and to increase cognitive and motivational learning outcomes, the online course discussed here was designed in line with principles of self-organized learning (SEMBILL & EGLOFFSTEIN, 2009). Thereby, learning is a complex problem-solving process, where students are enabled to organize their learning independently, to work with flexible and open learning material and to document their processes for evaluation. In small project-oriented collaborative groups, students work autonomously on relevant problem-like learning tasks (Problem Task: PT) over several weeks.

The 6 ECTS credit course “Foundations of scientific working methods” (Grundlagen wissenschaftlichen Arbeitens; GwA) is offered by the University of Bamberg and open to all regular students in Bavaria via the so called “Virtual University of Bavaria”. The target audience is beginning students in social science, economics or management degree programs at the undergraduate level. After two introductory lectures (6 hours), students work in open, online-based groups with tutorial support or independently for another 174 targeted hours. For the documentation of their learning processes, students record their course-related activities and times in learning diaries. In line with the four course phases, the group work is divided into four assignments, which are graded with points. In the first course phase (PT 1: “Organizing”), students develop a contract for their group collaboration that will guide their further coursework (5 points to be reached). During the second phase (PT 2: “Researching”), a research question has to be developed, along with a commented list of adequate sources and references (25 points). The third phase (PT 3: “Structuring”) deals with the modelling of relevant concepts and relationships in a concept map (15 points). In the fourth and final phase (PT 4: “Formulating”), students develop the outline of a scientific thesis and write the pertaining introductory chapter with reference to adequate sources (25 points). Each course phase follows a similar pattern: after an online presentation of the relevant theoretical content, students work in groups on the problem task. Additional content and examples are presented where necessary. All problem tasks refer to a topic to be freely chosen by the students in the second phase[3]. Although collaboratively working in online groups seems unfamiliar to most of the beginning students, experiences from prior semesters indicate that students could benefit both with respect to knowledge and the additional competencies to be acquired (e.g. working in groups) (FRÖTSCHL & BAIERLEIN, 2010).

[3] Previous topics included: “Work-life balance in corporate settings”, “Ergonomics and healthcare at work”, “Staff development in hospitals”

4 Methodology

4.1 Sample

The data was collected in the context of the described GwA-course. In winter semester 2012 a total of N = 538 students were registered in this course. Since not all students finished the course and therefore did not regularly complete their learning diaries, the following analysis refers to n = 238 students (response rate is 44.23 %). The sample consists of 123 (51.7 %) male and 115 (48.3 %) female students. On average, participants were 20.31 years of age (SD = 1.92, Min. = 18, Max. = 31). In the group, 92.2 % (n = 217) of the students were pursuing a business or economics degree (e.g. business administration, international business administration, management), 6.7 % (n = 16) were studying for (applied) computer science, or business information systems, 1.3 % (n = 3) were in a communication science/journalism program, and no information was available for 0.8 % (n = 2) of the participants. All in all, 98.7 % of the participants were in a bachelor program, while still one student took part in a (now outdated) diploma program (missing: n = 2).

4.2 Data collection via diary method

All participants were requested to keep a learning diary for the length of the semester. In the learning diary, they had to record all course-related activities on a regular basis. The records used standardized spreadsheets. In all, the students had to submit four learning diary files related to the four problem tasks given. Since the submission of each learning diary file was connected to the submission of each solution to the four problem tasks, a continuous assessment of the seminar-related activities and the corresponding time was possible. This provides the opportunity to show the correlated activities and the time required for each problem scenario. Therefore, the data collection can be assumed to be ecologically valid. Figure 1 shows an example of a learning diary from one fictional participant with regard to problem task four ("Formulating").

Learning diary for Problem task (PT) 4 - "Formulating"					
Name:	Researcher				
First name:	Ronald				
Notes					
Abbr.	**Description of activity**				
O	Organizing (e.g. arranging group meetings, scheduling of work, planning)				
C	Working with course contents (e.g. reading and understanding, clarification of unknown contents, technical terms etc.)				
A	Analyzing the Problem task (What's it all about? What is there to do? What has to be considered?)				
R	Research on chosen topic (e.g. literature research und -evaluation, systematizations on the topic)				
G	Working on group task (e.g. formulating the introductory sequence)				
I	Working on individual task (e.g. taking part in library tour)				
M	Miscellaneous				
Entries					
Date	**Activity**	**Duration (min)**	**Context**	**f2f or online**	**comments and explanations**
11-Jan-12	A	40	within group	online	joint elaboration of the assignment in PT 4
11-Jan-12	O	5	within group	online	distribution of sub-tasks
14-Jan-12	R	40	alone		first notes on PT 4
14-Jan-12	I	90	alone		library tour
16-Jan-12	G	120	within group	f2f	comparison and evaluation of individual solutions to sub-tasks, putting it all together for a first draft
19-Jan-12	G	30	alone		designing cover sheet for the assignment
21-Jan-12	G	40	alone		looking for adequate citations, research on additional resources
23-Jan-12	G	90	within group	f2f	joint redesign of the first draft, adding citations
25-Jan-12	G	35	within group	online	finishing first draft, request for tutor feedback
28-Jan-12	G	30	alone		working in tutor feedback
30-Jan-12	G	135	within group	f2f	finishing assignment considering tutor feedback, upload to the online learning platform

Fig. 1: Example of a learning diary for the fourth course phase (PT 4)

The learning diary captures all seminar-related activities in the following structure: short description of each relevant activity, corresponding date, and duration in minutes. Furthermore, the participants had to classify their activities according to the context or style of cooperation (group meetings or independent), type of group meetings (online meetings via chat, e-mail etc. or face-to-face – “f2f”), and the type of activity using given categories (see Figure 1: “O” to “M”). Therefore, the different types of activity were categorized in advance. For example, category “O” describes activities that refer to the creation of work schedules or agreements on group meetings. Category “C” covers the acquisition of theoretical seminar con-tent. For example, reading text fragments on the topic of citation rules, types of plagiarism or with regard to the typical structure of empirical research can all be considered theoretical seminar content and thus the knowledge base to solve the problem scenarios given. The category "A" covers activities analysing the problem tasks. Their purpose is to know and clearly understand what needs to be done. All research activities are classified as category "R". For example, this includes the participants' search for scientific literature related to their selected topic. Category "G" covers the work on group tasks. This means the formulation of an outline, the preparation of the literature list, or the formulation of the problem-related introductory section. Furthermore, all individual activities (e.g. participation in a library tour) are classified with "I". All other activities that cannot be categorized to one of the above categories are in category "M" (misc.).

In total, 10,540 individual activities and the required time were collected from 238 students during one whole semester and along the four course phases (PT 1 to 4) by diary method.

4.3 Operationalization

The first research question refers to the aggregate amount of the effective workload as well as the distribution of the workload over seminar time (one semester). Thus, we excluded all students who did not submit one or more learning diary files. In order to identify students' individual workloads, we aggregated all individual activity-based time periods. Hence, we calculated one value for each person summarizing the total amount of time spent on seminar activities. In addition, to identify the distribution of the workload over the semester, we aggregated the individual time periods for each of the 17 seminar weeks. Therefore, we calculated for each student and each of the 17 weeks one value for the amount of time spent on seminar activities.

With regard to research question two, we focused on the calculation of personalised time-on task. For this purpose, activities from the problem tasks 2, 3 and 4 were analyzed. As shown in Figure 1, the following categories of activity were relevant to assess the time-on-task: acquiring seminar content, task analysis, research activities on the selected topic, elaboration of the group assignments. Activities that refer to organisational tasks rather than content-related work were not considered. According to this structure, the results for each student show an average time-on-task for PT 2 of M = 558.73 minutes (SD = 251.47, Min. = 150, Max. = 1,440). On average, the duration of the activities for PT 3 is M = 434.82 minutes (SD = 248.07, Min. = 60, Max. = 1,300) for each student and for PT 4, the average time-on-task is 515.55 minutes (SD = 242.44, Min. = 50, Max. = 1,450). The descriptive results show that students' individual time-on-task varies considerably.

To assess the learning outcome, the individual scores (points) for PT 2, 3, and 4 are used. Therefore, the teaching staff evaluated the submitted assignments using standardized sheets. PT 1 ("Organizing") was not taken into consideration, as every group that submitted a collaboration contract (which was mostly a means of team-building) achieved the full score here. On average, the students achieved 13.02 (SD = 3.21, Min. = 0, Max. = 20) out of 25 maximum points in PT 2, M = 10.11 (SD = 2.08, Min. = 4, Max. = 15) out of 15 points in PT 3 and M = 15.53 (SD = 2.83, Min. = 0, Max = 21) out of 25 points in PT 4.

4.4 Methods of analysis

Following previous research on workload in higher education settings, we used different methods of descriptive statistics to analyze the first research question (cf. BLÜTHMANN & THIEL, 2011; BURCK et al., 2011; SCHULMEISTER & METZGER, 2011). Regarding the relationship between time-on-task and learning outcome, we carried out a regression analysis with the overall time-on-task (sum of tasks 2-4) as independent and learning outcome (sum of scores for PT 2-4) as dependent variable.

5 Results

5.1 Student workload and distribution of activities

Following the predefined requirements, each student had to fulfill a target workload of 180 hours or 10,800 minutes during the course. However, none of the participants were able to meet these requirements. On average, students' workloads during the semester were 2,159.25 minutes or about 36 hours. However, the standard deviation was 768.53 minutes (12.81 hours). Considering the broad spectrum between the minimum workload of 860 minutes (14.33 hours) and the maximum value of 4,735 minutes (78.91 hours), the working behavior of our sample can be considered heterogeneous. In order to avoid a bias due to statistical outliers, additional descriptive measures should be taken into account (cf. SCHULMEISTER & METZGER, 2011) (see summary in Table 1).

Table 1: Descriptive statistics of the individual workload

		Workload (min)	*Workload (h)*
	N	238	238
	M	2,159.25	35.99
	SD	768.53	12.81
	Min.	860.00	14.33
	Max.	4,735.00	78.92
Percentiles	10	1,253.00	20.88
	50 (Median)	2,042.50	34.04
	90	3,311.00	55.18

Most strikingly, even the highest measured workload represents only about 44 % of the predefined target workload of the course. Reviewing the learning diaries reveals that many students did not record the introductory lectures, for example, which leads to a misrepresentation of the indicated time exposure. Nevertheless, it can be concluded that most participants' workload falls short of the requirements. Considering the distribution of the workload over the semester, we found increased values in weeks 3, 6, and 14 directly before the submission deadlines for the solutions to PT 1, 2, and 4 (see Figure 2).

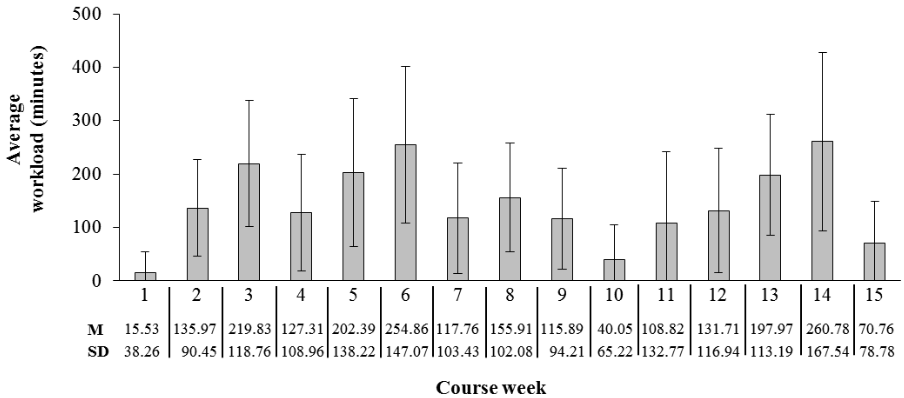

Fig. 2: Distribution of workload over course time

Over the course of the semester, we found high standard deviations of workload illustrating different forms of time and work organization among participants, as well as differences in engagement. Notably, in weeks 8 and 9, there was no increase in workload, although the deadline for PT 3 was approaching. The lower values in week 10 can be explained by the Christmas break. Also, students seem to make use of the flexible time management that was part of the course concept. In principle, it can be noted that a large number of students concentrate an above-average share of their workload on a short period of time before the deadlines.

5.2 Relationship between time-on-task and learning outcome

In order to analyze the relationship between active learning time (time-on-task) and the individual learning outcome, we extracted the time-on-task as one component of workload based on the individual diary entries for PT 2, 3, and 4. Table 2 shows how time is distributed across these three course phases.

Table 2: Descriptive comparison between total workload and time-on-task

	Overall workload [h] (N = 238)				*Time-on-task [h]* (N = 238)			
	M	**SD**	**Min.**	**Max.**	**M**	**SD**	**Min.**	**Max.**
Problem task 2 (PT 2)	10.71	4.68	2.50	30.00	9.31	4.19	2.50	24.00
Problem task 3 (PT 3)	8.26	4.35	1.75	24.08	7.25	4.13	1.00	21.67
Problem task 4 (PT 4)	10.48	4.60	1.67	25.17	8.59	4.04	0.83	24.17

Our research shows that – in line with expectations – individuals' average time-on-task is lower than the respective workload for all three course phases. Students on average work actively on PT 2 for 9.31 hours, on PT 3 for 7.25 hours, and on PT 4 for 8.59 hours. High values of standard deviations, as well as a high range of variation, have to be noted, which hints at a high variability of study time and effort between individuals. In order to analyze the relationship between time-on-task and individual learning outcome, we carried out a regression analysis. The results are shown in Table 3.

Table 3: Model estimate and relationship between time-on-task and learning outcome

	Learning outcome (score)		
Variable	***b***	**s.e.$_b$**	***β***
Constant	36.79 **	.83	
Time-on-task (hours)	.07	.03	.16 *
R^2 *(F, p)*	*.024 (5.92, p = .016)*		

Notes. N = 238, ** p < .001, * p < .05

As Table 3 shows, the intercept is at 36.79 points. Although the effect of the time-on-task is very low (0.07 units), it is still statistically significant. Looking at the effect size, time-on-task only explains 2.4 percent of the variance in learning outcome in the current analysis. To illustrate the positive relationship between time-on-task and learning outcome, both variables were depicted in a diagram (see Figure 3).

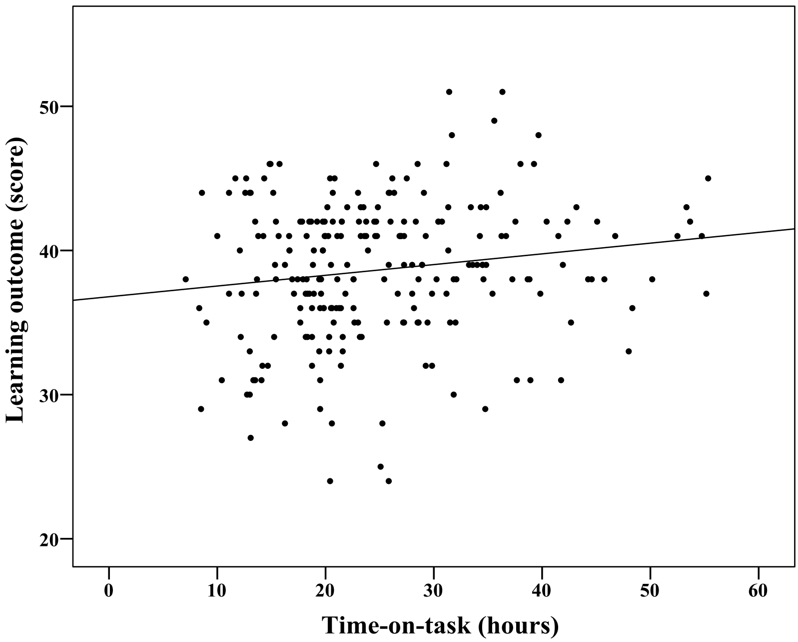

Fig. 3: Relationship between time-on-task and learning outcome

6 Discussion

In this study, we analyzed the workload of beginning students in an open online course. With respect to the first research question, the results show that the calculated actual workload was consistently lower than the intended target workload, which was in line with our assumptions and with prior research (cf. OPPERMANN, 2009; BURCK et al. 2011; SCHULMEISTER & METZGER, 2011). Compared to similar studies, however, there are some significant differences. In our setting, the workload gap is bigger than elsewhere, and, what is more, not one single student fulfilled the target workload (whereas in comparable studies at least some students did). A straightforward explanation might be that students simply took advantage of the freedom they were provided and shifted their workload to other courses or activities. To gain a deeper insight here, additional workload studies on a study program level would be necessary. In such studies, indicators for study motivation, students' emotions, and personal dispositions (state and trait-perspective) could be combined, so that a bigger picture of study behavior could be drawn.

Considering the second research question, we found a rather small but statistically significant relationship between time-on-task and learning outcome, which was generally in-line with our expectations. One can assume that trait-like person variables (e.g. general intelligence, academic self-concept, learning motivation, cf. HELM, 2015) as well as situational characteristics of the learning environment (e.g. experience of competence, social relatedness and autonomy, cf. DECI & RYAN, 2002) additionally influence the learning outcome in a significant way. Furthermore, it seems quite possible that time-one-task mediates the relationship between personal and/or situational variables and individual learning outcome. For modelling these relationships in further analyses, it might be fruitful to apply a more sophisticated multilevel approach. In general, this method is based on a hierarchical data structure where repeated measures (level 1) are nested within a person (level 2) (cf. HOX, 2010).

From a methodological perspective, the use of learning diaries can be discussed. On the one hand, the immediate recording of times and activities is of only low retrospectivity and thus more ecologically valid. On the other hand, diary methods also have some disadvantages. Erroneous or fragmentary recordings can easily remain undiscovered. Likewise, biases due to social desirability or repeated copying and pasting of records are possible. In our study, obvious distortions were corrected manually or completely left out, which was a very time-consuming task for 10,540 single entries. Therefore, the use of a centralized, online-based tool for recording workloads and activities would be highly desirable (cf. SCHULMEISTER

& METZGER, 2011). In this way, data could be validated right on entering, and a subsequent data aggregation would no longer be necessary.

Finally, the results raise some questions about the suitability of the underlying course concept. From a curricular perspective, adjustments are deemed necessary. A straightforward adjustment would be to add further content and thus additional workload to the course. However, the content had just been realigned before the study was carried out, which might also have contributed to the lower workload figures. After our data was collected, an end-of-term exam has been introduced as an additional curricular measure. This assessment stresses the individual perspective within the collaborative teaching-learning environment and helps to prevent negative group phenomena, such as free-riding or social loafing. In addition, the uneven distribution of workload and its variance might indicate that structure and scaffolds are of great importance for beginning students. Many of them have to become acquainted to a new world of "academic freedom" and thus have to develop effective working habits first. Just like learning to work in groups, this can be seen as an integral part of the academic socialization. Against this background, we still consider open online courses as a promising alternative for large classes for beginning students. As long as structures and scaffolds guarantee student responsibility and commitment, they can add a great amount of flexibility and innovative pedagogy to the beginners' curriculum.

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