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The right job pays: Effects of different types of work on study progress of pre-service teachers

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Summary Teacher shortages are a significant concern in many countries. Hiring pre-service teachers could help to alleviate this problem while providing students an opportunity to develop skills in a real-work context. However, being employed alongside full-time studying might compete with attendance or self-study and, thereby, hinder study progress. This study analyzed the effect of student employment on the study progress of 132 pre-service teachers, using 25 repeated measures over 4 years (n = 3,245). Employment hours, remuneration, domain-relevance, and timing (year of college) were taken into account. Multilevel growth analyses showed that students who spent more time on a paid teaching job in year 3 or 4 obtained significantly more study credits compared to those who were not paid or got paid for a job outside of education. Overall, student employment did not relate to less study progress and depending on domain-relevance, timing and remuneration, the effect can even be positive.

Keywords student employment, study progress, teacher education, pre-service teachers, teacher shortage

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1 Introduction

Several countries and regions cope with a shortage of qualified teachers (Donitsa-Schmidt & Zuzovsky, 2016; European Commission, 2014; Nguyen et al., 2022). When shortages are critical, schools in need of teaching staff may opt to offer pre-service teachers employment before they finish college. Hiring pre-service teachers can alleviate the shortage and provide pre-service teachers with valuable experience. However, it can also strain their study progress when it competes with study hours, or it can demotivate students to obtain a degree that they no longer seem to require. Thereby, it might even worsen the shortage of qualified teachers in the long run. The frequency of student employment within teacher education is unknown, but students in general increasingly opt to combine their study with employment (Beerkens et al., 2011; Meeuwisse et al., 2017; Quintini, 2015). Beerkens et al. (2011) report that approximately half of all students work alongside their studies in Europe (47%), the United States (49%) and Australia (50%). Quintini (2015) specifies that, within Europe, student employment ranges from 15% in Italy to over 60% in the Netherlands.

Systematic literature reviews of the effects of student employment on study outcomes present a complicated interaction (Riggert et al., 2006; Neyt et al., 2019). In general, most recent studies find either a negative effect of employment on study progress or a positive effect of working for a limited amount of hours per week (Neyt et al., 2019). Studies thus far mainly focus on programs in research universities without internships (Neyt et al., 2019; Riggert et al., 2006). Student employment is rarely studied in the context of teacher education. This is a specific type of education that is relatively practice-oriented and often includes several unpaid or paid internships that could lead to job offers, depending on the year of college and type of internship (Craig, 2016). The only available study into student employment and study progress in teacher education, from Wikan and Bugge (2014), compares self-reported performance and the number of hours that students spent on paid work during the fifth semester of their program. They report a positive relationship with less than 15 hours of paid work per week and a negative relationship with more. Their study generalizes all work as the same and does not consider other semesters than the fifth. It, therefore, remains unknown how the different types of paid and unpaid employment affect study progress throughout a four-year program in teacher education. Therefore, this study investigates how pre-service teachers' different types of paid or unpaid employment evolve and affect their study progress throughout all eight semesters. In doing so, this study will also help to address the practical concerns of pre-service teachers, teacher educators and policymakers, who wonder whether increased employment in the context of teacher shortages might be detrimental to study progress.

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2 Theoretical framework

Economists, sociologists, psychologists, and educational scientists applied a rich diversity of different theories from their respective fields to explain the impact of student employment on educational outcomes. Economists used Becker's theories of human capital (1964) and zero-sum theory of allocation (1965) to predict respectively beneficial or detrimental effects. Sociologists used primary orientation theory to predict negative effects of employment (Warren, 1999). Some educational scientists and psychologists used Bean and Metzner's (1984) or Tinto's (1997) theory to predict a negative effect on college retention. Although these theories help to understand either negative or positive effects, they do not account for the mixed and contextual differences that are found in the literature reviews (Riggert et al., 2006; Neyt et al., 2019). Within the field of psychology, Butler (2007), applied the theory of role-based resources to explain the different potential effects of student employment. This theory proposes that performance in multiple domains is beneficial for individuals when certain conditions are met (Greenhaus & Powell, 2006; Marks, 1977). Because this theory takes the different conditional aspects into account that are recurrent in the empirical findings, and because these conditional aspects are also the interest of this study, we will use this theory for our current purposes.

Butler's application of role-based resource theory to student employment, predicts that 'work-study congruence' enriches resources, leading to work-school facilitation, study effort, and better study performance. Job demands and the number of working hours, on the other hand, lead to work-school conflict and subsequently lower study effort and study performance. Student employment can be either positive, neutral, or negative for educational outcomes depending on the conditions. Evidence from Butler's study with 253 full-time American college students, and results from additional cross-sectional studies (Creed et al., 2015; Meeuwisse et al., 2017), support this model. In these samples of heterogeneous university students (different types of courses), they found that job congruence relates to work-school facilitation, which subsequently relates positively to study effort and study performance.

The two most recent systematic literature reviews report contradictory, but mainly non-positive effects of student employment on study progress (Riggert et al., 2006; Neyt et al., 2019). Neyt and colleagues report several heterogeneous effects: 1) studies in a European context found relatively more and larger negative effects than in the North-American context, 2) working more than 15 hours predominantly relates to lower study progress, while working a little can even be beneficial, 3) work-oriented students work more and perform worse compared to study-oriented students and 4) the negative relationship between student employment and study decisions is stronger when students work during the academic year (as opposed to during holidays) and in the private sector.

Butler's model could clarify some of the ambiguous and heterogeneous results. Job congruence and working hours may define whether student employment is advantageous for study progress or not. Potentially this could also explain why so many studies found a 'curvilinear relationship' (Neyt et al., 2019; Riggert et al., 2006). A curvilinear relationship means that working a limited number of hours is better than both not working and working more hours. For instance, Wikan and Bugge (2014) reported that working 1-15 hours related to better academic outcomes for Norwegian third-year pre-service teachers than working more or not working at all. This suggests that there might be an ideal balance between time spent on work and study. A bonus granted by control and or job-school congruence could initially lead to a positive effect, which can become harmful when too many hours lead to work-school conflict in terms of time allocation. To substantiate these findings for the teacher education domain, more specific research into the effects of different types of work over time is needed. There are a few shortcomings in prior research that inspire the scope and set-up of the present study.

First, a lack of experimental and longitudinal data makes it hard to understand whether employment has a causal effect on educational outcomes or whether it correlates with other relevant variables. Students who work (more) alongside their studies might have certain traits in common that distinguish them from others and explain differences in educational outcomes. The statistical methods in the literature on this topic so far could be more rigorous and use reliable administrative data and repeated measures or instrumental variables to decrease this risk (Dekker & Meeter, 2022; Riggert et al., 2006; Neyt et al., 2019).

Furthermore, studies on student employment in the context of teacher education did not distinguish between types of work (Wikan & Bugge, 2014). Studies outside of the teacher education domain that did distinguish between types of jobs took place at research universities without internships (Tuononen et al., 2016; Wang et al., 2010). In teacher education, internships are both part of the curriculum and offer a work-like experience. The responsibilities and demands of internships can lead to requests for unpaid overtime. Time spent on this type of work should also be taken into account because it decreases the available hours that students can spend on paid work or their studies.

Finally, to our knowledge, none of the studies took the timing of student employment in the study program into account. Wikan and Bugge (2014) only studied the relationship between employment and performance in the fifth semester of teacher education. Employment and types of employment likely change during college for pre-service teachers in many countries because they are expected to take on different types of paid or unpaid internships. Specifically, we investigate the impact of unpaid internships overtime hours, as well as hours spent on paid work in and outside of education on study

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progress in teacher education. Effects are analyzed in a longitudinal approach with repeated measures, enabling us to assess the effects of different types of employment on study progress within students and for each separate semester with more precision. Based on our results we present an overview of when, and how much hours spent on student employment affects study progress in teacher education. In line with Butler (2007) and Wang et al. (2010), we predicted that domain relevance (i.e., 'job congruence') and the number of working hours matter. Additionally, we expect that the types of jobs that students have change during the span of college, and we explore the effect of these different types of jobs for each separate semester. Therefore, we formulated the following specific research questions:

RQ 1: How does the allocation of time spent by pre-service teachers on unpaid internship overtime, paid jobs outside of education, and paid jobs as a teacher develop over time? The results from this research question provide a descriptive insight into student employment in the context of teacher education.

RQ 2: How does time spent on unpaid overtime during internships, paid jobs outside of education, and paid jobs as a teacher, relate to study progress during the 4 years of college? This research question is included to provide insight into the overall interactive relationship between student employment of different types on study progress in teacher education.

RQ 3: How much time spent on either unpaid internships, paid jobs outside of education, or paid jobs as a teacher, relates to optimal study progress during each specific semester of 4-year college? This research question adds to the present question by focusing on the role of timing in the study program in the relationship between student employment of different types and pre-service teachers' study progress.

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3 Materials and methods

3.1 Design

To measure the effect of different types of paid and unpaid work on study progress, we used an administrative dataset that contained the accumulated study credits of a cohort of 132 pre-service teachers in the Netherlands at 25 time points (repeated measures n = 3,245) over a 4-year timespan. Each repeated measure covered a period of two months. We combined this dataset with a survey about the average number of hours that students spent per week on different types of (un)paid work for every semester over the same 4-year period.

3.2 Procedure

The studied cohort consisted of 330 full-time pre-service teachers from 13 four-year Bachelor (undergraduate) study programs within a faculty of education at a Dutch university of applied sciences. All pre-service teachers who started a full-time teacher education study in 2016 and still were in their fourth year in 2020, received an email in the spring of 2020 with a link to an online survey. The email stated the purpose of the study and described how their survey data (time spent on different types of work) would be combined with administrative data (credits, course enrollment, previous education, and gender), after which it would be anonymized and made available for research in line with the FAIR principles (Wilkinson et al., 2016) through this permanent link: https://doi.org/10.3886/E178441V1. After students signed the online informed-consent statement, they were directed to the survey. The data management plan for this study was approved by the privacy officer of the university and ensured limited access, and deletion of identifiable information after the datasets were merged. All students who finished the survey received €10 for their effort. 189 students started the survey, and 142 students completed the survey. After data cleaning, 10 students who had interrupted their study and therefore had incomplete data were removed, and 132 students were used in the final dataset.

3.3 Participants characteristics

Within the chosen cohort, 36% of the pre-service teachers were male. In the Netherlands, students from different types of previous education are admissible to teacher education at a University of applied science. Most of the respondents followed 'higher general secondary education' (54%), followed by students from a vocational track (27%), and students who followed an academic track (19%) before becoming pre-service teachers (Table 1). These percentages correspond nearly precisely with the dispersion among previous education in the sample and are similar to national averages. The students in the sample followed 13 different teacher education courses (Biology [16], Dutch [6], Economics [2], Elementary school [36], English [17], French [7], Geography [11], German [6], History [10], Mathematics [10], Physics [2], Sociology [8], and Technology [1]).

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Table 1

Sample and response characteristics

Characteristic	Sample		Response	
	N	%	N	%
Gender				
Female	212	64	103	78
Male	118	36	29	22
Previous education				
HGSE	177	54	71	54
Vocational track	89	27	35	27
Academic track	63	19	26	20

Note. This table shows the characteristics of the sample compared to the realized response. HGSE stands for Higher General Secondary Education.

3.4 Measures

Administrative data

The university at which the study took place records the study progress of students in a 'data warehouse'. Students receive European 'study credits' (ECTS) for the courses that they finish. Each year's program contains 60 study credits, and 240 credits are needed to obtain a teaching degree. Each time a student receives new study credits, the new total amount of credits is recorded together with the associated date. The university information department provided us with a pseudonymized dataset that included data about enrolment, gender, previous education, and the records of cumulatively obtained study credit at 25 repeatedly measured moments (one measure for every two months, for a total of 48 months). The dataset included previous education and gender to the dataset because these were predictors of academic performance within this context (Bormans et al., 2015). Adding them as covariates would exclude them as confounding variables.

Online survey

The online survey first asked students to tick the boxes of the past years that they were enrolled. Next, it asked students to tick the boxes of the past eight semesters in which they had been employed in paid work that was not education related. When they ticked the box they were asked how many hours per week they had spent on average on that job during that semester. Students were then asked to tick a box for each semester that they had been in internships. For each checked semester they then were asked "If you on average spent more hours on your internship than was required for your study, how many extra unpaid hours did you on average spent on this internship per week?" for each semester they could then fill in a number. Finally, they were asked for

each semester if they had engaged in paid work as a teacher apart from their internships. When they ticked a box for a semester, they were asked to fill in how many hours on average per week they had worked on a paid job as a teacher at a school. This allowed us to study the effects of both unpaid work in education and paid work in and outside of education as separated from the study program on the accumulation of study credits.

3.5 Analytic strategy

To measure the impact of the different types of work on study progress we fitted multilevel growth models with the accumulation of obtained course credits over a span of 4 years as the dependent variable. We included time as an independent variable. Since the occasions at which the 25 repeated measures of study credits are collected vary, the actual dates are used to construct the time variable (Rasbash et al., 2020). The time of subsequent measurements is computed as the time passed after the first measurement. We used the number of hours worked per semester as a predictor for growth in study credits during that same period. The complete model fit reflects the degree to which variance in worked hours predicts fluctuations in obtained course credits.

The sample consisted of repeated measures within students who are nested in 13 courses of study. The repeated measures within a student are student-dependent and can be similar for students in the same course because of selection processes. This could violate the assumption of independence of observations on which standard statistical tests rely and lead to incorrect estimations of standard errors. If the intra-class correlation coefficient (ICC) of the course of study is significantly larger than zero, indicating a violation of the independence of observations, multilevel models with random intercepts are required to correctly estimate standard errors, among other reasons (Hox et al., 2018). Therefore, we fitted our growth models using multilevel modelling using the program MLwiN (Rasbash et al., 2020). The first growth model included repeated measures and student intercept variance levels (a random part of the model, allowing intercepts to vary per student). We then added course intercept variance and tested whether this led to significant χ^2 model fit improvement. In the random parts of these models, the 25 repeated measures represent the lowest variance level, which is nested within students, implying that the random parts of the growth models contain at least two levels. After establishing the required levels of intercept variance (the random part of the models), depicted in Table 2, we could estimate the effects of the different types of work on study progress. Doing this resulted in the baseline models which we could compare to models which included the different types of work.

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Table 2

Establishing the random part of the model

Effect	Parameter	Model 1	Model 2
		Fixed effects	
Intercept	γ000	-1.23 (1.02)	-1.28 (1.02)
Time	γ010	0.15*** (0.00)	0.15*** (0.00)
		Random effects	
Course variance	ν0ijk		0.00 (0.00)
Student variance	μ0ij	112.15 (14.71)	112.15 (14.71)
Repeated measures variance	e0i	156.92 (3.96)	156.92 (4.00)
Total variance	ν0ijk + μ0ij + e0i	269.07	269.07
		Goodness of fit	
Deviance		26,000.31	26,000.31
Sig. difference of fit compared to model			Model 2 $\chi^2_{(1)} = 0.00$

Note. Dependent variable is study credits after four years (repeated measures n = 3,245; student n = 132; Course n = 13) (se between brackets). One addition in time stands for one day. *$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

The effects of unpaid work in education and paid work in and outside of education are estimated as the interaction between the time factor in the growth model and the number of hours spent on respective overtime for the internship or work inside or outside education. Reductions in variation on the within-student, between-student, or total variance, are presented in percentages. The interaction represents the effects of weekly paid hours worked in education on growth in study credits over time. After fitting these growth models with time, hours worked, and the interaction between both as independent variables, we fitted new growth models in which we controlled for gender and previous education. We analyzed these models separately to ascertain if and how adding control variables changes the effects, given that adding covariates can spuriously diminish estimated effects when covariates are correlated with the number of hours worked. Finally, we also tested a model with all the covariates and interaction effects together.

We conducted a different set of analyses to estimate how the number of hours that are spent on the different types of work relates to the optimal amount of study progress in the different semesters. This was done by performing separate regression analyses in MLwiN for each semester and each type of work. The obtained study credits per semester functioned as dependent variables. In the first fitted models, the time spent on work outside of education, paid work as a teacher, or unpaid internship overtime hours during the first semester were included separately as independent variables. Secondly, we added the time spend on one of the types of work squared to the models. If time

squared proved a significant addition, this suggests a curvilinear relationship with an optimum. This allowed us to infer how many hours the exact break-even point is located for each separate semester and type of work. We tested for significance using Wald tests (ratios of regression coefficients and their standard error) and through testing model fit improvement through decreases in deviances with critical χ^2 values as cutoff points.

4 Results

4.1 Trends in types of work during college

The results in Table 3 and Figure 1 show the descriptive analysis of the amount of time that students spent on overtime during internships (unpaid work in education), paid work outside of education, and paid work in education over the course of eight semesters. At the start of their study, none of the students had a paid teaching job, one in four students reported overtime hours during internships, and a majority of 70.5 percent had a paid job outside of education. Throughout the four years of college, the balance gradually shifted; in the final year, 54.5 percent had a paid teaching job and 37.9 percent had a paid job outside of education. The average number of hours of unpaid overtime that students do during their internship slowly increased from *M* 1.8 hours (*SD* 5.2) in the first semester to *M* 7.4 hours (SD 9.0) per week in the eighth. The combined number of hours of paid work and unpaid work reported by students in addition to their study during an average week, gradually rose from 10.1 hours per week during the first semester up to 20 hours in the eighth semester. This suggests that, on average, students partly replaced work outside the educational domain for (un)paid work within the educational domain. It also shows that the total number of hours spent on work increased during the study and that the percentage of students who work increased (during the last semester only 8.3% of the students did not work besides their full-time study).

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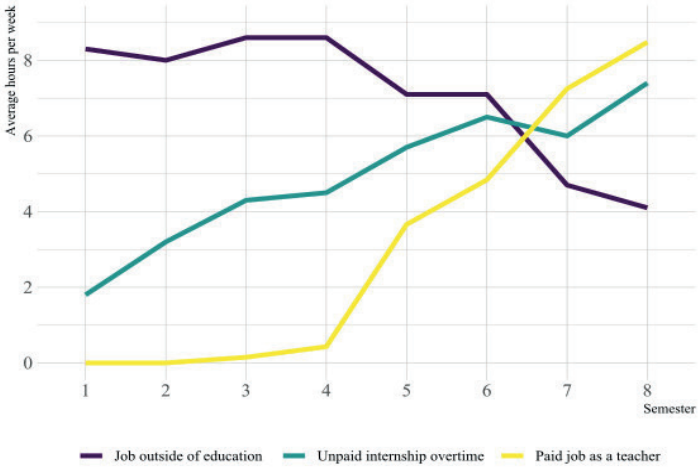
Table 3

Descriptive statistics

Semester	Paid job as a teacher %			Unpaid internship overtime %			Job outside education %		
	0 hours	1-15 hours	>15 hours	0 hours	1-15 hours	>15 hours	0 hours	1-15 hours	>15 hours
1	100	0	0	75	20.5	4.5	29.5	50	20.5
2	100	0	0	60.6	31.8	7.6	31.8	48.5	19.7
3	97	3	0	52.3	39.4	8.3	27.3	50.8	22
4	94.7	4.5	0.8	46.2	44.7	9.1	28	52.3	19.7
5	69.7	19.7	10.6	34.8	53.8	11.4	40.9	41.7	17.4
6	62.9	22	15.2	31.8	53.8	14.4	40.9	40.9	18.2
7	51.5	22	26.5	41.7	44.7	13.6	59.8	28.8	11.4
8	45.5	23.5	31.1	31.8	51.5	16.7	62.1	30.3	7.6

Figure 1

Time spent on different types of student employment during 4 years of college



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4.2 Effects of different types of work on study progress

The pre-service teachers, on average, obtained 213.4 out of the 240 study credits within the first four years and 26.7 credits per semester. Paid work as a teacher, which is only reported to occur in the third and fourth year, shows a significant positive interaction with growth in study credits (Table 4, models 6

and 7, “Paid job as teacher*Time”). This effect is also significant when controlling for other types of work (Table 5, models 7 and 8). Students who were paid for 16 hours of employment per week (which is the most frequent amount of hours) in education obtained 10.52 more credits after four years of college. Students who were paid to work 8 hours per week in education obtained 7.81 more credits, and those who worked 24 hours, obtained 15.96 more credits. The effects of paid work as a teacher in the first two years are unknown because none of the students reported having such a job during the first two years of college (Table 3). Internship overtime hours (unpaid work as a teacher) and paid work outside of education do not have significant effects on growth in study credits over time when all types of work are added to the model (Table 4, models 8 and 9). Adding the types of jobs that students have, explains 2.5% (r^2 = 0.03, similar to 0.32 standard deviations) of the accumulated study credits at the between-student level. Adding the interaction effects between the type of jobs and accumulated credits over time leads mostly to less variance on the within-student level. It explains 0.4% of accumulated study credits (comparable to Cohen’s *d* of 0.13). This indicates that paid work in education did not hinder the study progress of these pre-service teachers.

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Table 4
Effects of different types of work on growth in study credits over time

Effect	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	Fixed effects								
Intercept	-1.23 (1.02)	-1.34 (1.02)	-0.89 (1.04)	0.03 (1.10)	-0.69 (1.20)	-0.72 (1.02)	-0.49 (1.02)	-0.33 (1.42)	-0.04 (1.22)
Time	54.11*** (0.19)	54.03*** (0.20)	53.81*** (0.22)	53.96*** (0.19)	54.26*** (0.27)	53.52*** (0.22)	53.43*** (0.22)	52.98*** (0.28)	53.36*** (0.33)
Unpaid work in education		0.06 (0.05)	-0.08 (0.08)					0.03 (0.05)	-0.08 (0.08)
Unpaid work in education*Time			0.06* (0.03)						0.04 (0.03)
Paid work outside of education				-0.13* (0.05)	-0.04 (0.08)			-0.06 (0.05)	-0.02 (0.08)
Paid work outside of education*Time					-0.04 (0.03)				-0.02 (0.03)
Paid work in education						0.24*** (0.05)	-0.39 (0.20)	0.21*** (0.05)	-0.36 (0.21)
Paid work in education*Time							0.19*** (0.06)		0.17*** (0.06)
	Random effects								
Student variance	112.15 (14.71)	111.95 (14.69)	111.87 (14.67)	110.64 (14.40)	110.33 (14.38)	110.20 (14.40)	110.16 (14.38)	109.37 (14.19)	109.32 (14.23)
Repeated measures variance	156.92 (3.96)	156.85 (3.96)	156.64 (3.96)	156.58 (3.97)	156.48 (3.96)	155.71 (3.94)	155.21 (3.93)	155.65 (3.95)	155.02 (3.93)
Total variance	269.07	268.80	268.52	267.22	266.81	265.91	265.37	265.01	264.34
% expl. var. student level			0	1.35		1.74	0.04	2.49	0.04
% expl. var. rep. meas. level			0.13	0.22		0.77	0.32	0.81	0.40
% expl. var. total			0.10	0.68		1.18	0.14	1.51	0.25
	Goodness of fit								
Deviance	26000.31	25998.77	25994.56	25991.87	25989.57	25973.97	25964.06	25971.82	25959.14
Sig. difference of fit compared to model		Model 1 $\chi^2_{(1)} = 1.54$	Model 2 $\chi^2_{(1)} = 4.22^*$	Model 1 $\chi^2_{(1)} = 8.45^{**}$	Model 4 $\chi^2_{(1)} = 2.30$	Model 1 $\chi^2_{(1)} = 26.34^{***}$	Model 6 $\chi^2_{(1)} = 9.91^{**}$	Model 1 $\chi^2_{(3)} = 28.49^{***}$	Model 8 $\chi^2_{(3)} = 12.69^{**}$

Note. Dependent variable is study credits, measured 25 times (repeated measures n = 3,245; student n = 132; Course n = 13) (se between brackets). One addition in the time variable represents obtained study credits during one year. Interaction effects between a certain type of work and *Time indicate how the work affects growth in obtained study credits over time. $^*p < .05$ $^{**}p < .01$ $^{***}p < .001$

Table 5

Covariates effects on growth in study credits

Effect	Model 1	Model 2	Model 3	Model 4	Model 5
	Fixed effects				
Intercept	-1.23 (1.02)	-0.61 (1.13)	-1.85 (1.15)	-3.19 (1.40)	-1.11 (1.44)
Time	54.12*** (0.19)	54.11*** (0.19)	54.73*** (0.21)	54.73*** (0.21)	53.70*** (0.27)
Male		-2.83 (2.28)	2.91 (2.45)	3.44 (2.40)	3.14 (2.40)
Male*Time			-2.83*** (0.45)	-2.83*** (0.45)	-2.69*** (0.44)
Vocational track				-0.29 (2.17)	-2.45 (2.35)
Academic track				6.59*** (2.41)	-0.81 (2.60)
Vocational*Time					1.07*** (0.43)
Academic*Time					3.67*** (0.48)
	Random effects				
Student variance	112.15 (14.71)	110.78 (14.55)	110.88 (14.55)	103.86 (13.56)	104.22 (13.59)
Repeated measures variance	156.92 (3.96)	156.92 (3.96)	154.90 (3.91)	154.90 (3.93)	152.08 (3.86)
Total variance	269.07	267.70	265.79	258.76	256.30
% expl. var. student level			-	6.33	0.35
% expl. var. rep. meas. level			1.28	0	1.82
% expl. var. total			0.71	2.64	0.95
	Goodness of fit				
Deviance	26000.31	25998.77	25958.62	25950.45	25893.56
Sig. difference of fit compared to model		Model 1	Model 2	Model 3	Model 4
		$\chi^2_{(1)} = 1.54$	$\chi^2_{(1)} = 41.69^{***}$	$\chi^2_{(2)} = 8.17^{*}$	$\chi^2_{(2)} = 56.90^{***}$

Note. Dependent variable is study credits, measured 25 times (repeated measures n = 3,245; student n = 132; Course n = 13) (se between brackets). One addition in the time variable represents added study credits during one year. *$p < .05$ **$p < .01$ ***$p < .001$

If types of employment were potentially related to demographical features, which is feasible (Humphrey, 2006), they could act as confounding variables. We, therefore, decided to control for gender and previous education because these are predictors of academic performance in this context (Table 5). Especially previous education showed to be a predictor of growth in study credits, it explained 6.7 percent of the total variance (comparable to Cohen's *d* of 0.54). We, therefore, also did our analyses with these covariates to exclude them as confounding variables.

While controlling for gender and previous education, we tested the same models that included work outside of education and unpaid and paid work in education (Table 6). This confirmed our earlier findings. Only paid work as a

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Table 6

Effects of different types of work on growth in study credits over time with covariates

Effect	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Fixed effects						
Intercept	-1.11 (1.44)	-1.19 (1.44)	0.34 (1.41)	-0.58 (1.42)	0.03 (1.48)	0.94 (1.56)
Time	53.70*** (0.27)	53.57*** (0.28)	53.53*** (0.27)	53.79*** (0.28)	53.01*** (0.29)	52.57*** (0.37)
Male	3.14 (2.40)	3.21 (2.40)	3.78 (2.40)	3.38 (2.37)	3.71 (2.37)	3.96 (2.38)
Male*Time	-2.69*** (0.44)	-2.70*** (0.44)	-2.85*** (0.45)	-2.90*** (0.44)	-2.96*** (0.44)	-3.08*** (0.45)
Vocational track	-2.45 (2.35)	-2.60 (2.35)	-2.55 (2.34)	-2.35 (2.32)	-2.51 (2.32)	-2.51 (2.32)
Academic track	-0.81 (2.60)	-1.10 (2.61)	-1.19 (2.60)	-0.86 (2.57)	-1.22 (2.57)	-1.39 (2.58)
Vocational*Time	1.07*** (0.43)	1.09** (0.43)	1.00** (0.43)	0.91* (0.43)	0.91* (0.43)	0.94* (0.43)
Academic*Time	3.67*** (0.49)	3.73*** (0.49)	3.66*** (0.48)	3.76*** (0.48)	3.78*** (0.48)	3.86*** (0.49)
Unpaid work in education		0.09 (0.05)			0.05 (0.05)	0.03 (0.08)
Unpaid work in education*Time						0.01 (0.03)
Paid work outside of education			-0.16*** (0.05)		-0.08 (0.05)	-0.16* (0.08)
Paid work outside of education*Time						0.04 (0.03)
Paid work in education				0.28*** (0.05)	0.26*** (0.05)	-0.46** (0.21)
Paid work in education*Time						0.22*** (0.06)
Random part						
Student variance	104.22 (13.59)	104.27 (13.72)	103.46 (13.62)	101.34 (13.26)	101.03 (13.20)	101.25 (13.15)
Repeated measures variance	152.08 (3.86)	151.91 (3.84)	151.54 (3.83)	150.44 (3.81)	150.27 (3.81)	149.57 (3.80)
Total variance	256.30	256.18	255.00	251.78	251.30	250.83
Deviance	25893.56	25890.07	25881.48	25856.23	25852.19	25838.00
% expl. var. student level		-	0.70	2.76	3.06	-
% expl. var. rep. meas. level		0.11	0.36	1.08	1.19	0.47
% expl. var. total		0.004	0.50	1.76	1.95	0.19
Sig. difference of fit compared to model		Model 1 $\chi^2_{(1)}$ = 3.49*	Model 1 $\chi^2_{(1)}$ = 12.08**	Model 1 $\chi^2_{(1)}$ = 37.33***	Model 1 $\chi^2_{(3)}$ = 41.37***	Model 5 $\chi^2_{(3)}$ = 14.19**

Note. Dependent variable is study credits, measured 25 times (repeated measures n = 3,245; student n = 132; Course n = 13) (se between brackets). +1 in the time variable represents added study credits during one year. Interaction effects between a certain type of work and *Time indicate how the work affects growth in obtained study credits over time. *p < .05 **p < .01 ***p < .001

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teacher proved to show a significant positive effect on growth in study credits (Table 6, model 6, “Paid job as teacher*Time”). Again, this positive effect applied only to the last two years of college given that this type of employment did not occur in the first two years. With these more precise models, the effect on study credits was slightly larger. Students who had a paid job in education for 16 hours per week averaged 13.62 credits more than their peers, those with 8 hours gained 6.58 more credits, and those who worked 24 hours per week averaged 20.66 credits more than their peers. These differences range from 11% up to 34.4% of an academic year’s worth of study credits.

4.3 Optimal amount of hours spent on different types of student employment

To answer RQ 3, we wanted to test if there is an optimal amount of time that students should spend on the different types of work. During the first semester, the largest increase in study credits is found for students who work 7.75 hours per week outside of education. There is no difference in terms of study credits between students working 15.5 hours per week outside of education and students that do not have a job. Students working more than 15.5 hours per week outside of education receive fewer credits than students who do not work outside of education and the more hours these students work per week, the more negative the relationship between work and the number of study credits becomes (Figure 2). Changing the model from linear to curvilinear by adding paid work outside of education squared in model 4 (Table 7) explains 6.4% of all variance at the student level (similar to Cohen’s *d* of 0.52).

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Figure 2

Effect of hours per week spent on paid work outside of education on obtained study credits in the first semester

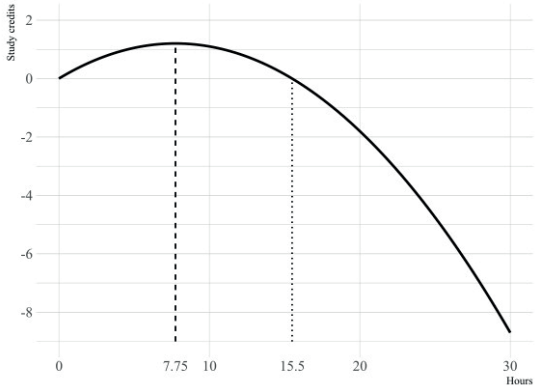

Table 7

Effect of work outside of education on obtained study credits in the first semester

Effect	Model 1	Model 2	Model 3	Model 4
		Fixed effects		
Intercept	26.55 (0.56)	26.35 (1.26)	27.02 (1.40)	26.01 (1.51)
Work outside of education			-0.08 (0.07)	0.31* (0.17)
Work outside of educaiton^2				-0.02** (0.01)
		Random effects		
Course variance		15.81 (7.92)	15.91 (7.95)	18.58 (8.94)
Student variance	42.61 (5.12)	27.20 (3.52)	26.90 (3.45)	25.28 (3.27)
Total variance	42.61	43.01	42.81	43.86
% expl. var. course level				n.a.
% expl. var. student level				6.40
% expl. var. total				n.a.
		Goodness of fit		
Deviance	866.75	832.61	831.34	825.35
Sig. difference of fit compared to model		Model 1	Model 2	Model 3
		$\chi^2_{(1)}$ = 34.14***	$\chi^2_{(1)}$ = 1.27	$\chi^2_{(1)}$ = 5.99*

Note. Example: for 10 weekly hours of work calculate 10x0.31+10^2x-0.02. $p < 0.05$ **$p < 0.01$ ***$p < 0.001$

We conducted the same analysis for other semesters and only found a significant curvilinear correlation between time spent on a paid job outside of education and obtained course credits during the third semester (Table 8, Model 4). In the third semester, paid work squared predicted 7.93% of the variance in study credits at the student level (d = 0.58) and 5.68% of the total variance (d = 0.49) in study credits (Table 8, Model 5). In this case, 8.25 hours of paid work outside of education correlated with the largest net gain in study credits, and the break-even point is 16.5 hours. Unpaid work in education did not correlate significantly with obtained credits during any of the single semesters. Having paid (congruent) work in education shows a positive significant effect on the gain in study credits, especially during the fifth semester (Table 9, Model 3). Interestingly, this relation is not curvilinear within semesters (Table 9, Model 4). As far as the range of our dataset permits (with 30 hours as the highest reported amount), more hours spent on paid work as a teacher during the fifth semester simply relates to more obtained study credits. No other significant semester-specific effects were found.

Table 8

Effect of a job outside of education on obtained study credits in the third semester

Effect	Model 1	Model 2	Model 3	Model 4	Model 5
		Fixed effects			
Intercept	24.16 (0.72)	24.39 (1.36)	25.86 (1.60)	24.36 (1.68)	24.36 (1.68)
Work outside of education			-0.17* (0.09)	0.33 (0.22)	0.33 (0.22)
Work outside of education^2				-0.02* (0.01)	-0.02* (0.01)
		Random effects			
Course variance		15.07 (8.94)	16.00 (9.27)	15.37 (8.89)	15.37 (8.89)
Student variance	67.82 (8.35)	56.51 (7.30)	54.82 (7.08)	52.36 (6.76)	52.36 (6.76)
Total variance	67.82	71.58	70.82	67.73	67.73
% expl. var. course level				4.10	n.a.
% expl. var. student level			3.08	4.70	7.93
% expl. var. total			1.07	4.56	5.68
		Goodness of fit			
Deviance	931.22	922.05	918.78	912.78	912.78
Sig. difference of fit compared to model		Model 1 $\chi^2_{(1)}$ = 9.17**	Model 2 $\chi^2_{(1)}$ = 3.27	Model 3 $\chi^2_{(1)}$ = 6.00*	Model 2 $\chi^2_{(2)}$ = 9.27**

Note. Example: for 10 weekly hours of work calculate 10x0.33+10^2x-0.02. *p < 0.05 **p < 0.01 ***p < 0.001

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Table 9

Effect of a paid job as a teacher on study progress in the fifth semester

Effect	Model 1	Model 2	Model 3	Model 4
		Fixed effects		
Intercept	21.69 (0.80)	22.47 (1.33)	20.30 (0.90)	29.87 (1.27)
Paid work in education			0.38*** (0.12)	0.32 (0.40)
Paid work in education^2				0.00 (0.02)
		Random effects		
Course variance		11.93 (8.38)		
Student variance	84.85 (10.44)	76.34 (9.83)	79.17 (9.75)	79.15 (9.74)
Total variance	84.85	88.27	79.17	79.15
% expl. var. course level				
% expl. var. student level			7.17	
% expl. var. total			7.17	
		Goodness of fit		
Deviance	960.80	957.74	951.64	951.62
Sig. difference of fit compared to model		Model 1 $\chi^2_{(1)} = 3.06$	Model 1 $\chi^2_{(1)} = 9.16^{**}$	Model 5 $\chi^2_{(1)} = 0.02$

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

4.4 Secondary analyses

To further explore to which degree study progress was influenced by employment, we ran regression analyses in which we tested the effect of work in the fifth semester on study credits obtained until and in the fifth semester, while adding previously obtained credits as a covariate. These analyses show that paid work in education remains a significant predictor of study progress when controlling for previously obtained credits (Table 10, Model 4). If work was only a consequence of academic proficiency instead of the other way around, this would not be the case.

Table 10

Effect of a paid job as a teacher on obtained study credits up to and including the fifth semester

Effect	Model 1	Model 2	Model 3	Model 4
		Fixed effects		
Intercept	134.71 (1.33)	134.71 (1.33	-20.11 (9.09)	-19.05 (8.82)
Previously obtained credits			1.37*** (0.08)	1.35*** (0.08)
Paid work in education				0.33** (0.12)
		Random effects		
Course variance		00.00 (0.00)		
Student variance	234.72 (28.89)	234.72 (28.89)	73.07 (8.99)	68.72 (8.46)
Total variance	234.72 (28.89)	234.72 (28.89)	73.07 (8.99)	68.72 (8.46)
% expl. var. course level				
% expl. var. student level			68.87	5.95
% expl. var. total			68.87	5.95
		Goodness of fit		
Deviance	1095.11	1095.11	941.06	932.96
Sig. difference of fit compared to model		Model 1 $\chi^2_{(1)} = 0.00$	Model 1 $\chi^2_{(1)} = 154.05$***	Model 5 $\chi^2_{(1)} = 8.10$**

Note. Models 1 and 2 show that including course variance is not required. *$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

5 Discussion

This study described how different types of student employment related to study progress over four years and during specific semesters of college in teacher education. In general, results show that many pre-service teachers took on a paid job as a teacher by the third year in addition to their internship requirements and that this related to significantly more study progress over time. Those who were paid to work in education in the third or fourth year averaged between 7 (when working 8 hours per week) and 21 (when working 24 hours per week) more study credits during their study, which equals respectively 11% and 34% of a full academic years' worth of credits. Time spent on unpaid work in education or paid work outside of education did not significantly relate to study progress over the four years of college. However, we did find that working around eight hours per week in a (non-congruent) job outside of

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education is connected to obtaining the optimal amount of study credits during the first and third semesters of college. It seems that paid work in education during the third and fourth years, on average, did not negatively affect the study progress of these pre-service teachers. Hiring third- and fourth-year pre-service teachers during their study in the case of a teacher shortage might not necessarily hurt their study progress.

The findings of this study contribute to the literature on student employment in four ways. First, in line with the research on role-based resources (Butler, 2007; Creed et al., 2015; Meeuwisse et al., 2017), we found that it matters whether student employment is domain-relevant. This could be due to the congruence, but it could also be due to other aspects of the job such as higher pay or other factors outside the work-study interface that we can't exclude. Yet, the type of job indeed seemed to matter, and this study was the first to extend these findings to the context of a vocational type of higher education.

Second, we found that it matters whether a domain-relevant job is paid or not. Unpaid domain-relevant work did not have a significant positive relation with study progress, while paid relevant work did show a positive significant interaction. If a domain-relevant job is not paid, students might still need to spend time on non-relevant work to ensure their income (Humphrey, 2006), which could lead to work-school conflict that counteracts the benefits. Or, in the parlance of the Human Capital and Zero Sum Theory (Becker, 1964; 1965), getting paid for relevant work allows two benefits: learning on the job while allowing one to quit spending time on a non-relevant job that does not grant these benefits.

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Third, we found that the effects of different types of jobs are dependent on the semester and year of college. To our knowledge, this was the first study that took the specific year and semester of college into account while estimating the effects of student employment. We found that students obtained relevant paid work in the third year of college. Studies that took only the first (e.g., Applegate, 2006), second (e.g., Salamonson & Andrew, 2006), or third year (Wikan & Bugge, 2014) of college into consideration, or that did not differentiate between years in their analyses (e.g., Butler, 2007; Meeuwisse et al., 2017), were not able to take such a transition into account. Effects of student employment in the third semester are different from those in the fifth because the nature of the work has changed considerably in the meantime. We also found a significant negative effect of more than one day per week of work during the first semester. It could be that students still need to explore how much work they can combine with their study at the start, and find out 'the hard way'.

Fourth, to our knowledge, this study was the first to transparently estimate the optimal number of hours that students spend on employment. We differentiated this for each type of employment and each semester. In line with Wikan and Bugge (2014), we found evidence of a curvilinear relationship

between paid non-relevant work in the first and second years of college. Around one day per week related to the highest study progress, while working more than two days per week related to below-average study progress.

5.1 Limitations and future studies

Four aspects of this study influence what conclusions can be drawn. First, the sample in our study only contained students who did not drop out of the study program. Consequently, the potential effects of student employment on dropping out have not been included. Although our sample mirrored the population of Dutch teacher education students on several dimensions and contained students with all different types of measured student employment, non-response could have led to non-response bias, given that the response rate for this study was 40%. Second, the demographic and study progress variables in this study are directly generated by the university administration, which makes their reliability optimal. But the number of hours that students spend on work is based on self-reports through a survey at one point in time, which is generally less reliable. Students might be biased in reporting how much time they spent on work because of desirability or because they may have trouble remembering exactly how many hours they worked in a given period. Third, this study was conducted with pre-service teachers enrolled in a Dutch University of applied sciences. Within teacher education, there are major differences between (and even within) countries, which makes it hard to generalize findings from one context to another. During the period of the study, there was a teacher shortage in The Netherlands. Without teacher shortages, the percentage of students who had a paid job as a teacher during their study may be significantly lower. Fourth, we asked how many hours students worked (paid or unpaid) in addition to their internship requirements, but we do not know whether they were paid for their internship requirements. Not all internships in education are paid in The Netherlands and the pay can differ between schools. This missing information could also be used to understand to which degree students might be required to find additional sources of income.

Future studies could investigate which students are offered paid relevant work to further examine potential confounding variables that could help explain the causal mechanism behind any interaction effects between student employment and study progress. It would also be of value to conduct more studies that take timing, remuneration, and relevance into account in other domains.

5.2 Practical relevance

The findings in this study indicate that hiring third- and fourth-year pre-service teachers during their study in the case of a teacher shortage did not

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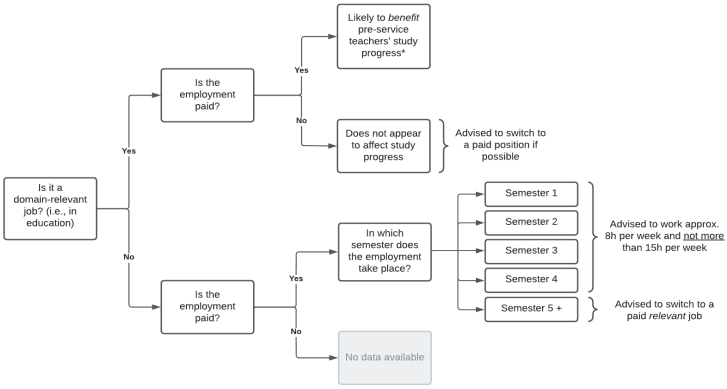
necessarily hurt their study progress. Combined, the findings from this study sketch a dynamic interaction of different relevant variables that should be taken into account when taking on employment in combination with a study. Figure 3 offers advice based on specific insights into the relationship between the number of employment hours and study progress for the different types of employment (i.e., domain relevance and remuneration) and within different semesters of the study program.

Figure 3

Flowchart of results of relationship between student employment and study progress



Note. *mainly based on data from semester 5 onwards

6 Conclusion

Teacher shortages are a significant concern in many countries. Hiring pre-service teachers could help to alleviate this problem but might compete with attendance or self-study and, thereby, hinder study progress. The findings from this study indicate that students who spent more time on a paid teaching job in year 3 or 4 obtained significantly more study credits compared to those who did not get paid or got paid for a job outside of education. This does not exclude that there might be negative effects of employment on retention, nor does it offer sufficient evidence for causal inference. However, this study does show that the quantity and the type of work that students take on can change drastically during college and that these characteristics matter when estimating effects on study progress.

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Samenvatting

De juiste baan loont: Effecten van verschillende soorten bijbanen op de studievoortgang van leraren in opleiding

Lerarentekorten kunnen de kwaliteit van onderwijs onder druk zetten. De tekorten maken het voor scholen aantrekkelijk om leraren in opleiding voor een deel van de week een betaalde aanstelling te bieden. Alhoewel dit voor scholen en studenten voordelen kan bieden, kan het betaald werken naast de studie mogelijk ook concurreren met studietijd en zo leiden tot studievertraging. Deze studie analyseerde de effecten van verschillende soorten bijbanen op de studievoortgang van 132 leraren in opleiding op 25 herhaalde meetmomenten over een tijdspanne van vier jaar (n = 3,245). Hierbij onderscheidden we de hoeveelheid gewerkte uren per week, of het werk betaald was, of het werk binnen het onderwijs was, en in welke periode van de studie het werk plaats vond. Multilevel groei-analyses toonden dat studenten die betaald werk in het onderwijs verrichten in jaar 3 en 4 van de studie significant meer studiepunten behaalden dan studenten zonder betaald werk of met betaald werk buiten het onderwijs. Het inzetten van studenten in opleiding gedurende jaar 3 en 4 om lerarentekorten tegen te gaan, lijkt gemiddeld genomen geen negatieve gevolgen te hebben voor de studievoortgang.

Kernwoorden lerarentekort, bijbanen, studievoortgang, lerarenopleiding

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