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Do Social Networks Help to Improve Student Academic Performance? The Case of Vk.com and Russian Students

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Abstract

A number of researchers have studied the effect of social networks on student academic performance, but the results are not only contradictory but also limited by the use of self-reported estimations of social network use. This paper overcomes this problem, however, as we collect unique data on the real time spent by Russian students in the Vk.com social network. Our results suggest that time spent on the social network before an exam can significantly improve student performance on the exam. The time spent online, however, influences exam results indirectly via peer effects rather than directly. Accordingly, social networks cannot only bring joy, but they can also be a productive channel for exploiting peer effects if the students are connecting with bright and talented classmates.

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1. Introduction

Social networks have become an important instrument people use on a daily basis for communication, information, education and entertainment. Students, often considered the most advanced and active audience of social networks, spend many hours online, and this time is often perceived by others as being used non-productively , especially as it relates to academic performance. Accordingly, many recent studies aim to explore the activities of students and teachers within online social networks (see Hew, 2011, for a review).

A number of studies use student surveys to demonstrate the effects of social networks on student performance. The findings of these studies cover a broad spectrum. For example, whereas some studies claim that the effects of social networking on student grades are negative (Junco, 2012a,b; Kirschner, 2010), others contend the effects are positive (Calafiore, 2011), and still other studies find mixed or no effects (Madge et al. 2009). The contradictive results may be explained, at least to some degree, by the serious problem related to the survey nature of the data used: the proxy of social network use is derived from the questionnaires and is therefore self-reported. Consequently, the reliability of the results is questionable because of subjectivity and selection biases.

The study presented here provides a solution to this problem. We manually collect data with respect to the exact amount of time the students spend in an online social network. Therefore, in analyzing the influence of social networking on student performance, we use the observed values.

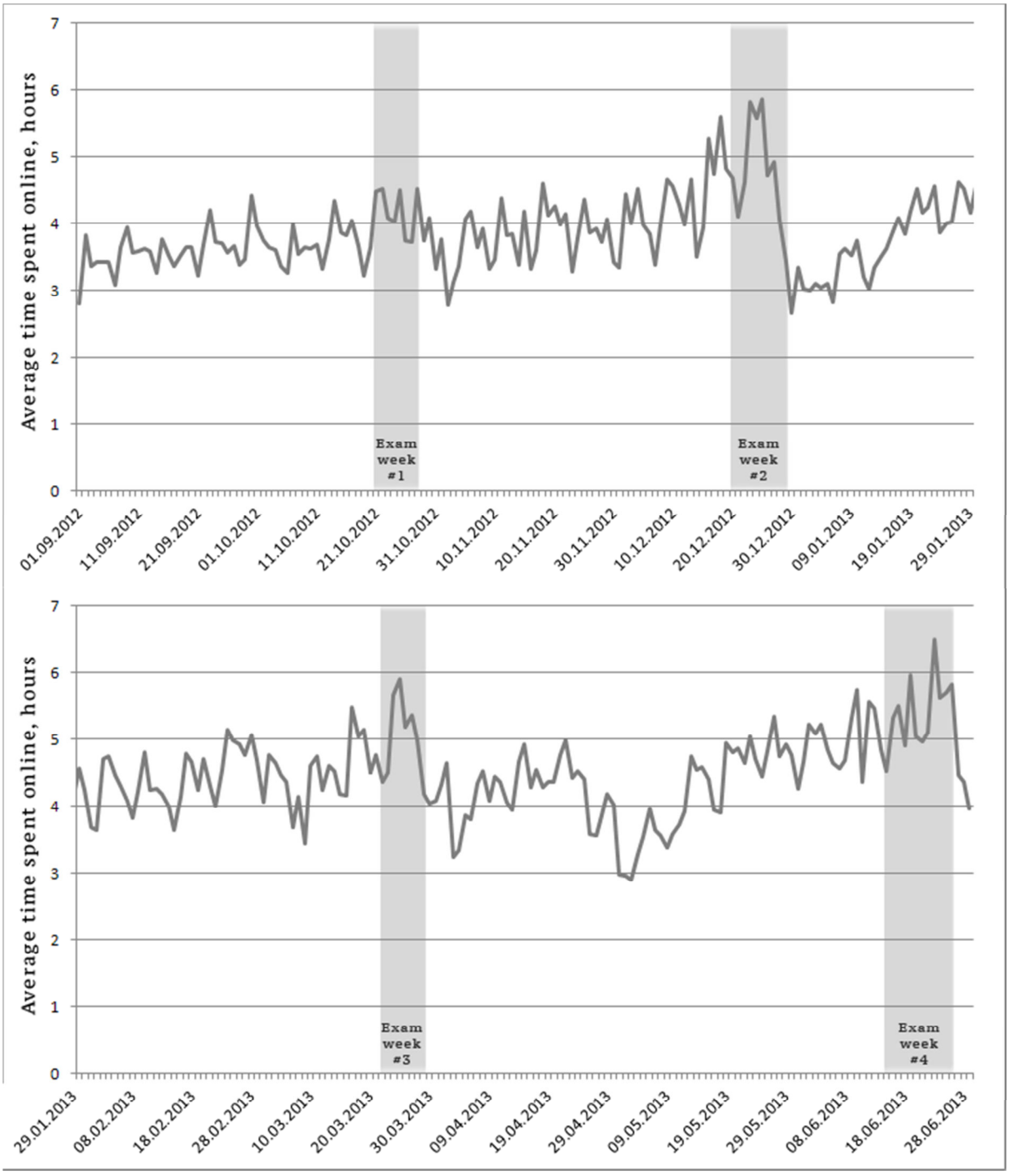
Social networking for students is part of a communication strategy that may involve well-known peer effects (see Androushchak et al., 2013, Poldin et al., 2013). In the second stage of this study, we determine whether social networking before an exam generates collective knowledge. That is, whether social networking functions indirectly as a type of the peer effect.

2. Data and Methodology

We use data on academic performance and individual characteristics of 123 second-year undergraduate students enrolled during the 2012-2013 academic year in the Economics Department of the Saint-Petersburg branch of the National Research University Higher School of Economics, NRU HSE (Russia). We also manually collect the unique data showing the exact time, minute-by-minute, each student spent in the social network known as Vk.com, the Russian analog of Facebook.com. Vk.com is extremely popular among Russian students. We detected the profiles of 123 students, though the total number of students is 136. The rest students, however, may run their profiles under false names. As the time spent online is recorded automatically and directly through Vk.com, students cannot influence the data.

During the academic year at the NRU HSE, the undergraduate students have four exam weeks, one each in October, December, March and June. On average, students spend approximately three to five hours per day online. However, they become more active during exam periods (see Figure 1). This suggests that during exam weeks, they attempt to use this channel as a way to quickly enhance their knowledge. One can argue that the best students do not need to study before an exam, and therefore, their increased use of Vk.com is more for entertainment than for study. Figure 1A in the Appendix, which details Figure 1, differentiates the use of Vk.com according to the level of student academic achievement and shows that the best students demonstrate the lowest increase in their use of Vk.com compared to average and poor students.

Figure 1. Average time students spend on Vk.com



To understand the relationship between the time spent on Vk.com and the grade a student receives on an exam, we use student exam level data. We estimate the regression as follows:

(1)

$ExGrade_{ij}$ measures the performance of student *i* studying subject *j*. There is a 10-point grade system implemented at the NRU HSE, in which a higher grade is assigned for a higher level of student performance. All grades less than 3 are rounded up to 3. The cut-off grade for passing the exam is equal to 4.

$VkTime_i$ denotes the time (in hours) student *i* spends on Vk.com during the entire academic year. This variable is a proxy for the general pattern of a student's social networking behavior.

$VkTimeExam_{ij}$ represents the time (in hours) the student spends on Vk.com the day before exam *j*.

The academic performance of the students originates, at least partly, from their individual abilities ($Abilities_i$). Following Poldin et al. (2013), we proxy the abilities by the sum of the grades received on the Unified State Examination (USE) administered during the admission stage. The USE is a series of national standardized tests administered to Russian secondary school graduates. The grades are sent to the universities to which the graduate applies, and the admittance decision is based strictly on the student's USE grade[1]. There are two tests that are obligatory for all graduates – mathematics and Russian. Other subjects that are tests are at the discretion of the university. For example, the NRU HSE requires a foreign language test and a test in economics for the Economics Department.

We introduce a number of control variables. Controlling for student gender, we set GEN_i equal to 0 for a female student and 1 for a male one. We control for the size of the settlement ($SSIZE_i$) from which a student came, setting 1 for cities with a population over 100,000 citizens and 0 otherwise. As the incentives may be different for students who pay tuition and those who do not, we also add a dummy variable, PAY_i, equal to 1 for those for whom studying at the HSE is free, and 0 for those who should pay tuition fees.

Finally, we introduce fixed effects for student groups ($Group[2\text{-}5]_i$), different subjects ($SUBJECT[2\text{-}29]_j$) and different exam weeks ($TERM[2\text{-}4]_j$). There are five student groups, and the student is initially randomly assigned to one of the five groups when he or she first attends the university. To control for group differences, we use dummy variables for all groups other than the first. For each exam week, starting with the second, we introduce a binary variable equal to 1 if the exam for subject *j* is passed during this week. Similarly, for each subject *j*, we include a special dummy variable.

How does the use of Vk.com improve exam results? One possible answer is that this occurs through synergistic communications with other students. In the second stage, we determined whether social networking enhances academic performance via the peer effect. We modify the equation by adding the group peer effect (the average grade of all students within the group except student *i* for all exams before exam *j*, $Peer_{ij}$) and the peer effect provided by the use of Vk.com ($PeerVk_{ij}$). We measure the latter as the sum of hours spent online before the exam multiplied by the average grades (before the exam) of the students who were online during the same period of time[2]. This variable is discussed in greater detail in Section 4. The equation estimated in the second stage is as follows:

$$\begin{aligned} \mathrm{ExGrade_{ij}} \sim\ & \mathrm{VkTimeExam_{ij}} + \mathrm{VkTime_i} + \mathrm{Peer_{ij}} + \mathrm{PeerVk_{ij}} + \mathrm{Abilities_i} \\ & + \mathrm{GEN_i} + \mathrm{SSIZE_i} + \mathrm{PAY_i} + \mathrm{TERM}[2-4]_j + \mathrm{SUBJECT}[2-29]_j \end{aligned} \qquad (2)$$

[1] For more details on the Russian USE system, see Prakhov (2012).

[2] To avoid possible performance bias (better students may communicate only with better students), we also estimate the influence of time spent online only with peers ($SumSame_{ij}$). We discuss this in Section 4.

The descriptive statistics for all variables are presented in Table 1.

Table 1. Descriptive statistics (2,583 student-exam observations)

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*
ExGrade	6.9609	1.8906	3.0000	10.0000
VkTimeExam	5.1613	3.3929	0.0000	19.5333
VkTime	1320.8850	670.1544	0.0000	3597.3000
Peer	6.5878	0.6065	4.7839	8.6049
PeerVk	22.1390	23.1016	0.0000	150.8400
Abilities	311.4394	16.3485	237.0000	338.0000
GEN	0.2849	0.4515	0.0000	1.0000
PAY	0.9253	0.2630	0.0000	1.0000
SSIZE	0.9624	0.1901	0.0000	1.0000
SumSame	14.0844	7.4792	0.0000	32.0000

As $ExGrade_{ij}$ is an academic grade, the dependent variable is of the ordinal scale. Thus, for an evaluation of the time effects on student performance, we use the ordered logistic model as discussed in Cameron et al. (2005).

3. Results: Time on Vk.com

We report the average marginal effects after estimating equation (1) in Table 2 (a full version of the results is presented in Table A1 in the Appendix). Each column corresponds with the particular grade, ranging from 3 to 10.

In general, student addiction to social-networking – the total time spent online during the year – has no significant effect on student grades. However, time spent on Vk.com just before the exam appears to be quite productive such that more time online moves the student closer to high grades (greater than 7) and farther from low grades.

Students' abilities are also found to enhance student grades. Quite naturally, more talented students are found to perform better. Furthermore, female students are found to have higher grades than male students, while student origin or tuition fees do not affect exam results.

Table 2. Time in Vk.com and exam grades (average marginal effects, 2,583 student-exam observations)

	Exam Grade							
Variable	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
VkTimeExam	-0.00094**	-0.00225**	-0.00183**	-0.00106**	0.00036**	0.00184**	0.00175**	0.00212**
	(0.00040)	(0.00095)	(0.00077)	(0.00045)	(0.00017)	(0.00077)	(0.00074)	(0.00089)
VkTime	0.00000	0.00000	0.00000	0.00000	-0.00000	-0.00000	-0.00000	-0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Abilities	-0.00028***	-0.00067***	-0.00055***	-0.00032***	0.00011***	0.00055***	0.00052***	0.00063***
	(0.00009)	(0.00021)	(0.00017)	(0.00010)	(0.00004)	(0.00017)	(0.00016)	(0.00019)
GEN	0.01366***	0.03284***	0.02676***	0.01545***	-0.00531***	-0.02687***	-0.02557***	-0.03095***
	(0.00252)	(0.00525)	(0.00427)	(0.00263)	(0.00137)	(0.00424)	(0.00418)	(0.00489)
PAY	-0.00485	-0.01166	-0.00950	-0.00549	0.00189	0.00954	0.00908	0.01099
	(0.00525)	(0.01259)	(0.01026)	(0.00593)	(0.00207)	(0.01030)	(0.00981)	(0.01186)
SSIZE	-0.00080	-0.00193	-0.00157	-0.00091	0.00031	0.00158	0.00150	0.00182
	(0.00495)	(0.01190)	(0.00970)	(0.00560)	(0.00193)	(0.00974)	(0.00927)	(0.01122)
Group[2-5]	yes	yes	yes	yes	yes	yes	yes	yes
TERM[2-4]	yes	yes	yes	yes	yes	yes	yes	yes
SUBJECT[2-29]	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

4. Results: Vk.com and peer effects

Spending time on the online social network during exams should not, by itself, increase the probability of attaining a better grade. In this section, we test the link between peer effects, time spent social networking and student performance. Introducing peer effects into consideration we will use a similar form as at Poldin et al. (2013).

For each student *i's* grade on exam *j*, we calculate two special indicators:

$$\mathrm{Peer_{ij}} = \frac{1}{\mathrm{N_i}} \times \sum_{\substack{\hat{\imath}=1 \\ \hat{\imath}\neq \mathrm{i}}}^{N_i} \frac{\left[\sum_{\hat{\jmath}=1}^{\mathrm{j}-1} \mathrm{ExGrade_{\hat{\imath}\hat{\jmath}}} \times \mathrm{ECTS_{\hat{\jmath}}}\right]}{\sum_{\hat{\jmath}=1}^{\mathrm{j}-1} \mathrm{ECTS_{\hat{\jmath}}}} \tag{3}$$

$$\mathrm{PeerVk_{ij}} = \sum_{\substack{\hat{\imath}=1 \\ \hat{\imath}\neq \mathrm{i}}}^{\mathrm{V_i}} \frac{\left[\sum_{\hat{\jmath}=1}^{\mathrm{j}-1} \mathrm{ExGrade_{\hat{\imath}\hat{\jmath}}} \times \mathrm{ECTS_{\hat{\jmath}}}\right]}{\sum_{\hat{\jmath}=1}^{\mathrm{j}-1} \mathrm{ECTS_{\hat{\jmath}}}} \times \mathrm{VkTimeExamS_{\hat{\imath}j}} \tag{4}$$

In Equation 3, $Peer_{ij}$ is the direct peer effect for student *i*, measured by the average grade (weighted with ECTS credits) received before exam *j* by all students other than *i* in a group to which student *i* belongs to. N_i is a number of students in this group.

In Equation 4, $PeerVk_{ij}$ is the peer effect from social network connections. It reflects the idea that the peer effect can be reached by spending time communicating with students with high grades. $VkTimeExamS_{\hat{\imath}j}$ measures the sum of hours that student *i* spent online simultaneously with student $\hat{\imath}$ during the day before exam *j*. It is multiplied by the average grade of student $\hat{\imath}$ (weighted with the ECTS credits). V_i represents the total number of students, who spent time online with student *i*. The more talented the classmates a student has and the more time the student spends communicating with these talented classmates, the more benefits the student should receive.

The results of the regression (2) estimation are presented in Table 3 (full results are available in Table A2 of the Appendix). We show the average marginal effects.

Table 3. Peer effects (average marginal effects, 2,583 student-exam observations)

	Exam Grade							
Variable	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***
VkTimeExam	0.00001	0.00003	0.00003	0.00002	-0.00001	-0.00003	-0.00003	-0.00003
	(0.00038)	(0.00088)	(0.00075)	(0.00045)	(0.00014)	(0.00072)	(0.00072)	(0.00087)
VkTime	0.00000	0.00000	0.00000	0.00000	-0.00000	-0.00000	-0.00000	-0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Peer	-0.03869***	-0.08981***	-0.07719***	-0.04572***	0.01479***	0.07415***	0.07331***	0.08915***
	(0.00396)	(0.00563)	(0.00466)	(0.00359)	(0.00283)	(0.00410)	(0.00471)	(0.00476)
PeerVk	-0.00012***	-0.00028***	-0.00024***	-0.00014***	0.00005***	0.00023***	0.00023***	0.00028***
	(0.00004)	(0.00009)	(0.00008)	(0.00005)	(0.00002)	(0.00007)	(0.00007)	(0.00009)
Abilities	-0.00015*	-0.00035*	-0.00030*	-0.00018*	0.00006*	0.00029*	0.00028*	0.00035*
	(0.00008)	(0.00018)	(0.00015)	(0.00009)	(0.00003)	(0.00015)	(0.00015)	(0.00018)
GEN	0.00584***	0.01355***	0.01165***	0.00690***	-0.00223***	-0.01119***	-0.01106***	-0.01345***
	(0.00200)	(0.00447)	(0.00382)	(0.00230)	(0.00083)	(0.00367)	(0.00366)	(0.00442)
PAY	0.00195	0.00452	0.00389	0.00230	-0.00074	-0.00373	-0.00369	-0.00449
	(0.00470)	(0.01091)	(0.00938)	(0.00556)	(0.00180)	(0.00901)	(0.00891)	(0.01083)
SSIZE	0.00264	0.00612	0.00526	0.00311	-0.00101	-0.00505	-0.00499	-0.00607
	(0.00458)	(0.01063)	(0.00913)	(0.00541)	(0.00176)	(0.00877)	(0.00867)	(0.01055)
SUBJECT[2-29]	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

As expected, social networking can improve student academic achievement when the student spends time online with classmates. Both *Peer* and *PeerVk* have positive effects on student performance, thus indicating that direct peer effects are accompanied and complimented by the right-before-exam peer effects, which occur after online communications. If the average grade of a peer group increases by 1, it increases the probability of receiving a better grade – 7, 8, 9, 10 – by 1.69%, 8.54%, 8.29% and 10.08%, respectively. Comparing this effect to that generated by the use of Vk.com, if a student wants to gain the same effect, it is enough to spend just 37 minutes online with a student with an average grade equal to 10. There are no such limits as those established for the regular *Peer*. Thus, the effect of the collective mind as generated by social networks should not be underestimated.

The influence of student gender and personal abilities remains unchanged.

As the time spent online precedes the exams, the causality of the relationship is quite natural. However, to verify this, we confirm robustness using the panel data techniques. As the fixed effect estimation is inappropriate for ordered logit models, we use the random effects model with the exam dates as the time variable[3]. Table A3 in the Appendix presents the results of the estimation, which generally show the same effects as described herein. Although this model is less appropriate for our data, it nonetheless reveals the peer effects generated through the use of Vk.com.

Another concern that may arise is that bright students who achieve better grades may be initially connected to other high-achieving students. Accordingly, we run our regression, changing the Vk.com peer effect ($PeerVk_{ij}$), for time spent online before exam j with students who are of the same level as student i, ±10% ($SumSame_{ij}$). The results presented in Table A4 in the Appendix indicate that even spending time online with students who are not significantly different with respect to academic achievement increases the probability of the student receiving a higher grade on the exam when controlling for ordinal peer effect and the student's personal abilities).

5. Concluding remarks

Using the direct measures of the time students spend in an online social network allows us to provide reliable and non-biased results related to the influence of social networks on student academic performance. While spending time online throughout the academic year does not generate many benefits, the targeted communication right before exams can significantly improve exam grades. We demonstrate that this positive influence is the result of peer effects, which are exploited online before an exam albeit in a hurried manner. Online communications via Vk.com with classmates who have higher grades is found to improve academic performance. Although our results are limited to Russian students in the NRU HSE, they prove the importance of online social networking as an efficient channel for peer effect exploitation.

[3] For more on estimation techniques – see http://www.gllamm.org

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Appendix

Figure A1. Average time the best, average and the worst students spend in Vk.com

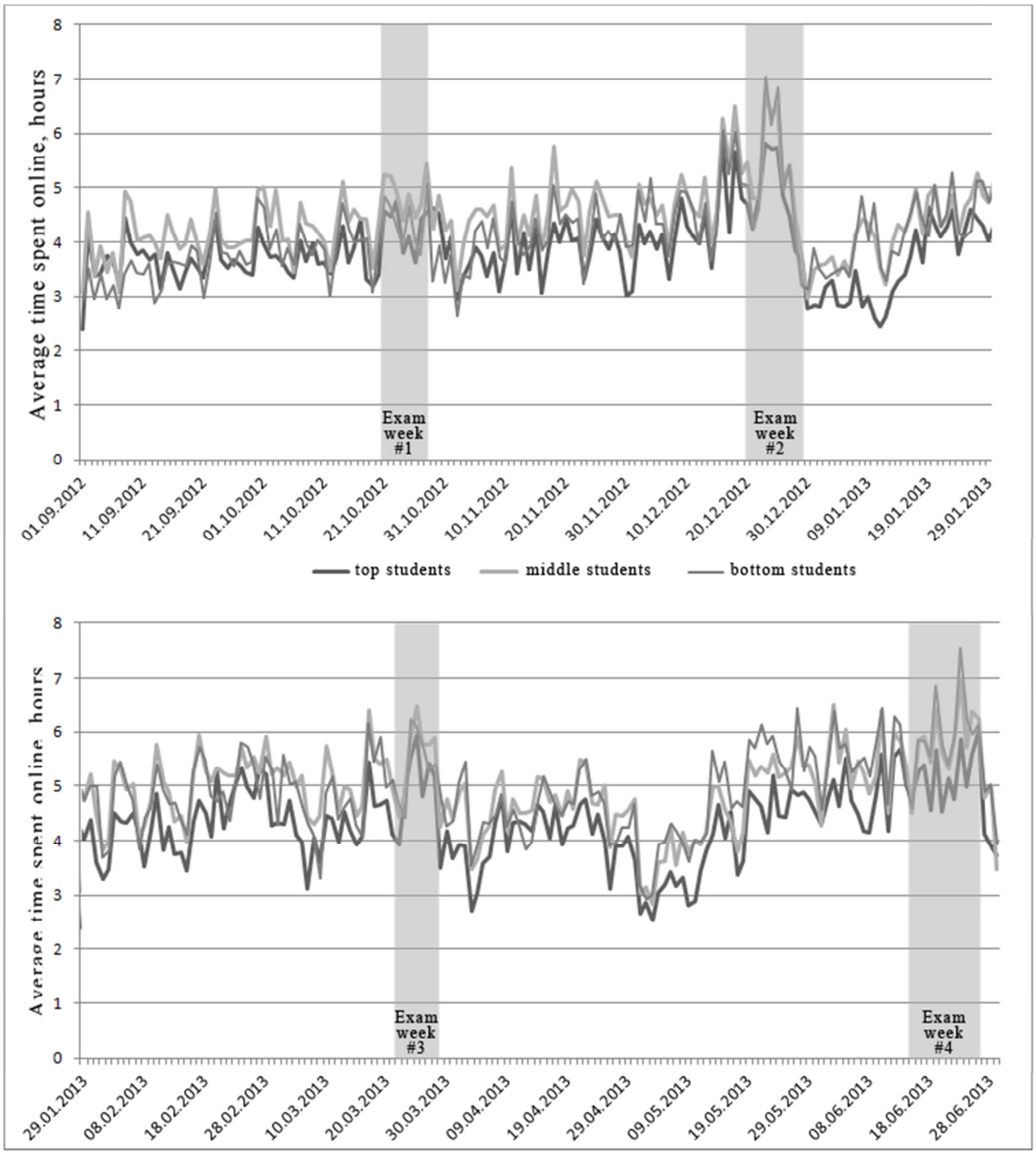

Table A1. Full version of Table 2

	Exam grade							
Variable	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***
VkTimeExam	-0.00094**	-0.00225**	-0.00183**	-0.00106**	0.00036**	0.00184**	0.00175**	0.00212**
	(0.00040)	(0.00095)	(0.00077)	(0.00045)	(0.00017)	(0.00077)	(0.00074)	(0.00089)
VkTime	0.00000	0.00000	0.00000	0.00000	-0.00000	-0.00000	-0.00000	-0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Abilities	-0.00028***	-0.00067***	-0.00055***	-0.00032***	0.00011***	0.00055***	0.00052***	0.00063***
	(0.00009)	(0.00021)	(0.00017)	(0.00010)	(0.00004)	(0.00017)	(0.00016)	(0.00019)
GEN	0.01366***	0.03284***	0.02676***	0.01545***	-0.00531***	-0.02687***	-0.02557***	-0.03095***
	(0.00252)	(0.00525)	(0.00427)	(0.00263)	(0.00137)	(0.00424)	(0.00418)	(0.00489)
PAY	-0.00485	-0.01166	-0.00950	-0.00549	0.00189	0.00954	0.00908	0.01099
	(0.00525)	(0.01259)	(0.01026)	(0.00593)	(0.00207)	(0.01030)	(0.00981)	(0.01186)
SSIZE	-0.00080	-0.00193	-0.00157	-0.00091	0.00031	0.00158	0.00150	0.00182
	(0.00495)	(0.01190)	(0.00970)	(0.00560)	(0.00193)	(0.00974)	(0.00927)	(0.01122)
Group2	0.00793**	0.01906**	0.01553**	0.00897**	-0.00309**	-0.01560**	-0.01485**	-0.01797**
	(0.00331)	(0.00776)	(0.00634)	(0.00369)	(0.00140)	(0.00634)	(0.00608)	(0.00731)
Group3	-0.00877***	-0.02108***	-0.01718***	-0.00992***	0.00341**	0.01725***	0.01642***	0.01987***
	(0.00315)	(0.00732)	(0.00596)	(0.00348)	(0.00136)	(0.00597)	(0.00572)	(0.00688)
Group4	-0.01677***	-0.04034***	-0.03287***	-0.01898***	0.00653***	0.03300***	0.03141***	0.03801***
	(0.00351)	(0.00761)	(0.00617)	(0.00369)	(0.00178)	(0.00612)	(0.00603)	(0.00711)
Group5	-0.02423***	-0.05827***	-0.04747***	-0.02742***	0.00943***	0.04767***	0.04538***	0.05491***
	(0.00393)	(0.00781)	(0.00630)	(0.00389)	(0.00230)	(0.00617)	(0.00623)	(0.00717)
TERM2	-0.00210	-0.00504	-0.00411	-0.00237	0.00082	0.00412	0.00393	0.00475
	(0.00556)	(0.01337)	(0.01090)	(0.00628)	(0.00219)	(0.01093)	(0.01040)	(0.01260)
TERM3	0.00999	0.02402	0.01957	0.01130	-0.00389	-0.01965	-0.01870	-0.02263
	(0.00874)	(0.02091)	(0.01698)	(0.00984)	(0.00341)	(0.01706)	(0.01632)	(0.01971)
TERM4	-0.00440	-0.01058	-0.00862	-0.00498	0.00171	0.00865	0.00824	0.00997
	(0.00790)	(0.01898)	(0.01547)	(0.00892)	(0.00311)	(0.01551)	(0.01477)	(0.01788)
SUBJECT2	-0.00009	-0.00021	-0.00017	-0.00010	0.00003	0.00017	0.00016	0.00019
	(0.00820)	(0.01972)	(0.01607)	(0.00928)	(0.00319)	(0.01614)	(0.01536)	(0.01859)
SUBJECT3	-0.10802***	-0.25977***	-0.21166***	-0.12225***	0.04204***	0.21254***	0.20230***	0.24482***
	(0.01398)	(0.02514)	(0.02074)	(0.01335)	(0.01024)	(0.02239)	(0.01955)	(0.01820)
SUBJECT4	-0.03341***	-0.08035***	-0.06547***	-0.03781***	0.01300***	0.06574***	0.06257***	0.07572***
	(0.00887)	(0.02021)	(0.01646)	(0.00950)	(0.00456)	(0.01637)	(0.01522)	(0.01886)
SUBJECT5	0.01223	0.02941	0.02396	0.01384	-0.00476	-0.02406*	-0.02290	-0.02772
	(0.00754)	(0.01794)	(0.01459)	(0.00844)	(0.00305)	(0.01460)	(0.01400)	(0.01690)
SUBJECT6	0.04940***	0.11880***	0.09680***	0.05591***	-0.01923***	-0.09720***	-0.09252***	-0.11196***
	(0.00911)	(0.01871)	(0.01494)	(0.00961)	(0.00465)	(0.01498)	(0.01520)	(0.01779)
SUBJECT7	0.04965***	0.11941***	0.09730***	0.05620***	-0.01933***	-0.09770***	-0.09300***	-0.11254***
	(0.00916)	(0.01883)	(0.01509)	(0.00969)	(0.00468)	(0.01510)	(0.01531)	(0.01792)
SUBJECT8	-0.06262***	-0.15059***	-0.12270***	-0.07087***	0.02437***	0.12321***	0.11728***	0.14193***
	(0.01016)	(0.02077)	(0.01699)	(0.01015)	(0.00665)	(0.01757)	(0.01442)	(0.01861)
SUBJECT9	0.01071	0.02577	0.02099	0.01213	-0.00417	-0.02108	-0.02007	-0.02428
	(0.01247)	(0.02988)	(0.02435)	(0.01408)	(0.00493)	(0.02444)	(0.02327)	(0.02816)
SUBJECT10	0.01274	0.03064	0.02497	0.01442	-0.00496	-0.02507	-0.02386	-0.02888
	(0.01376)	(0.03300)	(0.02688)	(0.01551)	(0.00545)	(0.02695)	(0.02569)	(0.03108)
SUBJECT11	-0.02957**	-0.07110**	-0.05793**	-0.03346**	0.01151**	0.05817**	0.05537**	0.06701**
	(0.01210)	(0.02848)	(0.02319)	(0.01335)	(0.00543)	(0.02315)	(0.02184)	(0.02674)
SUBJECT12	-0.00968	-0.02327	-0.01896	-0.01095	0.00377	0.01904	0.01812	0.02193
	(0.02772)	(0.06662)	(0.05428)	(0.03135)	(0.01083)	(0.05450)	(0.05187)	(0.06278)
SUBJECT13	-0.00071	-0.00170	-0.00139	-0.00080	0.00028	0.00139	0.00133	0.00161
	(0.00904)	(0.02173)	(0.01771)	(0.01023)	(0.00352)	(0.01778)	(0.01693)	(0.02048)
SUBJECT14	0.06583***	0.15830***	0.12899***	0.07450***	-0.02562***	-0.12952***	-0.12328***	-0.14919***
	(0.01012)	(0.01874)	(0.01569)	(0.01091)	(0.00573)	(0.01555)	(0.01605)	(0.01835)
SUBJECT15	-0.05390***	-0.12962***	-0.10561***	-0.06100***	0.02098***	0.10605***	0.10094***	0.12216***
	(0.01014)	(0.02164)	(0.01736)	(0.01003)	(0.00589)	(0.01699)	(0.01603)	(0.02003)
SUBJECT16	-0.04103***	-0.09868***	-0.08041***	-0.04644***	0.01597***	0.08074***	0.07685***	0.09300***
	(0.00945)	(0.02104)	(0.01690)	(0.00971)	(0.00487)	(0.01651)	(0.01611)	(0.01963)
SUBJECT17	0.00555	0.01336	0.01088	0.00629	-0.00216	-0.01093	-0.01040	-0.01259
	(0.00846)	(0.02030)	(0.01655)	(0.00955)	(0.00333)	(0.01660)	(0.01581)	(0.01913)
SUBJECT18	-0.07838***	-0.18849***	-0.15358***	-0.08871***	0.03051***	0.15422***	0.14679***	0.17764***
	(0.01233)	(0.02482)	(0.02001)	(0.01198)	(0.00794)	(0.02062)	(0.01779)	(0.02197)
SUBJECT19	-0.01518*	-0.03651*	-0.02975*	-0.01718*	0.00591*	0.02987*	0.02843*	0.03441*
	(0.00855)	(0.02031)	(0.01647)	(0.00952)	(0.00345)	(0.01650)	(0.01583)	(0.01912)

SUBJECT20	-0.08777***	-0.21108***	-0.17198***	-0.09934***	0.03416***	0.17270***	0.16438***	0.19893***
	(0.01346)	(0.02677)	(0.02161)	(0.01305)	(0.00880)	(0.02241)	(0.01910)	(0.02357)
SUBJECT22	-0.00046	-0.00111	-0.00090	-0.00052	0.00018	0.00091	0.00086	0.00104
	(0.00491)	(0.01180)	(0.00961)	(0.00555)	(0.00191)	(0.00965)	(0.00919)	(0.01112)
SUBJECT23	-0.00371	-0.00893	-0.00728	-0.00420	0.00145	0.00731	0.00696	0.00842
	(0.01064)	(0.02558)	(0.02084)	(0.01202)	(0.00416)	(0.02091)	(0.01991)	(0.02410)
SUBJECT24	-0.03294***	-0.07922***	-0.06455***	-0.03728***	0.01282**	0.06481***	0.06169***	0.07466***
	(0.01160)	(0.02705)	(0.02201)	(0.01271)	(0.00536)	(0.02201)	(0.02071)	(0.02535)
SUBJECT25	-0.10219***	-0.24575***	-0.20023***	-0.11565***	0.03977***	0.20106***	0.19138***	0.23161***
	(0.01226)	(0.02049)	(0.01687)	(0.01114)	(0.00950)	(0.01871)	(0.01505)	(0.01378)
SUBJECT26	0.01355***	0.03259***	0.02655***	0.01534***	-0.00527**	-0.02666***	-0.02538***	-0.03071***
	(0.00464)	(0.01082)	(0.00873)	(0.00493)	(0.00211)	(0.00860)	(0.00834)	(0.01011)
SUBJECT27	0.04738***	0.11395***	0.09285***	0.05363***	-0.01844***	-0.09323***	-0.08874***	-0.10739***
	(0.00723)	(0.01351)	(0.01042)	(0.00731)	(0.00401)	(0.01058)	(0.01122)	(0.01286)
SUBJECT28	0.02030***	0.04883***	0.03978***	0.02298***	-0.00790***	-0.03995***	-0.03803***	-0.04602***
	(0.00667)	(0.01537)	(0.01236)	(0.00730)	(0.00279)	(0.01240)	(0.01212)	(0.01449)
Obs	2,583	2,583	2,583	2,583	2,583	2,583	2,583	2,583

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A2. Full version of Table 3

	Exam grade							
Variable	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
VkTimeExam	0.00001	0.00003	0.00003	0.00002	-0.00001	-0.00003	-0.00003	-0.00003
	(0.00038)	(0.00088)	(0.00075)	(0.00045)	(0.00014)	(0.00072)	(0.00072)	(0.00087)
VkTime	0.00000	0.00000	0.00000	0.00000	-0.00000	-0.00000	-0.00000	-0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Peer	-0.03869***	-0.08981***	-0.07719***	-0.04572***	0.01479***	0.07415***	0.07331***	0.08915***
	(0.00396)	(0.00563)	(0.00466)	(0.00359)	(0.00283)	(0.00410)	(0.00471)	(0.00476)
PeerVk	-0.00012***	-0.00028***	-0.00024***	-0.00014***	0.00005***	0.00023***	0.00023***	0.00028***
	(0.00004)	(0.00009)	(0.00008)	(0.00005)	(0.00002)	(0.00007)	(0.00007)	(0.00009)
Abilities	-0.00015*	-0.00035*	-0.00030*	-0.00018*	0.00006*	0.00029*	0.00028*	0.00035*
	(0.00008)	(0.00018)	(0.00015)	(0.00009)	(0.00003)	(0.00015)	(0.00015)	(0.00018)
GEN	0.00584***	0.01355***	0.01165***	0.00690***	-0.00223***	-0.01119***	-0.01106***	-0.01345***
	(0.00200)	(0.00447)	(0.00382)	(0.00230)	(0.00083)	(0.00367)	(0.00366)	(0.00442)
PAY	0.00195	0.00452	0.00389	0.00230	-0.00074	-0.00373	-0.00369	-0.00449
	(0.00470)	(0.01091)	(0.00938)	(0.00556)	(0.00180)	(0.00901)	(0.00891)	(0.01083)
SSIZE	0.00264	0.00612	0.00526	0.00311	-0.00101	-0.00505	-0.00499	-0.00607
	(0.00458)	(0.01063)	(0.00913)	(0.00541)	(0.00176)	(0.00877)	(0.00867)	(0.01055)
TERM2	0.00254	0.00590	0.00507	0.00300	-0.00097	-0.00487	-0.00482	-0.00586
	(0.00523)	(0.01213)	(0.01042)	(0.00619)	(0.00199)	(0.01002)	(0.00991)	(0.01204)
TERM3	0.01107	0.02569	0.02208	0.01308	-0.00423	-0.02121	-0.02097	-0.02550
	(0.00799)	(0.01843)	(0.01579)	(0.00936)	(0.00307)	(0.01514)	(0.01507)	(0.01828)
TERM4	-0.00781	-0.01813	-0.01558	-0.00923	0.00299	0.01497	0.01480	0.01799
	(0.00725)	(0.01677)	(0.01444)	(0.00852)	(0.00287)	(0.01384)	(0.01363)	(0.01663)
SUBJECT2	0.00834	0.01936	0.01664	0.00985	-0.00319	-0.01598	-0.01580	-0.01921
	(0.00731)	(0.01688)	(0.01451)	(0.00864)	(0.00282)	(0.01394)	(0.01381)	(0.01677)
SUBJECT3	-0.10345***	-0.24015***	-0.20641***	-0.12227***	0.03956***	0.19828***	0.19605***	0.23839***
	(0.01290)	(0.02331)	(0.01960)	(0.01275)	(0.00862)	(0.02011)	(0.01852)	(0.01826)
SUBJECT4	-0.02720***	-0.06315***	-0.05428***	-0.03215***	0.01040***	0.05214***	0.05155***	0.06268***
	(0.00795)	(0.01779)	(0.01518)	(0.00902)	(0.00364)	(0.01455)	(0.01418)	(0.01747)
SUBJECT5	0.02022***	0.04695***	0.04035***	0.02390***	-0.00773**	-0.03876***	-0.03833***	-0.04660***
	(0.00728)	(0.01643)	(0.01407)	(0.00846)	(0.00303)	(0.01352)	(0.01341)	(0.01627)
SUBJECT6	0.04815***	0.11177***	0.09607***	0.05691***	-0.01841***	-0.09229***	-0.09125***	-0.11096***
	(0.00824)	(0.01646)	(0.01425)	(0.00932)	(0.00419)	(0.01357)	(0.01377)	(0.01649)
SUBJECT7	0.04554***	0.10573***	0.09087***	0.05383***	-0.01741***	-0.08730***	-0.08631***	-0.10496***
	(0.00811)	(0.01652)	(0.01429)	(0.00926)	(0.00406)	(0.01358)	(0.01378)	(0.01654)
SUBJECT8	-0.06194***	-0.14379***	-0.12358***	-0.07321***	0.02368***	0.11872***	0.11738***	0.14273***
	(0.00942)	(0.01876)	(0.01585)	(0.00972)	(0.00571)	(0.01549)	(0.01406)	(0.01741)
SUBJECT9	0.01067	0.02476	0.02128	0.01261	-0.00408	-0.02044	-0.02021	-0.02458
	(0.01164)	(0.02694)	(0.02317)	(0.01374)	(0.00455)	(0.02226)	(0.02195)	(0.02673)
SUBJECT10	0.00771	0.01790	0.01539	0.00912	-0.00295	-0.01478	-0.01462	-0.01777
	(0.01241)	(0.02879)	(0.02476)	(0.01464)	(0.00481)	(0.02375)	(0.02347)	(0.02857)
SUBJECT11	-0.02632**	-0.06111**	-0.05252**	-0.03111**	0.01007**	0.05046**	0.04989**	0.06066**
	(0.01109)	(0.02530)	(0.02166)	(0.01278)	(0.00470)	(0.02061)	(0.02045)	(0.02503)
SUBJECT12	-0.01246	-0.02893	-0.02487	-0.01473	0.00477	0.02389	0.02362	0.02872
	(0.02551)	(0.05917)	(0.05084)	(0.03011)	(0.00978)	(0.04881)	(0.04831)	(0.05873)
SUBJECT13	-0.00389	-0.00904	-0.00777	-0.00460	0.00149	0.00746	0.00738	0.00897
	(0.00825)	(0.01913)	(0.01644)	(0.00975)	(0.00315)	(0.01580)	(0.01563)	(0.01899)
SUBJECT14	0.06362***	0.14769***	0.12694***	0.07520***	-0.02433***	-0.12194***	-0.12057***	-0.14661***
	(0.00913)	(0.01678)	(0.01497)	(0.01037)	(0.00506)	(0.01408)	(0.01452)	(0.01709)
SUBJECT15	-0.05549***	-0.12881***	-0.11071***	-0.06558***	0.02122***	0.10635***	0.10516***	0.12787***
	(0.00944)	(0.01949)	(0.01637)	(0.00957)	(0.00529)	(0.01518)	(0.01505)	(0.01871)
SUBJECT16	-0.03999***	-0.09284***	-0.07979***	-0.04727***	0.01529***	0.07665***	0.07579***	0.09216***
	(0.00860)	(0.01864)	(0.01574)	(0.00919)	(0.00426)	(0.01470)	(0.01483)	(0.01817)
SUBJECT17	0.00595	0.01382	0.01188	0.00704	-0.00228	-0.01141	-0.01128	-0.01372
	(0.00774)	(0.01794)	(0.01542)	(0.00917)	(0.00298)	(0.01482)	(0.01466)	(0.01782)
SUBJECT18	-0.07847***	-0.18215***	-0.15656***	-0.09275***	0.03000***	0.15040***	0.14870***	0.18082***
	(0.01139)	(0.02237)	(0.01878)	(0.01134)	(0.00706)	(0.01827)	(0.01658)	(0.02048)
SUBJECT19	-0.01228	-0.02851	-0.02451	-0.01452	0.00470	0.02354	0.02328	0.02830
	(0.00778)	(0.01792)	(0.01533)	(0.00905)	(0.00306)	(0.01469)	(0.01460)	(0.01774)
SUBJECT20	-0.08242***	-0.19134***	-0.16446***	-0.09742***	0.03152***	0.15798***	0.15620***	0.18994***
	(0.01212)	(0.02392)	(0.02014)	(0.01218)	(0.00746)	(0.01979)	(0.01769)	(0.02188)
SUBJECT22	0.00060	0.00140	0.00120	0.00071	-0.00023	-0.00115	-0.00114	-0.00139
	(0.00457)	(0.01060)	(0.00911)	(0.00540)	(0.00175)	(0.00875)	(0.00865)	(0.01052)
SUBJECT23	-0.00177	-0.00411	-0.00353	-0.00209	0.00068	0.00340	0.00336	0.00408

	(0.01039)	(0.02411)	(0.02072)	(0.01227)	(0.00397)	(0.01990)	(0.01969)	(0.02394)
SUBJECT24	-0.03163***	-0.07342***	-0.06311***	-0.03738***	0.01209**	0.06062***	0.05994***	0.07289***
	(0.01073)	(0.02428)	(0.02080)	(0.01232)	(0.00476)	(0.01991)	(0.01944)	(0.02395)
SUBJECT25	-0.09865***	-0.22900***	-0.19683***	-0.11660***	0.03772***	0.18908***	0.18695***	0.22733***
	(0.01113)	(0.01872)	(0.01574)	(0.01050)	(0.00810)	(0.01679)	(0.01363)	(0.01325)
SUBJECT26	0.00947**	0.02197**	0.01889**	0.01119**	-0.00362**	-0.01814**	-0.01794**	-0.02181**
	(0.00437)	(0.01001)	(0.00854)	(0.00500)	(0.00180)	(0.00814)	(0.00810)	(0.00987)
SUBJECT27	0.04092***	0.09498***	0.08164***	0.04836***	-0.01565***	-0.07843***	-0.07754***	-0.09429***
	(0.00618)	(0.01170)	(0.00966)	(0.00678)	(0.00313)	(0.00931)	(0.01003)	(0.01168)
SUBJECT28	0.02001***	0.04645***	0.03992***	0.02365***	-0.00765***	-0.03835***	-0.03792***	-0.04611***
	(0.00601)	(0.01339)	(0.01131)	(0.00691)	(0.00242)	(0.01087)	(0.01105)	(0.01327)
Obs	2,583	2,583	2,583	2,583	2,583	2,583	2,583	2,583

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3. GLLAMM estimation for panel ordinal Logit model

Variable	*Coef.*	*Std. Err.*	*z*	*P>z*
VkTimeExam	0.0001	0.0167	0.0100	0.9950
VkTime	-0.0001	0.0001	-0.8200	0.4120
Peer	0.0055	0.0034	1.6100	0.1080
PeerVk	1.8710*	0.0989	18.9200	0.0000
Abilities	0.0055*	0.0017	3.1600	0.0020
GEN	-0.2150**	0.0858	-2.5100	0.0120
PAY	-0.1002	0.2086	-0.4800	0.6310
SSIZE	-0.0916	0.2033	-0.4500	0.6520
SUBJECT2	-0.3729	0.3208	-1.1600	0.2450
SUBJECT3	4.5893*	0.3702	12.4000	0.0000
SUBJECT4	1.1365*	0.3358	3.3800	0.0010
SUBJECT5	-0.8976*	0.3106	-2.8900	0.0040
SUBJECT6	-2.1064*	0.3035	-6.9400	0.0000
SUBJECT7	-1.9673*	0.3055	-6.4400	0.0000
SUBJECT8	2.7375*	0.3246	8.4300	0.0000
SUBJECT10	-0.2915	0.5470	-0.5300	0.5940
SUBJECT11	1.2275*	0.4742	2.5900	0.0100
SUBJECT13	0.3011	0.3707	0.8100	0.4170
SUBJECT14	-2.7705*	0.3069	-9.0300	0.0000
SUBJECT15	1.6161*	0.3106	5.2000	0.0000
SUBJECT16	0.9268*	0.3064	3.0200	0.0020
SUBJECT17	-1.0989*	0.3097	-3.5500	0.0000
SUBJECT18	2.6373*	0.3463	7.6200	0.0000
SUBJECT19	-0.2998	0.3069	-0.9800	0.3290
SUBJECT20	2.7810*	0.3777	7.3600	0.0000
SUBJECT21	-0.8768**	0.3835	-2.2900	0.0220
SUBJECT22	-0.4963	0.3049	-1.6300	0.1040
SUBJECT23	-0.3365	0.5014	-0.6700	0.5020
SUBJECT24	0.9214***	0.5111	1.8000	0.0710
SUBJECT25	3.8636*	0.3501	11.0400	0.0000
SUBJECT26	-0.8753*	0.2887	-3.0300	0.0020
SUBJECT27	-2.2437*	0.3076	-7.2900	0.0000
SUBJECT28	-0.4477	0.2911	-1.5400	0.1240
SUBJECT29	-1.2265*	0.3028	-4.0500	0.0000
SUBJECT30	-0.3371	0.3183	-1.0600	0.2900
contant_cut_1	8.6151*	1.1258	7.6500	0.0000
contant_cut_2	10.5839*	1.1264	9.4000	0.0000
contant_cut_3	11.8421*	1.1303	10.4800	0.0000
contant_cut_4	13.1113*	1.1358	11.5400	0.0000
contant_cut_5	14.2000*	1.1408	12.4500	0.0000
contant_cut_6	15.8312*	1.1484	13.7900	0.0000
contant_cut_7	17.6593*	1.1562	15.2700	0.0000

number of level 1 units (students) = 2553
number of level 2 units (students per group observations) = 109
number of level 3 units (groups) = 5
*** p<0.01, ** p<0.05, * p<0.1

Table A4. Synergetic effect (average marginal effects)

	Exam grade							
Variable	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
SumSame	-0.00035***	-0.00082***	-0.00071***	-0.00042***	0.00013**	0.00068***	0.00067***	0.00081***
	(0.00013)	(0.00030)	(0.00026)	(0.00016)	(0.00005)	(0.00025)	(0.00025)	(0.00030)
VkTime	-0.00000**	-0.00001**	-0.00001**	-0.00000**	0.00000**	0.00001**	0.00001**	0.00001**
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Peer	-0.03856***	-0.08904***	-0.07700***	-0.04611***	0.01415***	0.07465***	0.07356***	0.08836***
	(0.00396)	(0.00559)	(0.00467)	(0.00361)	(0.00288)	(0.00415)	(0.00474)	(0.00474)
Abilities	-0.00015*	-0.00035*	-0.00030*	-0.00018*	0.00006*	0.00029*	0.00029*	0.00034*
	(0.00008)	(0.00018)	(0.00016)	(0.00009)	(0.00003)	(0.00015)	(0.00015)	(0.00018)
GEN	0.00543***	0.01254***	0.01084***	0.00649***	-0.00199**	-0.01051***	-0.01036***	-0.01244***
	(0.00201)	(0.00449)	(0.00385)	(0.00233)	(0.00081)	(0.00373)	(0.00371)	(0.00443)
PAY	0.00284	0.00655	0.00567	0.00339	-0.00104	-0.00549	-0.00541	-0.00650
	(0.00470)	(0.01084)	(0.00938)	(0.00563)	(0.00173)	(0.00910)	(0.00896)	(0.01076)
SSIZE	0.00363	0.00838	0.00724	0.00434	-0.00133	-0.00702	-0.00692	-0.00831
	(0.00460)	(0.01062)	(0.00916)	(0.00549)	(0.00171)	(0.00888)	(0.00876)	(0.01053)
TERM2	-0.00146	-0.00337	-0.00292	-0.00175	0.00054	0.00283	0.00279	0.00335
	(0.00505)	(0.01166)	(0.01009)	(0.00604)	(0.00187)	(0.00978)	(0.00963)	(0.01157)
TERM3	0.00913	0.02108	0.01823	0.01092	-0.00335	-0.01767	-0.01741	-0.02092
	(0.00803)	(0.01845)	(0.01590)	(0.00951)	(0.00296)	(0.01539)	(0.01525)	(0.01829)
TERM4	-0.00973	-0.02247	-0.01943	-0.01164	0.00357	0.01884	0.01856	0.02230
	(0.00730)	(0.01678)	(0.01455)	(0.00869)	(0.00282)	(0.01407)	(0.01381)	(0.01663)
SUBJECT2	0.00810	0.01870	0.01617	0.00968	-0.00297	-0.01568	-0.01545	-0.01856
	(0.00729)	(0.01675)	(0.01450)	(0.00873)	(0.00270)	(0.01405)	(0.01388)	(0.01664)
SUBJECT3	-0.10367***	-0.23939***	-0.20701***	-0.12398***	0.03804***	0.20069***	0.19776***	0.23756***
	(0.01293)	(0.02324)	(0.01957)	(0.01275)	(0.00873)	(0.02021)	(0.01861)	(0.01811)
SUBJECT4	-0.02623***	-0.06057***	-0.05238***	-0.03137***	0.00962***	0.05078***	0.05004***	0.06011***
	(0.00793)	(0.01769)	(0.01519)	(0.00911)	(0.00353)	(0.01471)	(0.01427)	(0.01738)
SUBJECT5	0.01918***	0.04428***	0.03829***	0.02293***	-0.00704**	-0.03712***	-0.03658***	-0.04395***
	(0.00718)	(0.01614)	(0.01393)	(0.00847)	(0.00288)	(0.01350)	(0.01336)	(0.01600)
SUBJECT6	0.04897***	0.11309***	0.09779***	0.05857***	-0.01797***	-0.09481***	-0.09342***	-0.11222***
	(0.00830)	(0.01648)	(0.01437)	(0.00951)	(0.00424)	(0.01380)	(0.01399)	(0.01651)
SUBJECT7	0.04526***	0.10452***	0.09038***	0.05413***	-0.01661***	-0.08762***	-0.08634***	-0.10372***
	(0.00807)	(0.01638)	(0.01429)	(0.00935)	(0.00401)	(0.01370)	(0.01389)	(0.01642)
SUBJECT8	-0.06035***	-0.13935***	-0.12050***	-0.07217***	0.02214***	0.11682***	0.11512***	0.13829***
	(0.00938)	(0.01872)	(0.01588)	(0.00975)	(0.00563)	(0.01567)	(0.01417)	(0.01739)
SUBJECT9	0.01061	0.02451	0.02119	0.01269	-0.00389	-0.02055	-0.02025	-0.02432
	(0.01162)	(0.02675)	(0.02315)	(0.01386)	(0.00436)	(0.02244)	(0.02205)	(0.02653)
SUBJECT10	0.00723	0.01669	0.01443	0.00864	-0.00265	-0.01399	-0.01379	-0.01656
	(0.01246)	(0.02875)	(0.02487)	(0.01486)	(0.00463)	(0.02407)	(0.02371)	(0.02851)
SUBJECT11	-0.02722**	-0.06286**	-0.05435**	-0.03255**	0.00999**	0.05270**	0.05193**	0.06238**
	(0.01114)	(0.02525)	(0.02175)	(0.01298)	(0.00460)	(0.02090)	(0.02065)	(0.02497)
SUBJECT12	-0.01304	-0.03011	-0.02603	-0.01559	0.00478	0.02524	0.02487	0.02988
	(0.02556)	(0.05897)	(0.05098)	(0.03053)	(0.00941)	(0.04940)	(0.04873)	(0.05851)
SUBJECT13	-0.00248	-0.00574	-0.00496	-0.00297	0.00091	0.00481	0.00474	0.00569
	(0.00824)	(0.01902)	(0.01644)	(0.00985)	(0.00302)	(0.01594)	(0.01571)	(0.01887)
SUBJECT14	0.06334***	0.14627***	0.12649***	0.07575***	-0.02324***	-0.12263***	-0.12083***	-0.14516***
	(0.00906)	(0.01656)	(0.01491)	(0.01040)	(0.00506)	(0.01409)	(0.01456)	(0.01689)
SUBJECT15	-0.05430***	-0.12539***	-0.10843***	-0.06494***	0.01992***	0.10512***	0.10358***	0.12443***
	(0.00944)	(0.01951)	(0.01644)	(0.00963)	(0.00525)	(0.01541)	(0.01515)	(0.01871)
SUBJECT16	-0.03880***	-0.08960***	-0.07748***	-0.04640***	0.01424***	0.07511***	0.07402***	0.08891***
	(0.00860)	(0.01861)	(0.01579)	(0.00925)	(0.00419)	(0.01489)	(0.01492)	(0.01812)
SUBJECT17	0.00490	0.01131	0.00978	0.00586	-0.00180	-0.00948	-0.00935	-0.01123
	(0.00773)	(0.01782)	(0.01542)	(0.00926)	(0.00284)	(0.01495)	(0.01474)	(0.01769)
SUBJECT18	-0.07754***	-0.17906***	-0.15484***	-0.09273***	0.02845***	0.15011***	0.14792***	0.17769***
	(0.01136)	(0.02227)	(0.01881)	(0.01141)	(0.00702)	(0.01845)	(0.01671)	(0.02039)
SUBJECT19	-0.01222	-0.02821	-0.02440	-0.01461	0.00448	0.02365	0.02331	0.02800
	(0.00780)	(0.01788)	(0.01539)	(0.00915)	(0.00297)	(0.01486)	(0.01472)	(0.01769)
SUBJECT20	-0.08274***	-0.19106***	-0.16521***	-0.09894***	0.03036***	0.16017***	0.15783***	0.18959***
	(0.01217)	(0.02389)	(0.02020)	(0.01230)	(0.00751)	(0.02000)	(0.01784)	(0.02183)
SUBJECT22	0.00342	0.00789	0.00682	0.00409	-0.00125	-0.00661	-0.00652	-0.00783
	(0.00451)	(0.01039)	(0.00898)	(0.00538)	(0.00166)	(0.00870)	(0.00859)	(0.01031)
SUBJECT23	-0.00099	-0.00229	-0.00198	-0.00119	0.00036	0.00192	0.00189	0.00228
	(0.01032)	(0.02383)	(0.02061)	(0.01234)	(0.00379)	(0.01998)	(0.01969)	(0.02365)
SUBJECT24	-0.02973***	-0.06865***	-0.05936***	-0.03555***	0.01091**	0.05755***	0.05671***	0.06812***

	(0.01062)	(0.02396)	(0.02068)	(0.01240)	(0.00452)	(0.02001)	(0.01947)	(0.02365)
SUBJECT25	-0.09625***	-0.22225***	-0.19219***	-0.11510***	0.03531***	0.18632***	0.18360***	0.22055***
	(0.01094)	(0.01840)	(0.01556)	(0.01036)	(0.00802)	(0.01671)	(0.01360)	(0.01293)
SUBJECT26	0.01395***	0.03221***	0.02785***	0.01668***	-0.00512***	-0.02700***	-0.02661***	-0.03196***
	(0.00426)	(0.00954)	(0.00816)	(0.00482)	(0.00185)	(0.00778)	(0.00779)	(0.00937)
SUBJECT27	0.04384***	0.10123***	0.08753***	0.05242***	-0.01608***	-0.08486***	-0.08362***	-0.10045***
	(0.00631)	(0.01164)	(0.00951)	(0.00683)	(0.00330)	(0.00923)	(0.01010)	(0.01155)
SUBJECT28	0.01995***	0.04608***	0.03984***	0.02386***	-0.00732***	-0.03863***	-0.03806***	-0.04572***
	(0.00602)	(0.01333)	(0.01133)	(0.00697)	(0.00237)	(0.01098)	(0.01112)	(0.01320)
Observations	2,583	2,583	2,583	2,583	2,583	2,583	2,583	2,583

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1