Do the grades of early student submitters rank highly? : The relationship between assignment submission timing and academic performance

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課題提出のタイミングと学業成績の関係 ～早期提出者は成績上位になるか～

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1. Purpose

In this document report, we provide the results of investigating the relationship between the timing of students' submission of assignments and their related academic performance. "People with quick responses can work in the business world" is a commonly held understanding for many professionals, but it has not been proven. In parallel, is it possible to ask in the field of education whether "students who submit assignments early have high academic ability?" To this end, we investigated the relationship between the timing of students' submission of assignments and their academic ability. We report here whether it is meaningful to teach early assignment submission as a condition for fostering autonomous and active behavior in students.

2. Survey method

We collected data on the timing of submitted assignments as requested during the author's English lecture and the timing of sending chat quiz answers presented during online lectures using Zoom. We quantified them and investigated the correlation between the timing and the students' results of the unified English ability survey at their time of admission and their academic performance in lectures, that are final grades (Fnl). The Oxford University Press Placement Test (QPT) was employed for this report. Although the assignments were submitted weekly, we used two randomly selected assignments, Assignment 1 (Asm 1) and Assignment 2 (Asm2). The submitted assignment included lecture preparation notebooks (the students sent notebook images or photos by e−mail). Despite chat quizzes being administered four to five times per class, we randomly selected and used three quizzes, Chat quiz 1 (Cq1), Chat quiz 2 (Cq 2) and Chat quiz 3 (Cq3). The questions measured students' comprehension of key points taught in each class.

3. Quantification of submission timing

To quantify the submission timing of preparation note assignments, they were ranked in the order of submission. Similarly, for chat quizzes, the order was determined from the earliest transmission. Those students who did not submit assignments were ranked after the final submitter. Students who did not know the answers for the chat quiz were asked to send the response "I don't know" instead of answers. For the two types of English proficiency tests, a correlation analysis was performed using the obtained scores.

4. Result

The results of the correlation analysis are as follows : First, a correlation was observed between the QPT scores and academic performance (Fnl) as indicated in Table 1 below. Table 2 shows the associated Heat Map Legend depicting the relationship between the two variables. The results confirmed that students can improve their academic performance depending on their efforts at the university, regardless of their previous English proficiency. The QPT scores also correlated with the chat quiz and strongly correlated with the third chat quiz (Cq3).

Table 1. *Correlations of QPT, final grades, chat quizzes and assignments*

	QPT	Fnl	Cq1	Cq2	Cq3	Asm1	Asm2
QPT	1.0000	0.3224	−0.0983	0.0182	−0.3503	−0.1128	−0.1892
Fnl	0.3224	1.0000	−0.0941	−0.1338	−0.2639	−0.2512	−0.5732
Cq1	−0.0983	−0.0941	1.0000	0.0707	0.0988	0.1745	0.1717
Cq2	0.0182	−0.1338	0.0707	1.0000	0.4252	−0.1029	−0.0418
Cq3	−0.3503	−0.2639	0.0988	0.4252	1.0000	−0.0922	0.0565
Asm1	−0.1128	−0.2512	0.1745	−0.1029	−0.0922	1.0000	0.4457
Asm2	−0.1892	−0.5732	0.1717	−0.0418	0.0565	0.4457	1.0000

Table 2. *Heatmap legend of Table 1*

	1.00		−1.00～−0.75
	0.75～1.00		−0.75～−0.50
	0.50～0.75		−0.50～−0.25
	0.25～0.50		−0.25～0.00
	0.00～0.25		

There was a strong correlation between Assignment 1 (Asm1) and Assignment 2 (Asm2). This indicated that the timing of students submitting assignments was almost constant. There was also a strong correlation between Assignment 2 (Asm2) and academic performance (Fnl). From these facts, it could be deduced that students who send assignments earlier have higher academic performance.

There was also a strong correlation between chat quizzes 2 (Cq2) and 3 (Cq3). This implied that stu-

dents who sent chat quiz answers quickly always submitted swiftly. Conversely, students with late transmission timing were always late in transmission.

Figure 1 below is an undepicted graph based on a partial correlation matrix. This undirected graph makes it possible to visually understand the relationships between variables that have a significant partial correlation, which is statistically linked and illustrated from Table 1 to Table 3.

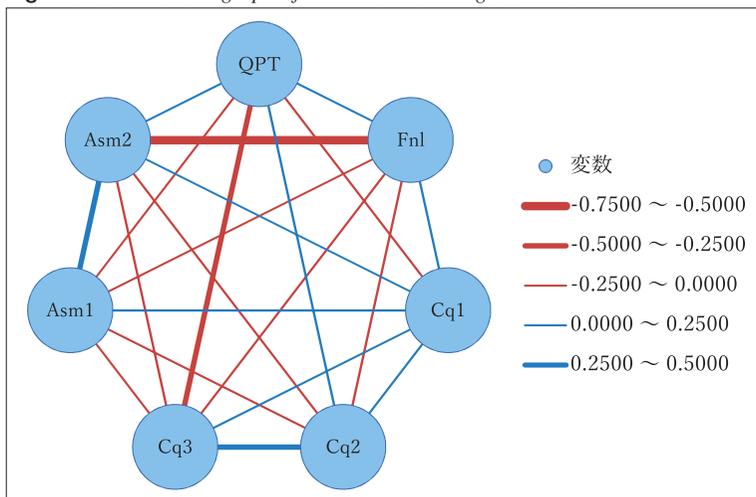**Figure 1.** *Undirected graph of correlations among 5 variables*

Table 3. *Uncorrelated test of the population correlation coefficient*

	QPT	Fnl	Cq1	Cq2	Cq3	Asm1	Asm2
QPT	–	0.0128	0.4590	0.8911	0.0065	0.3950	0.1512
Fnl	*	–	0.4784	0.3125	0.0434	0.0550	P < 0.001
Cq1			–	0.5946	0.4567	0.1863	0.1936
Cq2				–	P < 0.001	0.4380	0.7530
Cq3	**	*		**	–	0.4872	0.6708
Asm1						–	P < 0.001
Asm2		**				**	–

notes : upper triangle : P value / lower triangle : *, P <0.05 **, P <0.01

5. Consideration

Since the correlation was different from the causal relationship, it did not imply that "the earlier the submission timing is, the higher the academic performance will be" based on the results presented. However, one of the purposes of first−year education is to develop autonomous and active learners. Therefore, it could be said that instructing students to respond promptly to all requests from the university, including assignments, indirectly improves their academic performance.