"Assessing Active Learning in Online Comparative Politics Classes"

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Abstract

Studies on classroom behavior and learning outcomes have demonstrated that active learning leads to better learner outcomes. However, how do these insights based on the face-to-face classroom transfer to the virtual classroom? Existing studies have primarily studied the effects of online postings in asynchronous discussion forums on the authors of the postings, while the effect on the recipients – the students reading the postings – has been largely neglected from analyses. We set out to fill this gap in our understanding of the effects of online discussions on learner outcomes by analyzing the effect of the number of postings read by students on course performance. We first analyze the discussions of two online courses in-depth by looking at both the quantity and quality of postings made as well as the number of postings read by each student, controlling or other factors. We then test the main finding against a larger dataset of 279 students from eight additional classes, controlling for GPA, major, class standing, race, gender, and instructor. Overall, our results suggest that postings read is significantly correlated with course performance. We conclude that discussion have an important place in online classes.

"Learning from Peers: Assessing the Value of Discussions in Online Classes"

I. Introduction

Discussion, one way in which students can actively engage in the learning process, has long been heralded as a teaching method that results in improved learner outcomes and higher-order thinking skills. These relationships have been demonstrated for "traditional" classrooms, where students and professors engage in face-to-face conversations. However, conditions sometimes make it impractical or impossible to engage all students in meaningful discussion within the confines of a traditional classroom. The large number of students in a classroom may make it difficult to engage everyone in a meaningful discussion. Also, some students are "quiet" and hesitate to participate. Or perhaps the learning environment has shifted to an online format. Here, we are particularly interested in the online teaching format. How well do the findings on the positive effects of classroom discussion translate to the online environment? In order to answer this question, we first review the literature on the role of online discussion as an active learning strategy. We then design a multi-dimensional measure of online discussion participation and assess its effects on learner outcomes for two online courses. Finally, we test our main results against a larger dataset of eight classes with 279 students. Overall, we find that students' participation in online discussions has a positive effect on learner outcomes, and that students with a lower GPA especially benefit from online discussions.

II. Discussions as an Active Learning Strategy in Online Classes

Studies on classroom behavior and learning outcomes have demonstrated that active learning leads to better learner outcomes. When students are actively engaged in the learning process, they will learn more than if they passively memorize information. Students' active involvement in the learning process has been related to analysis, application, and other higher-order thinking skills (see Bloom 1956; Hativa 2000). Discussions are one such active learning strategy, and numerous studies have found student engagement in classroom discussions to be beneficial to students' learning outcome (e.g. Bender 2003; Bligh 2000). However, how do these insights based on the face-to-face classroom transfer to different learning contexts, such as the virtual classroom?

Teaching and learning online has become commonplace in American higher education. Several studies have assessed whether online instruction "works," that is, whether students benefit from taking either entire courses online or enroll in courses that replace some of the face-to-face class time with online instruction and assignments. Most of these studies conclude that students learn as well, if not better, when technology is added or replaces traditional instruction (e.g. Krentler and Willis-Flurry 2005; Botsch and Botsch 2001; Wilson, Pollock, and Hamann 2006; Wilson, Pollock, and Hamann 2007). We are primarily interested in understanding the effects of incorporating discussions into online courses.

Asynchronous discussion boards constitute an integral part of online instruction in many classes.[1] Students can post discussion comments, or reply to others, at their own time, which is different from the online chat, where students are online at the same time

[1] Schrire (2006: 50) comments that these discussions constitute "the principal interactive component in distance learning."

and can respond immediately to each other. Given the popularity of asynchronous discussions, several studies have scrutinized the effect of online discussion boards and have established the importance of online asynchronous discussion groups as part of collaborative learning in the virtual classroom. Numerous studies emphasize the crucial role interaction plays in the learning process in general and in the online environment in particular (e.g. see Garrison and Anderson 2003; Weinberger and Fischer 2005; Bryant 2005; Webb et al. 2004). Similarly, it is widely agreed that "collaboration can foster learning" (De Wever et al 2006:7; see also Lazonder, Wilhelm, and Ootes 2003; Bender 2003; Davis and Hillman Murrell 1993; Ellis et al. 2004). Schrire (2006:50) states that asynchronous online discussions offers "opportunities for collaborative learning…that can be characterized as dialogic in nature" and points to the importance of discourse in the learning process. Other studies have also pointed to the importance on online discussions in the learning process and the potential of online discussions to promote "deep learning" (e.g. Du, Havard, and Li 2005).

The analysis of online postings is facilitated by online instructional software, which creates and stores written records of students' contributions that lend themselves to content analysis and allows for an analysis of interaction patterns. Existing studies have developed various methodologies for analyzing online discussions (see De Wever et al. 2006 for a critical overview). However, it has also been noted that it is very difficult to link online discussion postings to cognitive gains, that is, to differentiate between behavioral aspects of discussion participation and the cognitive dimension: Do students' postings really represent their cognitive processes? For example, in her analysis of asynchronous discussion groups, Schrire (2006:66) concludes that "As far as

operationalization of cognition and related instrumentation were concerned, no single theory, definition or instrumentation satisfactorily reflected the complexity of this variable." Many studies of collaborative asynchronous behavior implicitly assume that postings are valid indicators of learning behavior. Weinberger and Fischer (2006:72; see also Chi 1997) explain with respect to online discussion boards, "The rationale for analyzing the discourse is that in this kind of data, cognitive processes of learning are being represented to a certain degree." While written postings can certainly be one indicator of learning, relying solely on the message students post leaves out another significant component of any collaborative context: reading, equivalent to listening in face-to-face classes. This omission of the effects of discussion *in the recipient* rather than *in the author* is interesting given that some studies have pointed to the fact that it is not just the author of the postings who benefits in terms of cognitive gains but also the group that is reading the postings (see Schrire 2006:54; Lazonder, Wilhelm, and Ootes 2003). However, these studies do not systematically explore the effects of discussions on the readers rather than the authors of postings.

We aim to make a contribution to the literature that furthers our understanding of "the relationship between the interactive, cognitive and discourse dimensions of learning in asynchronous computer conferencing" (Schrire 2006:51) by focusing on the effects of a generally neglected factor in discourse analysis of online discussion boards, namely reading. Our research design is divided into two main steps. First, we analyze the discussions of two online courses in-depth, looking at both the quantity and quality of postings as well as the number of postings read by each student, and controlling for several other factors. Second, we test the main findings of this in-depth analysis against a

larger number of students. We use data from eight additional classes and a total of 279 students to see whether the relationships we find in the smaller dataset hold when tested against a larger number of cases.

III. The Effects of Online Discussion Participation on Course Grade: A Multi-Dimensional Measurement

1. Research Design and Measurement

We selected two upper-level comparative politics courses. Even though the courses were taught by two different instructors, the courses were designed in similar ways. Furthermore, the discussion assignments were similar in structure. Both courses were organized around learning modules, each of which generally contained several activities, such as a short quiz on the assigned readings, an online discussion guided by discussion questions provided by the instructor, and a brief essay on a question specified in the module and generally aimed at assessing the students' overall comprehension of the material covered in the module. Both classes were also divided into discussion groups of approximately 10 students to create a seminar-like learning community in the online classes (enrollment for both classes together was 66 students). For the discussion assignments, a minimum number of meaningful and substantive discussion postings was required for students to receive full credit (no credit was given for comments such as "I don't care", "I don't think so", and other non-substantial postings). The students were not required to respond to others' postings.

In order to measure discussion participation in the online environment, we identified three distinct components of online discussions: number of direct statements,

number of in-depth statements, and number of postings read.[2] These measures are broadly comparable to different dimensions of discussion in face-to-face classes: The number of direct statements is equivalent to students in a traditional classroom responding directly to what another student had said previously; the number of in-depth statements reflects the "quality" of discussion contributions, much like in a face-to-face class; and the number of postings read resembles students' listening to what other students say.

We measure these components of online discussions in the following way: First, to analyze the quantity, quality, and interactivity of students' postings, we slightly modified a coding scheme developed by Henri (1992), a "landmark study" for content analysis in online discussions (Schrire 2006:51). We divided each posting into separate statements of meaning. We then counted how many of the statements were in direct response to other students' postings ("direct" postings) or posted statements that did relate only indirectly or not at all to others' postings. We then also coded how many statements were "in-depth", that is, added new ideas or evidence to the discussion (see Appendix for coding protocol). Second, the instructional technology software supported by our university and widely used across campus, WebCT, allowed us to measure the number of posting read as the program identifies how many postings students have opened. We assume that students will read most of the postings they open. To measure the dependent variable, learner outcomes, we used course grade as an indicator. While course grade is admittedly a somewhat crude indicator of learner outcomes and is likely to reflect knowledge better than learning, it has been used in other studies, e.g. Krentler

[2] Webb et al. (2004) use the number of times a student accessed a discussion board as an indicator of participation. Our measure, postings read, is more precise since the number of times a discussion board is accessed provides no information about how many postings a student read.

and Willis-Flurry (2005). It is also a useful indicator of overall student performance because we are here interested in how students do overall in the course rather than a particular aspect of learner outcomes. In other words, we wanted to know whether online discussion participation benefits students in reaching the overall course goals reflected in the course grade. Furthermore, this measure is useful because it is independent of our measure of active learning as neither direct responses nor in-depth comments were required for credit, and no required number of "postings read" was specified in the assignments. Students are often unaware that the instructors are able to monitor the frequency with which they read other students' postings.

2. Discussion Behavior and Course Performance

Based on these measures, we constructed an index of active learning by standardizing and summing each element: number of postings read, number of direct statements, and number of in-depth statements. The summative scale was then standardized (mean = 0, standard deviation = 1).[3] Figure 1 shows the distribution of our sample of 66 students along this scale. The scale has substantial variation, from very low (-1.35) to high scale scores (3.26). A small group of students were extraordinary active, producing a pronounced positive skew. Is it only this group that is likely to realize enhanced learning outcomes? What is the relationship between active learning and student attributes and course outcomes?

[Figure 1 about here]

[3] See Wilson, Pollock, and Hamann (2007) for a somewhat differently compiled index of discussion participation.

Table 1 reports zero-order correlations between the active learning scale (and each of its elements), student gender, prior term GPA, and course grade. Unsurprisingly, the scale has strong correlations with its constituents. Yet the inter-correlations of postings read, direct statements, and in-depth statements are only modestly positive. This suggests that each component of active learning may best be analyzed separately.[4] From a substantive standpoint, too, Table 1 reveals that the elements of active learning relate differently to important student attributes. For example, there are no emergent gender differences in the tendency to make direct or in-depth statements, but women are significantly more likely than men to read online postings. And although students' academic histories bear no significant relationships with their discussion group behaviors, certain components of active learning—again, particularly the number of postings read—show encouraging relationships with course performance. Indeed, the correlation between course grade and reading, at .333, rivals the relationship between course grade and the *overall* scale, at .351. But, not surprisingly, prior term GPA is the strongest correlate of course performance. How does active learning fare as a predictor of learning outcomes, controlling for the potent effect of prior academic achievement overall?

[Table 1 about here]

Table 2 presents results from a regression analysis, using each measure of active learning to predict course grade, controlling for prior term GPA. We also control for total number of statements posted by each student, which may be seen as the volume or "loudness" of online behavior. (To enhance interpretation, each active learning variable is in actual units of measure. For example, the coefficient on posting read shows the

[4] Alpha, equal to .46 for the three active learning items, also supports this approach.

marginal effect of reading one posting.) The effect of GPA is clearly evident. Each unit increase in GPA (equal to a letter grade) translates into a 9.5-point increase in course average, also equivalent to a letter grade. Thus, students with better academic records did better in the courses under study here. But note that, controlling for this substantial effect, postings read retains a strong relationship with course performance. For every 100 postings read, course grade increases, on average, by nearly 3 points, or about a third of a letter grade. Student reading ranged widely, from 50 postings to over 500 postings, with a mean of 255. Thus, all else being equal, a student who read 250 posts gained 7 points, practically three-quarters of a course letter grade.

[Table 2 about here]

In sum, the analysis of online reading behavior so far has provided three major insights. First, GPA, as a measure of "exogenous" resources—skills and experience that students bring with them to the course—provides a great deal of predictive leverage on course grade. Second, reading, as a measure of "endogenous" resources—cognitive engagement with the course material and with fellow students— has an independent effect on grade, controlling for GPA. And third, previous research (Wilson, Pollock, Hamann 2007) has demonstrated that the effect of reading on grade is more pronounced for low-GPA students than for high-GPA students. As GPA goes up, the "reading effect" diminishes.

IV. Testing the Effect of Reading Online Postings

The results of the in-depth study of discussion participation including the quality and quantity of postings as well as the number of postings read are powerful. However, the results are based on a small number of students since we analyzed just two classes. How well do the results concerning the effects of reading hold up in a larger dataset? To test the robustness of our main finding – the fact that reading online postings is a significant predictor of achieving course goals – we extended the study to an additional eight online classes enrolling a total of 279 students. All courses were online, upper-level comparative politics courses taught during Spring 2003, Summer 2004, Summer 2005, and Summer 2006. These courses were taught by the same two instructors who taught the two courses analyzed above.

All three of the effects of online reading are confirmed in the larger dataset (see Table 3). For low readers and high readers alike, GPA strongly shapes course grade. For low readers, mean grade increases by 18 points, from 62.6 (a low D) to 80.6 (a low B). For high readers, we see the same if somewhat weaker pattern—about a 14-point gradient—from 78.1 (a high C) to 91.8 (a low A). This larger dataset makes it clear, too, that the two sets of resources are related. Higher-GPA students are more likely to read online postings than are lower-GPA students. Students in the lowest two GPA quintiles averaged about 140 postings read, compared with over 200 postings for students in the highest two quintiles. So resources cumulate as GPA goes up, resulting in predictable effects on course performance. Even so, reading does have an independent effect on course grade. At all values of GPA, high readers do better than low readers. Moreover, this effect is greater for students who bring fewer resources to the course setting. For the

bottom three quintiles—most of these students have less than a B average—the reading effect ranges from about 16 to 22 points, or from a grade and a half to two full letter grades. For the highest two quintiles, however, the payoff, though still noteworthy (about 11 points), is less substantial. Thus, although less resourceful students also are less likely to take advantage of the reading effect, those who read do indeed realize salutary compensating effects. For example, high readers in the lowest quintile (who's midpoint GPA is a less than lustrous 2.3), did just about as well in the course (mean grade, 78.1) as low readers in the highest quintile (mean grade, 80.6). As important as GPA is, cognitive engagement clearly enhances student outcomes.

[Table 3 about here]

These data, which are generally in accord with results we obtained from a much smaller data set (Wilson, Pollock, Hamann 2007), are highly suggestive. But they are not definitive. Naturally, it could be that reading behavior is structured by other student characteristics, attributes unaccounted for in Table 1. Perhaps high readers are more likely than low readers to be political science majors and thus are more engaged by the course material from the outset. Or maybe maturation plays a role, with college seniors being over-represented among the ranks of the readers. Other factors, such as race or gender, might also be related to GPA and to the propensity to engage course material. To vanquish such spurious possibilities—and to examine the controlled effect of reading on course performance—we turn to a more complete analysis.

We modeled course grade as a function of GPA, number of postings read, and a set of background attributes, measured as dummies: political science major, senior class

standing, gender (female), race (white), and Hispanic ethnicity. To account for possible differences in grading protocols, we included a dummy variable that distinguishes between the two instructors who taught the courses in our study. In order to test for the diminishing effect of reading as GPA increases, we interacted the reading variable with a set of four GPA dummies, one for each quintile, quintile 2 through quintile 5. (Quintile 1 is the excluded category.) Table 4 displays the results.

[Table 4 about here]

Several of the background attributes do substantial explanatory work. Controlling for GPA and postings read, class standing and race were significant, with seniors, whites, and Hispanic students earning significantly higher course grades, on average. The instructor dummy also picked up variance. Neither gender nor major of the student (dummy for Political Science major), however, were statistically significant. Yet despite these effects, our two attributes of interest, GPA and reading behavior, testify clearly here. Each increment in GPA boosts course grade by more that a half-letter, on average. And, obviously, as reading goes up, so does student performance. But notice that the largest reading effect is confined to students who entered the course with the lowest GPAs. When we switch GPA quintile to zero, the code for the lowest GPAs (which also switches off all the GPA-posts read interaction terms), each 100 postings read returns an 11-point increase—an entire letter grade. This effect is only slightly reduced for the next-highest quintile (about a 3-point, statistically insignificant drop), but picks up negative speed as GPA increases, culminating in a reduction of only 6 points among students with the highest GPAs.

V. Conclusion

Our assessment of the effects of students' participation in online discussions yields four major results. First, in tune with much of the pedagogical literature, our study suggests that active learning can take place in any classroom, including the virtual one. Furthermore, irrespective of the instructional modality, students can benefit from active learning, and specifically, discussions. Our findings refute the fears that online teaching and learning turns students into passive and isolated learners that have to spend hours reading lecture notes on the screen or watching streamed videos of professors delivering lectures in traditional classrooms. Instead, our results show that it is beneficial to structure online courses in such a way that students are encouraged to participate actively in the classroom through discussions.

Second, online courses can provide a useful building block in assessment. Online course software facilitates the assessment of online courses in Political Science. The example provided here refers to assessing the overall benefits of active learning on course grades as a measure of course objectives reached. Thus, if the question is how to engage students in the material, discussions are one such tool. Yet, most online course software packages can also be used to assess other aspects of courses taught over the Internet. For example, auto-graded quizzes provide evaluations for each question, thus making it easy for instructors to assess which concepts students have successfully mastered. Discussions are all recorded in writing, which allows the instructor to take samples of discussions that could be analyzed for writing skills, mastery of the substantive material, or correct referencing skills. The same is true for essays or papers delivered online. In other words,

online courses allow for the assessment of student learner outcomes, but they also facilitate the assessment of student learning behavior.

Third, this study also raises interesting questions concerning what it is about online discussions that enhances student learner outcomes. Our data indicate that it is the participation aspect, especially the reading component, that drives performance in the course. Number of postings read was a more powerful predictor of course grade than either the quantity of postings (number of statements) or the quality of postings (in-depth or surface). Finally, postings read was also a more powerful predictor than whether students engaged in an actual dialogue with their peers rather than posting monologues. Our findings resonate to some extent with the findings of Webb et al. (2004:99), who conclude that "Participation in e-learning dialogue, whether active or passive, was positively associated with learning outcomes."[5] Thus, it might be of interest for further studies to include the "reading" aspect of online discussions more systematically.

Finally, our study makes a contribution to questions of measurement concerning the assessment of online courses. Methodologically, it points to some potential problems in analyzing discussion threads as indicators of cognitive gain or knowledge. Analyses of asynchronous discussions generally assume that students' postings reflect their cognitive processes and represent their knowledge. This assumption, however, might be faulty for some students. There are many reasons why students might not post "what they really think." Much like discussion in a face-to-face classroom might give more insights on student behavior rather than student knowledge and cognitive processes (we only know what students think or know to the extent that they are willing and able to express these

[5] Their results differ somewhat from ours, though, because the authors (2004:99) conclude that a combination of posting and reading is associated with better results, while our study finds that reading influences course grade more than posting.

thoughts and knowledge), similar limitations might apply in online discussions. Our findings suggest, for example, that the number of high-quality statements ("in-depth") is not a good predictor of course grade when controlled for GPA. This might seem counterintuitive, but becomes less so as we focus on discussion postings as a social behavior rather than an accurate reflection of students' cognitive processes. It is thus important to construct indicators and measurements of online learning that separate cognitive aspects from behavioral ones. Regardless, however, our study has confirmed that student-to-student interaction in online courses benefits student learning and should thus be encouraged through course design.

Figure 1. The Distribution of Active Learners, Standardized Scale

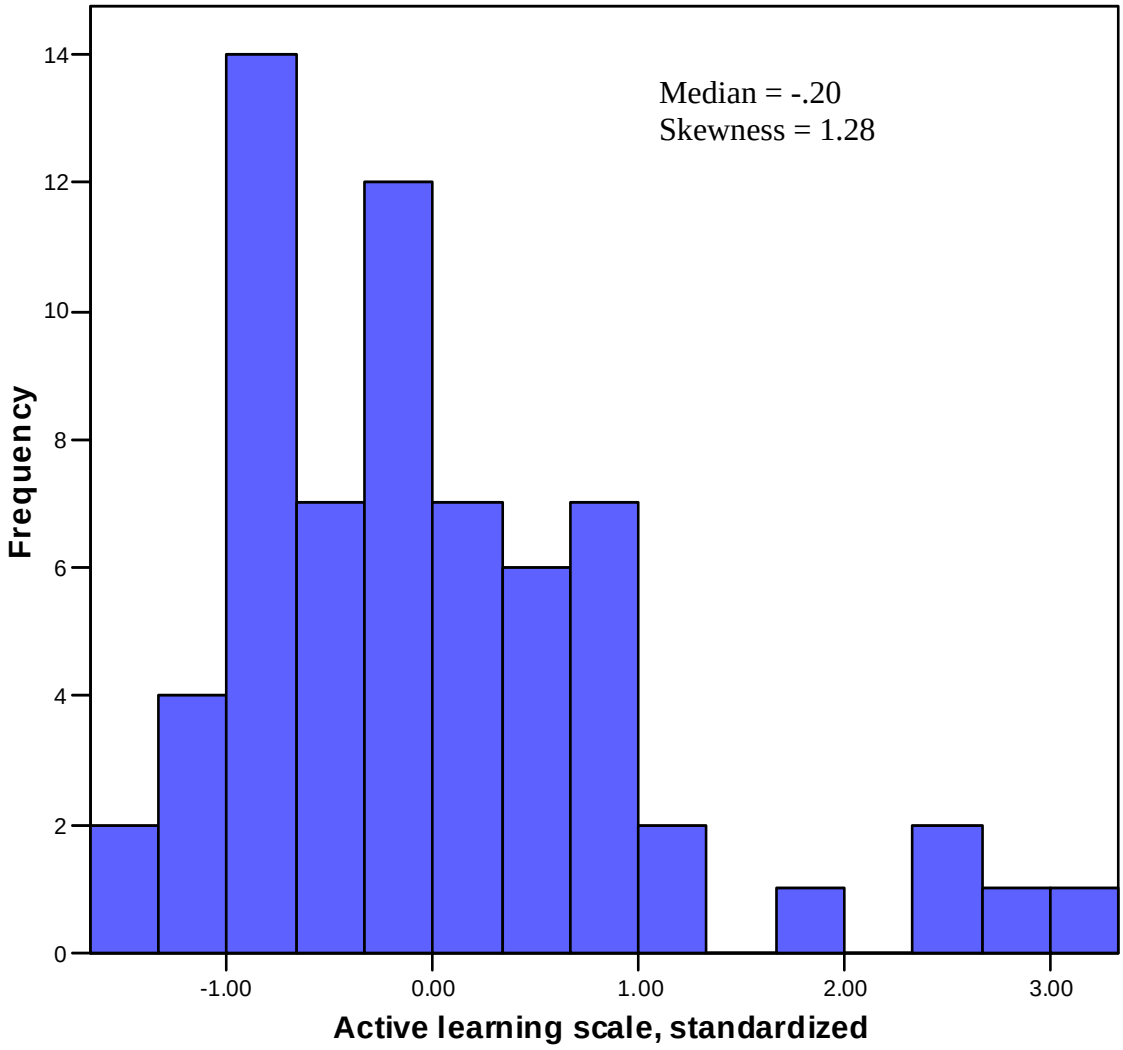

Table 1. Zero-order correlations between Active Learning, Gender, GPA, and Course grade

	Postings read	Direct statements	In-depth statements	Active learning scale	Female	Prior term GPA
Direct statements	.214					
In-depth statements	.204	.247*				
Active learning scale	.679**	.703**	.698**			
Female	.339**	.017	.017	.178		
Prior term GPA	-.078	.161	.242	.138	-.127	
Course grade	.333**	.168	.250*	.351**	-.062	.475**

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Note: N=66 for all correlations.

Table 2. Predicting Course Grade from GPA and Three Measures of Active Learning: Regression Coefficients and Statistics

Parameter	Coefficient	Standard error	t-ratio	Significance
Constant	47.639			
Prior term GPA	9.540**	2.175	4.386	.000
Postings read	.028**	.009	3.165	.002
Direct statements	.011	.065	.168	.867
In-depth statements	-.060	.232	-.259	.797
Total statements	.028	.057	.486	.629

R-square = .350. N = 66.

Table 3. Average Course Grade, by GPA and Reading Behavior[a]

GPA Quintile[b]	Mean grade, Low readers (N)	Mean grade, High readers (N)	Mean number posts read (N)
Lowest[c]	62.6 36	78.1 20	137.7 56
2	63.8 38	85.6 18	142.0 56
3	69.3 25	85.3 31	179.2 56
4	80.6 22	91.3 34	212.6 56
Highest	80.6 19	91.8 36	214.8 55
Total	69.4 140	87.4 139	177.1 279

[a]Table entries are mean course grades by GPA quintiles for students reading below the median number of postings ("Low readers") and for students reading above the median number of postings ("High readers"). Median is equal to 160. Mean number of postings read is also displayed for each GPA quintile.

[b]Quintile midpoints (ranges): lowest quintile, 2.32 (1.84-2.52); quintile 2, 2.78 (2.53-2.89); quintile 3, 2.99 (2.90-3.18); quintile 4, 3.30 (3.19-3.49); highest quintile, 3.69 (3.50-4.00). Mean GPA for all students, 3.01.

[c]Row totals, mean grade (N): lowest quintile, 68.1 (56); quintile 2, 70.8 (56); quintile 3, 78.1 (56); quintile 4, 87.1 (56); highest quintile, 87.9 (55); all, 78.4 (279).

Table 4. Regressing Course Grade on GPA, Posts Read, with Interaction Effects and Background Controls

	Coefficient	Standard error	t-ratio	prob>t
GPA quintile	7.00*	1.45	4.83	.00
Posts read	11.03*	2.03	5.44	.00
GPA quintile 2*Posts read	-2.96	2.09	-1.41	.16
GPA quintile 3*Posts read	-4.62*	2.24	-2.06	.04
GPA quintile 4*Posts read	-5.76*	2.46	-2.34	.02
GPA quintile 5*Posts read	-6.24*	2.88	-2.16	.03
Political science major	2.03	2.26	.90	.37
Senior	7.01*	2.29	3.06	.00
Female	2.05	2.40	.86	.39
White	7.44*	2.98	2.50	.01
Hispanic	9.52*	3.91	2.44	.02
Instructor	6.67*	2.39	2.79	.01
Constant	36.09			
Adjusted R^2	.30			
Number of cases	279			

Note: Dependent variable is course grade. GPA quintile is scaled 0 (lowest) to 4 (highest). Posts read is expressed in 100s (e.g., 1=100 posts read).
*Statistically significant (p<=.05).

Appendix

Coding Protocol for Online Discussions

Statements	Code	Definition	Examples/ Indicators	
Social statement	7	Statement or part of statement not related to formal subj content	"I'm feeling good today" self-introduction verbal support	
Meta-cognitive knowledge	8	Comparing oneself to another Being aware of self as agent	"As a black male, I …"	
Meta-cognitive skill	9	Verification or evaluation of one's own skills or learning	"I learned a lot about parliamentary systems from the chapter"	
Interactive statements:				
Direct, 1 Indirect, 2 Independent, 3	Cognitive , 1		Surface, 1	Proposing solutions or opinions w/o explanation or evidence
			In-depth, 2	Suggesting hypotheses Linking facts with ideas, explanation, or evidence
	Evaluative, 2		Surface, 1	Stating that one dis/agrees without explanation
			In-depth, 2	Justifying dis/agreement, proposing solutions, using metaphors

Note: These coding guidelines are based on Henri (1992).

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