Messages that foster a sense of belonging improve learning and satisfaction; an experiment in an online environment

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Abstract

The literature in pedagogy has shown that having a sense of belonging affects learning (Murphy et al., 2020; Walton and Cohen, 2011). The effect is stronger on minority groups (Brady et al., 2020). Like engagement, belonging can be fostered through learner-to-learner, learner-to-content, or learner-to- instructor interactions. According to Martin and Bolliger (2018) the most critical interaction for belonging is that between the professor and the student.

This paper shows the result of a communication experiment in an online environment. For six consecutive terms (N=144), the instructor taught Introduction to Statistics using a set of learning strategies: retrieval practice, alignment of objectives, and a well-organized course. The instructor added a more direct communication strategy during two of those five terms (N=58). She used weekly communications that linked course material with current events discussed by students the previous week and a personal message tailored to each student.

This intervention was meant to communicate to students that they are being heard and they are valued and respected. The messages contributed to solving cognitive challenges identified in the literature of Teaching Economics: student mental mindset and student fear and mistrust (Chew and Cerbin, 2021).

The differences in differences analysis resulted in improved learning, measured by better grades in Exams and Discussions and more enjoyment of the course, measured with student comments. The result is most significant for weaker students. Presumably, more vulnerable students increased the amount of effort invested in statistics as a result of the messages as suggested by Allgood and McGoldrick (2020). This experiment took place in Summer 2020, Fall 2020, Spring 2021, Summer 2021, and Fall 2021 during the COVID-19 pandemic.

Keywords: online learning, communication strategies, pedagogy, belonging.
JEL- classification: A22

1 Introduction

The process of digital transformation of higher education is not new. However, the importance of online learning had a revolutionary growth due to the crisis brought by the COVID-19 pandemic (Hodges et al., 2020). Teaching Economics was not an exception to this transformation. By addressing yet another aspect of improving online learning, this paper contributes to the literature on online pedagogy. Messages that intentionally appeal to the students' uniqueness are found to have a positive effect on learning and satisfaction.

These messages also reduce one of the cognitive challenges explored in the Education of Economics literature: student fear and mistrust. Lack of trust in the professor can undermine motivation and interfere with learning (Chew and Cerbin, 2021). This paper presents the results of an experiment in an online learning environment. The course where the experiment takes place follows retrieval practice (Pan and Sana, 2021), alignment of objectives (Matters, 2014), and is a well-organized, online course (Bozkurt and Sharma, 2020) and (Coates et al., 2004).

Once the course was set in its current form, the instructor had the time and the opportunity to try to convey in several ways the following message: "I see who you are, and I value and respect you and I want to share this learning experience with you." From a theoretical perspective, this kind of message could be part of the pedagogy of kindness as defined by Gilmour (2021). On the other hand, this type of message does intend to foster belonging. Even small cues of belonging have an effect on achievement Walton et al. (2012), and (Walton and Cohen, 2011) find that the impacts of a 'belonging intervention' last for at least 3 years and they have a greater impact on minority students.

Addressing students by name and trying to value their personal experience alludes to the principles of the pedagogy of kindness and social belonging. This practice can be used at any time and in other formats. However, the online format gives a particularly apt environment to use this tool.

In order to communicate this message, the instructor used the information that students share on discussions. Every week (module), a new announcement addressed the students' stories, and a personalized message was sent after the midterm. In every case, the objective was to convey the message written above.

The effect of this intervention was measured using the grades of students and the comments on the Faculty Evaluation Questionnaire. The intervention did not have a significant effect on quizzes or exercises. However, it increased the grade in the Cumulative Final Exam by 9 out of 100 points, having a greater impact on the weaker students. It also had a significant effect on the discussion grades. The differences in differences estimator is significant and show a 4 percent improvement in discussion grades.

Finally, even if there had not been any significant effect on student performance, there was an effect on student satisfaction. The number of comments on the Faculty Evaluation Questionnaires was slightly more with the treatment and included comments such as -very encouraging- -great learning environment- -enjoyed this class-.

The rest of the paper is organized in a literature review, a description of

the experiment and data, the model, and conclusions.

2 Literature Review

There are at least four strands of literature that converge in this paper: online learning; communication as an online teaching tool; belonging and kindness, and teaching economics. In this section I establish where the experiment stands amongst the scholarly research in these topics.

2.1 Not all online courses are created equal

Amidst the growth in distance learning in the last few months as a response to COVID-19, researchers in the area of online learning have been prompt to distinguish between the online pedagogy that has decades of research and practice, and the Emergency Remote Teaching that occurred as a response to the Pandemic (Hodges et al., 2020). There are many ways to teach in person and online. Therefore, for clarification purposes, we must explain that the course where this experiment takes place is not a live-stream of an in-person Lecture, as opposed to the example used in Cacault et al. (2021). Instead, this is a course designed to be online from its origins. Martin et al. (2019) describe good online courses as having four components: good course design, aligned student evaluation, some way of course assessment, and several strategies for course facilitation. Those are features of the Statistics Course presented in this paper. Regarding course facilitation, Martin and Bolliger (2018) consider that timely instructor responses or instructor personal responses to student reflections as essential components of the Online Learning Environment. These are the tools being used in this experiment.

2.2 Communication in online learning

The literature identifies three strands of communication that convey important engagement conducive to learning. They are 1) learner to learner, 2) learner to instructor, and 3) learner to content (Martin and Bolliger, 2018) and (Bettinger et al., 2017). According to (Martin and Bolliger, 2018), out of the three types of communication, the link of learner to instructor is the

most important one in terms of the perceived learning of students. The main strategies to strengthen the learner to instructor engagement are suggested to be: regular messages (emails, texts, announcements) (Martin and Bolliger, 2018) and (Dixson, 2010), and instructor feedback on assignments (King, 2014), including rubrics ((Martin and Bolliger, 2018). The treatment that the instructor uses in this experiment improves the regular, weekly messages. The treatment directly affects the the learner-instructor engagement. Depending on the message and the student preferences and characteristics, it can also affect the learner to content engagement.

From a different perspective, (Wanstreet, 2006) consider that communication strategies can be organized into three different types: 1) instructional exchange, 2) computer-mediated communication, and 3) social or psychological connection. The treatment in this experiment alludes to a social and psychological connection while the instructional exchange and the computer-mediated communication stays the same as in the control group.

In this case, we go a step further and claim that communication is important but we find that kindness in the form of 1) weekly messages that address experiences that speak to the uniqueness of our students, and 2) at least one personalized letter that stresses the fact that they are being addressed as a person have an effect in the performance as well as in the overall course satisfaction.

Considering that we are dealing with learner-instructor engagement and psychological connection, best practices for online communication suggest that "[the moment and means] to communicate with your students helps foster a sense of community in your class which helps your students feel connected to you and their classmates" (Venable, 2015).

2.3 Kindness and the pedagogy of belonging

The concept of kindness is not frequently cited in pedagogical or teaching literature. However, there are two articles written in 2021, as a response to the anxiety observed in students, that refer to what they name the pedagogy of kindness: Gilmour (2021) and Stephens (2021). In this literature, "kindness is the ability to bear the vulnerability of others" (Phillips and Taylor,

2009). The authors that explore the pedagogy of kindness observed a period of uncertainty, disruption, and potential anxiety. Their response was to use compassion shaping approaches to build trust (Gilmour, 2021). The principal trait of this practice is trust in students, believing when they claim to have an emergency. A second trait is seeking to narrow transactional distance and foster connection and emotional support (Gilmour, 2021) and (Stephens, 2021). In this sense, our experiment also promotes kindness.

On the other hand, several experiments have shown that simple interventions that promote belonging have an effect on college achievement and health (Walton and Cohen, 2007) and Walton and Cohen (2011). The literature has baptized this research as Pedagogy of Belonging (Edgeworth and Santoro, 2015). The positive impact is more pronounced in African Americans and Hispanic students (Walton and Cohen, 2011). Members of socially stigmatized groups may be more uncertain about their social belonging in colleges and universities. Much energy is diverted into finding out if one belongs or not. This fear translates into poorer academic results. However, when the student receives a message stating that she belongs, then, the lever is useful to avoid health problems and focus into solving the task at hand: studying (Cohen et al., 2006). Our intervention strives to continually remind students that they belong in class.

2.4 Teaching Economics

The literature in teaching economics has *"opened a black box"*, in the words of Allgood and McGoldrick (2020), by dissecting a cognitive framework that allows economic educators to understand the learning process. The traditional economic approach assumes that the student's utility is a function of learning that depends on the effort invested (Becker, 1982). To complement this approach, Chew and Cerbin (2021) identify nine cognitive challenges and by doing so, provide clarity on the *"black box"*, the way learning happens. Students face several cognitive challenges, fear and mistrust is the third challenge. A student who feels out of place or afraid, is less likely to thrive in the learning process.
Another of the findings in the area of teaching economics is the "alignment of objectives" or more precisely stated, "learning outcomes"Allgood and Bayer (2017). By setting precise and measurable learning outcomes, the assign-

ments, the objectives and the whole teaching practice is aligned. Having explicit, clear learning outcomes eliminates uncertainty for students, and for instructors it provides a basis to build the entire course (Allgood and McGoldrick, 2020). Finally, a few efforts have been conducted in the area of inclusion and diversity. (Al-Bahrani, 2022) and (Bayer et al., 2019) claim that establishing a supporting class climate that builds a sense of belonging is the first principle to foster diversity and inclusion in the economics classroom.

3 The Course

The course where the experiment takes place began as an online course in the summer of 2020. In parallel, the COVID-19 pandemic had pushed all the college experience in our university to emergency remote teaching mode. In the University where this course is provided, we had planned to create a course on Introduction to Statistics in the online format. Faculty were hired with this sole purpose. The course was designed following at least three best practices for online learning. In practical terms this means that 1) the course was thoroughly organized, 2) the course used retrieval practice, and 3) the course was perfectly aligned in terms of what is being taught and what it is evaluated.

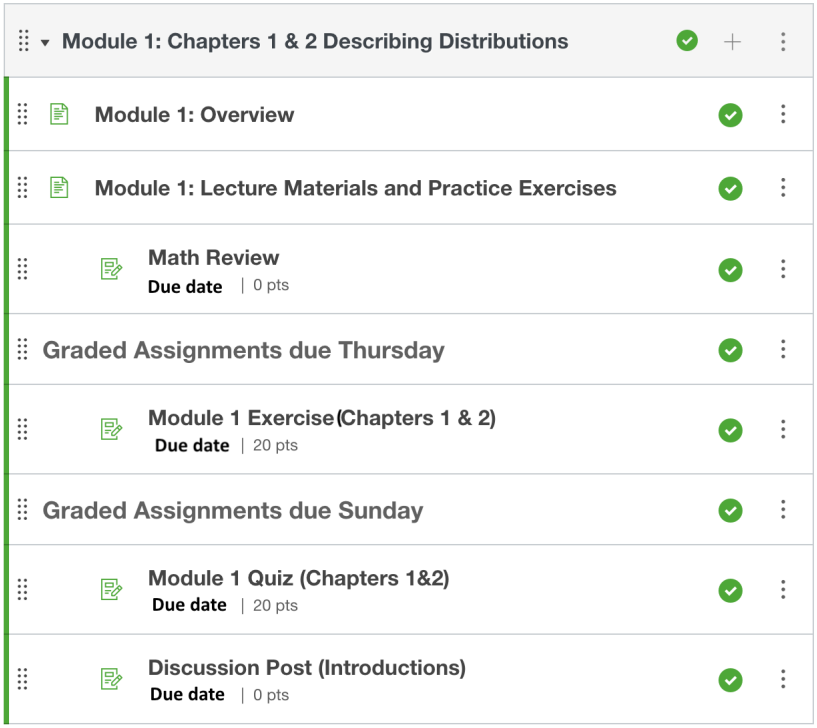
As Martin et al. (2019) claim, there are four categories to describe an online course: course design, course evaluation (student evaluation), course facilitation, and course assessment. As in many colleges and universities, the evaluation of the online course is not completely under control of the instructor. Therefore, we are not going to refer to that category. The course design, the student evaluation, and the course facilitation in this course are addressed in this course through three practices: good organization, retrieval practice, and alignment.

3.1 Good organization

The organization of the course corresponds to fourteen modules. Each module teaches two chapters of the textbook Moore et al. (2021).The syllabus explains the grading criteria, how many assignments are designated for each

module, and the precise date and time that each assignment is due. Each module has the following components: 1) Overview, objectives and weekly assignments; 2) Lectures and Practice Exercises, that consist of notes and short videos explaining statistical concepts and solving exercises; and 3) Graded Assignments due mid-week and by the end of the week. See figure 1.

Figure 1: How a Module Looks Like



Students answer each exercise, quiz, and discussion on a Learning Management System (Canvas). Most of the exercises and quizzes are automatically graded. The instructor checks open ended questions and manually grades discussions and provides personalized feedback in both treated and control.

A well organized course contributes to all three elements of online teaching. Having certainty over what to expect each week. Knowing exactly what assignments are due when and how much each weights contributes to 'Course

Design', but also to help students find the material that they will be evaluated on (Course Evaluation). Also, by knowing where to find each element of the course, the facilitation of the course is rendered easier as opposed as when the instructor changes the location of videos, exercises, procedures or reviews.

3.2 Retrieval Practice

Students engaged in retrieval practice typically feature strong learning outcomes (Karpicke and Blunt, 2011). Retrieval Practice claims that actively trying to remember something or performing some skill is a more effective way of learning than passively reading or listening about it (Hopkins et al., 2016). Therefore, exercise solving and quizzes help students understand concepts better than only listening to a lecture or reading. Retrieval practice helps engage metacognition and keeps the brain focused in solving the task at hand (Hopkins et al., 2016). Therefore, it is regarded by some as the most powerful learning strategy. There is abundant literature particularly for the learning of Math and STEM related principles (Lyle et al., 2020) and (Avvisati and Borgonovi, 2020). Instead of using the method of lecture notes, and evaluating students through one midterm and one final exam, this course makes students practice through exercises and quizzes before they engage in a midterm and a cumulative final exam. Exercises and quizzes are tailored to practice several times similar questions to understand statistical concepts. Using retrieval practice as a core part of the course, is part of the design, and it is also a way to facilitate learning.

3.3 Alignment

Once learning objectives have been defined, activities, lectures and the evaluation tools (quizzes, exams) are aligned with these objectives. In the Economics Literature, they are also called learning outcomes (Allgood and Bayer, 2017). By stating explicitly what students are expected to demonstrate, by assignment, and by module, uncertainty is lowered for the student. Similarly, the lecture and the examples are aimed precisely to fulfill this objective and cover this material. While it seems an obvious characteristic of any university level course, sometimes professors deviate from the objective or skip a step or two of a procedure that students must know and are evaluated upon.

Alignment of objectives, material and evaluation of students contributes to having a well-designed course, have a better facilitation where the important material is covered and allows students to be evaluated fairly.

4 The Experiment

From the first day of classes, every Monday, the instructor sends a message to communicate with students telling them about the material that will be covered each module, and reminding them to complete the assignments.

The weekly message delivered during the control periods follows the format below: All names are hypothetical to preserve the privacy of students.

> Hello Class,
> This week you are introduced to three new concepts:
>
> 1) Sampling, 2) Experiments, and 3) Ethics in data use
>
> Here is the list of assignments for this week:
>
> By Thursday at 11:59 pm:
>
> - Complete Problem Set 5
> - Post a Comment on the Discussion on Ethics
>
> By Sunday at 11:59 pm:
>
> - Complete Quiz 6
> - Respond to a peer in the Discussion on Ethics and use of data.
>
> I am here in case you need me, Professor -Last Name

The treatment weekly message had a different format:

> Hello Class,
> Sometimes we just get it. We do our reading, exercises, go back to videos, we solve the quizzes, we discuss; get things done; amazing. However, sometimes we struggle because R did not get installed

correctly (Jason), or because we are traveling to the other side of the world (Sophia), or because we had a birthday to celebrate (Roan), or we are working a lot (Jeff and Brian), you name it. You struggle, I struggle; we all sometimes do.

This week is like no other; you are introduced to three new concepts: 1) Sampling, 2) Experiments, 3) Biases that we want to avoid in statistics when we do sampling and experiments.
Given what you discussed in the past two weeks, I think you might be interested in learning a bit more about Behavioral Economics and how it's related to statistics. Mainly because we want to avoid biases when doing our sampling or whenever we use data for decision making. In this week's discussion we will learn about these biases.

Here is the list of assignments for this week:

By Thursday at 11:59 pm:

- Complete Problem Set 5
- Post a Comment on the Discussion on Biases

By Sunday at 11:59 pm:

- Complete Quiz 6
- Respond to a peer in the Discussion on Biases

Thank you for inspiring the topic of biases. Thank you, for doing statistics even when you don't feel like it. I am here in case you need me, Professor Last Name

The main features of the treatment message are that: 1) A record is kept to make sure that every student is mentioned in the general announcements by name at least once. 2) The professor uses the comments from the previous week to steer the direction of the examples and discussions in the following week. Therefore, the dialogue is current and tailored to this particular cohort. 3) Finally, the professor allows herself to enjoy the conversation, she 'speaks' to students and believes they listen.

In the control group there is also a personalized message that is sent as soon as the midterm is graded. Approximately five days after the midterm.

> Hello Cooper,
> It is refreshing to have your opinion through the discussion posts! I wonder how you are feeling [Cooper reported being sick before]. This semester, with the stress of COVID, a mass shooting, and no Spring Break, some students are reducing their time on Canvas.
>
> This message is to reach out to you, especially now as we head to the second part of the course.
>
> You have turned in most assignments on time, and your current grade is a B-. I like your strategy of consistently solving quizzes. This way, you get the main idea of each module, and you can keep the pace. To further improve, try solving the exercises as well; even if you don't succeed 100%, they still count and allow you to practice. Also, review the videos where I solve problem sets because those videos match up closely with the content on quizzes.
>
> If you struggle with the weekly work or just want to check in, visit me during office hours Wednesday or Thursday (time), and we can talk through your questions.
>
> I may not often reach out to you directly, but know that I am paying attention to you.
> Dr. Last Name

Each student received one personalized message during the treatment group. During the control period there was no personalized message. The main features of the personalized message are: 1) The professor is intentional about conveying the message that she is trying to see them, to see who they are. 2) When writing this message, the professor addresses someone in particular. The professor thinks about Cooper, with his eagerness to get good grades, his passion for skiing, his multiple responsibilities, and the fact that he got sick. 3) The professor gives a practical strategy to improve the grade, still the essential message is that she cares for the student: "I see who you are, and I value and respect you and I want to share this learning experience with you".

5 Data

The population served by this online course is primarily male (86%), with 21 females out of 143 students. This student body composition is a bit more extreme than the 63% national average of Economic Majors at colleges and universities (Bayer and Wilcox, 2019). The racial composition in our sample is 58% white, while the national average in Economics Major according to Bayer and Wilcox (2019)is 53% . 35% of the students in our sample are international students, some from Europe (2), New Zealand (1), and Latin America (3), but mostly from Asia. There was only one African American in the control group and also one in the treatment group.

Motivational and behavioral processes explain which students are more likely to select online courses instead of face to face (McPartlan et al., 2021). This self-selection responds to competing responsibilities such as family or work. Demographic characteristics such as income level, gender, and age determine who prefers online learning over face-to-face. We find that the treatment and control groups hold statistically equal demographics. The combined group is a bit different from the predictions for online learning which tends to be more skewed toward female, older and part-time (McPartlan et al., 2021) and (Moore and Kearsley, 2011). Our students are all younger than 24, mostly men and mostly full-time students, some with part-time jobs. Also, unlike other periods of time, the online option has less disruptions than face to face options that may go remote due to COVID-19.

6 Econometric Specification

We specify the following model for student i=1,...n

$$Final_i = \gamma_0 + \gamma_1 Treated_i + \gamma_2 Summer_i + X_i'\beta + \epsilon_i \tag{1}$$

Where Final is the final exam grade; Treated = 1 when the student is part of the control group; β_i is a vector of parameters to be estimated, and $epsilon_i$ is the error term.

This equation tests the effect of the treatment on students cumulative final exam score. Here the parameter of interest is $gamma_i = \frac{\partial Treated_i}{\partial Final_i}$.

Table 1: Covariates Treated vs Control

variable	combined N=143 (proport.)	(N)	control (n=85) (proport.)	(n)	treated (n=58) (proport.)	(n)	p-value .
Female	0.146	21	0.117	10	0.189	11	0.35
1 if female	(0.03)	(4)	(0.03)	(3)	(0.05)	(3)	
International	0.349	50	0.341	29	0.362	21	0.79
1 if Intnal.	(0.04)	(6)	(0.05)	(4)	(0.06)	(4)	
White	0.58	83	0.6	51	0.55	32	0.56
1 if white	(0.04)	(6)	(0.05)	(5)	(0.06)	(4)	
African Amer	0.013	1	0.012	1	0.017	1	0.78
1 if African Amer	(0.009)	(1)	(0.12)	(1)	(0.017)	(1)	
Hispanic	0.055	8	0.023	2	0.103	6	0.06
1 if Hispanic	(0.02)	(3)	(0.02)	(1)	(0.04)	(2)	

*P-value evaluates Ho¿ treated-Control=0

standard error in parenthesis

The vector X contains elements that control for student ability and also demographics. The control for student ability is the grade of the first assignment, ex1. The demographic controls are 'female' (one if student is female), 'intnal' (one if the student is international), and 'white' (one if the student is white). We also added controls for the terms that take place during the summer.

We then explore a differences in differences model where we analyze exercises, quizzes, discussions, and exams. We assume that the first exercise, the first quiz and the second discussion (the one after students make their personal introductions), are the previous, untreated observations in every case. We also make the cavalier assumption that the midterm can be considered the previous observation. However, as table 3 suggests, the midterm takes place after at least seven messages that are different between treated and control group. Therefore a simple t-test rejects the hypothesis that the midterm grade is the same between treated and control group.

On the other hand, we assume that the last exercise, the last quiz, the last discussion, and the cumulative final exam are the posterior observations. Table 3 shows that the means of all exercises and quizzes are statistically equal. However, we observe differences in the Final Exam, the Midterm and

the last discussion.

As expected, when we run the Difference in Difference regressions, only the discussion and exams have a significant result.

7 Results

As the comparison of means above depict, there is no statistical difference between cohorts in demographics or ability. In this section we show the results of the regressions as well as a brief analysis of the student's comments in the Faculty Evaluation.

7.1 Quantitative Analysis

The main regression shows that the effect from the treatment has an impact of 9 out of 100 points in the cumulative final exam grade. Those students who belonged to the cohorts that received personalized, tailored messages, had on average 9 points more on the Final Exam than their counterparts in the control group.

Table 2: Difference in Difference Estimation

	(1)	(2)	(3)	(4)
	diff_exer	diff_quiz	diff_exams	diff_discuss
treated	-0.373	-0.215	1.072	2.657*
	(-0.72)	(-0.47)	(0.36)	(2.33)
_cons	-0.219	-0.521	-2.211	0.812
	(-0.71)	(-1.94)	(-1.02)	(1.31)
N	143	143	143	143

t statistics in parentheses

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

As expected, the term when the course was taken (summer or not), the student ability (exercise 1), the gender, racial group or being international had no effect on the grade. See table 1.

Table 3: Effect of treated on Final Exam

	(1) final	(2) final	(3) final	(4) final	(5) final
treated	6.362*	9.523**	9.879**	9.651**	9.322**
	(2.05)	(3.03)	(3.23)	(3.04)	(2.99)
summer		-6.547	-6.710	-6.649	-6.193
		(-1.45)	(-1.48)	(-1.48)	(-1.32)
ex1			0.538	0.523	0.519
			(1.42)	(1.40)	(1.34)
female				2.650	2.361
				(0.54)	(0.46)
intnal					-0.0897
					(-0.02)
white					-2.689
					(-0.55)
_cons	71.38***	71.38***	62.26***	62.21***	63.96***
	(33.36)	(33.24)	(9.51)	(9.55)	(8.20)
N	143	143	143	143	143

t statistics in parentheses

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

The differences in difference estimation is not significant as we compare the first and the last exercise nor the first and the last quiz. However, it has a positive effect on exams and discussions.

When being addressed and nudged to study, students put more effort which translates into a better grade in the Final Exam and richer class discussions. The t-tests from the comparison of means show that the midterm already has some difference between treated and control. In this case, the only valid difference in difference estimation is the discussion. The discussion before treatment shows a similar behavior between treated and control.

On the other hand, the difference between the last-treated and the last non-treated discussion shows a positive and significant improvement.

This result is expected since discussions are the forum where the exchange of ideas and comments takes place. Discussions are particularly prone to the effect of our intervention since they constitute the public media in which students interact with each other and the instructor.

Table 4: Difference in Difference Estimation

	(1)	(2)	(3)	(4)
	diff_exer	diff_quiz	diff_exams	diff_discuss
treated	-0.373	-0.215	1.072	2.657*
	(-0.72)	(-0.47)	(0.36)	(2.33)
_cons	-0.219	-0.521	-2.211	0.812
	(-0.71)	(-1.94)	(-1.02)	(1.31)
N	143	143	143	143

t statistics in parentheses

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

7.2 Qualitative Analysis

We analyze students comments in the Faculty Evaluation. By the end of the term, every student is requested to solve a Faculty Evaluation survey. Unfortunately for our analysis, the questions regarding the instructor changed over time. Still, we are able to compare the overall grade given to the course each term as well as student comments. Using the simple average of the course evaluations, we find that the treated courses received a higher grade than the control group.

To analyze students' comments, we counted positive and negative comments. We find a ratio of 24 positives vs. 21 negatives in the control group and a ratio of 25 positives vs. 13 negatives in the treatment group. Even though Students in the treated group were fewer (n=58), they had more comments than the control group (n=85). Therefore, we assume that overall, there was slightly higher student satisfaction in the treated group than

Table 5: Average Course Evaluation

		Average
Summer 2020	Control	4.00
Fall 2020	Control	3.86
Fall 2021	Control	3.85
Spring 2021	Treated	4.50
Summer 2021	Treated	4.44

in the control group.

In both groups, we find comments regarding the instructor's care or the course's good environment. However, the emphasis is greater in the treated group, where we find comments such as "loved the online class,"; "the professor made an effort to connect,"; "safe and respectful," and " cares about the success of students"; and "great learning environment." We claim that these comments respond to the treatment conveyed in the messages.

This experiment takes place in an online learning environment. While we argue that personalized messages have an effect on student performance and satisfaction, it is possible that the outcome would be different in a weaker course. I was fortunate to have mentoring and training that resulted in a course that is well-organized, uses retrieval practices and is aligned between learning objectives, material covered and student evaluation.

As the pedagogy of belonging has discovered, this type of interventions might have a greater positive impact on minority students or any stigmatized group (Cohen et al., 2006). We tried an interaction between treated and female (not shown) and even thou the effect is positive, the result is not significant. Possibly due to the small number of females that result in high standard errors. Still, Cohen et al. (2006) argues that everyone can potentially belong to a stigmatized group at one point or another in life *. In any case, we don't know what kind of challenge students in this cohorts were facing and how a personalized message may have triggered an affirmation of

*In a personal interview he gives examples such as women in engineering, older people in technological areas, or men with careers on child care

belonging.

Table 6: Student Comments Control Group

positive	negative	Comment summary
1	0	I learned
0	1	please reply faster
1	0	kind, knowledgeable, good professor
1	1	enjoyed the class, need more worksheets
1	1	challenging course, need summary of equations
1	1	good challenging course
1	0	easy to understand
1	0	smooth transition to online
1	1	valuable course, midterm needs more questions
1	0	professor seems to care about her students
1	0	good
1	0	appreciate connect to current events
0	1	stats is difficult
1	1	The best online courses are in Econ, need more R
0	1	need more videos
0	1	avoid mistakes linking assignments
0	1	need more feedback, ask how students are
0	1	difficulty of questions ranged wildly
1	0	great instructor
1	1	enjoyed, don't like online
0	1	need more R exercises
1	1	good lecture notes, prefer lectures
1	0	it was a nice experience
0	1	math is hard online
1	1	great course, need more collaboration
1	1	great course, R is confusing
1	0	enjoyed structure and pace
0	1	no need to use R, unoriginal exercises
1	0	hard homework
1	1	great course, need more videos
1	1	great professor, hard class
1	0	phenomenal teacher, more videos
0	1	good course

Table 7: Student Comments Treated Group

positive	negative	Comment summary
1	1	challenging, professionalism of professor helped
0	1	change timing to upload assignments
0	1	more peer interaction to answer assignments
1	0	class well structured, effective overview and lecture
1	0	well laid out structure, consistent, able to ask questions
1	0	I was challenged to study and pay attention, great instructor
1	1	best instructor, points in the syllabus were off
0	1	more videos
1	0	good
1	1	loved the online class, need databases for assignments
1	0	good R exercises, good videos
1	0	amazing professor, taught beautifully
1	0	meaningful assignments, well structured, best teacher
1	0	the professor was very useful
1	0	well organized
1	1	online is tough, liked the course
1	0	well organized
1	0	professor made an effort to connect
1	0	accessible to clear doubts
1	0	a pleasure, safe, respectul environment, well put together
1	0	extremely professional
1	0	professor cares about success of students
1	1	discussions were integral, effective, wish synchronous
1	0	great learning environment
1	0	challenging but I learned, understanding, well organized
1	0	great online professor
1	0	well formatted, well put together, useful discussions
1	1	good discussions, new points of view, R is not effective
1	0	professor cared for class, effective teaching style

8 Conclusions

This paper presents the result of an experiment in an online setting where personalized messages were used. The main finding is that personalized messages improve the learning outcome of students measured as better grades in the cumulative final exam and in discussions. In addition, the experiment finds that these type of messages improve the student satisfaction. As online learning keeps growing in coverage and importance, evidence is particularly lacking into what is the impact of instructor's effort to bring kindness and belonging into the online environment. Our results underscore the urgent need to fully incorporate more of this kindness into our teaching practices.

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