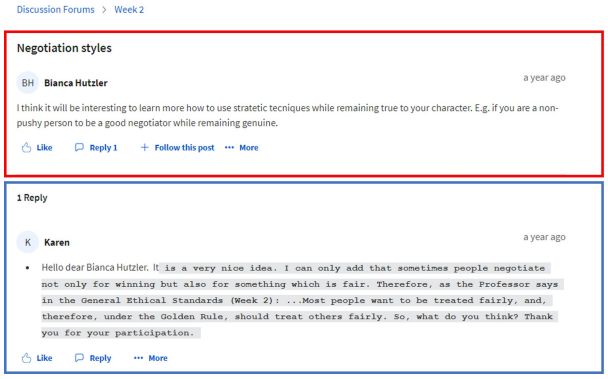
Mind the Gap: Gender Disparity in Online Learning Platform Interactions
Online Appendix

Appendix A: A Typical Post in a Coursera Course Forum

Figure 1 Screenshot of Forum Post and Response



Appendix B: Empirical Details

B.1. Recognition of Gender from Displayed Names

In Coursera forums, users infer other participants' gender mainly through their displayed user names. Therefore, we conduct two experiments to verify that the displayed name is a reliable information source for gender recognition. We have a research assistant team with three members with diversified gender, background and native language. For the first experiment, we randomly select 1,000 names from all displayed names in the forum. The team members each read through the names and label the name as female, male or unknown based on their first impression. Then we cross-verify the labels created by the three members. The three members reach consensus on 73% of the names, among which 80% are consensus on either female or male.

In the second experiment, we randomly sample 100 users from the forum who have uploaded a photo with clear gender identification. We assume the gender of the photo is the real gender of the user. The team members go through these users' names and label them in the same way. All team members accurately labeled 93% of all names on average. These two experiments show that common users are able to identify other users' gender through the displayed names at a significantly high accuracy level.

B.2. Example Posts

In this section, we provide three example posts for each topic. The examples are randomly selected from our dataset.

Topic I: Course Content

- *"What do you think of the decision to allow the changes in working capital shortcut? Does it impact the usefulness of the cash flow statement?"*

- *"What are some methods that can be used in the current scenarios where practices like user testing are cumbersome as it is remote because of COVID? Physical Labs for UX also is not a solution in today's world. Your thoughts?"*
- *"My program is correct but it keeps on asking enter a number what should I do?"*

Topic II: Socialization

- *"Hi everyone, Eric from Singapore. Hope to learn together with all of you in this python journey :)"*
- *"I haven't read either of the roles and I need a partner real quick for this exercise. if you're looking for one as well then hmu here and then we can move forward."*
- *"Hello everyone. Since there are is a huge interest in discussing ideas and negotiation strategies through Whatsapp I suggest to make another one group. What do you think about it? If you are interested you can just write you number to add you to a closed group."*

Topic III: Assignment Review

- *"Please review my week 4 assignment. Here is the link: [Assignment Link]."*
- *"I uploaded all the screenshots correctly according to the order. I got only 70% even after getting 4/4 from three peers. Please check my assignment and kindly reset it if it's wrong."*
- *"If the link is not clickable, just copy and past it in your browser. I highly appreciate your help, and will gladly review your submission too."*

Topic IV: Technical Issue

- *"The output comes out exactly whats expected but the grader says it's incorrect."*
- *"I have already completed this during the first part of the Specialisation. Do I HAVE to do it again?"*
- *"Where can I download the slides?"*

B.3. Textual Analysis

In this section, we provide more details about our textual analysis. Our target is to extract the main topics from the text of forum posts. To do so, we first convert the post texts into a machine-readable format. This requires five steps: (1) remove punctuations; (2) convert all words to lower cases; (3) tokenize the text into sequences of words and bigrams; (4) remove stop words or words that appear frequently in the statements but do not confer substantive meaning, such as the, to, etc., and (5) assign a parts-of-speech tag to each remaining word and lemmatize all words back to their roots.

Secondly, we train a Doc2Vec model using a random sub-sample of the processed texts. Doc2Vec is a well-adopted unsupervised algorithm to create vector representations of words, i.e., to project a document into a d-dimensional vector space. Unlike simple bag-of-words model, Doc2Vec is designed to preserve the logical relationships among words in the document. There are two major types of Doc2Vec model: distributed bag-of-words (DBOW) and distributed memory (DM). We adopt DBOW, since it is more suitable and runs faster for short documents like our forum posts. Intuitively, DBOW predicts randomly sampled words in the

Table A1 Performance of Topic Classifiers

	Accuracy				Precision			
	NB	LSVM	NN	KNN	NB	LSVM	NN	KNN
Course Content	0.714	0.775	0.832	0.793	0.843	0.826	0.829	0.784
Assignment Review	0.668	0.862	0.907	0.899	0.610	0.934	0.922	0.961
Socialization	0.671	0.645	0.890	0.743	0.623	0.592	0.890	0.723
Technical Issue	0.866	0.917	0.967	0.971	0.804	0.881	0.969	0.978
	Recall				F-1 Score			
	NB	LSVM	NN	KNN	NB	LSVM	NN	KNN
Course Content	0.530	0.706	0.840	0.816	0.645	0.758	0.833	0.796
Assignment Review	0.942	0.780	0.890	0.832	0.740	0.849	0.905	0.891
Socialization	0.886	0.946	0.892	0.790	0.728	0.728	0.890	0.754
Technical Issue	0.970	0.966	0.966	0.964	0.879	0.921	0.967	0.971

Notes: Here we present four metrics of classifier performance: accuracy, percision, recall, and F-1 Score. As commonly defined, precision is the share of true positive cases in all cases predcted to be positive. Accuracy is the share of all correctly classified cases in the full sample. Recall is the share of true positive cases in all real positive cases. As a combination of these two measures, F-1 score is defined as 2 times the harmonic average of precision and recall.

document given some neighboring words and the document ID. We train the DBOW model and use it to convert each post into a 80-dimension vector.

Next, we use machine learning methods to train the topic classifier. The input of the classifier is the text vector generated by Doc2Vec. For the output, our research team members manually label a random subset of posts in our sample as zero or one for each topic, and we only use the posts that all researchers reach a consensus to train and test the classifiers. For each topic, we randomly include 500 posts labeled as one and other 500 labeled as zero in our sample. We use 70% of the sample as training set and the rest 30% as test set. Four commonly-ued supervised machine learning models are used for classification: Naïve Bayes (NB), Linear Support Vector Machine (LSVM), Neural Network (NN) and K-nearest Neighbors(KNN). We use ten-fold cross-valediction method to test for the performance of classifiers. The performance matrices are shown in Table A1. NN generates a F-1 Score greater than 0.8 for all four topics. Therefore, we apply the NN classifier to the full sample to obtain an predicted indicator for each post and topic.

B.4. Sentiment Analysis

Intuitively, the sentiment metrics should account for two facts: (1) higher frequency of words in a category indicates stronger orientation to that sentiment; (2) the words that are more common in the full dataset have less distinguishing power. Therefore, we follow common practice in NLP and use tf-idf method to construct sentiment metrics (Madini and Nooy 1999, Keppler et al. 2022b). Specifically, we first compute a weight for each word m in sentiment category k as $w_{mk} = log(N/df_{mk})$, where N is the total number of posts in our sample and df_{mk} is the number of posts in which the word (m,k) appears. Then, the tf-idf count for each word m in post p is $tfidf_{mkp} = w_{mk} \times log(1+tf_{mkp})/log(1+n_p)$, where tf_{mkp} is the frequency of word (m,k) in post p and n_p is the number of words in post p. Finally, the total tf-idf count for each sentiment k of post p is $S_{kp} = \sum_m tfidf_{mkp}$.

Appendix C: Additional Robustness Tests

This section contains all supplementary summary statistics and robustness test results. Table C1 shows summary of definitions to all variables in main text Table 1. C2 shows the full results of regressions in main

text Table 2, in which only the coefficients of control variables are not shown due to space limit. For payment method variables *Self-paid User*, *Sponsored User* and *Fin-aid User*, the baseline is *unpaid user*, which is omitted due to colinearity. Similarly, the baseline of post context variables, i.e., *Course Context* and *Item Context*, is *Week Context*, which is also omitted.

We use one week observation window for our analysis in the main text, and our results are robust against other definition of observation windows. Table C3 shows estimation results with alternative observation windows—2, 4, and 6 weeks. For example, the outcome variable of column (1) in panel A is an indicator of whether the post receives response in 2 weeks after being created. Other fields are defined similarly.

Our results are also robust against extreme values and various staff types. Table C4 and Table C5 show regression results of our robust check against extremely active peers or staffs. In panel A of each table, we use the subsample of posts excluding those responded by 1% most active learners or staffs, respectively. In panel B, we exclude the posts responded by 10% most active learners and staffs. Table C6 and panel A of Table C9 show summary statistics and regression results of our robust check against various staff types - instructors, mentors and teaching assistants. As mentioned in the main text, mentors are voluntary learners that have already passed the course. Teaching assistants are staff hired by course providers. Panel B and C further demonstrates that gender disparity is evident across different course workloads and subjects. Course workload is measured using the total number of video classes per course. Most of the courses offered by the sample institution are computer science-related and most discussions occur in these courses, and as such we categorize course subjects into programming-, data science-, and non-computer-science-related courses. All estimates for *FemalePost* remain negative, and barring courses in the third workload quantile, the estimates are statistically significant.

Further, we include posts with unknown gender in the sample and create an additional dummy variable of unknown gender in the regression. Panel A of Table C7 shows that posts without a disclosed gender indeed have a lower response rate than posts from male learners. Moreover, the magnitude of this disparity is significantly smaller than the male-female gap (at 0.72% while the female-make disparity is 1.91%). We also check whether the gender disparity is more salient among learners whose genders are easier to tell from displayed names. As commonly known, the English audience are more likely to have difficulty identifying gender from Chinese and Indian names rather than US names. Panel B of Table C7 shows the gender disparity of receiving response from staff on subsample of posters who are not from China nor India, and from US only.

Additionally, Table C8 shows regression results controlling two more measures of knowledge accumulation in discussion forum - total number of staff and peer posts in the forum prior to each post's time of creation. Table C12 shows regression results where we replace the staff-to-learner ratio control with staff-to-female ratio control.

Table C1 Variable Definitions

Variable Name	Variable Definition
I. Response to Posts	
Has Response	Indicator of whether the post has received at least one response within the observation window.
Has Response - Peer	Indicator of whether the post has received at least one response from peer learners within the observation window.
Female Peer	Indicator of whether the post has received at least one response from female peer learners within the observation window.
Male Peer	Indicator of whether the post has received at least one response from male peer learners within the observation window.
Has Response - Staff	Indicator of whether the post has received at least one response from teaching staff within the observation window.
Female Staff	Indicator of whether the post has received at least one response from female teaching staff within the observation window.
Male Staff	Indicator of whether the post has received at least one response from male teaching staff within the observation window.
II. Average Staff Response Quality	
Has Vote(s)	Indicator of whether the staff responses to the post has received any votes.
Length	Average number of words of all staff responses to the post.
Smog Index	Average smog index of all staff responses to the post.
III. Average Staff Response Sentiment	
Positive	Average positive score of all staff responses to the post.
Academic	Average academic score of all staff responses to the post.
Goal	Average goal score of all staff responses to the post.
Persist	Average persist score of all staff responses to the post.
Try	Average try score of all staff responses to the post.
VI. Post Characteristics	
Study Hours	Time that a learner has already spent on the course before creating the post.
N Items Passed	The number of learning units (videos, quizzes, assignments, etc.) passed in this course.
Weekday Post	Whether the post is created during the weekday or the weekend.
Daytime Post	Whether the post is created during the day (from 8 am to 8 pm) or during the night.
Learner-staff Ratio	Ratio between newly-enrolled learners in the month and the number of registered and forum-responding teaching staff in the same month.
Aggregate Learner Base	Monthly aggregate number of learners of the course.
Post Context	A field in original data indicating the context of the post, which takes three values - "Course", "Item", and "Week".
Course	Indicator of post context classified as "Course", referring to general course discussion.
Item	Indicator of post context classified as "Item", referring to discussion related to specific course items.
Week	Indicator of post context classified as "Week", referring to discussion relted to weekly contents.
V. Learner Characteristics	
N Courses Taken	Number of courses the user has taken before creating the post.
N Courses Passed	Number of courses the user has passed before creating the post.
Course Payment	
Self-paid	Indicator that the user has paid for the course with his/her own fund.
Group Sponsored	Indicator that the user is sponsored for the course by external institutions.
Financial Aided	Indicator that the user receives financial aid for the course tuition from Coursera.
Unpaid	Indicator that the user has audited the course without payment.
Weekday Learner	Indicator that the user is active primarily during weekday rather than weekend.
Daytime Learner	Indicator that the user is active primarily during day time rather than night time.
VI. Post Topic Indicators	
Course Content	Indicator whether the post is classified under the topic "Course Content".
Peer Review	Indicator whether the post is classified under the topic "Peer Review".
Socialization	Indicator whether the post is classified under the topic "Socialization".
Technical Issue	Indicator whether the post is classified under the topic "Technical Issue".

Table C2 Gender Disparity in Quantity of Responses: Full Results

	(1) All Responses	(2) Learner Responses	(3) Staff Responses
Female Post	-0.0182**	0.0088	-0.0311***
	(0.0086)	(0.0056)	(0.0086)
log(N Courses Taken)	0.0215	0.0113	0.0133
	(0.0236)	(0.0120)	(0.0234)
log(N Courses Passed)	0.0042	0.0016	-0.0001
	(0.0106)	(0.0063)	(0.0111)
log(Study Hours)	0.0202	0.0051	0.0093
	(0.0179)	(0.0128)	(0.0217)
log(N Items Passed)	0.0276	-0.0178	0.0581**
	(0.0244)	(0.0202)	(0.0276)
Weekday User	0.0152***	0.0099***	0.0093**
	(0.0055)	(0.0038)	(0.0047)
Daytime User	-0.0003	0.0024	-0.0001
	(0.0030)	(0.0027)	(0.0022)
Weekday Question	0.0173***	0.0046	0.0172***
	(0.0044)	(0.0036)	(0.0056)
Daytime Question	-0.0043	-0.0034	-0.0020
	(0.0039)	(0.0031)	(0.0033)
Self-paid User	-0.0196*	-0.0035	-0.0201
	(0.0107)	(0.0048)	(0.0133)
Sponsored User	-0.0366***	-0.0125	-0.0312**
	(0.0090)	(0.0084)	(0.0130)
Fin-aid User	-0.0078	-0.0060	-0.0027
	(0.0098)	(0.0072)	(0.0119)
Learner-staff Ratio	-0.0316	0.0210*	-0.0570
	(0.0301)	(0.0114)	(0.0402)
Aggregate Learner Base	0.0743***	-0.0001	0.0920***
	(0.0201)	(0.0097)	(0.0255)
Course Context	-0.143***	-0.0680***	-0.121***
	(0.0300)	(0.0097)	(0.0255)
Item Context	0.2010***	0.2840***	-0.0832*
	(0.0518)	(0.0402)	(0.0485)
Observations	222,470	222,470	222,470
Adj. R-squared	0.112	0.090	0.205
Course-subforum FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes

Notes: The model is estimated through OLS regression. Full sample is used and each observation is a post. Sample period is 1/1/2015 - 12/31/2020. We control for subforum fixed effect and month fixed effect. The outcome variables of column (1), (2) and (3) are whether the post receives any response, response from peer learner, and response from staff in one week, respectively. We take log transformation to all continuous variables. Standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.

Appendix D: Additional Results on Mechanisms

This section contains supplementary summary statistics and regression results relevant to our discussion of mechanisms. To complement our analysis of content- and style-based heuristics, we provide more descriptions

Table C3 Gender Disparity in Receiving Responses: Alternative Observation Window

	(1) 2-week	(2) 4-week	(3) 6-week
A. Outcome Variable: 1(Has Response)			
Female Post	-0.0175**	-0.0175**	-0.0177**
	(0.0085)	(0.0084)	(0.0084)
Observations	222,470	222,470	222,470
Adj. R-squared	0.109	0.106	0.104
B. Outcome Variable: 1(Has Response from Peer)			
Female Post	0.0092	0.0087	0.0077
	(0.0059)	(0.0061)	(0.0071)
Observations	222,470	222,470	222,470
Adj. R-squared	0.087	0.085	0.084
C. Outcome Variable: 1(Has Response from Staff)			
Female Post	-0.0314***	-0.0315***	-0.0315***
	(0.0086)	(0.0086)	(0.0086)
Observations	222,470	222,470	222,470
Adj. R-squared	0.205	0.206	0.206
Course-subforum FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes

Notes: The model is estimated through OLS regression. Panel A, B and C show gender coefficients where the outcome variables are whether the post receives any response, response from peers, or response from staff, respectively. Column (1), (2) and (3) uses outcome variables defined in 2-week, 4-week and 6-week window, respectively. The sample, all control variables and fixed effects remain the same as in Table . Standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.

Table C4 Gender Disparity in Peer Responses: Removing Top Active Peer

	(1) Full Sample	(2) Course Content	(3) Peer Review	(4) Socialization	(5) Technical Issue
Panel A: Removing Top 1% Peer					
Female Post	0.0054	-0.0032	0.0036	0.0139	0.0006
	(0.0064)	(0.0063)	(0.0082)	(0.0105)	(0.0059)
Observations	173,269	73,321	56,174	46,377	92,331
Adj. R-squared	0.084	0.055	0.143	0.070	0.062
Panel B: Removing Top 10% Peer					
Female Post	0.0028	-0.0031	-0.0009	0.0163	0.0004
	(0.0061)	(0.0052)	(0.0083)	(0.0104)	(0.0051)
Observations	151,407	65,287	47,063	40,826	81,561
Adj. R-squared	0.062	0.045	0.102	0.058	0.052
Control Variables	Yes	Yes	Yes	Yes	Yes
Course-subforum FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes

Notes: The top most active peer learners are defined as those who created the maximum number of responses throughout our whole sample period. In panel A and B, we remove the posts responded by the top 1% and 10% most active learners from the sample, respectively. The five columns show gender coefficients of the full sample as well as the four post types subsamples. standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.

of linguistic characteristics of posts and responses. Table D1, Table D3 and Table D4 shows summary statistics of all post linguistic variables we have created from two primary dimensions: complexity/informativeness, and tone/sentiment. Table D1 describes linguistics characteristics of posts by the gender of post creators. Table D2 summarizes textual similarity of learners' posts. Table D3 and Table D4 describes responses by the gender and the role of response creators, respectively.

In section 5.3, we show that gender homophily among male staff leads to the gender disparity in receiving responses. In addition, we also analyzed the possibility of gender homophily among peer learners. Table D5

Table C5 Gender Disparity in Staff Responses: Removing Top Active Staff

	(1) Full Sample	(2) Course Content	(3) Peer Review	(4) Socialization	(5) Technical Issue
Panel A: Removing Top 1% Staff					
Female Post	-0.0300***	-0.0361***	-0.0147***	-0.0233***	-0.0318***
	(0.0058)	(0.0064)	(0.0052)	(0.0065)	(0.0077)
Observations	206,592	87,554	65,441	54,750	114,046
Adj. R-squared	0.166	0.177	0.190	0.156	0.151
Panel B: Removing Top 10% Staff					
Female Post	-0.0181***	-0.0251***	-0.0072*	-0.0119**	-0.0198***
	(0.0049)	(0.0052)	(0.0040)	(0.0056)	(0.0058)
Observations	188,017	79,178	61,180	50,368	100,549
Adj. R-squared	0.108	0.117	0.126	0.101	0.101
Control Variables	Yes	Yes	Yes	Yes	Yes
Course-subforum FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes

Notes: The top most active staff is defined as those who created the maximum number of responses throughout our whole sample period. In panel A and B, we remove the posts responded by the top 1% and 10% most active staff from the sample, respectively. The five columns show gender coefficients of the full sample as well as the four post types subsamples. standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.

Table C6 Summary Statistics of Staff Response Variables: by Topic and Staff Type

	Gender of Post Creator							
	All Posts			Male		Female		
Variable	Obs. (1)	Mean (2)	S.D. (3)	Obs. (4)	Mean (5)	Obs. (6)	Mean (7)	Mean Diff. (8)
A. Outcome Variable: 1(Has Response from Instructor)								
Full Sample	321,942	0.002	0.048	150,476	0.003	72,197	0.002	0.001***
Course Content	128,132	0.003	0.053	62,565	0.004	31,549	0.002	0.002***
Assignment Review	111,127	0.001	0.035	47,728	0.002	22,164	0.001	0.000
Socialization	80,035	0.002	0.049	38,886	0.003	19,912	0.002	0.001**
Technical Issue	182,123	0.003	0.053	87,005	0.004	39,064	0.003	0.001**
B. Outcome Variable: 1(Has Response from Mentor)								
Full Sample	321,942	0.210	0.407	150,476	0.230	72,197	0.179	0.052***
Course Content	128,132	0.221	0.415	62,565	0.242	31,549	0.173	0.068***
Assignment Review	111,127	0.159	0.366	47,728	0.178	22,164	0.147	0.031***
Socialization	80,035	0.184	0.388	38,886	0.205	19,192	0.153	0.052***
Technical Issue	182,123	0.275	0.447	87,005	0.293	39,064	0.245	0.048***
C. Outcome Variable: 1(Has Response from Teaching Assistant)								
Full Sample	321,942	0.155	0.362	150,476	0.158	72,197	0.122	0.037***
Course Content	128,132	0.156	0.363	62,565	0.160	31,549	0.115	0.046***
Assignment Review	111,127	0.127	0.333	47,728	0.131	22,164	0.111	0.021***
Socialization	80,035	0.128	0.334	38,886	0.132	19,192	0.098	0.034***
Technical Issue	182,123	0.204	0.403	87,005	0.203	39,064	0.169	0.035***

Notes: Panel A, B and C show summary summary statistics of outcome variables defined as whether the post receives response from instructor, mentor, or teaching assistant, respectively. In each panel, the five rows show the summary statistics of the full sample as well as the four topic type subsamples. *Mean Diff.* is male group mean minus female group mean. The significance is based on standard t-tests. Standard errors: *** p<0.01, ** p<0.05, * p<0.1.

shows test of gender homophily among peer learners. The outcome variable is whether the post receives response from female or male peer learner in a week. Unlike the male staff, male peers appear to be gender neutral when responding to posts, while female peers favor females' posts slightly over males' posts. However, as shown in Table 2 column (2), such observation does not translate into a significant gender disparity in the likelihood of receiving responses from peer learners, considering the fact that male peers account for the majority.

Table D6 and Table D7 shows the robustness check of gender homophily against extremely active peers or staffs. For instance, panel A shows the point estimation of post gender indicator with the sample removing top 1% most active peer learner, where the outcome variable is whether the post receives response from female peer in 1 week. Panel B, C, and D are defined similarly. Table D8 shows that gender homophily exists

Table C7 Effect of Gender Nondisclosure and Exclusion of Nationalities

Panel A. Response Rates to Posts by Learner Gender			
	(1) All Responses	(2) Staff Responses	(3) Learner Responses
Female Post	-0.0191**	-0.0319***	0.0086
	(0.0089)	(0.0092)	(0.0056)
Nondisclosed Gender Post	-0.0072*	-0.0086**	0.0002
	(0.0042)	(0.0043)	(0.0028)
Controls	Yes	Yes	Yes
Observations	321720	321720	321720
Adj. R-squared	0.107	0.199	0.095
Course-subforum FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes
Panel B. Excluding Learners of Different Nationalities			
	(4) Remove India	(5) Remove China and India	(6) US Only
FemalePost	-0.0343***	-0.0344***	-0.0400***
	(0.0092)	(0.0092)	(0.0119)
Observations	179,171	177,327	68,475
Adj. R-squared	0.213	0.213	0.219
Control Variables	Yes	Yes	Yes
Course-subforum FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes

Notes: Standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.

Table C8 Gender Disparity with Post-based Knowledge Accumulation Controls

	(1) All Responses	(2) Learner Responses	(3) Staff Responses
Female Post	-0.0171**	-0.0305***	0.00977*
	(0.00746)	(0.00801)	(0.00563)
N Prev Peer Posts	0.299***	0.150***	0.260***
	(0.0188)	(0.0169)	(0.0158)
N Prev Staff Posts	-0.188***	-0.0278	-0.125***
	(0.0338)	(0.0367)	(0.0174)
Aggregate Learner Base	0.0670***	0.0883***	-0.00650
	(0.0183)	(0.0242)	(0.0104)
Observations	222,470	222,470	222,470
Adj. R-squared	0.211	0.238	0.183
Control Variables	Yes	Yes	Yes
Course-subforum FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes

Notes: The outcome variables of column (1), (2) and (3) are whether the post receives any response, response from peer learner, and response from staff in one week, respectively. We take log transformation to all continuous variables. Standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.

for all staff types - instructor, mentor, and teaching assistant. US and Indian learners' posts account for 27% and 28% of our sample, respectively. Other countries each only accounts for less than 3% of all posts. We divide learners into US/Indian learners (the majority) and other learners (the minority). As shown in Table D9, for US/Indian learners and other learners, there is no significant difference in the likelihood of receiving staff response, US/Indian staff response, as well as other staff response. Therefore, we do not find support for an inherent bias of teaching staffs against nationality.

Table C9 Gender Disparity in Staff Responses: Heterogeneous Environments

Panel A. Response Rate by Question Content				
	(1) Course Content	(2) Peer Review	(3) Socialization	(4) Technical Issue
Outcome Variable: 1(Has Response from Instructor)				
Female Post	-0.0023***	-0.0005	-0.0015***	-0.0014**
	(0.0008)	(0.0003)	(0.0005)	(0.0006)
Outcome Variable: 1(Has Response from Mentor)				
Female Post	-0.0260***	-0.0112	-0.0162**	-0.0248***
	(0.0071)	(0.0076)	(0.0081)	(0.0094)
Outcome Variable: 1(Has Response from Teaching Assistant)				
Female Post	-0.0174**	-0.0081	-0.0116	-0.0185**
	(0.0084)	(0.0077)	(0.0082)	(0.0087)
Observations	94,023	69,860	58,024	125,926
Adj. R-squared (Row 1)	0.034	0.022	0.023	0.031
Adj. R-squared (Row 2)	0.271	0.271	0.228	0.241
Adj. R-squared (Row 3)	0.170	0.170	0.142	0.162
Panel B. Response Rate by Course Workload				
	(5) less than p25	(6) p25-50	(7) p50-75	(8) greater than p75
Outcome Variable: 1(Has Response from Staff)				
FemalePost	-0.0388***	-0.0174***	-0.0111	-0.0209**
	(0.0104)	(0.0043)	(0.0143)	(0.0091)
Observations	64,607	44,987	63,674	49,202
Adj. R-squared	0.210	0.345	0.339	0.193
Panel C. Response Rate by Course Subject				
	(9) All CS	(10) Programming	(11) Data Science	(12) Non-CS
Outcome Variable: 1(Has Response from Staff)				
FemalePost	-0.0257**	-0.0222*	-0.0087**	0.0018
	(0.0113)	(0.0110)	(0.0035)	(0.00204)
Observations	172915	87665	85250	49,555
Adj. R-squared	0.197	0.333	0.167	0.049
Control Variables (All Panels)	Yes	Yes	Yes	Yes
Course-subforum FE (All Panels)	Yes	Yes	Yes	Yes
Year-Month FE (All Panels)	Yes	Yes	Yes	Yes

Notes: Standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.

Table C10 Staff Response Disparity: Logit Model

	(1) Full Sample	(2) Course Content	(3) Peer Review	(4) Socialization	(5) Technical Issue
Female Post	-0.0625***	-0.0682***	-0.0513**	-0.0228	-0.0618***
	(0.0127)	(0.0197)	(0.0258)	(0.0260)	(0.0151)
Observations	220,916	92,634	69,598	57,588	125,202
Pseudo R-squared	0.229	0.243	0.297	0.222	0.178
Control Variables	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes

Notes: This table shows logit regression results. The five columns show gender coefficients of the full sample as well as the four post types subsamples. All control variables in model (1) and month fixed effect are included. standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.

Appendix E: Additional Results about Learner Performance

This section contains supplementary statistics and results about the impact of receiving response on learners' performance. Table E1 shows summary statistics of outcome and explanatory variables by gender and observation windows. We observe each learner from the day that he/she started learning until 12 weeks afterwards. For example, the outcome variable *Pass Course* in panel A is defined as whether the learner passes the course within 1 week after he/she has started. The rest of the variables are defined similarly. Note

Table C11 Gender Disparity in Quality of Staff Responses: Alternative Observation Window

	(1) 2 Week	(2) 4 Week	(3) 6 Week
A. Outcome Variable: 1(Response Has Vote(s))			
Female Post	-0.00362***	-0.00386***	-0.00398***
	(0.00107)	(0.00105)	(0.00110)
Observations	222470	222470	222470
Adj. R-squared	0.020	0.021	0.021
A. Outcome Variable: 1(Avg. Response Length)			
Female Post	-0.0726***	-0.0729***	-0.0730***
	(0.0203)	(0.0203)	(0.0202)
Observations	222470	222470	222470
Adj. R-squared	0.200	0.201	0.200
A. Outcome Variable: 1(Avg. Response Smog Index)			
Female Post	-0.0564***	-0.0566***	-0.0566***
	(0.0157)	(0.0157)	(0.0157)
Observations	222470	222470	222470
Adj. R-squared	0.203	0.203	0.203
Controls	Yes	Yes	Yes
Course-subforum FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes

Notes: This table shows regression outcomes of response quality measures within 2-week, 4-week, and 6-week observation windows. Standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.

Table C12 Gender Disparity in Receiving Responses: Controlling for Staff-to-female ratio

	(1) All Responses	(2) Learner Responses	(3) Staff Responses
FemalePost	-0.0139*	0.0089*	-0.0134**
	(0.0071)	(0.0048)	(0.0064)
Controls	Yes	Yes	Yes
Observations	222,470	222,470	222,470
Adj. R-squared	0.115	0.090	0.220
Course-subforum FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes

Notes: In this set of regressions, we replace the staff-to-learner ratio control with staff-to-female ratio control. Standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.

Table D1 Summary Statistics of Post Linguistic Variables by Gender

	All			Male			Female			
Variable	Obs.	Mean	S.D.	Obs.	Mean	S.D.	Obs.	Mean	S.D.	Mean Diff.
Text Length	321,942	25.258	25.330	150,476	25.068	25.028	72,197	28.102	29.710	-3.034***
Smog Index	321,942	11.723	5.491	150,476	11.674	5.462	72,197	12.101	5.958	-0.427***
Sentiment Score										
Strong	321,942	1.183	0.796	150,476	1.174	0.799	72,197	1.250	0.865	-0.076***
Power	321,942	0.724	0.663	150,476	0.701	0.664	72,197	0.778	0.692	-0.076***
Positive	321,942	0.996	0.729	150,476	0.973	0.729	72,197	1.057	0.784	-0.083***
Affiliation	321,942	0.744	0.664	150,476	0.720	0.663	72,197	0.794	0.699	-0.074***
Active	321,942	1.434	0.750	150,476	1.405	0.760	72,197	1.459	0.805	-0.054***
Academic	321,942	0.331	0.509	150,476	0.319	0.504	72,197	0.325	0.511	-0.006***
Need	321,942	0.355	0.528	150,476	0.343	0.522	72,197	0.379	0.544	-0.036***
Goal	321,942	0.103	0.315	150,476	0.107	0.320	72,197	0.116	0.334	-0.009***
Try	321,942	0.195	0.427	150,476	0.201	0.433	72,197	0.228	0.458	-0.027***
Means	321,942	0.668	0.640	150,476	0.652	0.642	72,197	0.701	0.660	-0.048***
Persist	321,942	0.117	0.333	150,476	0.120	0.337	72,197	0.134	0.355	-0.014***
Complete	321,942	0.202	0.429	150,476	0.205	0.431	72,197	0.105	0.457	-0.013***
Fail	321,942	0.092	0.295	150,476	0.092	0.296	72,197	0.105	0.315	-0.013***

Notes: Each observation is a post. We use the full text, including the title and the content of the post to compute linguistics measures. *Mean Diff.* is male group mean minus female group mean. The significance is based on standard t-tests. Standard errors: *** p<0.01, ** p<0.05, * p<0.1.

Table D2 Cosine Similarity of Learners' Posts

	Gender of Post Creator									
	All Posts			Male			Female			Mean Diff.
Sample	Obs. (1)	Mean (2)	S.D. (3)	Obs. (4)	Mean (5)	S.D. (6)	Obs. (7)	Mean (8)	S.D. (9)	(10)
Full Sample	321,942	0.037	0.042	150,476	0.033	0.040	72,197	0.034	0.039	0.000
Topic Subsamples										
Course Content	128,132	0.023	0.026	62,565	0.021	0.025	31,549	0.022	0.022	-0.001***
Peer Review	111,127	0.066	0.053	47,728	0.062	0.526	22,164	0.062	0.526	0.000
Socialization	80,035	0.027	0.036	38,886	0.024	0.034	19,192	0.025	0.032	-0.001***
Technical Issue	182,123	0.025	0.024	87,005	0.024	0.023	39,064	0.025	0.023	-0.001***

Table D3 Summary Statistics of Response Linguistic Variables by Gender

	All			Male			Female			
Variable	Obs.	Mean	S.D.	Obs.	Mean	S.D.	Obs.	Mean	S.D.	Mean Diff.
Text Length	512,592	19.427	20.463	253,500	19.180	19.911	135,275	22.338	22.979	-3.158***
Smog Index	512,592	9.605	5.591	253,500	9.159	5.588	135,275	10.241	5.991	-1.082***
Sentiment Score										
Strong	512,592	0.927	0.804	253,500	0.928	0.799	135,275	1.000	0.849	-0.072***
Power	512,592	0.518	0.637	253,500	0.509	0.630	135,275	0.589	0.674	-0.081***
Positive	512,592	0.759	0.681	253,500	0.748	0.680	135,275	0.813	0.708	-0.064***
Affiliation	512,592	0.477	0.607	253,500	0.478	0.605	135,275	0.501	0.627	-0.026***
Active	512,592	1.092	0.812	253,500	1.088	0.814	135,275	1.162	0.839	-0.074***
Academic	512,592	0.264	0.467	253,500	0.240	0.452	135,275	0.308	0.496	-0.067***
Need	512,592	0.248	0.459	253,500	0.240	0.453	135,275	0.298	0.492	-0.058***
Goal	512,592	0.076	0.272	253,500	0.083	0.284	135,275	0.077	0.274	0.006***
Try	512,592	0.168	0.399	253,500	0.177	0.406	135,275	0.186	0.420	-0.009***
Means	512,592	0.541	0.630	253,500	0.541	0.629	135,275	0.548	0.648	-0.07***
Persist	512,592	0.151	0.376	253,500	0.085	0.287	135,275	0.102	0.315	-0.017***
Complete	512,592	0.071	0.263	253,500	0.161	0.386	135,275	0.163	0.391	-0.003*
Fail	512,592	0.071	0.263	253,500	0.073	0.266	135,275	0.084	0.284	-0.011***

Notes: This table shows summary statistics of linguistics variables of responses. Each observation is a response. *Mean Diff.* is male group mean minus female group mean. The significance is based on standard t-tests. Standard errors: *** p<0.01, ** p<0.05, * p<0.1.

Table D4 Summary Statistics of Response Linguistic Variables by Learner/Staff

	Staff			Learner			
Variable	Obs.	Mean	S.D.	Obs.	Mean	S.D.	Mean Diff.
Post Length	118,032	23.989	19.123	394,560	18.063	20.651	5.927***
Smog Index	118,032	10.743	5.086	394,560	8.904	5.855	1.672***
Sentiment Score							
Strong	118,032	1.109	0.799	394,560	0.872	0.797	0.237***
Power	118,032	0.657	0.664	394,560	0.477	0.623	0.181***
Positive	118,032	0.740	0.678	394,560	0.764	0.681	-0.025***
Affiliation	118,032	0.462	0.592	394,560	0.481	0.611	-0.019***
Active	118,032	1.305	0.788	394,560	1.029	0.809	0.277***
Academic	118,032	0.286	0.485	394,560	0.258	0.462	0.028***
Need	118,032	0.345	0.510	394,560	0.219	0.439	0.125***
Goal	118,032	0.099	0.306	394,560	0.069	0.261	0.031***
Try	118,032	0.247	0.465	394,560	0.144	0.373	0.103***
Means	118,032	0.590	0.653	394,560	0.526	0.622	0.064***
Persist	118,032	0.132	0.351	394,560	0.069	0.261	0.063***
Complete	118,032	0.187	0.409	394,560	0.140	9.365	0.048***
Fail	118,032	0.101	0.309	394,560	0.062	0.247	0.039***

Notes: This table shows summary statistics of linguistics variables of responses by the role of poster, being it either learner or staff. Staff includes instructor, mentor and teaching assistant. Each observation is a response. *Mean Diff.* is male group mean minus female group mean. The significance is based on standard t-tests. Standard errors: *** p<0.01, ** p<0.05, * p<0.1.

that the gender gap in pass rate is significant and large for all observation windows, size ranging from 5.1% to 10.4%. Male learners appear to receive more response from staff and are more likely to pass the course in all observation windows.

Table E2 shows the first stage regression results of the IV regression, i.e., regressing the main explanatory variable on the IV. Panel A (B) reports the results of regressing the indicator of having peer (staff) response

Table D5 Gender Homophily: Peer Responses

	(1) Full Sample	(2) Course Content	(3) Peer Review	(4) Socialization	(5) Technical Issue
A. Outcome Variable: 1(Has Response from Female Peer)					
Female Post	0.0134***	0.0116***	0.0125***	0.0128***	0.0114***
	(0.0032)	(0.0031)	(0.0037)	(0.0043)	(0.0038)
Observations	222,470	94,023	69,860	58,024	125,926
Adj. R-squared	0.032	0.028	0.053	0.028	0.029
B. Outcome Variable: 1(Has Response from Male Peer)					
Female Post	-0.0051	-0.0097	-0.0051	-0.0005	-0.0088*
	(0.0050)	(0.0065)	(0.0050)	(0.0061)	(0.0048)
Observations	222,470	94,023	69,860	58,024	125,926
Adj. R-squared	0.058	0.044	0.088	0.051	0.050
Control Variables	Yes	Yes	Yes	Yes	Yes
Course-subforum FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes

Notes: Panel A and B show gender coefficients where outcome variables are whether the post receives response from female peer or male peer in one week, respectively. All control variables as well as the linguistic and reputation characteristics are included. Standard errors in parentheses are clustered at course level. Control variables include learner and post characteristics, as well as linguistic characteristics. *** p<0.01, ** p<0.05, * p<0.1.

Table D6 Gender Homophily: Peer Responses, Removing Top Active Peer

	(1) Full Sample	(2) Course Content	(3) Peer Review	(4) Socialization	(5) Technical Issue
A. 1(Has Response from Female Peer), Removing Top 1% Active Peer					
Female Post	0.0112***	0.0090***	0.0120***	0.0129***	0.0095**
	(0.0032)	(0.0029)	(0.0041)	(0.0048)	(0.0037)
Observations	173,269	73,321	56,174	46,377	92,331
Adj. R-squared	0.030	0.027	0.049	0.029	0.027
B. 1(Has Response from Female Peer), Removing Top 10% Active Peer					
Female Post	0.0076***	0.0073**	0.0058	0.0119***	0.0073**
	(0.0027)	(0.0028)	(0.0035)	(0.0042)	(0.0032)
Observations	151,407	65,287	47,063	40,826	81,561
Adj. R-squared	0.022	0.024	0.033	0.027	0.023
C. 1(Has Response from Male Peer), Removing Top 1% Active Peer					
Female Post	-0.0047	-0.0087	-0.0075	0.0026	-0.0091**
	(0.0046)	(0.0062)	(0.0054)	(0.0059)	(0.0039)
Observations	173,269	73,321	56,174	46,377	92,331
Adj. R-squared	0.057	0.045	0.084	0.052	0.050
D. 1(Has Response from Male Peer), Removing Top 10% Active Peer					
Female Post	-0.0039	-0.0062	-0.0088*	0.0056	-0.0068**
	(0.0037)	(0.0049)	(0.0050)	(0.0065)	(0.0027)
Observations	151,407	65,287	47,063	40,826	81,561
Adj. R-squared	0.045	0.039	0.067	0.045	0.042
Control Variables	Yes	Yes	Yes	Yes	Yes
Course-subforum FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes

Notes: Panel A and C uses the subsample where posts responded by the top 1% most active peers are removed, and panel B and D uses the subsample where we remove the posts responded by the top 10% most active peers throughout the whole sample period. Standard errors in parentheses are clustered at course level. Control variables include learner and post characteristics, as well as linguistic characteristics. *** p<0.01, ** p<0.05, * p<0.1.

on the IV, which is defined as the fraction of other posts with peer (staff) response in the same forum within the same day of posting. A large and significant coefficient of the first stage regression indicates strong IV.

Table D7 Gender Homophily: Staff Responses, Removing Top Active Staff

	(1) Full Sample	(2) Course Content	(3) Peer Review	(4) Socialization	(5) Technical Issue
A. 1(Has Response from Female Staff), Removing Top 1% Active Staff					
Female Post	-0.0046	-0.0072**	-0.0020	-0.0043	-0.0048
	(0.0032)	(0.0034)	(0.0024)	(0.0041)	(0.0030)
Observations	206,592	87,554	65,441	54,750	114,046
Adj. R-squared	0.069	0.077	0.078	0.064	0.072
B. 1(Has Response from Female Staff), Removing Top 10% Active Staff					
Female Post	-0.0002	-0.0028	0.0014	0.0007	0.00029
	(0.0024)	(0.0021)	(0.0018)	(0.0031)	(0.0023)
Observations	188,017	79,178	61,180	50,368	100,549
Adj. R-squared	0.069	0.071	0.086	0.052	0.074
C. 1(Has Response from Male Staff), Removing Top 1% Active Staff					
Female Post	-0.0172***	-0.0195***	-0.0123***	-0.0135***	-0.0204***
	(0.0038)	(0.0049)	(0.0034)	(0.0044)	(0.0048)
Observations	206,592	87,554	65,441	54,750	114,046
Adj. R-squared	0.125	0.128	0.136	0.126	0.118
D. 1(Has Response from Male Staff), Removing Top 10% Active Staff					
Female Post	-0.0125***	-0.0154***	-0.0079**	-0.0109***	-0.0151***
	(0.0040)	(0.0048)	(0.0034)	(0.0036)	(0.0050)
Observations	188,017	79,178	61,180	50,368	100,549
Adj. R-squared	0.078	0.087	0.075	0.082	0.079
Control Variables	Yes	Yes	Yes	Yes	Yes
Course-subforum FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes

Notes: Panel A and C uses the subsample where posts responded by the top 1% most active staff is removed, and panel B and D uses the subsample where we remove the posts responded by the top 10% most active staff throughout the whole sample period. Standard errors in parentheses are clustered at course level. Control variables include learner and post characteristics, as well as linguistic characteristics. *** p<0.01, ** p<0.05, * p<0.1.

Table D8 Gender Homophily by Staff Types

	(1) Instructor	(2) Mentor	(3) Teaching Assistant
A. Outcome Variable: 1(Has Response from Female Staff)			
Female Post	0.00001	0.0033	0.0026
	(0.0001)	(0.0048)	(0.0045)
Adj. R-squared	0.023	0.181	0.179
B. Outcome Variable: 1(Has Response from Male Staff)			
Female Post	-0.0011***	-0.0208***	-0.0143**
	(0.0004)	(0.0056)	(0.0067)
Adj. R-squared	0.020	0.154	0.122
Observations	222470	222470	222470
Control Variables	Yes	Yes	Yes
Course-subforum FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes

Notes: Standard errors in parentheses are clustered at course level. Control variables include learner and post characteristics, as well as linguistic characteristics. *** p<0.01, ** p<0.05, * p<0.1.

Table D9 Test of Discrimination against Nationality

	(1) Has Staff Response	(2) Has US/IN Staff Response	(3) Has Other Staff Response
US/IN Learners' Post	0.112	0.0627	0.0453
	(0.0692)	(0.0674)	(0.0353)
Observations	222470	222470	222470
Adj. R-squared	0.212	0.167	0.149
Control Variables	Yes	Yes	Yes
Course-subforum FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes

Notes: Outcome variables of the three columns are indicators of receiving staff response, receiving US or Indian staff response, and receiving response from staff of other countries, respectively. Standard errors in parentheses are clustered at course level. Control variables include learner and post characteristics, as well as linguistic characteristics. *** p<0.01, ** p<0.05, * p<0.1.

Table E1 Summary Statistics of Performance Analysis: Alternative Observation Windows

	All			Female		Male		
Variable	Obs.	Mean	S.D.	Obs.	Mean	Obs.	Mean	Mean Diff.
Panel A: 1-week Observation Window								
Pass Course	92,635	0.342	0.474	18,724	0.228	43,599	0.332	-0.104***
Has Peer Response	92,635	0.491	0.500	18,724	0.456	43,599	0.481	-0.024***
Has Staff Response	92,635	0.224	0.417	18,724	0.188	43,599	0.243	-0.055***
Panel B: 3-week Observation Window								
Pass Course	144,679	0.508	0.500	29,525	0.398	68,394	0.502	-0.104***
Has Peer Response	144,679	0.560	0.496	29,525	0.556	68,394	0.562	-0.005
Has Staff Response	144,679	0.273	0.445	29,525	0.243	68,394	0.296	-0.052***
Panel C: 6-week Observation Window								
Pass Course	171,234	0.663	0.473	35,533	0.596	81,022	0.667	-0.071***
Has Peer Response	171,234	0.590	0.492	35,533	0.594	81,022	0.592	0.002
Has Staff Response	171,234	0.291	0.454	35,533	0.263	81,002	0.316	-0.054***
Panel D: 9-week Observation Window								
Pass Course	179.941	0.715	0.452	37,567	0.663	84,984	0.718	-0.055***
Has Peer Response	179,941	0.598	0.490	37,567	0.605	84,984	0.600	0.005
Has Staff Response	179,941	0.297	0.457	37,567	0.270	84,984	0.323	-0.052***
Panel E: 12-week Observation Window								
Pass Course	183,630	0.730	0.444	38,380	0.682	86,701	0.733	-0.051***
Has Peer Response	183,630	0.601	0.490	38,380	0.610	86,701	0.604	0.005*
Has Staff Response	183,630	0.299	0.458	38,380	0.272	86,701	0.324	-0.053***

Notes: For each panel, the variables *Pass Course*, *Has Peer Response* and *Has Staff Response* are defined as whether the learner pass the course, receives any response from peers, or receives any response from staff within the corresponding observation window, respectively. Note that sample size becomes larger when the observation window becomes longer, since the sample consists of the learners that are still active in the latest week. For example, if a learner pass the course in 1 week, then he/she will not be included in the 3-week sample. *Mean Diff.* is female group mean minus male group mean. The significance is based on standard t-tests.Standard errors: *** p<0.01, ** p<0.05, * p<0.1.

Table E2 Impact of Forum Response on Learner Performance: First Stage

	(1) 1-week	(2) 2-week	(3) 3-week	(4) 4-week	(5) 5-week
A. Instrumented Variable: 1(Has Peer Response)					
IV_{Peer}	0.3460***	0.3040***	0.2960***	0.2860***	0.2780***
	(0.0392)	(0.0385)	(0.0380)	(0.0393)	(0.0407)
Observations	92,620	125,525	144,657	157,168	165,328
Adj. R-squared	0.061	0.053	0.049	0.047	0.045
B. Instrumented Variable: 1(Has Staff Response)					
IV_{Staff}	0.8310***	0.8350***	0.8410***	0.8440***	0.8440***
	(0.0438)	(0.0483)	(0.0477)	(0.0479)	(0.0473)
Observations	92,620	125,525	144,657	157,168	165,328
Adj. R-squared	0.408	0.421	0.427	0.433	0.438
Control Variables	Yes	Yes	Yes	Yes	Yes
Course FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes

Notes: Panel A and B shows the fist stage regression IV coefficients where the instrumented variables are whether the learner receives response from peer or staff, respectively. Each column shows the regression results where variables are defined in the corresponding observation window. All control variables and fixed effects are included. Standard errors are clustered at course level. *** p<0.01, ** p<0.05, * p<0.1.