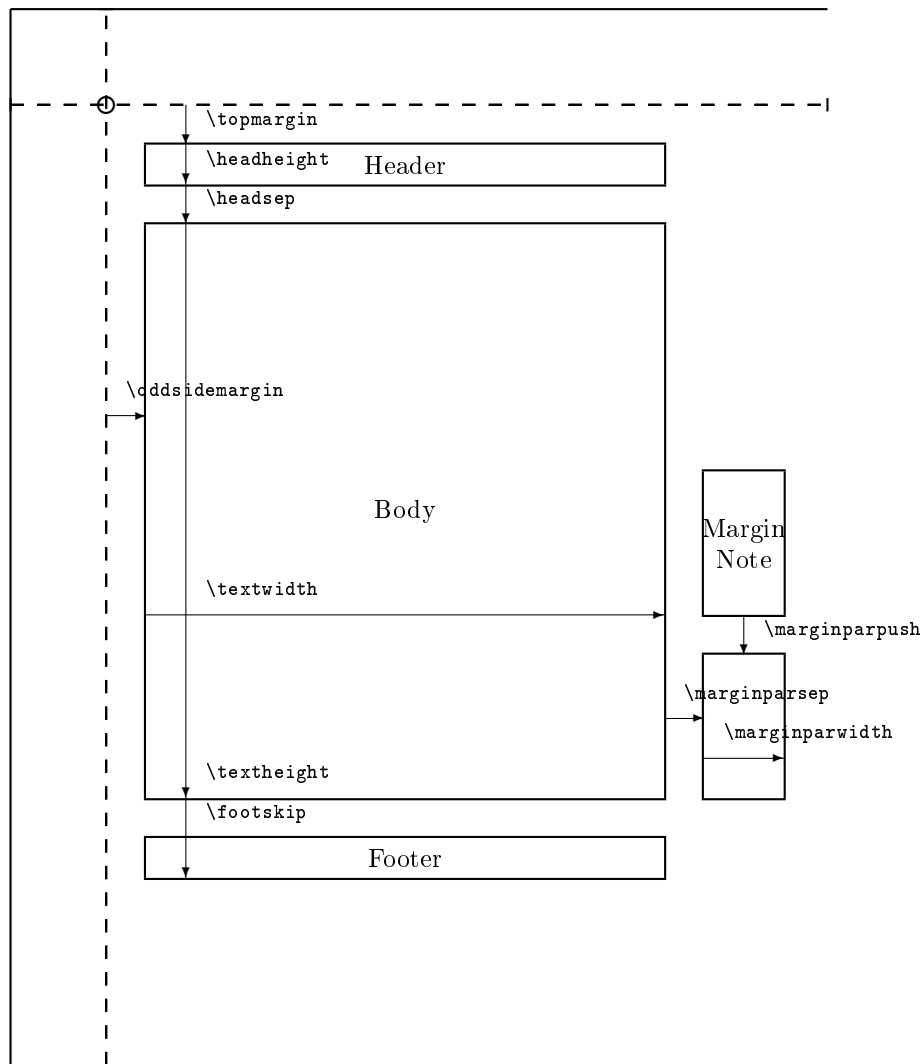The circle is at 1 inch from the top and left of the page. Dashed lines represent (\hoffset + 1 inch) and (\voffset + 1 inch) from the top and left of the page.

\topmargin

\headheight   Header

\headsep

\oddsidemargin

Body

Margin
Note

\textwidth

\marginparpush

\marginparsep

\marginparwidth

\textheight

\footskip

Footer

Actual page layout values.

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1 Plots

../plots/attritecoefplot.png

2 Tables

Variable	(1) Above median		(2) Control, All		(3) Treated, All		(3)-(1)	T-test P-value (3)-(2)
	N	Mean/SE	N	Mean/SE	N	Mean/SE		
Midterm 1 Score	420	2.044 (0.025)	215	0.000 (0.068)	215	0.004 (0.068)	0.000***	0.971
Math Quiz Score	420	0.591 (0.043)	215	-0.000 (0.068)	215	0.056 (0.065)	0.000***	0.550
Pre Treatment Videos	420	12.100 (0.659)	215	12.107 (0.788)	215	12.265 (0.922)	0.884	0.896
PSET	420	0.271 (0.042)	215	0.242 (0.053)	215	0.228 (0.055)	0.529	0.855
Transfer Status	420	0.271 (0.022)	215	0.493 (0.034)	215	0.451 (0.034)	0.000***	0.386
Prev. GPA	323	3.447 (0.029)	133	2.914 (0.045)	142	2.943 (0.056)	0.000***	0.691
Male	420	0.593 (0.024)	215	0.665 (0.032)	215	0.586 (0.034)	0.869	0.091*
Female	420	0.393 (0.024)	215	0.330 (0.032)	215	0.405 (0.034)	0.775	0.110
Other gender/not spec.	420	0.014 (0.006)	215	0.005 (0.005)	215	0.009 (0.007)	0.569	0.563
Chinese	420	0.502 (0.024)	215	0.488 (0.034)	215	0.442 (0.034)	0.148	0.335
Latinx	420	0.062 (0.012)	215	0.140 (0.024)	215	0.153 (0.025)	0.001***	0.683
Other Asian	420	0.152 (0.018)	215	0.140 (0.024)	215	0.219 (0.028)	0.047**	0.033**
Vietnamese	420	0.045 (0.010)	215	0.047 (0.014)	215	0.014 (0.008)	0.016**	0.049**
White	420	0.150 (0.017)	215	0.121 (0.022)	215	0.116 (0.022)	0.229	0.882
Other ethnicity/not spec.	420	0.088 (0.014)	215	0.065 (0.017)	215	0.056 (0.016)	0.123	0.687

Notes: This table includes all students who took the final exam (i.e. completed the experiment. *Midterm 1 Score* and *Math Quiz Score* are in standard deviation units. *Pre Treatment Videos* is the number of course-relevant videos watched before the first midterm. *PSET* is the number of visits to the PSET tutoring lab before the first midterm. *Prev. GPA* is the cumulative GPA at the beginning of the course, which is only observed for students who had attended UCSD previously. *Transfer Status* and all gender and ethnicity variables are binary and equal 1 if the student matches that category. The value displayed for t-tests are p-values. Standard errors are robust. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Variable	N	(1) Control, All Mean/SE	N	(2) Treated, All Mean/SE	T-test P-value (1)-(2)
Midterm 1 Score	166	0.029 (0.077)	166	0.021 (0.078)	0.938
Math Quiz Score	166	-0.012 (0.077)	166	0.091 (0.076)	0.341
Pre Treatment Videos	166	12.090 (0.882)	166	12.410 (1.018)	0.813
PSET	166	0.283 (0.066)	166	0.253 (0.066)	0.746
Transfer Status	166	0.470 (0.039)	166	0.416 (0.038)	0.321
Prev. GPA	105	2.929 (0.047)	114	3.001 (0.059)	0.346
Male	166	0.657 (0.037)	166	0.584 (0.038)	0.176
Female	166	0.337 (0.037)	166	0.404 (0.038)	0.212
Other gender/not spec.	166	0.006 (0.006)	166	0.012 (0.008)	0.563
Chinese	166	0.518 (0.039)	166	0.410 (0.038)	0.048**
Latinx	166	0.139 (0.027)	166	0.169 (0.029)	0.448
Other Asian	166	0.145 (0.027)	166	0.217 (0.032)	0.087*
Vietnamese	166	0.048 (0.017)	166	0.006 (0.006)	0.018**
White	166	0.102 (0.024)	166	0.145 (0.027)	0.244
Other ethnicity/not spec.	166	0.048 (0.017)	166	0.054 (0.018)	0.804

Notes: The value displayed for t-tests are p-values. Standard errors are robust. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 1: Effect of Being Assigned Treatment (ITT) on Relevant Videos Watched

	Unique Videos				Total Videos			
	All Observations	All Observations	Matching Pairs	Matching Pairs	All Observations	All Observations	Matching Pairs	Matching Pairs
Treated	21.33***	21.10***	20.49***	20.11***	38.09***	37.86***	38.31***	38.01***
	(1.63)	(1.47)	(1.39)	(1.42)	(3.88)	(3.19)	(3.40)	(3.58)
Midterm 1 score	2.15**	1.59*	−1.41	−38.17	4.08**	2.45	−3.35	−44.15
	(0.94)	(0.91)	(0.89)	(34.18)	(1.99)	(1.87)	(2.30)	(75.36)
Year = 2019	−2.40	−1.13	−2.90**		−8.21**	−4.87	−8.23**	
	(1.63)	(1.46)	(1.34)		(3.88)	(3.32)	(3.63)	
Intercept	32.97***	15.10*	14.20**	10.66	53.92***	−15.50	−20.52	−45.58
	(1.54)	(8.10)	(6.89)	(11.63)	(3.69)	(14.64)	(13.98)	(28.72)
N	430	430	332	332	430	430	332	332
Controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Pair Fixed Effects	No	No	No	Yes	No	No	No	Yes

Notes: 'Videos watched' includes all videos watched before the final exam relevant to the course. Test score variables are normalized by the control mean and standard deviation. Standard errors are robust to heteroskedasticity. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.

Table 2: Effect of Being Assigned Treatment (ITT) on Relevant Videos Watched before Midterm 2

	Unique Videos				Total Videos			
	All Observations	All Observations	Matching Pairs	Matching Pairs	All Observations	All Observations	Matching Pairs	Matching Pairs
Treated	6.43***	5.68***	5.63***	5.00***	9.44***	8.60***	8.82***	7.77***
	(1.52)	(1.07)	(1.13)	(1.19)	(2.73)	(1.74)	(1.87)	(1.82)
Midterm 1 score	0.97	0.32	−0.14	−52.22	0.85	0.08	−0.61	−68.23
	(0.85)	(0.72)	(0.81)	(34.77)	(1.49)	(1.12)	(1.26)	(45.48)
Year = 2019	−8.03***	−5.54***	−6.39***		−12.32***	−7.39***	−8.34***	
	(1.53)	(1.12)	(1.16)		(2.76)	(1.77)	(1.90)	
Intercept	25.56***	−2.71	−3.94	−19.68*	37.47***	−10.31	−11.40	−34.77**
	(1.35)	(6.33)	(6.67)	(11.18)	(2.49)	(10.64)	(11.07)	(14.79)
N	395	395	362	362	395	395	362	362
Controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Pair Fixed Effects	No	No	No	Yes	No	No	No	Yes

Notes: 'Videos watched' includes all videos watched before the second midterm relevant to the course. Test score variables are normalized by the control mean and standard deviation. Standard errors are robust to heteroskedasticity. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.

Table 3: Effect of Being Assigned Treatment (ITT) on Duration of Videos Wathced

	Unique Videos				Total Videos			
	All Observations	All Observations	Matching Pairs	Matching Pairs	All Observations	All Observations	Matching Pairs	Matching Pairs
Treated	2.24***	2.22***	2.17***	2.12***	4.09***	4.05***	4.08***	4.10***
	(0.27)	(0.25)	(0.27)	(0.29)	(0.50)	(0.41)	(0.44)	(0.53)
Midterm 1 score	−0.16	−0.15	−0.32*	−9.11	−0.15	−0.20	−0.28	0.84
	(0.17)	(0.16)	(0.19)	(7.13)	(0.29)	(0.25)	(0.28)	(15.34)
Year = 2019	0.39	0.71***	0.67**		−0.02	0.70*	0.69	
	(0.27)	(0.25)	(0.27)		(0.50)	(0.41)	(0.45)	
Intercept	3.68***	3.29***	3.17***	5.53***	5.79***	1.96	1.14	5.69***
	(0.24)	(1.08)	(1.17)	(1.29)	(0.45)	(1.59)	(1.74)	(2.14)
N	395	395	331	331	395	395	362	362
Controls	No	Yes	Yes	No	No	Yes	Yes	No
Pair Fixed Effects	No	No	No	Yes	No	No	No	Yes

Notes: 'Videos watched' includes all videos watched before the second midterm relevant to the course. Test score variables are normalized by the control mean and standard deviation. Standard errors are robust to heteroskedasticity. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.

Table 4: Effect of Being Assigned Treatment (ITT) on Test Scores

	Final				Midterm 2			
	All Observations	All Observations	Matching Pairs	Matching Pairs	All Observations	All Observations	Matching Pairs	Matching Pairs
Treated	0.17**	0.15*	0.13	0.18*	0.18*	0.16*	0.17*	0.19*
	(0.09)	(0.08)	(0.09)	(0.11)	(0.09)	(0.09)	(0.09)	(0.10)
Midterm 1 score	0.64***	0.53***	0.51***	0.68	0.58***	0.49***	0.47***	0.55
	(0.05)	(0.05)	(0.06)	(1.84)	(0.04)	(0.05)	(0.05)	(1.73)
Year = 2019	0.02	0.02	0.01		0.09	0.08	0.06	
	(0.09)	(0.09)	(0.10)		(0.09)	(0.09)	(0.09)	
Intercept	−0.11	−1.71***	−1.77***	−0.08	−0.11	−1.55***	−1.64***	−0.06
	(0.08)	(0.38)	(0.40)	(0.35)	(0.08)	(0.41)	(0.42)	(0.25)
N	374	374	332	332	395	395	362	362

Notes: Test score variables are in standard deviation-units. Standard errors are robust to heteroskedasticity. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.

Table 5: Effect of Watching Videos (LATE) on Test Scores for those induced by treatment

	Final				Midterm 2			
	All Observations	Matching Pairs	Matching Pairs	All Observations	Matching Pairs	Matching Pairs	m7	m8
relu_since_mid1								
relu_bt_mid1_mid2								
Unique, relevant videos	0.008**	0.007*	0.006	0.008*				
	(0.004)	(0.004)	(0.004)	(0.005)				
Midterm 1 score	0.654***	0.542***	0.515***		0.558***	0.478***	0.481***	
	(0.047)	(0.049)	(0.059)		(0.048)	(0.049)	(0.055)	
Year = 2019	0.057	0.039	0.025		0.307**	0.236**	0.244*	
	(0.090)	(0.088)	(0.093)		(0.151)	(0.117)	(0.130)	
Unique, rel. videos before Midterm 2					0.027*	0.028*	0.029*	0.0
					(0.015)	(0.015)	(0.016)	(0.0
Intercept	−0.405**	−1.842***	−1.893***		−0.812*	−1.689***	−1.743***	
	(0.202)	(0.385)	(0.410)		(0.427)	(0.442)	(0.441)	
N	374	374	332	332	395	395	362	36

Notes: 'Unique relevant video' variables are instrumented using exogenously assigned treatment. The first coefficient in each column is the local average treatment effect on exam score of each video induced to be watched by treatment. Test score variables are in standard deviation-units. Standard errors are robust to heteroskedasticity. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.

Table 6: Interaction effect coefficients: first stage

	(1) Unique, relevant videos	(2) Unique, relevant videos	(3) Relevant videos	(4) Relevant videos
Treated × Midterm 1 score	1.520 (1.759)	0.504 (1.655)	2.563 (4.412)	-0.468 (3.754)
Treated × Math Quiz score	0.703 (1.962)	-0.474 (1.678)	-1.357 (4.291)	-4.722 (3.499)
Treated × PSET	0.540 (1.783)	-1.398 (1.536)	-3.612 (7.186)	-9.931 (5.441)
Treated × Freshman	3.459 (3.063)	3.255 (2.576)	-0.539 (8.075)	-1.138 (6.282)
Treated × Transfer Student	-2.872 (3.065)	-3.006 (2.573)	1.601 (8.065)	1.288 (6.256)
Treated × Male	-2.242 (3.172)	-1.235 (2.651)	-8.081 (8.213)	-5.034 (6.320)
Treated × Female	2.139 (3.190)	0.843 (2.683)	8.575 (8.250)	4.590 (6.392)
Treated × Asian	2.686 (3.254)	3.279 (2.781)	4.244 (8.652)	5.422 (6.415)
Treated × Latinx	-8.336* (3.602)	-5.193 (3.316)	-5.822 (9.177)	4.524 (8.865)
Treated × White	6.144 (4.658)	2.305 (3.673)	9.539 (13.091)	-1.255 (8.249)
Treated × Other ethnicity/not spec.	-3.609 (7.034)	-5.653 (5.891)	-22.910 (22.922)	-31.190 (15.895)
Observations	374	374	374	374

Notes: Each coefficient is the estimated β_3 from equation (X). Test score (outcome) variables are in standard deviation units. Standard errors are robust to heteroskedasticity. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.

Table 7: Interaction effect coefficients: second stage

	(1) Final exam score	(2) Final exam score	(3) Midterm 2 score	(4) Midterm 2 score
Treated × Midterm 1 score	0.002 (0.095)	-0.056 (0.100)	0.009 (0.086)	-0.006 (0.093)
Treated × Math Quiz score	0.090 (0.100)	0.076 (0.096)	0.165 (0.102)	0.161 (0.099)
Treated × PSET	-0.046 (0.110)	-0.023 (0.097)	-0.027 (0.100)	0.007 (0.096)
Treated × Freshman	-0.178 (0.177)	-0.216 (0.173)	0.129 (0.183)	0.134 (0.177)
Treated × Transfer Student	0.130 (0.178)	0.171 (0.173)	-0.139 (0.183)	-0.139 (0.176)
Treated × Male	0.239 (0.187)	0.323 (0.183)	0.153 (0.185)	0.192 (0.187)
Treated × Female	-0.322 (0.188)	-0.382* (0.184)	-0.208 (0.185)	-0.238 (0.187)
Treated × Asian	-0.215 (0.180)	-0.231 (0.171)	-0.402* (0.189)	-0.440* (0.178)
Treated × Latinx	0.022 (0.227)	0.069 (0.223)	0.237 (0.254)	0.264 (0.232)
Treated × White	0.271 (0.250)	0.335 (0.231)	0.638* (0.260)	0.713** (0.247)
Treated × Other ethnicity/not spec.	0.276 (0.347)	0.112 (0.318)	-0.113 (0.307)	-0.271 (0.317)
Observations	374	374	395	395

Notes: Each coefficient is the estimated β_3 from equation (X). Test score (outcome) variables are in standard deviation units. Standard errors are robust to heteroskedasticity. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.