Bridges Evaluation Report Spring 2016

During the Spring 2016 semester, three Bridges exercises were included as homework assignments for the students enrolled in ITCS 2214 section 002, and two exercises were in used as homework assignments for students enrolled in one section of ITCS 2215. As in previous semesters, we administered the knowledge tests to measure gains in course material for students enrolled in all sections of ITCS 2214. The knowledge tests were administered to the sections during the first and last weeks of the semester. The students in all sections of ITCS 2214 were also asked to take an Attitude toward Computing survey and to self-report their confidence in retention in the major on a 1-5 scale during the first week of the semester.

Comparison of Bridges class to three other sections of ITCS 2214 Pretest data

The table below shows the mean scores of the students enrolled in section 002 (Bridges section) compared to the other three sections on all of the measures taken during the first week of the semester including their GPA. The students in the two groups differed on only one of computing attitude subscale scores (gender differences in computing). The Bridges group had a higher score, indicated a slightly more positive attitude toward women in computing. This difference in gender attitude was not a results of a difference in gender representation, because women made up 10% of the Bridges sample and 15% of the control group sample , $\chi(1, n=208) < 1$. Otherwise, computing attitudes both positive and negative were about the same in the two groups. Also, there were no group differences in self-reported confidence about graduating with a computer science major. For both groups, confidence was high with an average rating of over 4 out of a possible 5-point scale.
There were, however, some important group differences in GPA and in performance on the knowledge pretest. Overall, the control group has a higher GPA in comparison to the Bridges group, but surprisingly, they scored lower on the knowledge pretest.

Measures taken during the first week of Spring 2016 semester

Group Statistics

	group	N	Mean	Std. Deviation	t test
GPA	Bridges	46	2.53983	.625729	-4.47, p< .01
	Control	156	2.99795	.602625	
Know Score	Bridges	44	38.4091	13.43947	3.66, p < .01
	Control	132	31.5000	9.82558	
Confidence in Major	Bridges	39	4.18	.790	-1.21, p = .228
	Control	67	4.37	.795	
Positive CA	Bridges	40	38.2750	4.00633	<1
	Control	67	37.7015	6.41025	
Negative CA	Bridges	40	32.8000	3.63177	<1
	Control	67	32.4925	5.53056	
Male/Female CA	Bridges	40	19.2250	1.51043	2.29, p = .024
	Control	67	18.2537	2.86749	
Career CA	Bridges	40	17.2750	2.40712	<1
	Control	67	17.1791	2.67381	

Notes
Positive CA= Computing Attitude Scale- positive attitude toward computing
Negative CA=Computing Attitude Scale-negative attitude toward computing
Male/female CA=Computing Attitude Scale-attitude toward men and women
Career CA=Computing Attitude Scale- Career oriented factor.
KnowScore= Score on the Knowledge pretest

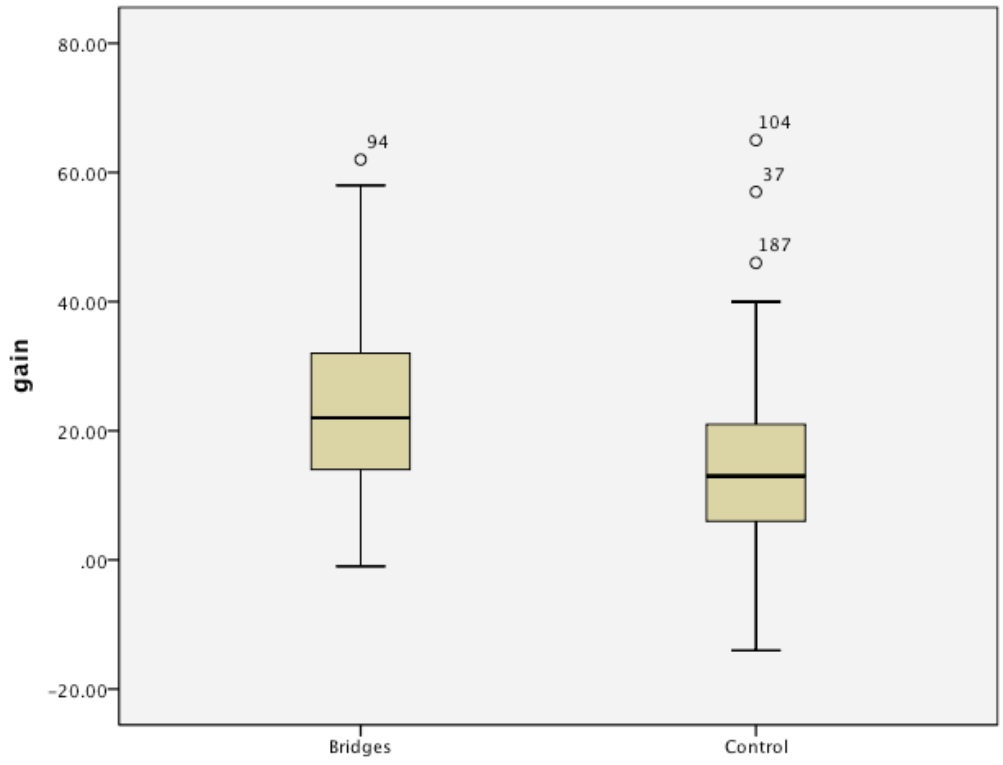
Measures taken at the end of the Spring 2016 semester

The table below compares the two groups (Bridges vs control sections) on the measures taken at the end of the semester. Although the Bridges group got higher scores on the knowledge test at the end of the semester and showed greater gains on the knowledge test (posttest minus pretest), their average grade in the course was significantly lower than the control group.

Group Statistics

	group	N	Mean	Std. Deviation	t test
$Know_{post}$	Bridges	35	64.1143	17.80246	4.89, p<.01
	Control	85	48.9059	14.45817	
gain	Bridges	33	23.2727	15.85141	2.69, p= .008
	Control	78	15.1026	14.08747	
Grade	Bridges	45	2.0222	1.35661	-2.95, p=.004
	Control	138	2.7319	1.41700	

Performance on the knowledge test showed significant gains for both of the groups. However, the box plot below shows that the Bridges group showed larger gains than the Control group. The differences in knowledge gains for the groups could be explained at least partially by the differences in instructor emphasis on the knowledge tests. The bridges instructor used the knowledge test for the final exam while the other instructor used it as a classroom exercise that did not count toward the final grade.



Course Grades in ITCS 2214

In spite of showing greater gains in performance on the knowledge test, course grades in the Bridges section on average were significantly lower than in the other sections of the course. However, there were significant differences among the 4 sections in the distribution of the final grades are shown in the Table below, $\chi^2(15, N=208)=64.30$, $p < .001$. Most notably, Section 3 had a large number of A grades relative to the other sections with fewer Ds, Fs, and Ws. The table below shows that there were 25 withdrawals among the 208 students who were enrolled and 26 students with F grades.

SECTION * GRADE

		GRADE						Total
		A	B	C	D	F	W	
1	Count	7	13	8	4	11	10	53
	% within SECTION	13.2%	24.5%	15.1%	7.5%	20.8%	18.9%	100.0%
	% within GRADE	10.8%	28.9%	30.8%	19.0%	42.3%	40.0%	25.5%
2	Count	7	12	9	9	8	4	49
	% within SECTION	14.3%	24.5%	18.4%	18.4%	16.3%	8.2%	100.0%
	% within GRADE	10.8%	26.7%	34.6%	42.9%	30.8%	16.0%	23.6%
3	Count	38	13	5	2	0	1	59
	% within SECTION	64.4%	22.0%	8.5%	3.4%	.0%	1.7%	100.0%
	% within GRADE	58.5%	28.9%	19.2%	9.5%	.0%	4.0%	28.4%
5	Count	13	7	4	6	7	10	47
	% within SECTION	27.7%	14.9%	8.5%	12.8%	14.9%	21.3%	100.0%
	% within GRADE	20.0%	15.6%	15.4%	28.6%	26.9%	40.0%	22.6%
Total	Count	65	45	26	21	26	25	208
	% within SECTION	31.3%	21.6%	12.5%	10.1%	12.5%	12.0%	100.0%
	% within GRADE	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Regression analysis with course grade as the outcome measure.

We used a regression to determine which of the pretest measures would predict course grade. In the first step, 43% of the variance in course grade was accounted for by the GPA, and the pretest knowledge score. When the computing attitude subscale scores were added in model 2, however, that increased to 45% of the variance but it did not constitute a significant change in explained variance, F < 1.

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	64.842	2	32.421	28.461	.000[a]
	Residual	86.576	76	1.139		
	Total	151.418	78			
2	Regression	67.397	6	11.233	9.626	.000[b]
	Residual	84.021	72	1.167		
	Total	151.418	78			

a. Predictors: (Constant), Know, GPA

b. Predictors: (Constant), Know, GPA, CA subscale scores (F1,F2,F3,F4)

c. Dependent Variable: GradeN

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.354	.756		-4.436	.000
	GPA	1.389	.200	.618	6.933	.000
	$Know_{pre}$	.043	.010	.403	4.514	.000
2	(Constant)	-2.176	1.478		-1.472	.145
	CGPA	1.350	.212	.601	6.377	.000
	$Know_{pre}$	.044	.010	.412	4.413	.000
	F1	-.035	.052	-.119	-.660	.511
	F2	.042	.050	.143	.842	.403
	F3	-.082	.066	-.119	-1.244	.218
	F4	.022	.080	.036	.273	.786

a. Predictors: (Constant), knowpretest, GPA

b. Predictors: (Constant), knowScore, GPA, CA subscale scores (F1,F2,F3,F4)

c. Dependent Variable: GradeN

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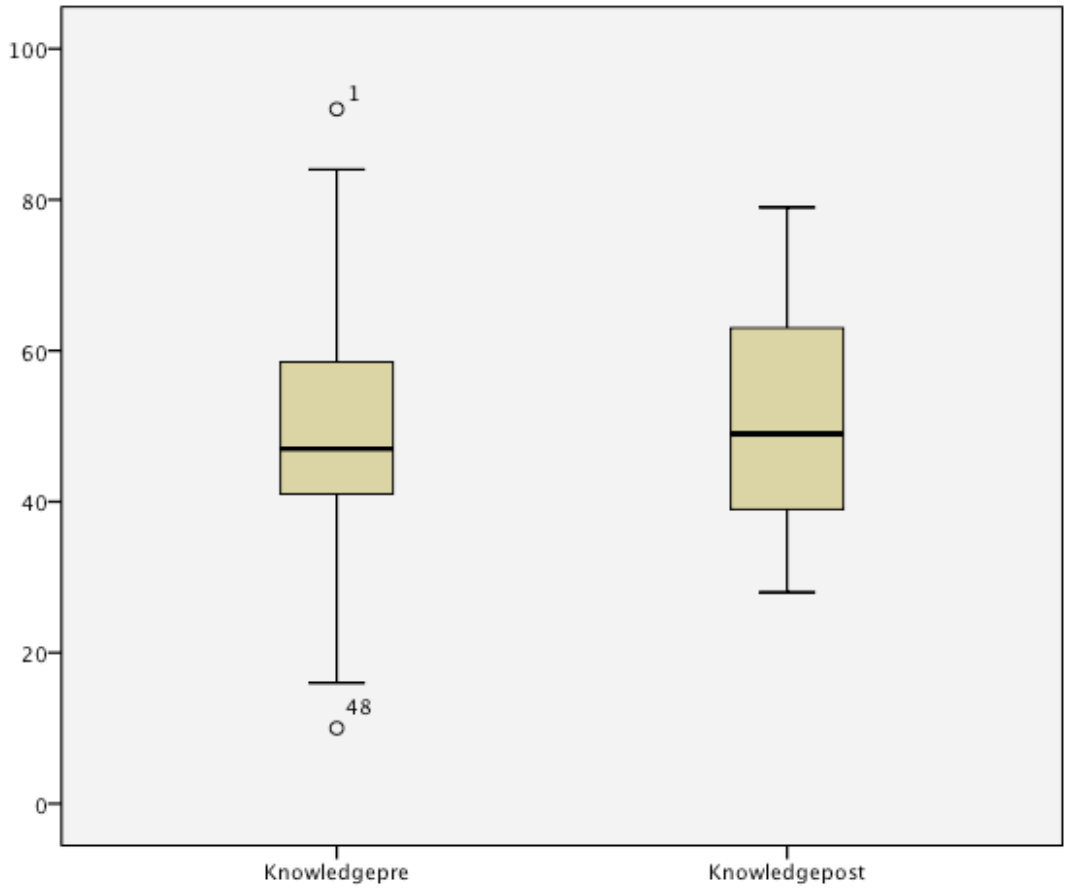
There were 71 students who were enrolled in the senior level course—13%(9) women. These students were offered the opportunity to mentor a sophomore student who was enrolled in the ITCS 2214 course. Twice during the semester, a time was set up for the peer mentoring session and both groups of students were invited to attend. Unfortunately, only a handful of sophomore and senior students showed up for the sessions. As a result, we were unable to evaluate the usefulness of the peer mentoring. We will need to develop more effective strategies for engaging both groups of students in the peer mentoring experience. Neither group felt that the experience that was offered provided sufficient benefit.

We did, however, administer the knowledge test established for the ITCS 2214 students in the beginning and end of the semester to measure whether there would be any gains in performance on this measure. The box plots shown below indicate that there was no significant difference in the senior students performance on the test. Scores on the Knowledge pretest (M = 50.5, SD = 15.54) were similar to the post test (M = 50.5, SD = 15.54), $t < 1$. The average gain was equal to 1 point on the test.



Moreover, course grade was not significantly correlated to scores on the knowledge pretest ($r(47) = -.09$, the knowledge post test, $r(47) = .15$, or on the gains $r(47) = .28$, $p = .058$.