Bridges Evaluation Report Spring 2015

During the Spring 2015 semester, four Bridges exercises were included as homework assignments for the students enrolled in ITCS 2214 section 001. We also administered the knowledge tests to measure gains in course material mastered for students enrolled in ITCS 2214 sections 001, 002 and 003. 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. These scales were used again in the survey during the last week of the semester together with a course engagement survey and items that measured the level of experience, and the number of hours required for the course and the homework assignments.

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

The table below shows the mean scores of the students enrolled in section 001 (Bridges section) compared to the other two sections on all of the measures taken during the first week of the semester including their GPA. Although the students in the two groups did not differ on any of the computing attitude subscale scores, or in their confidence about graduating with a computer science major, their were some differences in GPA and knowledge pretest scores. The control group has a slightly higher average GPA but the Bridges group did a little better on average on the knowledge pretest.

Measures taken during the first week of Spring 2015 semester

	GROUP	N	Mean	Std. Deviation	t test
GPA	BRIDGES	49	2.55627	.964311	-2.70, p=.009
	CONTROL	113	2.97094	.722598	
Confidence in major	BRIDGES	44	4.59	.622	<1
	CONTROL	41	4.66	.480	
Positive CA	BRIDGES	44	39.4091	4.08809	<1
	CONTROL	41	39.1220	4.97592	
Negative CA	BRIDGES	44	34.6136	4.27114	<1
	CONTROL	41	34.1951	4.46777	
Male/female CA	BRIDGES	44	18.5909	2.03822	<1
	CONTROL	41	18.3659	3.25389	
Career CA	BRIDGES	44	18.2955	1.92390	<1
	CONTROL	41	18.2195	2.20808	
knowScore	BRIDGES	38	35.5526	10.66618	2.06, p=.044
	CONTROL	90	31.6000	7.79340	

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

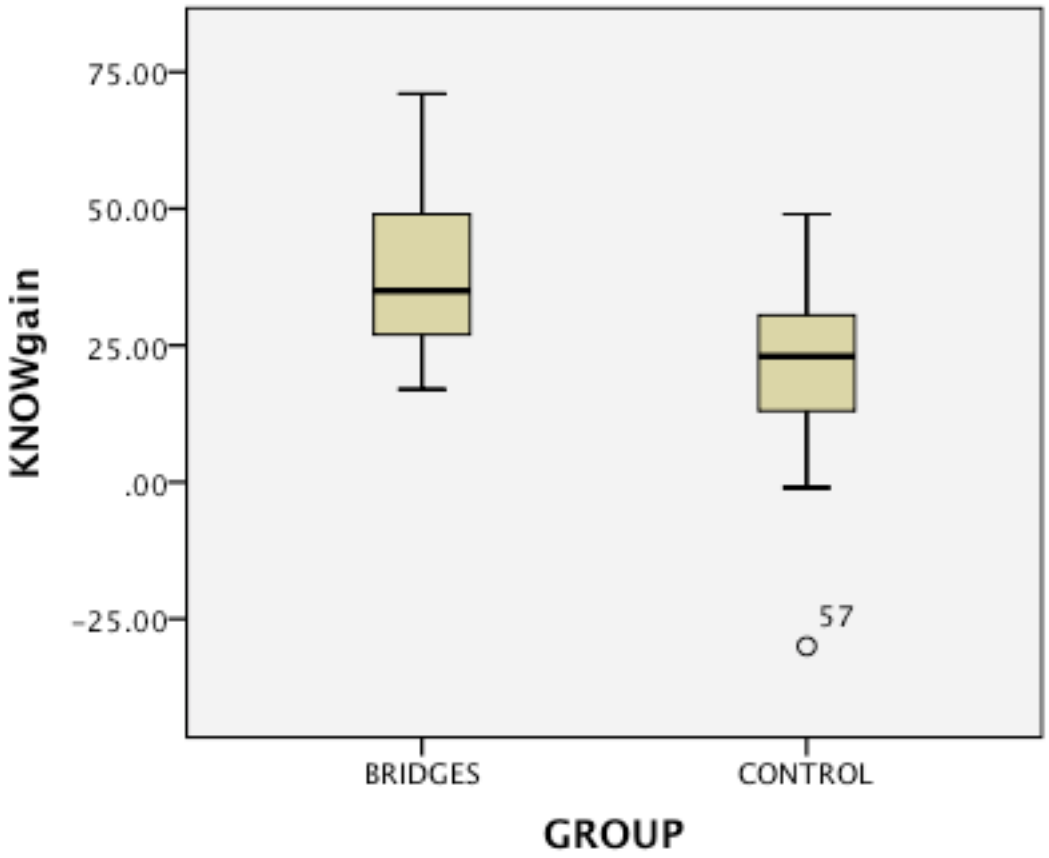
Career CA=Computing Attitude Scale- Career oriented factor.
KnowScore= Score on the Knowledge pretest

Measures taken during the last week of the Spring 2015 semester

	GROUP	N	Mean	Std. Deviation	t test
KnowScore2	BRIDGES	29	74.4483		6.95, p <.001
	CONTROL	81	53.6790	13.81921	
Confidence	BRIDGES	28	4.46	.637	-1.75, p=.087
	CONTROL	60	4.70	.462	
Age	BRIDGES	28	21.39	2.726	-2.57, p=.012
	CONTROL	61	23.46	4.829	
Positive CA	BRIDGES	28	38.6429	4.49868	-1.17, p=.248
	CONTROL	61	39.8361	4.40523	
Negative CA	BRIDGES	28	33.9286	4.53732	<1
	CONTROL	61	33.2459	6.63992	
Male/female CA	BRIDGES	28	18.7500	1.97437	<1
	CONTROL	61	18.7705	1.99494	
Career CA	BRIDGES	28	18.0357	1.85557	<1
	CONTROL	61	17.7705	2.16328	
Engage-skills	BRIDGES	28	27.5000	5.80230	-2.89,p=.005
	CONTROL	61	31.3770	6.00601	
Engage-emotional	BRIDGES	28	14.9643	3.88236	-3.35, p=.001
	CONTROL	61	18.1639	4.77905	
Engage-participation	BRIDGES	28	13.8929	4.15745	-3.13,p=.003
	CONTROL	61	17.1148	5.19326	
Engage-performance	BRIDGES	28	8.5000	2.76887	-6.87,p<.001
	CONTROL	61	12.5500	2.14106	
GPA2	BRIDGES	49	2.7188	.53043	-3.99,p<.001
	CONTROL	113	3.0856	.55216	
GradeN	BRIDGES	49	1.1633	1.38965	-9.66, p<.001
	CONTROL	113	3.2566	.92368	
Assignment	BRIDGES	28	18.0357	3.46925	-3.07,p=.004
	CONTROL	61	20.3934	3.32304	

The table above compares the two groups (Bridges vs control sections) on the measures taken during the last week of the semester. Although the Bridges group got higher scores on the knowledge test in comparison to the control group at the end of the semester, their average grade was significantly lower than the control group and their GPAs at the end of the semester were lower. By comparison, the control group scored higher than the bridges group on confidence in graduating in the major, opinions about the assignments and on all of the subscales of the course engagement scale. There were no differences in any of the factors associated with computing attitudes.

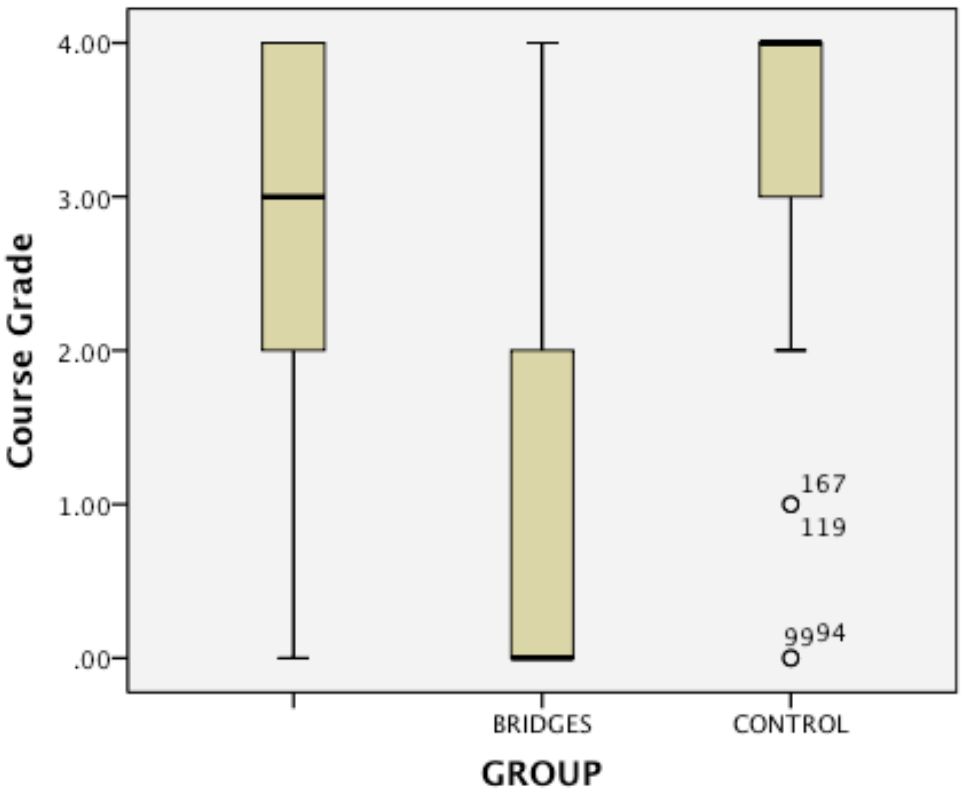
When the pre/post scores were compared across time, there were no significant shifts in the average ratings for confidence in retention in the major, and there were no significant shifts in the subscale scores of the Attitude toward the Computer Science Scale; however, performance on the knowledge test showed significant gains for both of the groups. The box plot below shows the knowledge gains (post knowledge score-pre knowledge score) for both groups. It is apparent that the Bridges group showed larger (M = 39.12, SD = 14.6) gains than the Control group (M = 22. 00, SD = 13.28), t (93) = 5.33, p <.001. 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

Similar to the data reported in the Fall 2014 semester, in spite of showing greater gains in performance on the knowledge test, course grades in the Bridges section were significantly lower than in the other sections of the course. The box plot on the next page compares the Bridges section to the control and online section of the course.

Differences among the 4 sections in the distribution of the final grades are shown in the Table, $\chi^2(18, N=206)=86.95$, $p < .001$. The table below shows that there were 20 withdrawals among the 206 students who were enrolled and 13 students with F grades.



SECTION * Grade Crosstabulation

		Grade							
		A	B	C	D	F	I	W	Total
001	Count	3	8	9	3	9	0	17	4
	% within SEC	6.1%	16.3%	18.4%	6.1%	18.4%	.0%	34.7%	100.0%
	% within Grade	3.8%	14.8%	26.5%	50.0%	69.2%	.0%	85.0%	23.8%
002	Count	29	18	8	1	0	0	0	5
	% within SEC	51.8%	32.1%	14.3%	1.8%	.0%	.0%	.0%	100.0%
	% within Grade	37.2%	33.3%	23.5%	16.7%	.0%	.0%	.0%	27.2%
003	Count	29	14	11	1	1	0	1	5
	% within SEC	50.9%	24.6%	19.3%	1.8%	1.8%	.0%	1.8%	100.0%
	% within Grade	37.2%	25.9%	32.4%	16.7%	7.7%	.0%	5.0%	27.7%
080	Count	17	14	6	1	3	1	2	4
	% within SEC	38.6%	31.8%	13.6%	2.3%	6.8%	2.3%	4.5%	100.0%
	% within Grade	21.8%	25.9%	17.6%	16.7%	23.1%	1.0E2 %	10.0%	21.4%
Total	Count	78	54	34	6	13	1	20	20
	% within SECTION	37.9%	26.2%	16.5%	2.9%	6.3%	.5%	9.7%	100.0%

Regression analysis with course grade as the outcome measure.
We tested a number of models to determine which combination of variables accounted for the most variance in course grade. Below is an example of a model that accounted for 54% of variance in two steps. In the first step, 30% of the variance was accounted for by the GPA, confidence in major, and pre knowledge score. When the engagement subscale scores were added, however, that increased significantly.

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.417	3	8.472	6.329	.001[a]
	Residual	58.896	44	1.339		
	Total	84.313	47			
2	Regression	45.659	8	5.707	5.758	.000[b]
	Residual	38.654	39	.991		
	Total	84.313	47			

a. Predictors: (Constant), knowScore, 15, CGPA
b. Predictors: (Constant), knowScore, 15, CGPA, Engage3, 5, Engage4, Engage1, Engage2
c. Dependent Variable: GradeN

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.028	1.239		-.830	.411
	CGPA	.776	.182	.544	4.259	.000
	15	.042	.035	.152	1.197	.238
	knowScore	.013	.016	.100	.777	.441
2	(Constant)	-2.565	1.806		-1.421	.163
	CGPA	.472	.180	.331	2.625	.012
	15	.011	.032	.039	.341	.735
	knowScore	.016	.015	.127	1.077	.288
	5	-.032	.334	-.012	-.094	.925
	Engage1	.062	.035	.328	1.756	.087
	Engage2	-.012	.054	-.043	-.219	.828
	Engage3	.006	.046	.022	.129	.898
	Engage4	.135	.057	.338	2.388	.022

a. Dependent Variable: GradeN

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