

GEOLOGY PROGRAM HIGHLIGHTS

When reviewing the geology faculty's efforts at experiential learning, it is important to review undergraduate and graduate students' research work with the faculty, given geology's research emphasis. It is also a good idea to review some of the media coverage given to some of the faculty's accomplishments.

In what follows, we summarize the program's media highlights, faculty's research work with undergraduate students as a form of experiential learning, and the faculty's research work with graduate students as a form of experiential learning. The source document for each is listed, which can be examined in the geology program offices.

MEDIA HIGHLIGHTS

(Source Document: *Media Highlights--ISU Geology Program*)

Between 2003 and 2005, the ISU geology program has been featured in the media nineteen times:

- One (1) of these was on ABC TV, featuring Dr. Rathburn's work
- Two (2) of these were features of faculty work in professional society media (such as the Geological Society of America)
- Five (5) of these have been in newspapers outside the ISU community, such as in the San Diego Union Tribune
- Ten (10) of these have in) within the ISU community, such as the ISU Report of the President

UNDERGRADUATE RESEARCH

(Source Document: *Undergraduate Research--Recently Published Papers/Abstracts/Meeting Presentations*)

From 2001-2005, sixteen students graduated with a B.S. in geology, and one student graduated into geography his senior year. Of these seventeen students, eleven (65%) have published abstracts/papers, and two (12%) have completed senior research theses.

When all the publications, abstracts, and presentations of undergraduate students are viewed, students were able to enter fifty-one (51) publications and abstracts onto their C.V.'s, as well as 26 presentations:

- Of the fifty-one publications/abstracts claimed on students' c.v.'s, forty-nine of these (96%) included geology faculty as co-authors or co-presenters
- Of the twenty-six presentations, 21 (81%) included faculty as co-presenters

This indicates that faculty plays an active role in engaging students in experiential learning, encouraging students at the undergraduate level to participate in research with the program's highly qualified faculty.

Assessment and Accreditation
Division of Academic Affairs
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GRADUATE RESEARCH

(Source Document: *Graduate Research: 2000-2005 Published Papers/Abstracts/Meeting Presentations*)

From 2000-2005, graduate students could claim eighteen professional research presentations on their C.V.'s. Nine of these (50%) presentations included geology faculty as co-presenters.

During the same time period, graduate students wrote forty-two publications/abstracts; thirty-eight of these (90%) were with geology faculty.

It can be concluded that geology faculty encourage students to publish and present their research, and that they engage students in research activities.

Geology Program Entry and Exit Exams (2006)

Methodology

The geology program requires students to take an examination at entry into the program, and at the end of the program. The examination requires students to answer questions on general geology, historical geology, mineralogy, petrology, paleontology, structural geology, and sedimentation/stratification. Because there are ten questions per category, mean correct and incorrect proportions can be calculated. The total number of scores was thirty-four (N=34), with twenty for the test taken at the entry level (n=20), and fourteen for the test taken at exit level (n=14). To date, the scores of four students (n=4) could be compared pre- and post-test.

Results

A review of the test scores, described in more detail at the end of this report, are as follows:

- *Pooled Averages/Medians:* For Freshman students, 85% answer questions correctly in respect to general geology knowledge, 38% for historical geology; 43% for mineralogy, 33% for petrology; 56% for paleontology, 35% for structural geology, and 30% for sedimentation/stratification; for Senior students, 94% answer correctly for general geology, 67% for historical geology, 76% for mineralogy; 65% for petrology; 84% for paleontology, 67% for structural geology, and 62% for sedimentation/stratification; differences between means and medians on these questions appear to be significant;
- *Test of differences in FR and SR tests for four similar test scores:* There are significant positive differences in respect to questions on mineralogy and structural geology.

Continued assessment of entry and exit-level exam data will produce a larger samples size, enabling a more complete comparison among years, and between entry- and exit-level data for more students. Future reports should therefore produce even more cogent analysis.

Tests of Differences Between FR, SO and JR, SR

Method: Student scores for those identified as FR and SO were (1), and those identified as JR and SR were identified as (2)

Descriptive Statistics

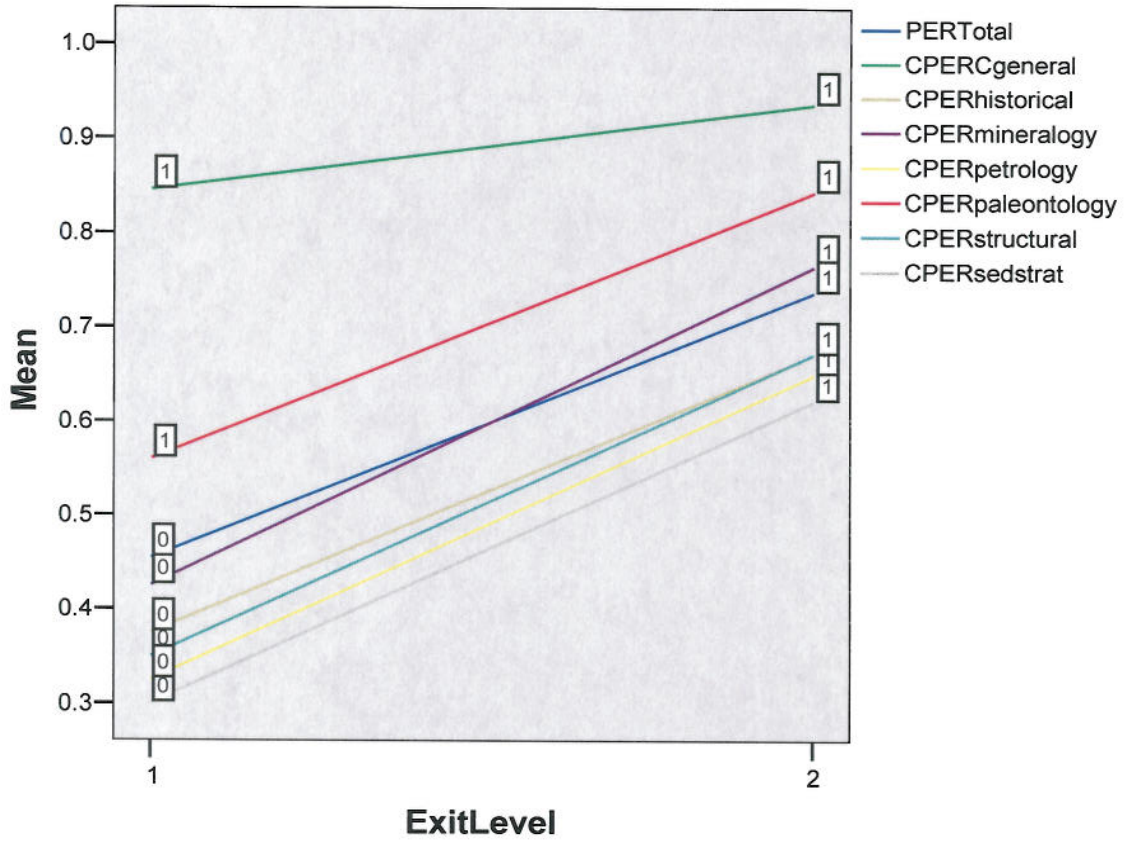
IC=Incorrect answers

ICPER=Percentage of incorrect answers

C=Correct answers

CPER=Percentage of correct answers

	N	Minimum	Maximum	Mean	Std. Deviation
ICgeneral (1-10)	34	0	4	1.18	1.029
Cgeneral	34	6	10	8.82	1.029
CPERCgeneral	34	1	1	.88	.103
ICPERgeneral	34	0	0	.12	.103
IChistorical (11-20)	34	0	9	5.03	2.634
Chistorical	34	1	10	4.97	2.634
CPERhistorical	34	.1	1.0	.497	.2634
ICPERhistorical	34	.0	.9	.503	.2634
ICmineralogy(21-30)	34	0	10	4.35	2.806
Cmineralogy	34	0	10	5.65	2.806
CPERmineralogy	34	0	1	.56	.281
ICPERmineralogy	34	0	1	.44	.281
ICpetrology (31-40)	34	1	10	5.41	2.653
Cpetrology	34	0	9	4.59	2.653
CPERpetrology	34	.0	.9	.459	.2653
ICPERpetrology	34	.1	1.0	.541	.2653
ICpaleontology(41-50)	34	0	8	3.24	2.323
Cpaleontology	34	2	10	6.76	2.323
CPERpaleontology	34	.2	1.0	.676	.2323
ICPERpaleontology	34	.0	.8	.324	.2323
ICstructural(51-60)	34	1	9	5.18	2.222
Cstructural	34	1	9	4.82	2.222
CPERstructural	34	.1	.9	.482	.2222
ICPERstructuralperc	34	.1	.9	.518	.2222
ICsedstrat(61-70)	34	2	10	5.68	2.253
Csedstrat	34	0	8	4.32	2.253
CPERsedstrat	34	.0	.8	.432	.2253
ICPERsedstrat	34	.2	1.0	.568	.2253
Valid N (listwise)	34				



Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
CPERCgeneral	1	20	.85	.110	.025	.79	.90	1	1
	2	14	.94	.063	.017	.90	.97	1	1
	Total	34	.88	.103	.018	.85	.92	1	1
CPERhistorical	1	20	.375	.2197	.0491	.272	.478	.1	.8
	2	14	.671	.2234	.0597	.542	.800	.3	1.0
	Total	34	.497	.2634	.0452	.405	.589	.1	1.0
CPERmineralogy	1	20	.43	.253	.057	.31	.54	0	1
	2	14	.76	.182	.049	.66	.87	0	1
	Total	34	.56	.281	.048	.47	.66	0	1
CPERpetrology	1	20	.325	.2023	.0452	.230	.420	.0	.7
	2	14	.650	.2279	.0609	.518	.782	.3	.9
	Total	34	.459	.2653	.0455	.366	.551	.0	.9
CPERpaleontology	1	20	.560	.2186	.0489	.458	.662	.2	1.0
	2	14	.843	.1284	.0343	.769	.917	.6	1.0
	Total	34	.676	.2323	.0398	.595	.758	.2	1.0
CPERstructural	1	20	.350	.1606	.0359	.275	.425	.1	.7
	2	14	.671	.1490	.0398	.585	.757	.4	.9
	Total	34	.482	.2222	.0381	.405	.560	.1	.9
CPERsedstrat	1	20	.300	.1835	.0410	.214	.386	.0	.6
	2	14	.621	.1188	.0318	.553	.690	.3	.8
	Total	34	.432	.2253	.0386	.354	.511	.0	.8

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
CPERCgeneral	Between Groups	.068	1	.068	7.700	.009
	Within Groups	.282	32	.009		
	Total	.349	33			
CPERhistorical	Between Groups	.724	1	.724	14.786	.001
	Within Groups	1.566	32	.049		
	Total	2.290	33			
CPERmineralogy	Between Groups	.948	1	.948	18.390	.000
	Within Groups	1.650	32	.052		
	Total	2.598	33			
CPERpetrology	Between Groups	.870	1	.870	19.164	.000
	Within Groups	1.453	32	.045		
	Total	2.322	33			
CPERpaleontology	Between Groups	.659	1	.659	18.787	.000
	Within Groups	1.122	32	.035		
	Total	1.781	33			
CPERstructural	Between Groups	.851	1	.851	34.970	.000
	Within Groups	.779	32	.024		
	Total	1.629	33			
CPERsedstrat	Between Groups	.851	1	.851	33.060	.000
	Within Groups	.824	32	.026		
	Total	1.674	33			

Test Statistics(b)

	CPERCgenera l	CPERhistorical	CPERmineralog y	CPERpetrology	CPERpaleontology	CPERstructural	CPERsedstrat
Mann-Whitney U	70.500	50.500	39.000	43.500	41.500	21.500	19.500
Wilcoxon W	280.500	260.500	249.000	253.500	251.500	231.500	229.500
Z	-2.546	-3.162	-3.566	-3.413	-3.486	-4.189	-4.269
Asymp. Sig. (2-tailed)	.011	.002	.000	.001	.000	.000	.000
Exact Sig. [2*(1-tailed Sig.)]	.014(a)	.001(a)	.000(a)	.000(a)	.000(a)	.000(a)	.000(a)

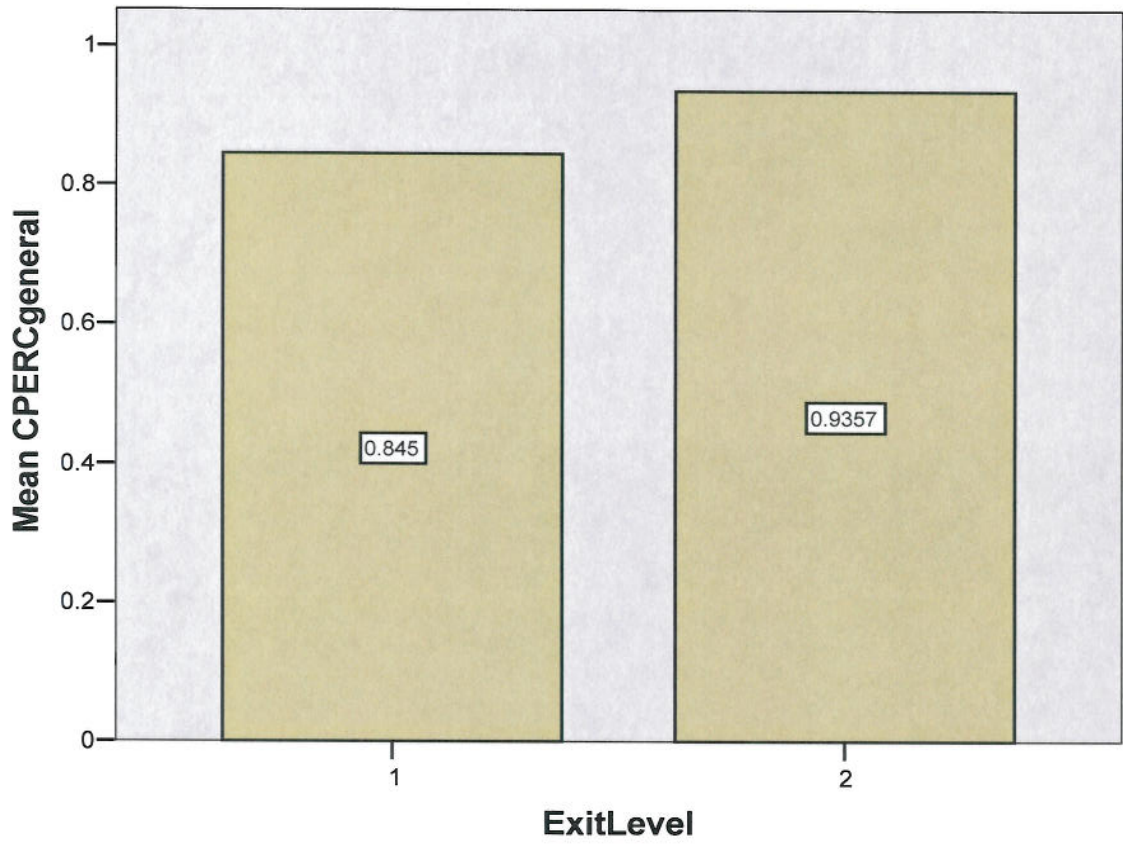
a Not corrected for ties.

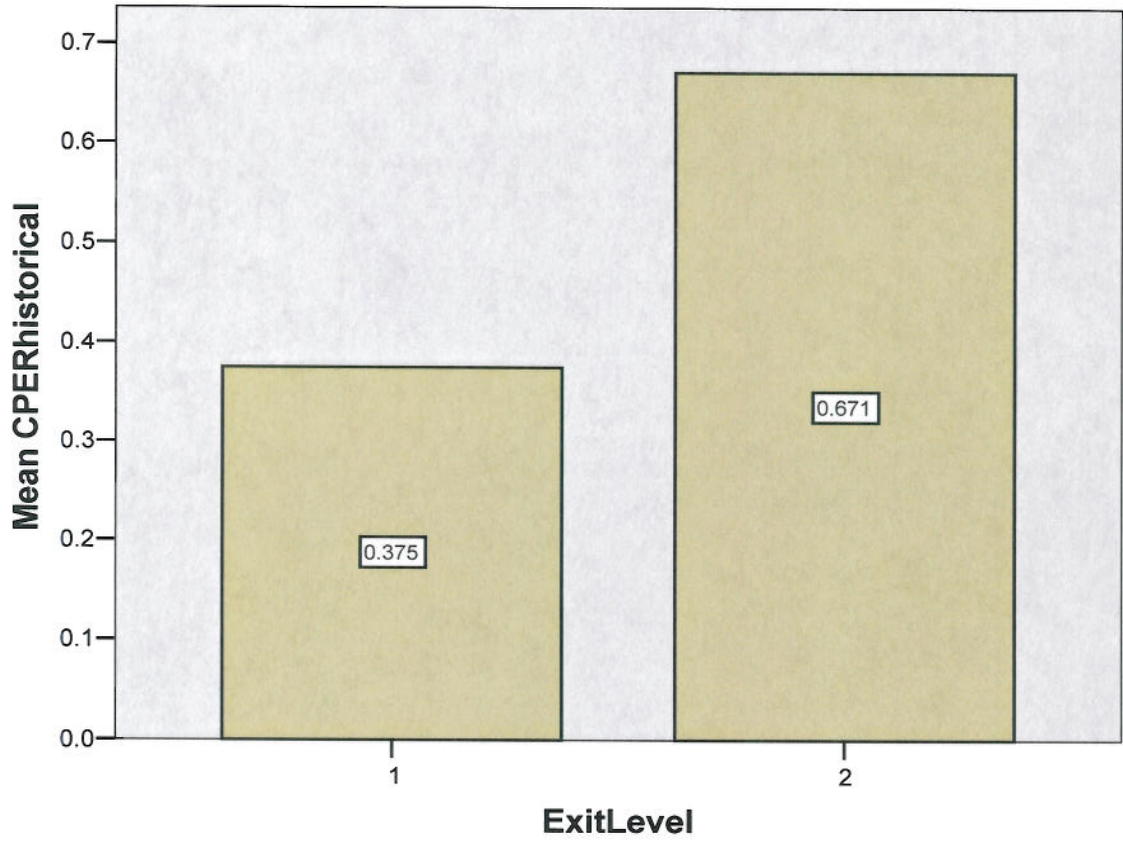
b Grouping Variable: ExitLevel

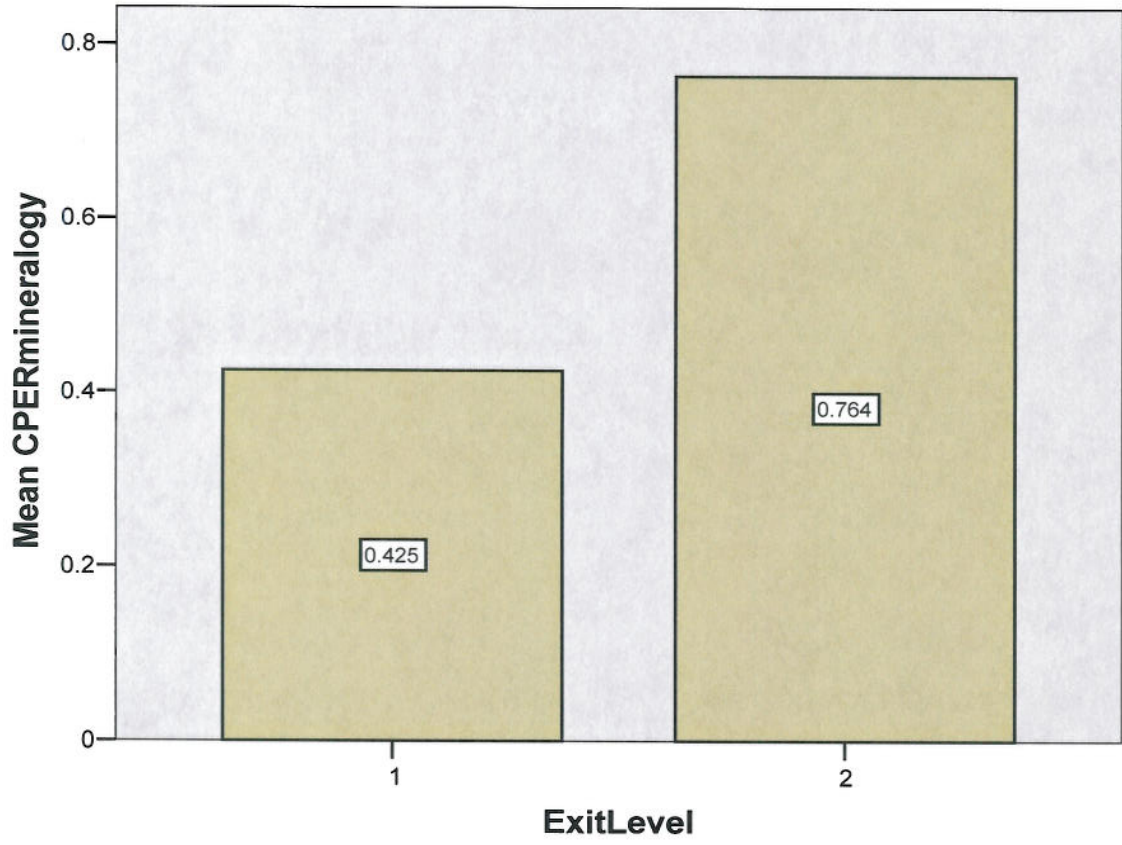
Test Statistics(a)

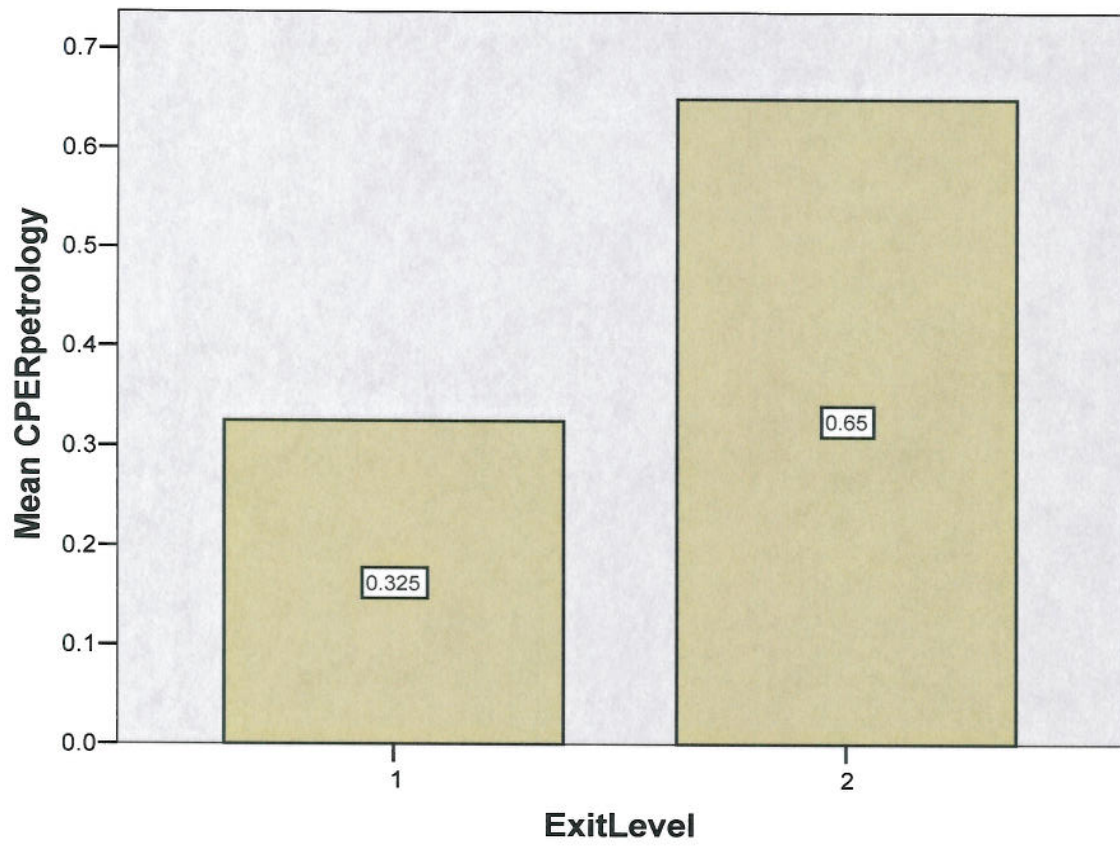
		CPERCgenera l	CPERhistorical	CPERmineralog y	CPERpetrology	CPERpaleontology	CPERstructural	CPERsedstrat
Most Extreme Differences	Absolute	.479	.471	.657	.564	.679	.686	.757
	Positive	.479	.471	.657	.564	.679	.686	.757
	Negative	.000	.000	.000	.000	.000	.000	.000
Kolmogorov-Smirnov Z		1.373	1.353	1.886	1.619	1.947	1.968	2.173
Asymp. Sig. (2-tailed)		.046	.051	.002	.011	.001	.001	.000

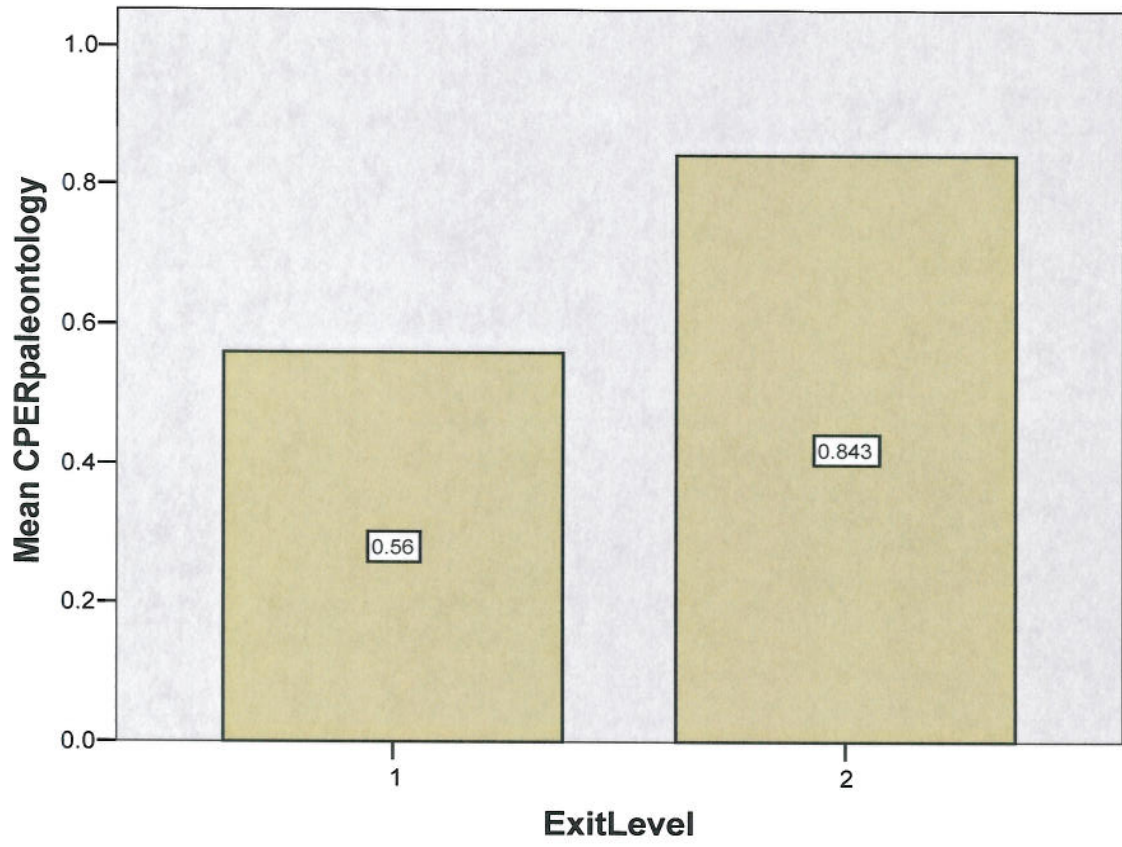
a Grouping Variable: ExitLevel

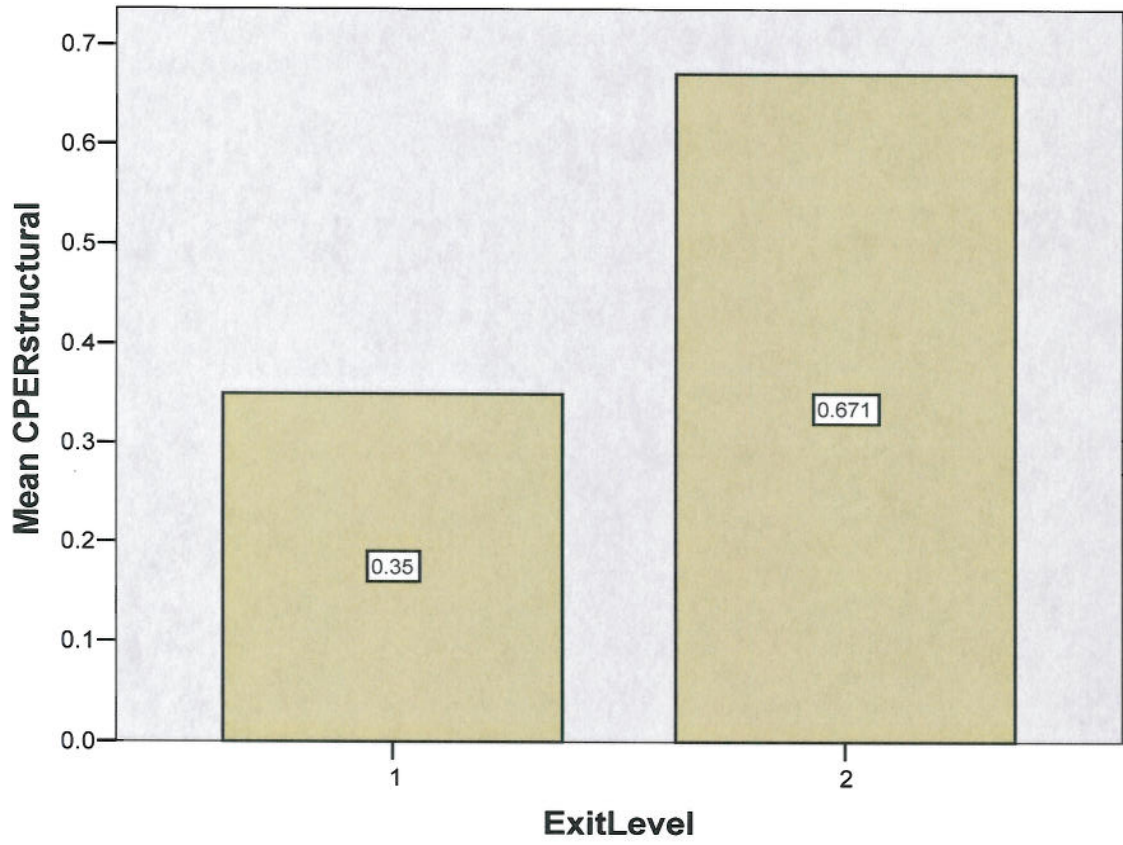


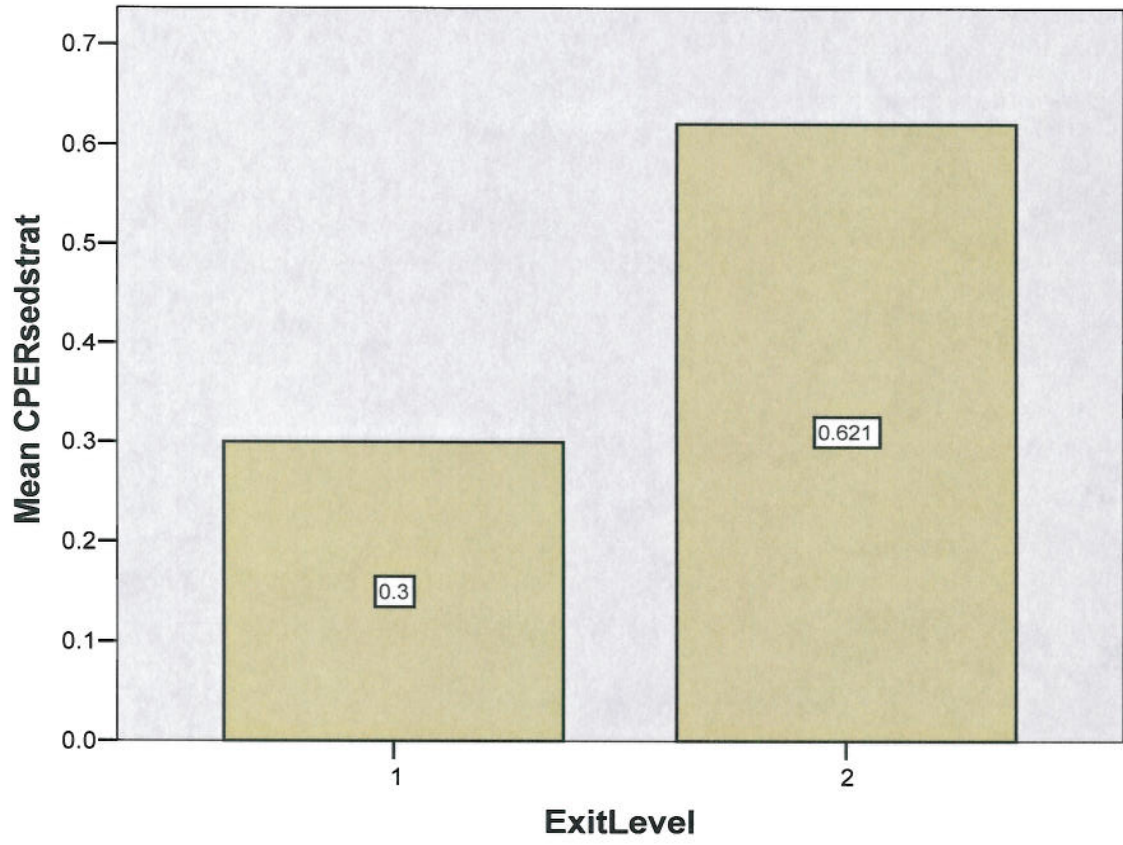












Test of Differences Between Four Students, Pre and Post Test

.Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
PERTotal	1	4	.525	.2171	.1085	.180	.870	.3	.8
	2	4	.807	.0853	.0427	.671	.943	.7	.9
	Total	8	.666	.2146	.0759	.487	.845	.3	.9
CPERCgeneral	1	4	.93	.050	.025	.85	1.00	1	1
	2	4	.98	.050	.025	.90	1.05	1	1
	Total	8	.95	.053	.019	.91	.99	1	1
CPERhistorical	1	4	.475	.3775	.1887	-.126	1.076	.1	.8
	2	4	.775	.2062	.1031	.447	1.103	.5	1.0
	Total	8	.625	.3240	.1146	.354	.896	.1	1.0
CPERmineralogy	1	4	.400	.3367	.1683	-.136	.936	.0	.8
	2	4	.925	.0957	.0479	.773	1.077	.8	1.0
	Total	8	.663	.3623	.1281	.360	.965	.0	1.0
CPERpetrology	1	4	.375	.2500	.1250	-.023	.773	.1	.7
	2	4	.650	.2646	.1323	.229	1.071	.3	.9
	Total	8	.513	.2800	.0990	.278	.747	.1	.9
CPERpaleontology	1	4	.700	.3464	.1732	.149	1.251	.2	1.0
	2	4	.900	.1155	.0577	.716	1.084	.8	1.0
	Total	8	.800	.2619	.0926	.581	1.019	.2	1.0
CPERstructural	1	4	.400	.2582	.1291	-.011	.811	.1	.7
	2	4	.800	.0816	.0408	.670	.930	.7	.9
	Total	8	.600	.2777	.0982	.368	.832	.1	.9
CPERsedstrat	1	4	.400	.2160	.1080	.056	.744	.2	.7
	2	4	.625	.0957	.0479	.473	.777	.5	.7
	Total	8	.513	.1959	.0693	.349	.676	.2	.7

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
PERTotal	Between Groups	.159	1	.159	5.853	.052
	Within Groups	.163	6	.027		
	Total	.322	7			
CPERCgeneral	Between Groups	.005	1	.005	2.000	.207
	Within Groups	.015	6	.003		
	Total	.020	7			
CPERhistorical	Between Groups	.180	1	.180	1.946	.212
	Within Groups	.555	6	.093		
	Total	.735	7			
CPERmineralogy	Between Groups	.551	1	.551	9.000	.024
	Within Groups	.368	6	.061		
	Total	.919	7			
CPERpetrology	Between Groups	.151	1	.151	2.283	.182
	Within Groups	.398	6	.066		
	Total	.549	7			
CPERpaleontology	Between Groups	.080	1	.080	1.200	.315
	Within Groups	.400	6	.067		
	Total	.480	7			
CPERstructural	Between Groups	.320	1	.320	8.727	.025
	Within Groups	.220	6	.037		
	Total	.540	7			
CPERsedstrat	Between Groups	.101	1	.101	3.627	.106
	Within Groups	.168	6	.028		
	Total	.269	7			

Test Statistics(b)

	PERTotal	CPERCgenera l	CPERhistorical	CPERmineralog y	CPERpetrology	CPERpaleontology	CPERstructural	CPERsedstrat
Mann-Whitney U	1.000	4.000	4.000	.500	3.500	5.000	.500	3.000
Wilcoxon W	11.000	14.000	14.000	10.500	13.500	15.000	10.500	13.000
Z	-2.021	-1.323	-1.230	-2.191	-1.307	-.949	-2.191	-1.479
Asymp. Sig. (2-tailed)	.043	.186	.219	.028	.191	.343	.028	.139
Exact Sig. [2*(1-tailed Sig.)]	.057(a)	.343(a)	.343(a)	.029(a)	.200(a)	.486(a)	.029(a)	.200(a)

a Not corrected for ties.

b Grouping Variable: ExitLevel

Test Statistics(g,h)

		Number of Runs	Z	Exact Sig. (1-tailed)
PERTotal	Exact Number of Runs	4(a)	-.382	.371
	Minimum Possible			
	Maximum Possible			
CPERCgeneral	Exact Number of Runs			
	Minimum Possible	3(b)	-1.146	.114
	Maximum Possible	6(b)	1.146	.886
CPERhistorical	Exact Number of Runs			
	Minimum Possible	4(c)	-.382	.371
	Maximum Possible	6(c)	1.146	.886
CPERmineralogy	Exact Number of Runs			
	Minimum Possible	2(d)	-1.909	.029
	Maximum Possible	4(d)	-.382	.371
CPERpetrology	Exact Number of Runs			
	Minimum Possible	6(d)	1.146	.886
	Maximum Possible	6(d)	1.146	.886
CPERpaleontology	Exact Number of Runs			
	Minimum Possible	3(e)	-1.146	.114
	Maximum Possible	8(e)	2.673	1.000
CPERstructural	Exact Number of Runs			
	Minimum Possible	2(d)	-1.909	.029
	Maximum Possible	4(d)	-.382	.371
CPERsedstrat	Exact Number of Runs			
	Minimum Possible	3(f)	-1.146	.114
	Maximum Possible	4(f)	-.382	.371

a No inter-group ties encountered.

b There are 2 inter-group ties involving 8 cases.

c There are 1 inter-group ties involving 4 cases.

d There are 1 inter-group ties involving 2 cases.

e There are 2 inter-group ties involving 7 cases.

f There are 1 inter-group ties involving 3 cases.

g Wald-Wolfowitz Test

h Grouping Variable: ExitLevel

