

Studying the Relationship between Developmental Math Student Attitudes and Academic Achievement

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Abstract

- ❖ The purpose of this study was to examine the relationship between students' levels of confidence and anxiety and academic achievement in the course.
- ❖ The significance of this study is to better understand this relationship in order to create a more effective learning environment.
- ❖ We looked at archival and current survey data.
- ❖ Statistical analysis was applied to the survey data.
- ❖ Based on our results, we changed the focus of the survey to more of a detailed self-efficacy objective.

Research Question

- ❖ What is the relationship between students' attitude and confidence and academic achievement?

Null Hypothesis

- ❖ There is no relationship between students' attitude and confidence and academic achievement.

Background

- ❖ The Seven Principles of Good Practice in Undergraduate Education focuses on encouraging academic achievement at an undergraduate level.
 1. Encourages contacts between students and faculty.
 2. Develops reciprocity and cooperation among students.
 3. Uses active learning techniques.
 4. Gives prompt feedback.
 5. Emphasizes time on task.
 6. Communicates high expectations.
 7. Respects divers talents and ways of learning.
- ❖ The current survey touches on these seven principles broadly.
- ❖ We have changed the survey to incorporate these principles to more specifically address the components of the course. This will allow us to have a better understanding of the relationship of students' self-efficacy and components of the course design.

Definition

- ❖ Self-efficacy: "Perceived self-efficacy is a judgment of one's capability to accomplish a certain level of performance" (Bandura, 1977, p. 391).

Delimitations

- ❖ Check-up survey 3 was not conducted each semester.
- ❖ Spring 2010 did not have exams 5 and 6

Existing Survey Instrument Items

11. Thinking about this class, how would you describe your current **anxiety** level?

- Very Small
- Some
- Average
- Quite a Bit
- Off the Charts

Feelings about Math

1. My current level of **anxiety** or fear with regards to mathematics since beginning this class...

- has greatly increased
- has increased
- has remained the same
- has decreased
- has greatly decreased

2. Compared to the grade (scores) I expected to be getting in this course, I am doing ...

- much better than expected
- better than expected
- about the same as expected
- worse than expected
- much worse than expected

3. My confidence level with regards to mathematics since beginning this class...

- has greatly increased
- has increased
- has remained the same
- has decreased
- has greatly decreased

Findings

Term and Year	Survey Items	Correlation Table By Semester						Final Grade
		Exam 1	Exam 2	Exam 3	Exam 4	Exam 5	Exam 6	
Spring 2010	Confidence 1	r -0.450	-0.342	-0.673**	-0.348	.5	.5	-0.405
	Confidence 2	p 0.106	0.231	0.008	0.222	.5	.5	0.151
	Confidence 3	p -0.268	-0.435	-0.607*	-0.370	.5	.5	-0.582*
Fall 2010	Anxiety 1	p 0.399	0.158	0.036	0.236	.5	.5	0.047
	Anxiety 2	r .378*	.438**	0.077	.462**	.386*	.380*	.469**
	Anxiety 3	p 0.015	0.004	0.634	0.002	0.013	0.014	0.002
Spring 2011	Confidence 1	p 0.223	0.287	0.18*	0.307	0.266	0.309*	0.336*
	Confidence 2	r .395*	.439**	0.117	.523**	.456**	.468**	.520**
	Confidence 3	p 0.011	0.004	0.466	0.000	0.003	0.002	0.000
Fall 2011	Anxiety 1	r .334*	.349**	0.130	.339**	.401**	.285*	.420**
	Anxiety 2	p 0.033	0.025	0.419	0.030	0.009	0.071	0.006
	Anxiety 3	r .490*	.447**	0.381	.578**	.459*	.503**	.512**
Spring 2012	Confidence 1	p 0.011	0.022	0.055	0.002	0.018	0.009	0.008
	Confidence 2	r .461*	.370*	0.330	.417*	.472*	.557**	.481*
	Confidence 3	p 0.031	0.090	0.134	0.053	0.027	0.007	0.024
Fall 2012	Anxiety 1	r -.426*	-.315*	-.247*	-.513**	-.334*	-.424*	-.437*
	Anxiety 2	p 0.030	0.117	0.224	0.007	0.095	0.031	0.026
	Anxiety 3	r -.274*	-.303*	-.267*	-.393*	-.413*	-.500**	-.253*
Spring 2013	Confidence 1	p 0.218	0.170	0.229	0.070	0.056	0.018	0.256
	Confidence 2	r .630**	.647**	.497**	.578**	.579**	.603**	.565**
	Confidence 3	p 0.000	0.000	0.004	0.001	0.001	0.000	0.001
Fall 2013	Anxiety 1	p 0.275	0.240	0.080	0.305	0.500*	0.317	.499*
	Anxiety 2	r 0.205	0.271	0.171	0.137	0.015	0.140	0.015
	Anxiety 3	r .393*	.414**	.372*	.433**	.566**	.504**	.630**
Spring 2014	Confidence 1	p 0.013	0.009	0.020	0.006	0.000	0.001	0.000
	Confidence 2	r -.403*	-.359*	-.350*	-.348*	-.508**	-.438*	-.481**
	Confidence 3	p 0.024	0.048	0.054	0.055	0.004	0.014	0.006
Fall 2014	Anxiety 1	r .489*	.422*	.415*	.435*	.468*	.531*	.546*
	Anxiety 2	p 0.052	0.308	0.048	0.098	0.024	0.123	0.007
	Anxiety 3	r -.213*	-.022*	-.199*	-.045*	-.307*	-.311*	-.520**
Spring 2015	Confidence 1	p 0.193	0.892	0.225	0.788	0.058	0.054	0.001
	Confidence 2	r .562**	.540**	.552**	.577**	.546**	.457**	.551**
	Confidence 3	p 0.001	0.002	0.002	0.001	0.002	0.011	0.002
Fall 2015	Anxiety 1	r 0.320	.545**	.487*	.480*	.494*	.566**	.471*
	Anxiety 2	p 0.128	0.006	0.016	0.018	0.014	0.004	0.020
	Confidence 1	r .636**	.620**	.555**	.523**	.570**	.543**	.632**
Spring 2016	Confidence 2	p 0.000	0.000	0.001	0.003	0.001	0.002	0.000
	Confidence 3	r -.295*	-.335**	-.599**	-.761**	-.770**	-.607**	-.577**
	Anxiety 1	p 0.162	0.007	0.002	0.000	0.000	0.002	0.003
Fall 2016	Anxiety 2	r 0.218	0.064	0.132	0.181	.399**	.290*	.310*
	Confidence 1	p 0.142	0.670	0.376	0.222	0.005	0.048	0.034
	Confidence 2	r -.340*	-.238*	-.144*	-.196*	-.330*	-.244*	-.259*
Spring 2017	Confidence 3	p 0.012	0.083	0.300	0.156	0.015	0.076	0.058
	Anxiety 1	r -.460**	-.044*	-.179*	-.186*	-.466**	-.243*	-.263*
	Anxiety 2	p 0.001	0.768	0.228	0.211	0.001	0.009	0.074
Fall 2017	Confidence 1	r -.392*	-.314*	-.368*	-.435*	-.326*	-.359*	-.301*
	Confidence 2	p 0.022	0.070	0.032	0.010	0.060	0.037	0.083
	Confidence 3	r -.233*	-.132*	-.115*	-.496*	-.329*	-.329*	-.217*
Spring 2018	Anxiety 1	p 0.369	0.613	0.660	0.043	0.198	0.198	0.403
	Anxiety 2	r 0.142	0.306	0.275	.389*	.453**	.375*	.287*
	Confidence 1	p 0.248	0.079	0.115	0.023	0.007	0.029	0.100
Fall 2018	Confidence 2	r 0.248	0.186	0.265	0.352	0.232	.412*	.342*
	Confidence 3	p 0.187	0.316	0.150	0.052	0.209	0.021	0.660
	Initial Anxiety	r 0.050	0.243	0.333	.416*	-.350*	-.396*	-.385*
Spring 2019	Confidence 1	p 0.782	0.166	0.054	0.014	0.042	0.021	0.024
	Confidence 2	r .187*	.273**	0.055*	.237**	0.151	0.149	0.182*
	Confidence 3	p 0.047	0.003	0.559	0.011	0.130	0.135	0.052
Exp Grade 1	Confidence 1	r -.219*	-.219*	-.182**	-.218**	-.233**	-.242**	-.270**
	Confidence 2	p 0.000	0.000	0.003	0.000	0.000	0.000	0.000
	Confidence 3	r 0.037	0.019	-0.032	-.141*	-.023	-.090	-.183**
Exp Grade 2	Confidence 1	p 0.578	0.775	0.634	0.035	0.073	0.194	0.006
	Confidence 2	r .200*	.205*	0.019	0.155	0.151	0.125	0.170
	Confidence 3	p 0.033	0.029	0.840	0.099	0.131	0.211	0.071

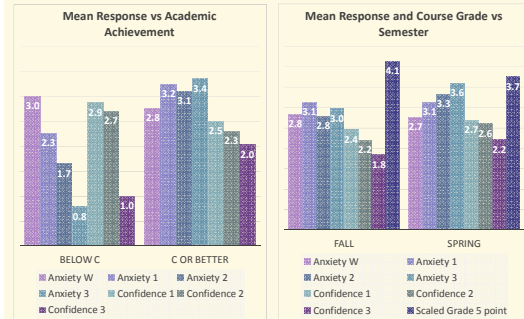
*** Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).
* Cannot be computed because at least one of the variables is constant.

		Correlation Table All Semesters						Final Grade
		Exam 1	Exam 2	Exam 3	Exam 4	Exam 5	Exam 6	
Initial Anxiety	r	-.127*	-0.097	-.114*	-0.093	-.137**	-0.098	-.103*
	p	0.012	0.054	0.024	0.065	0.008	0.058	0.041
Anxiety 1	r	.329**	.368**	.149*	.317**	.271**	.295**	.332**
	p	0.000	0.000	0.017	0.000	0.000	0.000	0.000
Anxiety 2	r	.373**	.437**	.255**	.427**	.388**	.438**	.360**
	p	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Anxiety 3	r	.447**	.485**	0.161	.518**	.501**	.533**	.532**
	p	0.000	0.000	0.086	0.000	0.000	0.000	0.000
Confidence 1	r	-.105	-.109	-0.094	-.111	-.191**	-.157*	-.209**
	p	0.092	0.080	0.133	0.074	0.003	0.014	0.001
Confidence 2	r	0.044	0.087	-0.031	-0.090	-.148*	-.074*	-.134*
	p	0.509	0.193	0.646	0.181	0.031	0.286	0.045
Confidence 3	r	.187*	.273**	0.055*	.237**	0.151	0.149	0.182*
	p	0.047	0.003	0.559	0.011	0.130	0.135	0.052
Exp Grade 1	r	-.219*	-.219*	-.182**	-.218**	-.233**	-.242**	-.270**
	p	0.000	0.000	0.003	0.000	0.000	0.000	0.000
Exp Grade 2	r	0.037	0.019	-0.032	-.141*	-.023	-.090	-.183**
	p	0.578	0.775	0.634	0.035	0.073	0.194	0.006
Exp Grade 3	r	.200*	.205*	0.019	0.155	0.151	0.125	0.170
	p	0.033	0.029	0.840	0.099	0.131	0.211	0.071

*** Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

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Graphs



- ❖ Passing and failing students started out with similar anxiety levels but failing students experienced higher anxiety by the end of the semester.
- ❖ Anxiety and confidence levels were similar for fall and spring semesters.

Conclusion

- ❖ Reject the null hypothesis.
- ❖ Based on the results there is a relationship between the students' anxiety, confidence and academic achievement.
- ❖ The results are statistically significant but the Pearson Correlations are ambiguous.
- ❖ Rewriting the survey instrument will allow us to study domain specific questions relating to self-efficacy.
- ❖ We expect that continuing this research will result in a clarification of this relationship.
- ❖ New research question: What is the relationship between students' self-efficacy for instructional modality and academic achievement?

New Survey Questions

- ❖ I am more confident in my ability to succeed in math when:
 - ❖ When I attend CARE Center hours:
 - ❖ When I receive help from CARE Center Tutors
 - ❖ I complete the workbook before/while doing the homework:
 - ❖ When I see the Instructor, during Office Hours or in the CARE Center, for help
 - ❖ When I view the videos for each lesson
- Using this 5-Point Likert Scale
Strongly Disagree Disagree Undecided Agree Strongly Agree

References

- ❖ Chickering, A. W., Gamson, Z. F., & American Association for Higher Education, W. D. C. (1987). Seven Principles for Good Practice in Undergraduate Education. *AAHE Bulletin*, 3-7.
- ❖ Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ US: Prentice-Hall, Inc.
- ❖ Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, N.J.: Prentice Hall.

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- ❖ Correlation tables were made by using SPSS