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## A Follow-up Study to Compare Success Rates of Developmental Math Students

By Teresa Woodard and Sexton Burkett

In 2003, we conducted a research study comparing the success rates of students in “Arithmetic” (MTH 02), “Algebra I” (MTH 03), and “Algebra II” (MTH 04) when they were offered at Southwest Virginia Community College (SWCC) for three credits versus five credits. The data included fifteen semesters from Fall 1993 to Summer 1998 when the courses were offered for three credits and fifteen semesters from Fall 1998 to Summer 2003 when the courses were offered for five credits. The results of the study were published in the Spring 2005 *Inquiry* article “Comparing Success Rates of Developmental Math Students.” Our findings showed no significant differences in the success rates of students who were enrolled in the three-credit classes and the five-credit classes. Therefore, we concluded that three-credit courses are just as effective in training developmental math students as five-credit courses. As a result of the study, SWCC returned to offering the development math courses for three credits in Spring 2005.

### Following Up on the Data

It had been three years since the developmental math classes have once again been offered at SWCC for three credits, so we decided to do a follow-up study. This time, we looked at nine semesters from Spring 2002 to Fall

*“We recommend that developmental courses be offered for three credits instead of five. Advantages include lower costs to students, fewer scheduling problems, and possibly less burnout for students and teachers.”*

2004 when the courses were offered for five credits, and nine semesters from Spring 2005 to Fall 2007 when the courses were offered for three credits.

Again, we looked at the number of developmental students (on-campus and off-campus) who received grades of Satisfactory (S), Unsatisfactory(U)/Re-

enroll(R), Withdrawal (W), and Audit (A)/Incomplete(I)/No Grade(N). The total number of students enrolled during this study in MTH 02 was 649 for five credit and 441 for three credits; MTH 03 had 1,112 for five credits and 1,071 for three credits; and MTH 04 had 336 for five credits and 304 for three credits.

An independent t-test was run on the mean number of students enrolled in each class (MTH 02, MTH 03, and MTH 04) using version 16 of the Statistical Package for the Social Sciences (SPSS). The SPSS is a comprehensive statistical analysis and data management system that provides techniques to measure similarities and differences in data and classifies the data. The data were then collapsed into a single group and five credits were compared to three credits by grade categories.

**Table 1: The Mean Number of Students in MTH 02 Compared for Five and Three Credits by Grade Categories**

Grade Categories	n	Mean	SD	t	p
Satisfactory (S)					
5 credits	9	40.78	23.478	1.751	.106
3 credits	9	25.44	11.802		
Unsat/Re (U/R)					
5 credits	9	23.78	19.279	.465	.649
3 credits	9	19.78	17.196		
Withdraw (W)					
5 credits	5	12.40	2.191	5.792	.000
3 credits	8	4.00	2.726		
Inc/Audit/ No Grade (A,I,N)					
5 credits	5	1.20	.447	.598	.576
3 credits	2	1.00	.000		

n = number of semesters

Table 1 indicates that the only category with a significant difference in the means in MTH 02 occurred in the Withdrawals ( $p < .0001$ ). The means declined from 12.40 for five credits to 4.00 for three credits, which is a highly significant difference in withdrawals. This is interpreted to mean that there were fewer dropouts. The three other categories showed a slight tendency for students to score less when courses were offered for three credits instead of five, but there was not a significant decline in the mean scores.

**Table 2: The Mean Number of Students in MTH 03 Compared for Five and Three Credits by Grade Categories**

Grade Categories	n	Mean	SD	t	p
Satisfactory (S)					
5 credits	9	62.78	37.573	.225	.825
3 credits	9	59.44	23.875		
Unsat/Re (UR)					
5 credits	9	48.11	26.984	.561	.583
3 credits	9	41.33	24.238		
Withdrawals (W)					
5 credits	9	11.22	7.496	-1.345	.198
3 credits	9	16.78	9.871		
Inc/Audit/ No Grade (A,I,N)					
5 credits	5	2.60	2.302	-1.542	.184
3 credits	2	6.50	4.950		

n= number of semesters

Table 2 indicates no significant differences in any of the categories at the .05 level of probability for MTH 03. There was a slight decrease in the mean scores of students in the Satisfactory and Unsatisfactory/Re-enroll categories and a slight increase in the mean scores for Withdrawals and Incomplete/Audit/No Grade from five credits to three credits, but none of the differences were significant at the .05 probability level.

**Table 3: The Mean Number of Students in MTH 04 Compared for Five and Three Credits by Grade Categories**

Grade Categories	n	Mean	SD	t	p
<b>Satisfactory (S)</b>					
5 credits	9	18.89	8.609	-.445	.662
3 credits	9	21.11	12.252		
<b>Unsat/Re (U/R)</b>					
5 credits	9	12.00	7.500	.136	.893
3 credits	9	11.56	6.307		
<b>Withdrawals (W)</b>					
5 credits	6	4.33	2.805	-.514	.617
3 credits	8	5.25	3.615		

n= number of semesters

Table 3 indicates no significant differences in the three categories listed at the .05 level of probability. There were no Incompletes, Audits, or No Grades for MTH 04. The mean scores for the MTH 04 students decreased slightly in the U/R category from five to three credits, but increased slightly for the S and W categories, although not significantly.

### Collapsed Math Courses

After computing the results for each individual developmental math course, we collapsed the three courses into a single group and did an independent t-test of that data. Not surprisingly, we also found no significant differences in the mean scores of students when comparing the collapsed courses for five and three credits. These findings are presented in Table 4.

**Table 4: The Mean Number of Students in All Three Courses (MTH 02, MTH 03, MTH 04), Collapsed and Compared for Three and Five Credits by Grade Categories**

Grade Categories	n	Mean	SD	t	p
Satisfactory (S)					
5 credits	27	40.81	30.986	.728	.470
3 credits	27	35.33	23.865		
Unsat/Re (U/R)					
5 credits	27	27.96	24.300	.603	.549
3 credits	27	24.22	21.159		
Withdrawals (W)					
5 credits	20	9.45	6.228	.196	.845
3 credits	25	9.00	8.612		
Inc/Audit/ No Grade (I,A,N)					
5 credits	10	1.90	1.729	-1.199	.254
3 credits	4	3.75	4.272		

N = number of semesters

Table 4 indicates no significant differences in any of the categories at the .05 level of probability when the courses were collapsed. Although the mean scores of students increased slightly for the Incomplete, Audit, and No Grade Category from five credits to three credits, they decreased slightly for the other three categories.

## **Results and Recommendations**

When comparing three years when the developmental courses of MTH 02, MTH 03, and MTH 04 were offered for five credits and three years when they were offered for three credits, results indicated no significant differences in Satisfactory, Unsatisfactory/Re-enroll, or Incomplete/Audit/No Grades. The only significant difference occurred in the Withdrawals for MTH 02 when the mean scores decreased from 12.40 for five credits to 4.00 for three credits ( $p < .0001$ ) (see Table 1). No significant differences at all were found when the courses were collapsed into a single group.

Since no significant differences were found in the success rates of any of the developmental students when the courses were offered for five credits and then for three credits, we conclude that three-credit courses are just as effective as five-credit courses for developmental math students, reinforcing our earlier study.

As a result of both studies, we recommend that developmental courses be offered for three credits instead of five. Advantages include lower costs to students, fewer scheduling problems, and possibly less burnout for students and teachers. We also recommend that this study be replicated by other colleges that offer a variety of credits for developmental courses.

Since SWCC has reverted to offering the courses for three credits instead of five, there has been more satisfaction with the courses. Instructors have commented that the three-credit courses fit the schedule much better and are financially much better for the students. Three-credit courses are also much more convenient for students who attend night classes, as they only have to attend one night per week instead of two nights when the courses are offered for five credits. Instructors think that most students can grasp the material in three-credit courses. The positive aspect that instructors have said about the five-credit courses is that they may be better for slower students who have trouble mastering the material. Nevertheless, according to our study, there were no significant differences in success rates.

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## **Reference**

Woodard, T., & Burkett, S. (2005, Spring). Comparing success rates of developmental math students. *Inquiry* 10(1), 54-63.

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