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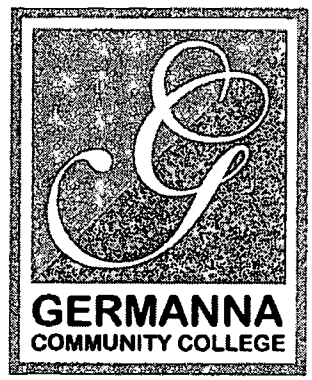
ABSTRACT

This report documents student outcomes in developmental English and mathematics courses at Germanna Community College (Virginia) for the academic years 1994-95 through 1999-2000. It provides data to answer three questions: What proportion of students enroll in developmental courses? What is the success rate for students enrolled in developmental courses? What success do students have in completing college-level courses following their developmental coursework? Approximately 60% of curriculum-placed students are recommended for developmental coursework, and approximately 60% of those students actually enroll. Students are much more likely to be recommended for developmental math than developmental English. Approximately 60% of the students who enroll for developmental math and English courses complete them satisfactorily. Students who chose not to enroll in developmental math were more successful in their collegiate math course, even when a developmental course was recommended. This suggests that some of these students were misplaced into the developmental math course. Another possible source for this result is re-assessment of the student after enrollment, which is not recorded on the information system. The success rate in ENG 111 College Composition is essentially the same for students who enrolled in developmental English as those who did not, indicating that these students are receiving an appropriate preparation in their developmental course. (JA)

Germanna Community College



Student Outcomes in Developmental Education

1994-95 through 1999-2000

PRELIMINARY REPORT

Includes Figures through Fall 1999

Office of Research and Planning

John W. Curtis, Director

July 2000

Germanna Community College

Student Outcomes in Developmental Education, 1994-95 through 1999-2000: Preliminary Report

This report documents student outcomes in developmental English and mathematics courses for the academic years 1994-95 through 1999-2000. The report provides data to answer three questions:

- What proportion of students enroll in developmental courses?
- What is the success rate for students enrolled in developmental courses?
- What success do students have in completing college-level courses following their developmental coursework?

Data for this report is drawn from the Virginia Community College System Research and Assessment Data Support System (RADSS), as part of the ongoing student outcomes assessment process at Germanna. This preliminary report includes data available for the 1999-2000 academic year as of April 14, 2000. Final figures will be available in August 2000. The present report is limited to student outcomes in specific classes, and does not include data on overall developmental enrollment trends, assignment of instructional faculty, or student retention.

The purpose of the present report is to stimulate discussion within the Germanna community regarding the quality and effectiveness of developmental education. It should be noted at the outset that this report does not present recommendations for action; such recommendations—where appropriate—should be developed by the instructional and student support units of the College. The report does conclude with some suggestions of possible issues for further study.

What proportion of students enroll in developmental courses?

Most students entering Germanna Community College complete an initial assessment of their readiness for college-level work. At Germanna, this assessment is primarily concerned with two skill areas: English language skills (both writing and reading) and mathematics. The assessment is accomplished through various means: students may complete a local placement test (the College has used primarily the Compass and Asset tests developed by ACT, Inc. for several years); the student may provide scores on the SAT or ACT college entrance examinations; or the student may present evidence of prior college-level coursework. On the basis of the initial assessment, students are recommended for enrollment in either college-level

or developmental courses. Although demonstrated preparation is considered a "requirement" for enrollment in many college-level courses, it is not always possible to enforce that requirement; for the purposes of this report, discussion will focus on whether students are "recommended" for developmental coursework, and on whether they actually enroll. Table 1 gives initial figures for the proportion of students in each category.

Table 1.
Students recommended for and enrolling in developmental coursework

Academic Year	New Students[1]	Recommended for Developmental		Enrolling in Developmental[2]		Rec. Students Who Enroll	
1994-95	1680	628	37.4%	442	26.3%	365	58.1%
1995-96	1839	688	37.4%	456	24.8%	367	53.3%
1996-97	2219	786	35.4%	533	24.0%	460	58.5%
1997-98	2462	859	34.9%	590	24.0%	504	58.7%
1998-99	2517	990	39.3%	637	25.3%	560	56.6%
1999-2000	2518	962	38.2%	541	21.5%	491	51.0%

[1] New students are students enrolling at Germanna for the first time during the academic year.

[2] Enrollment in developmental courses was not necessarily during the first academic year.

In general, during the reporting period between 35% and 40% of new students were recommended for developmental coursework, and between 50% and 60% of these students enrolled in a developmental course. Some students who were not recommended for developmental enrolled in those courses anyway, so that altogether approximately 25% of all new students enrolled in developmental courses during the reporting period. These initial figures are somewhat misleading, however, due to the wide variations in enrollment patterns among Germanna students. There are several cases in which an entering student may not actually be assessed for placement in college-level courses. In addition, the present analysis is based only on computer records available through the student information system. These two factors combined exclude several groups of students:

- Students who have not yet declared a curriculum and have taken only a few courses on a part-time basis may not have placement scores on their record.
- Students who first enroll at Germanna as high school students may not have submitted their placement test scores for entry in the information system.

- Students who transfer to Germanna from another college, or who have completed previous college-level coursework, may be advised to enroll in a college-level course without having placement scores on their record.

To compensate for at least the first two of these situations, *the remainder of this analysis will be limited to curriculum-placed students*. Table 2 provides figures on developmental enrollment for curriculum-placed students only.

Table 2.
Students recommended for and enrolling in developmental coursework
(Curriculum-placed students only)

Academic Year	New Students[1]	Recommended for Developmental		Enrolling in Developmental[2]		Rec. Students Who Enroll	
1994-95	743	431	58.0%	309	41.6%	266	61.7%
1995-96	789	458	58.0%	338	42.8%	279	60.9%
1996-97	977	570	58.3%	405	41.5%	355	62.3%
1997-98	1057	618	58.5%	433	41.0%	384	62.1%
1998-99	1212	743	61.3%	518	42.7%	462	62.2%
1999-2000[3]	1069	687	64.3%	419	39.2%	384	55.9%

[1] New students are students enrolling at Germanna for the first time during the academic year.

[2] Enrollment in developmental courses was not necessarily during the first academic year.

[3] The smaller number of new curriculum-placed students for 1999-2000 does not indicate a decline in enrollment, but rather is reflective of students' delay in declaring a curriculum.

As the table indicates, the proportion of students recommended for developmental coursework is much higher when only curriculum-placed students are considered. The difference is attributable primarily to the fact that these students are more likely to have placement test scores on file. In addition, the table indicates that the proportion of students recommended for developmental courses has increased during the last two academic years. There are a number of factors which might explain this increase, including changes in the placement test threshold levels for college courses, and changes in the student population. (It is also important to note that students may change their declared curriculum at any time, so that the proportions in the table will change; this would especially impact the figure for the 1999-2000 academic year, with many students newly enrolled and not yet having declared a curriculum.) The present report will not

investigate these factors; however, such an analysis would be useful for a better understanding of the placement and developmental coursework process.

At Germanna, students are recommended for developmental coursework in two disciplines, English and math, and a much higher proportion of students are recommended for developmental math than for English. Table 3 documents the respective proportions of curriculum-placed students recommended for and enrolling in developmental courses in each discipline.

Table 3.
Students recommended for and enrolling in developmental coursework, by developmental course discipline (Curriculum-placed students only)

Developmental Math

Academic Year	New Students[1]	Recommended for Developmental		Enrolling in Developmental[2]		Rec. Students Who Enroll	
1994-95	743	410	55.2%	278	37.4%	233	56.8%
1995-96	789	424	53.7%	321	40.7%	252	59.4%
1996-97	977	546	55.9%	382	39.1%	323	59.2%
1997-98	1057	594	56.2%	404	38.2%	351	59.1%
1998-99	1212	670	55.3%	445	36.7%	379	56.6%
1999-2000	1069	617	57.7%	346	32.4%	309	50.1%

Developmental English

Academic Year	New Students[1]	Recommended for Developmental		Enrolling in Developmental[2]		Rec. Students Who Enroll	
1994-95	743	108	14.5%	68	9.2%	62	57.4%
1995-96	789	97	12.3%	62	7.9%	55	56.7%
1996-97	977	142	14.5%	99	10.1%	86	60.6%
1997-98	1057	133	12.6%	94	8.9%	82	61.7%
1998-99	1212	303	25.0%	161	13.3%	144	47.5%
1999-2000	1069	319	29.8%	161	15.1%	145	45.5%

[1] New students are students enrolling at Germanna for the first time during the academic year.

[2] Enrollment in developmental courses was not necessarily during the first academic year.

Table 3 indicates that the proportion of students recommended for and enrolling in developmental math courses is substantially greater than the proportion of developmental English students. The table also indicates that the proportion of students recommended for

developmental English nearly doubled in 1998-99 over previous levels. This is likely due in large part to a significant change in the cutoff score on the placement reading exam, which took effect in April 1998, and the creation of an additional corresponding developmental reading course. However, at the same time, the proportion of students recommended for developmental English who actually enrolled decreased, as many of the newly identified "developmental" students apparently did not follow through in their enrollment. (It is not possible in the present analysis to make an exact match between the developmental course a student took and the one for which he or she was recommended.)

Despite the substantial numbers of students recommended for and enrolling in developmental courses, the aggregate enrollment in those courses is relatively small. Between 1994-95 and 1999-2000, all developmental courses combined represented less than 6% of total course registrations at the College, and approximately 6% of total credits earned. Within the specific disciplines where developmental courses are offered, however, the pre-collegiate courses comprise a higher percentage. Developmental English courses ranged in frequency from 5.3% to 10.0% of annual total English course registrations during the period, with the highest proportion coming during 1999-2000. Developmental math courses were a much more significant proportion, representing between 36.3% and 39.9% of total math registrations, with no clear trend.

Summary

1. Not all incoming students are assessed for college-level readiness; for the purpose of this analysis, it is most appropriate to focus on curriculum-placed students only.
2. Approximately 60% of curriculum-placed students are recommended for developmental coursework, and approximately 60% of those students actually enroll. Combined with the "non-recommended" students, approximately 40% of curriculum-placed students enroll in developmental courses.
3. Students are much more likely to be recommended for developmental math than developmental English. The proportion of students recommended for developmental English has increased in the last two years, however, likely due to a change in the reading placement test cutoff score.
4. Developmental courses comprise only about 6% of total College offerings, although they represent a more substantial proportion of math course registration.

What is the success rate for students enrolled in developmental courses?

This section compiles information on curriculum-placed students who enrolled in developmental math and English courses between 1994-95 and 1999-2000 and the grades they received in those courses. Students in developmental courses receive grades of "Satisfactory", "Unsatisfactory" or "Re-enroll"; they may also receive incomplete, withdrawal, or audit grades. Tables 4 and 5 present the results of developmental courses in math and English, respectively.

Table 4.
Grade outcomes in developmental math courses
(Curriculum-placed students only)

	MTH 03[1]				MTH 04				All Developmental Math			
Year[2]	Recommended		Not Recommended		Recommended		Not Recommended		Recommended		Not Recommended	
	No.[3]	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'
1994-95	196	66.8	40	57.5	136	62.5	35	65.7	332	65.1	75	61.3
1995-96	209	70.8	56	73.2	117	69.2	33	75.8	363	69.4	98	73.5
1996-97	254	57.1	47	66.0	135	63.7	29	65.5	440	61.1	88	68.2
1997-98	268	60.1	47	66.0	154	58.4	37	45.9	479	62.2	104	57.7
1998-99	353	64.9	48	52.1	208	65.9	40	70.0	624	67.0	104	64.4
1999-00	261	55.6	39	71.8	121	58.7	17	52.9	403	56.6	67	61.2
Total	1541	62.2	277	64.6	871	63.1	191	63.4	2641	63.7	536	64.6

[1] MTH 03 and MTH 04 are the only developmental math courses with sufficient numbers of students enrolled who were not recommended for developmental math. "All Developmental Math" includes MTH 01, MTH 02, and MTH 05 as well.

[2] For 1999-2000, the figures are for Summer and Fall 1999 only.

[3] "No." is the total count of all student enrollments. '% S' is the percentage of all students receiving a grade of Satisfactory.

The purpose of the tables in this section is not to compare student success rates over time, nor is it to imply that there is a certain proportion of students in developmental courses who should complete satisfactorily. The purpose is solely to indicate what proportion of students who do enroll in developmental courses does complete them successfully. Table 4 indicates that this proportion among students in developmental math courses is approximately 60%. There does not appear to be a significant difference in success rates between the specific courses, although the proportion of students receiving an 'S' for MTH 02 and MTH 05 (not shown in the table) is somewhat higher. Further, there does not appear to be a significant difference in success rates

between students who enrolled after being recommended for a developmental course, and students who were not recommended.

Additional analysis shows that some of the course grades shown above are for students who are repeating the same developmental course. Repeats comprise approximately 9% of the developmental math course grades in this table. Approximately 46% of the students who are repeating a developmental math course complete it satisfactorily on the second attempt. (This proportion among repeat students is included in the overall figures provided in the table, but does not produce a significant effect due to the small number of cases.)

Although a direct comparison is not warranted, it may be of interest to look at a similar success rate for curriculum-placed students in college-level math courses. For all MTH courses numbered 100 or higher, approximately 75% of students received a grade of 'C' or better during this period.

Table 5.
Grade outcomes in developmental English courses
(Curriculum-placed students only)

	ENG 01[1]				ENG 04				All Developmental English			
Year[2]	Recommended		Not Recommended		Recommended		Not Recommended		Recommended		Not Recommended	
	No.[3]	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'
1994-95	56	71.4	6	100.0	9	100.0	0	0.0	65	75.4	7	100.0
1995-96	49	71.4	4	50.0	15	80.0	2	100.0	64	73.4	6	66.7
1996-97	73	61.6	10	80.0	17	76.5	3	0.0	90	64.4	13	61.5
1997-98	82	56.1	9	44.4	18	50.0	3	33.3	103	56.3	12	41.7
1998-99	112	65.2	17	76.5	43	48.8	6	50.0	192	57.8	23	69.6
1999-00	82	57.3	7	42.9	38	52.6	1	0.0	167	54.5	12	50.0
Total	454	63.0	53	67.9	140	60.0	15	40.0	681	60.8	73	63.0

[1] ENG 01 and ENG 04 are the only developmental English courses with sufficient numbers of students enrolled who were not recommended for developmental English—and even for those courses, the number of students in a single year is really too small for percentages to be meaningful. "All Developmental English" includes ENG 06, ENG 07, and ENG 09 as well.

[2] For 1999-2000, the figures are for Summer and Fall 1999 only.

[3] "No." is the total count of all student enrollments. "% S" is the percentage of all students receiving a grade of Satisfactory.

The proportion of students completing developmental English courses satisfactorily is similar to that for developmental math, at approximately 60%. (Percentages in Table 5 vary more widely due to the smaller number of cases.) It does appear that the number of students recommended for developmental reading (ENG 04) increased during the last two academic years, likely due to the changed placement test threshold mentioned in the previous section. For these two years, the proportion of recommended students completing satisfactorily was lower than the proportion in earlier years; however, the limited number of cases for analysis suggests only that this trend bears further observation. The number of students recommended for ENG 01 developmental writing increased substantially for 1998-99, although this appears to have been a one-time event.

Repeat enrollments in developmental English courses comprise only about 7% of the totals shown in the table. Again, approximately 45% of students repeating the developmental course complete it satisfactorily on the second attempt. The comparison rate for students completing college-level English courses with at least a 'C' was 75%.

Summary

- Approximately 60% of the students who enroll for developmental math and English courses complete them satisfactorily. This includes a small number of students who are repeating the course.

What success do students have in enrolling in college-level courses following their developmental coursework?

This final section of the report documents outcomes (in the form of course grades) for students enrolled in the "entry-level" collegiate courses in both math and English, classified according to the students' developmental background. Based on a combination of the results from the previous two sections, the tables in this section classify students according to their "developmental background", comprising two factors:

- Was the student recommended for developmental coursework? and
- Did the student actually enroll in a developmental course?

The section presents results for three areas: College Mathematics, College Composition, and Business Math.

The analysis in this section concerns "success" in specific collegiate-level courses—defined for this analysis as receiving a grade of 'C' or better—for students separated into four different

categories of developmental background. At the outset, it should be noted that *a majority of the students in these collegiate courses are successful*, based on this measure. This statement holds whether the students enrolled in a developmental course or not, and whether they were recommended for developmental courses or not. As a consequence, the bulk of the analysis which follows concerns possible *differences* in the success rates of students, based on their identified developmental status. Such differences might indicate that not all students are receiving the most appropriate course placement—although it must be acknowledged that this ideal goal is not likely attainable.

College Mathematics (MTH 151 and MTH 163)

For the purpose of this analysis, two of the Germanna math classes are designated as "entry-level" collegiate courses: MTH 151, Math for the Liberal Arts I; and MTH 163, Pre-Calculus I.[1] These two courses, along with the developmental MTH 03, 04, and 05, are the most common enrollments for students providing placement test scores. The outcomes for MTH 151 and MTH 163 are grouped together throughout, as students rarely complete both courses. As in the previous sections, results presented here are based on curriculum-placed students only, which excludes the many high school dual-enrollment students who take MTH 163 each year. The analysis is based on two different "outcome" measures in the collegiate courses: The proportion of students receiving a letter grade of 'C' or better in the collegiate course; and the average grade in the course (on the 4-point GPA scale). Not all combinations of all these measures are presented in this report, but further tables are available from the Office of Research and Planning.

[1] MTH 120 "Introduction to Mathematics" also fits the technical definition of a "college-level" course, since it is offered at the 100-level. However, the placement test threshold for MTH 120 has generally been the same as that for the developmental MTH 03.

Table 6.
Grade outcomes in collegiate math courses (MTH 151/163), by developmental math background
(Curriculum-placed students only)

Year	Recommended[1]					Not Recommended				
	Enrolled[1]		Did Not Enroll			Enrolled		Did Not Enroll		
	No.	% Pass[2]	No.	% Pass	Sig.[3]	No.	% Pass	No.	% Pass	Sig.
1994-95	118	69.5	38	78.9		28	71.4	88	79.5	
1995-96	103	68.0	41	82.9		38	63.2	83	85.5	*
1996-97	113	76.1	29	93.1	*	23	65.2	97	77.3	
1997-98	124	75.0	39	82.1		22	77.3	112	83.0	
1998-99	132	66.7	32	65.6		29	79.3	151	82.8	
1999-00[4]	116	61.2	30	66.7		21	57.1	140	81.4	*
Total	706	69.4	209	78.5	*	161	68.9	671	81.7	*

[1] "Recommended" or "Not Recommended" for developmental math. "Enrolled" or "Did Not Enroll" in any developmental math course. This table does not specify whether the student enrolled in the specific recommended developmental course, or whether the student completed the developmental course successfully.

[2] '% Pass' is the percentage of students in the category receiving a grade of 'C' or better in MTH 151 or MTH 163.

[3] Statistical significance: a '*' in this column indicates that there is a statistically significant relationship between enrollment in a developmental course and the proportion of students completing successfully (O^2 test at $p < .05$).

[4] For 1999-2000, the figures are for Summer and Fall 1999 only.

Table 6 presents "success" rates for all curriculum-placed students who took either MTH 151 or MTH 163 during the period, classified according to their background of placement into and enrollment in developmental math. The table indicates a potential issue in the placement of students in developmental classes, at least among the students who did enroll in these collegiate math courses. The primary comparison in the table is in the success rates between students who enrolled in developmental math courses and those who did not; the table separates those who enrolled when they were recommended to do so, and those who enrolled even when this was not recommended. In either case, the success rate of students who did *not* enroll in a developmental math course was *higher*, which indicates a possible misplacement of students into developmental courses. The pattern of higher rates of success is consistent throughout the table, although most of the differences for specific years do not reach a level of statistical significance. (This is likely due to the relatively small number of cases.) When all the enrollments during the period are taken together, however, the difference is both clear and statistically significant.

The better results in the collegiate math courses among students who did not enroll in developmental courses are also documented when the actual grades are calculated for the collegiate course. Among students who were recommended for developmental math, those who actually enrolled achieved an average grade of 2.47 on the 4-point scale. Those who did *not* enroll scored an average of 2.69, and the difference is statistically significant. (Statistical significance here is measured by a two-tailed t-test comparison of the mean grades, $p < .05$) Among those not recommended for developmental, the pattern was the same: Enrollees averaged a 2.59 GPA in the collegiate course, compared with 2.89 among those who did not enroll.

That this statistical result indicates a possible misplacement of students into developmental courses can be explained as follows: Among students who were recommended for developmental math, those who did not enroll in a developmental course were able to complete the collegiate math course at higher rates and with higher average grades than those who did enroll in developmental. This indicates that many of these students probably should not have been placed into developmental math. However, one weakness of the present analysis is that the categorization of students as "recommended" for developmental coursework is based only on placement test scores entered into the student information system. There are at least two reasons why this limitation may exaggerate the apparent "misplacement" of students into developmental courses.

Students who take placement tests have the option of re-taking those tests if they feel their scores are not reflective of their skills; anecdotal information indicates that they do not often do so, however. In addition, many instructors use diagnostic exams at the beginning of their courses. On the basis of this exam, the instructor may recommend that a student enroll in a different course; however, the results of these exams are not included in the student information system data. Thus, a student who scores low on the placement exam may move appropriately into a collegiate course, and complete it successfully, but still remain in the information system as recommended for developmental. The question of the validity of the placement testing process remains, although it is entirely possible that students are being placed into the most appropriate courses by other means.

Additionally, it must be recognized that a student's enrollment in any course represents a *choice*. While completion of prerequisites is stipulated as a "requirement", there is no absolute enforcement of these prerequisites at present. A student may discuss his or her situation with a

faculty advisor, counselor, or the course instructor, and choose to enroll in a course which varies from the placement recommendation. Finally, it should be recognized that mathematics is an area which creates a very real "math anxiety" in many people. The level of a student's confidence, persistence, and effort are intangible variables which are not included in this analysis, but which certainly can have an impact on the student's success.

Summary

- The analysis indicates that students who chose not to enroll in developmental math were more successful in their collegiate math course, even when a developmental source was recommended. This suggests that some of these students were misplaced into the developmental math course.
- Further discussion of the issue of placement considers other possible sources for this result, including re-assessment of the student after enrollment—not recorded on the information system—and the intangible factors of effort and "math anxiety".

College Composition (ENG 111)

Table 7.
Grade outcomes in College Composition (ENG 111), by developmental English background
(Curriculum-placed students only)

	Recommended[1]					Not Recommended				
Year	Enrolled[1]		Did Not Enroll			Enrolled		Did Not Enroll		
	No.	% Pass[2]	No.	% Pass	Sig.[3]	No.	% Pass	No.	% Pass	Sig.
1994-95	40	77.5	18	72.2		5	40.0	367	76.3	
1995-96	31	74.2	23	78.3		5	80.0	380	75.8	
1996-97	50	64.0	16	75.0		6	83.3	415	74.0	
1997-98	39	71.8	17	47.1		9	100.0	468	78.6	
1998-99	73	74.0	84	75.0		11	45.5	486	73.7	*
1999-00[4]	46	56.5	86	60.5		11	63.6	398	69.3	
Total	279	69.5	244	68.0		47	68.1	2514	74.7	

[1] "Recommended" or "Not Recommended" for developmental English. "Enrolled" or "Did Not Enroll" in any developmental English course. This table does not specify whether the student enrolled in the specific recommended developmental course, or whether the student completed the developmental course successfully.

[2] '% Pass' is the percentage of students in the category receiving a grade of 'C' or better in ENG 111.

[3] Statistical significance: a '*' in this column indicates that there is a statistically significant relationship between enrollment in a developmental course and the proportion of students completing successfully (O^2 test at $p < .05$).

[4] For 1999-2000, the figures are for Summer and Fall 1999 only.

As in previous sections, Table 7 includes only curriculum-placed students, which excludes a large number of high school dual-enrollment students. The first point to make regarding Table 7 is that a large majority of curriculum-placed students are *not* recommended for developmental English, and most of these students do not enroll. This does make the comparison of success rates in ENG 111 somewhat difficult, since there are relatively few cases for the other situations depicted in the table. (Of 3,084 students in the table, only 326 or 10.6% enrolled in a developmental English course.) It is partly due to this skewing in the developmental English background that the table does not depict any clear pattern of differences in the outcomes of ENG 111 students. Among those students recommended for developmental English, the success rates vary from one year to the next, but the overall proportions of successful students in the two background categories end up essentially equal. As noted previously with regard to Table 3, the number of students recommended for developmental English increased substantially for 1998-99 and 1999-00; the success rates fluctuated during these two years, but remained similar whether the students enrolled in developmental or not. The analysis of average grades received in the ENG 111 course produces similar results.

The results of Table 7 may be somewhat misleading, because the table does not separate students in their developmental background according to recommendation for or enrollment in developmental writing courses as opposed to developmental reading courses. A further examination of students enrolling in ENG 111 based on their previous enrollment specifically in ENG 01 "Preparing for College Writing" gives some additional evidence. As noted previously, only a few of the students who took ENG 111 during the period had enrolled in the developmental course; in this case, 265 of 3,130 or 8.5%. Nearly all of the students who enrolled in ENG 01 completed it successfully, although a few of them may have repeated the course before doing so. Among the students who successfully completed ENG 01, 69.9% received a grade of 'C' or better in ENG 111. This compares with a success rate of 65.5% among unsuccessful completers of ENG 01, and 71.5% among students who did not take the developmental course. These differences are small, and are not statistically significant. In terms of the average grade received in ENG 111, students who successfully completed ENG 01 received an average grade of 2.42 on the 4-point scale, while students who did not enroll in ENG 01 averaged 2.66. This difference is statistically significant, since there are some 2,800 cases in the analysis, but does not indicate a substantial disparity.

Summary

- The success rate in ENG 111 College Composition is essentially the same for students who enrolled in developmental English as those who did not. This indicates that these students are receiving an appropriate preparation in their developmental course.
- Students successfully completing ENG 01 received slightly lower actual grades, on average, in ENG 111, although the difference is not large.

Business Math (BUS 121)

Business Math (BUS 121) represents a special case of math placement. For many years, students enrolling BUS 121 were expected to fulfill a prerequisite in math, through either previous coursework or documented placement test scores. Some students were placed in developmental math courses as preparation for the Business Math course. However, based on their experience working with these students, business faculty were concerned that some students enrolling in BUS 121 did not have specific skills needed for that course. As a result, beginning in 1996-97 in collaboration with the business faculty, math instructors began offering the developmental MTH 02 course specifically as preparation for BUS 121. This section presents evidence of student outcomes in BUS 121 by developmental math background, both in general and related specifically to MTH 02.

Table 8.
Grade outcomes in Business Math (BUS 121), by developmental math background
(Curriculum-placed students only)

Year	Recommended[1]					Not Recommended				
	Enrolled[1]		Did Not Enroll			Enrolled		Did Not Enroll		
	No.	% Pass[2]	No.	% Pass	Sig.[3]	No.	% Pass	No.	% Pass	Sig.
1994-95	23	60.9	23	60.9		6	66.7	33	75.8	
1995-96	17	64.7	31	80.6		3	100.0	35	80.0	
1996-97	16	56.3	36	80.6		4	75.0	32	93.8	
1997-98	20	55.0	27	70.4		4	100.0	32	90.6	
1998-99	19	73.7	20	70.0		4	75.0	39	89.7	
1999-00[4]	13	84.6	16	75.0		5	40.0	29	89.7	*
Total	108	64.8	153	73.9		26	73.1	200	86.5	

[1] "Recommended" or "Not Recommended" for developmental math. "Enrolled" or "Did Not Enroll" in any developmental math course. This table does not specify whether the student enrolled in the specific recommended developmental course, or whether the student completed the developmental course successfully.

[2] '% Pass' is the percentage of students in the category receiving a grade of 'C' or better in BUS 121.

[3] Statistical significance: a '*' in this column indicates that there is a statistically significant relationship between enrollment in a developmental course and the proportion of students completing successfully (O^2 test at $p < .05$).

[4] For 1999-2000, the figures are for Summer and Fall 1999 only.

Table 8 shows results somewhat different from those presented in Table 6. For BUS 121 students who were "not recommended" for developmental math, the table shows a mixed result. Overall, those students who enrolled in developmental math courses were less likely to achieve a 'C' in BUS 121. However, the difference does not hold in all years and is not statistically significant. Among students who were recommended for developmental math, for the first four years of the period, those who did not enroll were more likely to succeed in BUS 121. For the last two years, however, the reverse has been true. But throughout the period, these differences do not reach the level of statistical significance, due to the relatively small number of cases in the various categories. In sum, the table does not indicate a clear relationship between enrollment in developmental math and success in the BUS 121 course.

In this case, however, the results of Table 8 are not especially useful, since there is a question as to whether all of the developmental math courses provide the specific skills needed for success in Business Math. It is more useful to look specifically at whether students have completed MTH 02 before taking BUS 121, at least for the years since 1996-97. A review of the

enrollment histories of students enrolling in BUS 121 from 1994-95 through the present reveals that only 20 of 487 students had enrolled in MTH 02 as their sole math preparation course prior to enrolling in BUS 121. An additional 55 students had enrolled in another developmental math course; and 141 students had enrolled in MTH 120 prior to BUS 121. The remaining 237 BUS 121 students had not enrolled in any of these math courses prior to Business Math. Table 9 documents the outcomes in BUS 121 by the specific math course taken previously.

Table 9.
Grade outcomes in Business Math (BUS 121), by prior math course outcome
(Curriculum-placed students only)

Prior Math Course	Outcome of Math Course	BUS 121 Outcome		
		No.	% Pass[1]	Avg. Grade
MTH 02	Successful[2]	20	65.0	2.22
	Not Successful	0	- -	- -
MTH 03-05	Successful	43	72.1	2.40
	Not Successful	12	25.0	1.63
MTH 120	Successful	132	78.8	2.83
	Not Successful	9	33.3	2.75
No Prior MTH		237	82.3	3.00

[1] '% Pass' is the percentage of students receiving a grade of 'C' or better in BUS 121.

[2] "Successful" in the developmental math courses is defined as a grade of 'S'. For MTH 120, it is a grade of 'C' or better.

As previously noted, the number of students enrolling only in MTH 02 prior to the BUS 121 course is quite small; even so, *all* of the students who enrolled in BUS 121 and had taken MTH 02 had completed the developmental course successfully. Most of these were in the period since the course was reorganized in 1996-97. However, there were a total of 79 students who completed MTH 02 successfully between 1996-97 and 1998-99, so it is clear that many of them are not enrolling immediately in BUS 121. The number of students taking MTH 120 as a precursor to BUS 121 has declined in the last three years, while the number of students enrolling in primarily MTH 03 or 04 has remained steady, if small. (It should be noted that MTH 120 is no longer listed as a prerequisite for BUS 121, but the placement test score thresholds for these

math courses have overlapped to some extent in the past.) A comparison of the BUS 121 success rates for students completing each of the math courses indicates that the students who completed only MTH 02 were the least successful among those students completing a math prerequisite. Although this evidence is not definitive, it does seem to indicate a need for further investigation of the appropriate placement and prerequisites for students enrolling in BUS 121.

Summary

- The analysis of outcomes in Business Math presents a mixed picture. There does not appear to be a relationship between placement recommendation and enrollment in developmental math courses and the outcome in BUS 121. Although less of the students who took a developmental math course were successful in BUS 121, the difference is not large.
- Further, it appears that only a small number of students is utilizing the recommended prerequisite of MTH 02 in preparation for BUS 121, and those students who do take MTH 02 do not necessarily fare as well as others. More analysis is called for, perhaps with detailed attention to the specific sequencing of developmental placement, advising, and enrollment.

Shortcomings in the present report

The present report is limited by several constraints, which should be considered before basing recommendations for action on these findings:

- As noted previously, the analysis is limited to data entered into the student information system. It does not include information on student's academic preparation other than recorded placement test scores and enrollment in Germanna courses.
- The pattern of student enrollments in the community college is inherently complicated. Students do not necessarily follow placement recommendations, do not necessarily enroll in courses in the recommended sequence, and may "stop out" of the College for an extended period between course enrollments. Many students are returning to the classroom after many years of absence, which may make the comparison of student backgrounds and preparation less conclusive.
- Without a doubt, there is an intangible factor in student success which might be labeled "persistence" or "self-confidence". Many of the students in a community college setting may be unsure of their skills, which may affect their choice of courses. Placement test results may not reflect a student's abilities accurately, if the test is taken without some preparation or without a clear understanding of its importance. An individual faculty or staff member can have a tremendous impact on the student's success, regardless of the student's preparation or prior experience. It is not possible to include an analysis of this intangible factor in a brief quantitative report such as the present one, yet it is a very real factor in student success.

Despite these shortcomings, the present report should expand on the base of information available, and as such represents a contribution toward the ongoing improvement of the placement and developmental education process.

Possible issues for further study

1. The present analysis does not specifically address the question of placement test score thresholds. This could be investigated by including the actual placement test score(s) in the analysis. However, this would also introduce an additional element of complexity into the analysis, which would not necessarily produce any more definitive results.

2. The present analysis is based only on data entered in the student information system. The analysis would be strengthened by including additional information on prior high school or college coursework. Again, however, this would produce a more complex analysis without a guarantee of more definitive results.

3. The present analysis does not attempt to account for time as a variable in the hypothesized relationship between prior academic preparation, placement, developmental coursework, and collegiate coursework. This could be introduced by including dates of the various testing and coursework items. It might be hypothesized that student enrolling directly from high school have a different outcome than students who have been away from the classroom for some time. This would also incorporate the recent shift in Germanna's enrollment toward more students entering directly from high school.

4. The present quantitative analysis should be supplemented by interviews with students regarding their placement and enrollment choices, as well as their experience in the classroom. This would help to illuminate the otherwise "intangible" elements in the placement process and course outcomes.

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