



**Costs and Consequences of Remedial Course Enrollment in Ohio
Public Higher Education: Six-Year Outcomes for Fall 1998 Cohort**

August 2006

Policy Background

- Ohio's higher education policymakers are concerned with issues related to students' preparation for college and degree completion.
- Discussions about student preparation focus on the costs of remedial courses, with the implication being that higher education costs will fall if students require fewer remedial courses.
- Legislation has been introduced in the Ohio General Assembly that stiffens high school graduation requirements (the Ohio Core) and restricts public universities' teaching of remedial courses.
- The proposed high school graduation requirements are intended to increase preparation levels and reduce remediation rates, and the restrictions on university remedial course instruction are intended to reduce costs by shifting remediation to the two-year sector.
- Policymakers have an intense interest in increasing degree production in science, technology, engineering and mathematics (STEM) fields.
- Recent legislation required the Ohio Board of Regents to study how funding policies could be modified in order to reward degree completion. Some study group recommendations focus on STEM course enrollment and degree production.

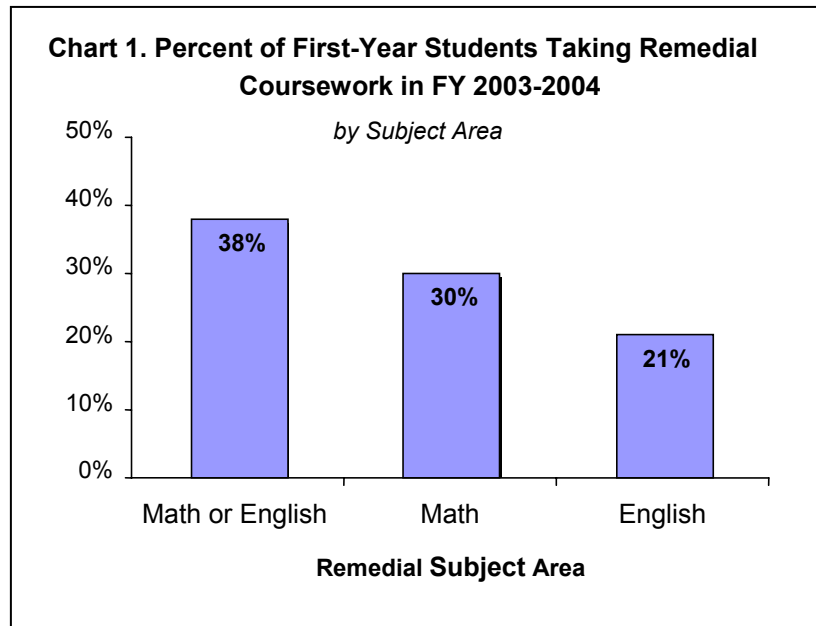
Questions

- What is the current extent and magnitude of remedial course enrollment in Ohio?
- What are the consequences of remedial course needs, in terms of student enrollment choices, degree attainment, and instructional costs?
- What is the impact of remedial course enrollment on STEM degree attainment in particular?

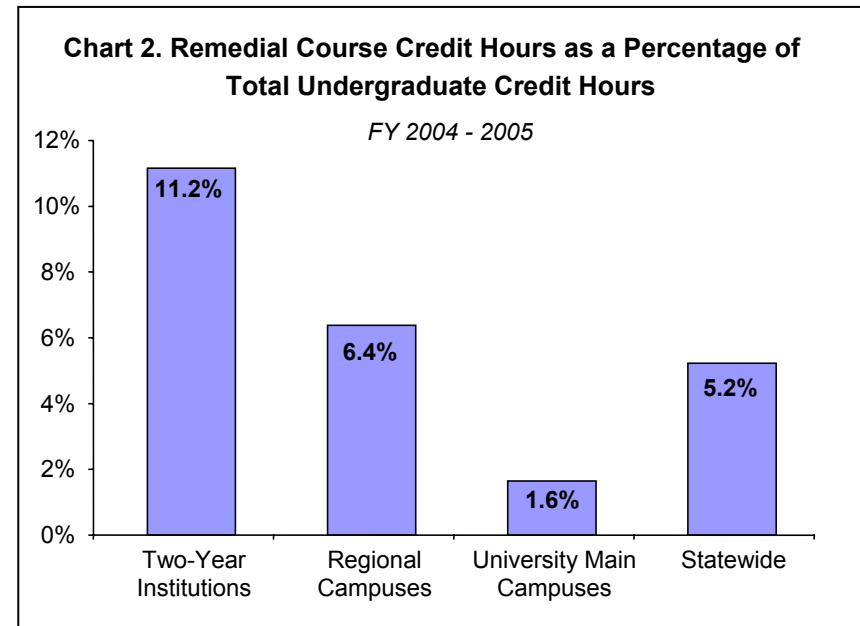
Conclusions

- A high proportion (38%) of incoming freshmen take remedial coursework, but remedial courses account for about 5% of undergraduate FTE and 3.6% of undergraduate instructional costs.
- Additional consequences of students' poor preparation for college include lower degree completion rates and fewer students pursuing STEM majors. Fifteen percent of remedial students earn a bachelor's degree within six years, compared to 47% of non-remedial students. Of interest to policy makers who advocate increases in STEM graduate production, only 1% of remedial students earned a bachelor's degree in a STEM field, compared to 9% of non-remedial graduates.
- Non-remedial students make a host of academic decisions that tend to increase costs: they are more likely to enroll at four-year institutions and to choose more costly majors, and they attempt far more total credits due to the greater length of their academic careers.

Extent of Remedial Course-Taking



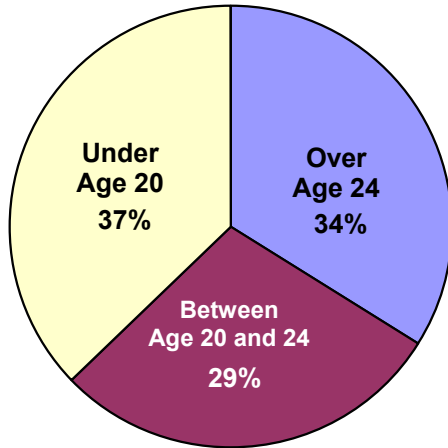
- Ohio does indeed have a problem with under-prepared students entering college, with 38% of all first-time freshmen in FY2004 taking at least one remedial course in math or English.
- Academic weakness in math is most prevalent. Thirty percent of students took remedial math courses compared to 21% who took remedial English courses.



- Remedial courses accounted for 5.2% of all undergraduate credits attempted in FY 2004. The remedial credit share was 11.2% in the two-year sector, followed by 6.4% at university regional campuses and 1.6% at university main campuses.
- In FY 2005, remedial courses cost \$6,089 per FTE, compared to \$8,805 per FTE for all undergraduate courses. Remedial courses account for 3.6% of total undergraduate costs.

Chart 3. Distribution of Remedial Student Credit Hours by Age

FY 2004



- Remedial course instruction needs are distributed across all age groups, with 37% of total remedial credits taken by “traditional” students under age 20, 29% taken by students between 20 and 24, and 34% taken by students over 24 years of age.
- The age distribution of remedial course-taking indicates that there may be limits on the impact of proposals such as the “Ohio Core” that require or encourage high school graduates to take more college preparatory courses. The short-run impact will be seen with traditional-age students, with delayed and possibly diluted effects on older students.

Likely Consequences of Reducing Remedial Education Needs

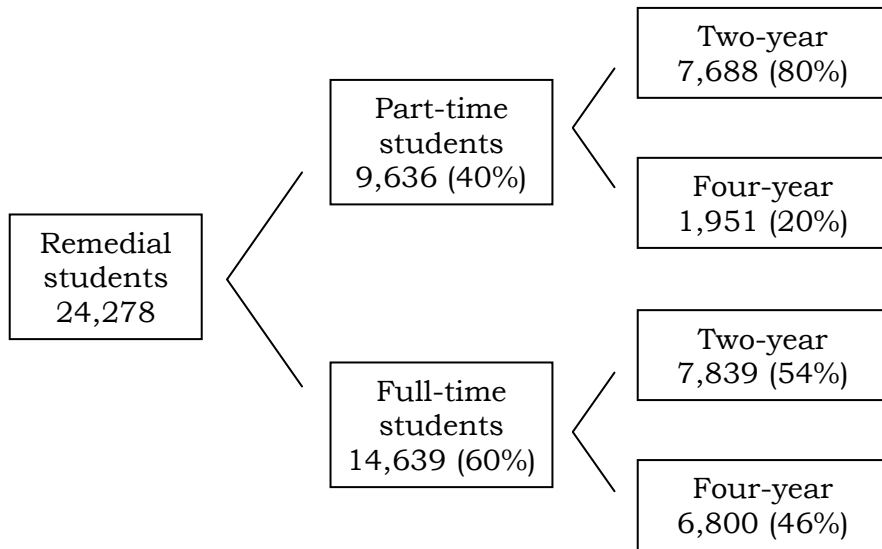
- If policies such as the Ohio Core succeed, the consequences will go far beyond the increased efficiency gained by the reduced need to teach remedial courses.
- Generally, outcomes for remediation-free students are associated with higher, not lower, costs. Better prepared students are more likely to begin college as full-time students and enroll at four-year institutions. They are more likely to earn a bachelor’s degree, which is a more costly outcome than leaving school or earning an associate degree. Moreover, degrees earned by remediation-free students are more likely to be in STEM fields, which cost more than other fields.

Description of Student Cohort for Analysis

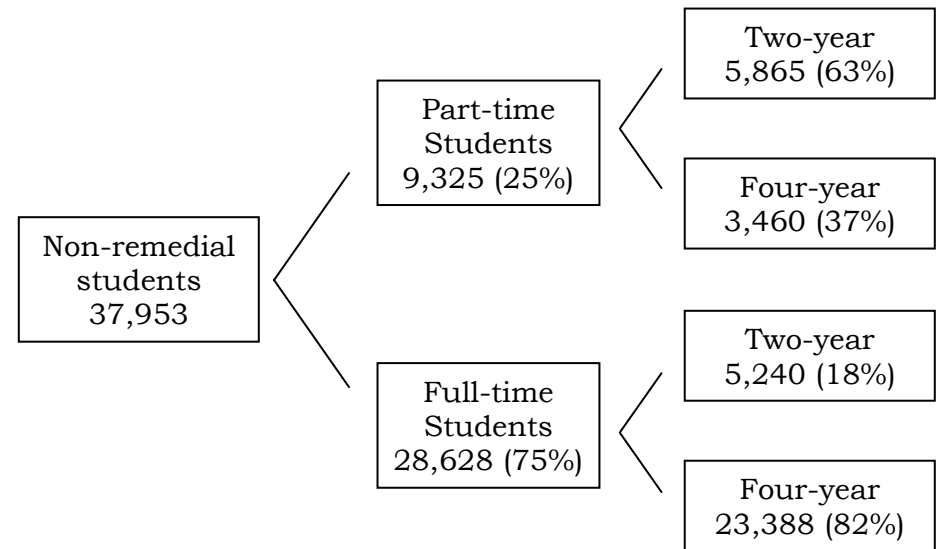
- The cohort of students for purposes of this analysis are 62,231 first-time, first-year, degree-seeking undergraduates enrolled in fall 1998 in Ohio public higher education institutions. Academic outcomes and instructional costs (see appendix for information on cost calculations) are tracked six years through FY 2004. High school students participating in Ohio’s Postsecondary Enrollment Options Program (PSEO) are not included in the cohort.

Chart 4. Enrollment Choices by Level of Preparation

Remedial Students



Non-remedial Students

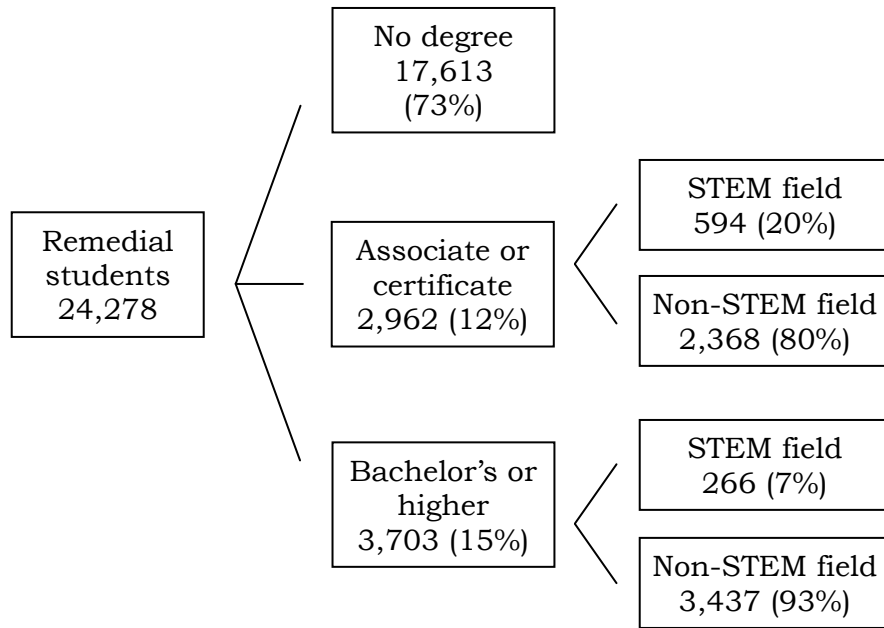


- Students who take remedial courses are less likely than non-remedial students to enroll as full-time students in their first year (60% compared to 75%). Both part-time and full-time students who take remedial courses are more likely to enroll in two-year institutions than their non-remedial counterparts.
- Among part-time students, 80% of remedial students

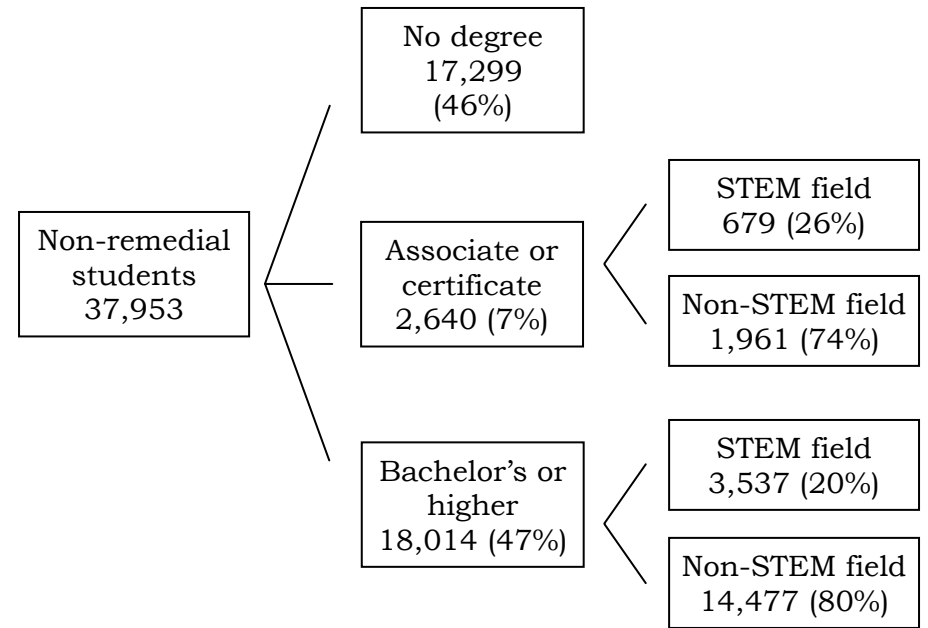
- enrolled in two-year schools, compared to 63% of non-remedial students. Among full-time students, 54% of remedial students enrolled at two-year schools, compared to 18% of the non-remedial students.
- 28% of the remedial students enrolled full-time at a four-year institution, compared to 62% of the non-remedial students.

Chart 5. Success Rates by Level of Preparation

Remedial



Non-Remedial



- Only 27% of students who took remedial courses earned an associate degree or higher within six years, compared to 54% of students who did not take remedial courses.
- The difference in success rates widens as the bar for "success" is raised. Non-remedial students are three times as likely to earn a bachelor's degree (47%) as remedial students (15%).

- Only 1% (266 of 24,278) of remedial students earned a bachelor's degree in a STEM field within six years compared to 9% (3,537 of 37,953) of the non-remedial students.

Table 1. Cost per FTE in the First Year of College

Average First-Year FTE and Cost per FTE, by Remedial Enrollment and Sector						
	<i>All First-Time Students</i>		<i>Non-Remedial Students</i>		<i>Remedial Students</i>	
	Avg. FTE	Cost per FTE	Avg. FTE	Cost per FTE	Avg. FTE	Cost per FTE
All Sectors	0.83	\$6,950	0.88	\$7,407	0.76	\$6,124
2-Year Sector	0.68	\$6,016	0.66	\$6,341	0.70	\$5,797
4-Year Sector	0.94	\$7,456	0.97	\$7,708	0.87	\$6,592

- Students who take remedial courses have lower average instructional costs than non-remedial students for a variety of reasons. Remedial students take lighter course loads: average first-year FTE is .76 for remedial students and .88 for non-remedial students. Furthermore, average cost per FTE is lower for remedial students (\$6,138) than for non-remedial students (\$7,404).
- One reason for the lower cost per FTE of remedial students is their greater likelihood of enrolling in the two-year sector, which has lower costs than the four-year sector. Average first-year costs per

FTE in the two-year sector are \$6,016, compared to \$7,456 in the four-year sector.

- Even among students enrolled in the same sector, students taking remedial courses have lower average costs per FTE than the non-remedial students. Average costs per FTE in the two-year sector are \$5,797 for remedial students compared to \$6,341 for non-remedial students. Likewise, average costs per FTE in the four-year sector are \$7,708 for non-remedial students compared to \$6,592 for remedial students.

Table 2. Six-Year Instructional Costs, by Academic Attainment and Remedial Enrollment

Cohort	All Students			Remedial Students			Non-remedial Students		
	Number	% of Total Students	Average Six-Year Costs	Students	% of Remedial Students	Average Six-Year Costs	Students	% of Non-Remedial Students	Average Six-Year Costs
Earned Bachelor's Degree	20,770	33%	\$42,391	3,677	15%	\$39,989	17,093	45%	\$42,896
Earned Associate Degree	5,274	8%	\$22,548	2,758	11%	\$22,578	2,516	7%	\$22,515
Persisted through 6th Year	9,801	16%	\$24,776	4,741	19%	\$21,654	5,060	13%	\$27,702
Left School	24,547	39%	\$9,144	12,806	52%	\$8,225	11,741	31%	\$10,147
Total Students	62,231	100%	\$24,497	24,426	100%	\$17,210	37,805	100%	\$29,205

- Over the six year period from FY 1999 through FY 2004, students who earned bachelor's degrees were the most expensive to educate, with an average cost per student of \$42,391. Those who left school were the cheapest, with an average cost of \$9,144. Associate degree recipients and 6th year persisters fell in the middle, with average costs of \$22,548 and \$24,776 respectively.
- Remedial students had lower average "lifetime" costs than non-remedial students due in part to their lower degree completion rates. Average costs for remedial students were \$17,210, compared to \$29,205 for non-remedial students.
- At each level of academic success, the non-remedial students had higher costs than the remedial students, although the difference in cost for an Associate degree was only \$62.
- We suspect that the \$2,907 cost premium for non-remedial bachelor's degree recipients over their remedial counterparts is due to a greater tendency for non-remedial students to choose higher cost fields such as engineering. In the following table, we examine costs by major field in more detail.

Table 3. Costs of Bachelor’s Degrees by Major and Level of Preparation

Major	All Students			Remedial Students			Non-remedial Students		
	Students	% within Degree Level	Average Cost per Degree	Students who took Remedial Courses	% within Degree Level	Average Cost per Degree	Students who did not take Remedial Courses	% within Degree Level	Average Cost per Degree
All fields	20,770	100%	\$42,391	3,677	100%	\$39,989	17,093	100%	\$42,896
Engineering	1,878	9%	\$56,187	142	4%	\$51,689	1,736	10%	\$56,549
Health	824	4%	\$50,902	107	3%	\$50,664	717	4%	\$50,938
Nat. Science & Mathematics	1,837	9%	\$49,290	132	4%	\$47,816	1,705	10%	\$49,403
Arts & Humanities	4,079	20%	\$41,905	752	20%	\$40,953	3,327	19%	\$42,117
Education	3,014	15%	\$40,619	766	21%	\$39,414	2,248	13%	\$41,017
Social & Behavioral Sciences	3,994	19%	\$38,233	833	23%	\$38,230	3,161	18%	\$38,233
Business	4,647	22%	\$38,177	765	21%	\$37,572	3,882	23%	\$38,292
Other	497	2%	\$37,123	180	5%	\$35,017	317	2%	\$38,273

- The average six-year cost for all Bachelor's degrees was \$42,391, but the cost varied widely by major. Engineering degrees cost \$56,187 on average, about 47% higher than the social and behavioral sciences (\$38,233) and business (\$38,177). Health (\$50,902) and science and math (\$49,290) were also higher than average cost, with arts and humanities (\$41,905) and education (\$40,619) falling close to the average. These cost differences by major field suggest that the average cost per degree for remedial students is lower than the average cost per degree for non-remedial students, in large part because only 11% of the remedial students earned degrees in the three highest-cost fields, compared to 24% of the non-remedial students.
- However, even among students who earned degrees in similar majors, average costs per degree for remedial students tended to be lower than the costs for non-remedial students. For example, remedial students earning engineering degrees had average per-degree costs of \$51,689, compared to \$56,549 for non-remedial engineering graduates. A variety of factors could account for these results. Within these broad groupings of majors, non-remedial students might be more likely to choose the detailed subfields that have higher costs. Also, the remedial students are more likely to have begun college in the two-year sector and may be more likely to choose their electives among lower-division courses that cost less.

Table 4. Costs of Associate Degree Programs by Level of Preparation

Major	All Students			Remedial Students			Non-remedial Students		
	Students	% within Degree Level	Average Cost per Degree	Students who took Remedial Courses	% within Degree Level	Average Cost per Degree	Students who did not take Remedial Courses	% within Degree Level	Average Cost per Degree
All Fields	5,296	100%	\$22,548	2,772	100%	\$22,578	2,524	100%	\$22,515
Health	1,095	21%	\$29,359	562	20%	\$29,695	533	21%	\$29,006
Engineering	644	12%	\$25,222	295	11%	\$26,060	349	14%	\$24,572
Nat. Science & Mathematics	553	10%	\$24,334	255	9%	\$21,895	298	12%	\$26,357
Arts & Humanities	870	16%	\$20,056	422	15%	\$20,794	448	18%	\$19,338
Social & Behavioral Sciences	168	3%	\$18,929	99	4%	\$20,164	69	3%	\$17,222
Education	181	3%	\$18,945	124	4%	\$19,721	57	2%	\$17,256
Other	530	10%	\$19,255	312	11%	\$19,503	218	9%	\$18,894
Business	1,233	23%	\$18,550	689	25%	\$18,940	544	22%	\$18,075

- The highest-cost associate degree field was health (\$29,359), 58% higher than the lowest-cost field, business. Other high-cost fields include engineering (\$25,222) and natural science and math (\$24,334).
- The disciplines chosen by remedial and non-remedial degree recipients were more similar at the associate level than at the bachelor's level. Twenty percent of associate degrees earned by remedial students were in health, compared to 21% for non-remedial students. Larger differences exist in engineering (11% of remedial graduates, 14% of non-remedial graduates) and natural science and mathematics (9% of remedial graduates, 12% of non-remedial graduates).
- Remedial graduates within similar fields tend to have higher per-degree costs than do non-remedial graduates. For example, remedial health graduates had average costs of \$29,695 compared to \$29,006 for non-remedial graduates in health; and remedial engineering graduates had average costs of \$26,060 compared to \$24,572 for non-remedial graduates in engineering. Natural science and math was an exception - remedial graduates had average costs of \$21,895 compared to \$26,357 for non-remedial graduates.
- The cost effects of discipline mix and cost differences within discipline work in opposite directions and largely cancel each other. If the remedial associate degree recipients had the same discipline mix as their non-remedial counterparts, their average cost per degree would increase by \$402. On the other hand, if the remedial graduates had the same costs per degree by discipline as the non-remedial graduates, their average cost per degree would decrease by \$587.

Summary and Conclusions

This research was undertaken in order to inform Ohio's higher education policy discussions on the need to both increase the preparation levels of incoming students and to increase the numbers of students who earn degrees, especially in STEM (science, technology, engineering and math) fields. "Cost" is an interesting component in these discussions, in that the remedial instruction discussions often focus on the cost burden of such courses, and the issue of cost often does not arise in the STEM degree production discussion. Based on the results of this report, we can draw the following conclusions that may be of use to policy makers:

1. Although 38% of first-time students in Ohio's public institutions take at least one remedial course in their first year of college, remedial instruction accounts for a much smaller share of total undergraduate credit hours (5.2%) and a still smaller proportion of total undergraduate instructional costs (3.6%).
2. Since young (under age 20) students account for 37% of total remedial course credits, improved college preparation levels of new high school graduates may have a limited impact on the level of remedial instructional activity.
3. If Ohio reduced its total remedial instructional activity by a third, the estimated direct instructional cost impact is a 1.2% reduction (1/3 of the 3.6%) in undergraduate instructional costs.
4. The direct costs of remedial courses are not inconsequential, but the costs in terms of the lower degree completion rates of the students who take

remedial courses are large. Among a cohort of fall 1998 first-time students, the six-year bachelor's degree completion rate was 47% for non-remedial students and 15% for remedial students. If the 24,426 remedial students in this cohort had the same bachelor's degree attainment rates as their better-prepared counterparts, bachelor's degree production from this cohort would have increased by 36%.

5. STEM degree production and student preparation are linked. Only 1% of the fall 1998 cohort who took remedial courses earned bachelor's degrees in STEM fields, compared to 9% of the non-remedial students.
6. Expectations that an influx of better-prepared students will reduce system-wide costs may be unfounded. Better-prepared students cost more on a per-year basis because they are more likely to enroll in more costly four-year institutions, take heavier course loads, and take more costly courses.
7. On a "lifetime" basis, better prepared students cost more because they are less likely to drop out and are more likely to earn bachelor's degrees. Average six-year costs for remedial students were \$17,210, compared to \$29,205 for non-remedial students.
8. Six-year instructional costs for students who earn degrees vary considerably by major. At both the bachelor's and associate level, per-degree costs in "high policy interest" fields such as engineering, science and math, and health are much higher than those for other majors. Six-year costs for bachelor's degrees in engineering are about \$56,000, which is 35% to 50%

higher than those for business, social science, education, and arts and humanities graduates.

9. It is difficult to imagine that greatly increasing the number of STEM degrees earned can be accomplished without expanding the pool of better-prepared students and providing considerably more instructional resources for any additional students pursuing degrees in those more expensive fields.

Appendix A

Cost per Degree Calculation

Costs are reported to the Ohio Board of Regents by public colleges and universities at the end of each fiscal year in several categories, such as faculty salary, administration, library, academic support, and maintenance.

The following files are submitted by campuses:

- Faculty and Instructional Non-faculty Funding (FF) File
- Funding Unit Expenditure (FX) File
- College Expenditure (CP) File
- Campus Expenditure (CX) File

Once all files have been submitted, Resource Analysis allocates Instructional and General (I&G) costs to all combinations of subject and level taught at the campuses. Expenses are allocated based on such measures as student credit hours, course credit hours, instructor compensation, and square feet of facility space. These costs are then converted to a full-time-equivalent (FTE) basis.

To calculate the cost of a degree, the following steps are performed:

1. FTE enrollment is calculated for each student in each subject/level combination taken prior to graduation, by year and campus. Depending on the campus calendar, 1 FTE = 30 or 45 credit hours.
2. Each student's subject/level FTE is multiplied by the appropriate cost per FTE for that subject and level (obtained from Resource Analysis) to obtain subject/level costs per student.
3. Subject/level costs are aggregated to the student to obtain total costs per student.
4. Total costs are summed for all students in the cohort for whom you are seeking to calculate a cost per degree (i.e. developmental students earning a bachelor's degree). The resulting total cost is then divided by the number in the cohort to obtain an average cost per degree.