UNDERPREPARED STUDENTS: THEIR PROGRESSION TO COLLEGE LEVEL COURSES

CHALLENGE:

On a national level, the percentage of community college students who need developmental mathematics, reading, and writing courses is approximately 50%, with reported percentages as high as 55% in Florida, 60% in California, 65% in Massachusetts, 75% in New York City, and 81% in Oklahoma (Strong American Schools 2008; Lynch, Montgomery College Office of Institutional Research (MCOIR). The percentage of students needing remediation in mathematics is generally higher than those needing remediation in reading and writing English. For example, in Maryland, 35% of students need remediation in reading and writing, and 65% need remediation in mathematics (MCOIR). Those students needing remediation before entering college courses are often referred to as developmental students.

ACADEMICALLY VULNERABLE STUDENTS

Underprepared or developmental students are often academically vulnerable and characterized by the following:

> ➢ They are first generation college students
> ➢ They have no family guidance to help them navigate the academic world
> ➢ They have job responsibilities
> ➢ They have child care responsibilities (16% are single parents (Karp)
> ➢ They have family responsibilities
> ➢ They are from low-income families
> ➢ They are involved in hours of commuting
> ➢ They are distracted by transportation difficulties
> ➢ They are from underrepresented minorities
> ➢ They have financial limitations—cannot afford books
> ➢ They have poor high school academic preparation

(Bailey, Jaggars, and Jenkins)

AMERICAN DREAM:

It is the American dream that everyone will be educated. Community colleges help in fulfilling this dream because they have an "open-door" admissions policy. The Montgomery College policy is that "all who are high school graduates, or the equivalent, and who can benefit from the programs and services of the College, shall qualify for Admission." Moreover, most community colleges have a very diverse population: Montgomery College "has students enrolled from every continent and from more than 170 countries around the globe" (Montgomery College).

As Jenkins asserts, "Community colleges enroll over 40% of undergraduates in the United States, Thanks to their "open-door" admissions policy and relatively low cost, they have helped to broaden access to postsecondary education for students who in the past might not have gone to college. In part because of these uniquely American institutions, college access in the United States has expanded dramatically over the past 50 years" (Jenkins).

While providing such access is certainly congruent with American culture and American history, the community college "open-door" policy does provide challenges. One of the most important challenges is meeting the needs of the underprepared or developmental students, who reflect a high percentage of the community college population.

FULFILING THE AMERICAN DREAM AND CONFRONTING THE CHALLENGE:

ASSESSMENT:
The majority of community colleges in the United States require an Assessment Test of all entering students. The most common of the Assessment Instruments are ACCUPLACER, developed by the College Board, and COMPASS, developed by ACT; 62% of community colleges use ACCUPLACER and 46% of community colleges use COMPASS (Hughes and Scott-Clayton). Both assessment instruments are based on objective questions and are computerized.

Hughes and Scott-Clayton suggest that the ideal assessment, especially for developmental students would include diagnostic and affective questions as well as academic questions. Some community colleges include a writing sample as a supplement to the English objective tests; however, the size of many community colleges often makes this an unfeasible undertaking. Some community colleges offer the Assessment Test to students in their local high schools as a way "to remove the high stakes context and provide information on skills deficiencies well before college entry" (Hughes and Scott-Clayton).

COURSE PLACEMENT:
DEVELOPMENTAL WRITING

Course Descriptions
At Montgomery College, there are two developmental writing courses, English 001(EN 001) and English 002 (EN 002), reflecting different skills levels. For example, developmental EN 001 begins with paragraph writing and progresses to multi-paragraph essays while EN 002 begins with multi-paragraph essays and focuses on development of ideas and thesis statement control. In addition, there are tests in grammar, mechanics, punctuation, and usage. Students also read essays and complete assignments in grammar and writing on the computers in the Writing

Center. Some of these courses are taught in computer classrooms; others are taught in regular classrooms with students having access to computers in the Writing Center.

Progression to College Level

If students earn an "A" or a "B" in EN 001 and have satisfactorily fulfilled the reading prerequisite, they may progress to a college-level writing course. If students earn a "C" in EN 001, then they progress to EN 002, which includes many of the same requirements as EN 001, but focuses on multi-paragraph essays. If students earn a "U" in EN 001,they retake EN 001. If students earn an "A" or "B" in EN 002 and have satisfactorily fulfilled the reading prerequisite, they may progress to a college-level writing course. If students earn a "U" in EN 002, they must retake EN 002 or enroll in EN 001.

Course Outcomes

Jenkins finds that those community colleges that are "effective in serving the educationally disadvantaged students are characterized by 'instructional program coherence,' meaning that course and teaching are guided by a common instructional framework, with clearly defined learning outcomes" (Bailey, Jaggars, and Jenkins).

Both courses are guided by course outcomes, created by English faculty on all three campuses. At the end of these courses, students will be able

- ➢ To write a multi-paragraph essay utilizing a clear thesis statement,
- ➢ To demonstrate the writing process (pre-writing, outlining, drafting, revising, proofreading, and editing),
- ➢ To recognize the thesis statement and supporting evidence in student and professional essays,
- ➢ To write sentences that observe the conventions of standard English,
- ➢ To use rhetorical strategies, based on audience and purpose.

COURSE PLACEMENT:
DEVELOPMENTAL READING

Course Descriptions

At Montgomery College, there are two developmental reading courses, reflecting different skills levels. For example, Reading 095 (RD 095) includes students who read at approximately the 6th through the 9th grade reading levels while Reading 099 (RD 099) includes students who read at approximately the 10th through the 12th grade reading levels. In RD 095, students learn how 1) to follow oral and written directions, 2) to use context clues and word analysis to enhance reading comprehension, 3) to locate the main idea and infer an unstated main idea 4) to identify the

patterns read of organization, 5) to apply reading strategies, and 6) to apply critical thinking skills. In RD 099, the students focus on skills 3-6 mentioned above, emphasizing critical thinking skills. Students are required to do reading lab exercises in the Writing Center on a weekly basis. Some of these courses are taught in computer classrooms; others are taught in regular classrooms with students having access to computers in the Writing Center.

Progression to College Level

If students earn an "A" in RD 095, they may progress to RD 120, a college-level reading course, and if they have satisfied the writing prerequisite, may also enroll in college-level writing. If students earn a "B" or "C," then they progress to RD 099, which includes many of the same requirements as RD 095, but focuses on applying critical thinking skills in reading. If students earn an "A," "B," or "C" in RD 099, then they may progress to a college-level reading course, and if they have satisfied the writing prerequisite, may also enroll in a college-level writing course.

Course Outcomes

Jenkins finds that those community colleges that are "effective in serving the educationally disadvantaged students are characterized by 'instructional program coherence,' meaning that course and teaching are guided by a common instructional framework, with clearly defined learning outcomes" (Bailey, Jaggars, and Jenkins).

Both courses are guided by course outcomes, created by reading faculty on all three campuses. At the end of Reading 095 and 099 courses, students will be able

- ➢ To locate and state the main idea, thesis, or theme in essays, expository writing, and narratives; demonstrate the ability to infer an implied main idea.
- ➢ To demonstrate an understanding of the rhetorical patters of organization in literature, essays, and college text material to improve reading comprehension.
- ➢ To apply cognitive and meta-cognitive reading strategies such as outlining, mapping, diagramming, summarizing, SQ3R, Cornell note taking, skimming, scanning, and lecture-and text-based note-taking.
- ➢ To apply critical reading/thinking skills such as (but not limited to) inferring the author's meaning; differentiating fact from opinion; interpreting graphs and charts; detecting purpose, tone, bias, and propaganda techniques; and evaluating arguments.

COURSE PLACEMENT:
DEVELOPMENTAL MATHEMATICS

Course Descriptions

At Montgomery College, there are three different levels of developmental mathematics: Pre-algebra, Elementary Algebra, and Intermediate Algebra. These courses represent a progression of topics usually found in 10th and 11th grades of high school. They begin with basic arithmetic skills, working with decimals and fractions, and advance to solving equations and modeling real world situations.

Progression to College Level

Students with a "C" or better are allowed to move on to the next course. After the completion of Intermediate Algebra, students have a choice of college level mathematics in which they can enroll including statistics, finite mathematics, pre-calculus, and business calculus. See case study for additional details about mastering the mathematical content to progress to college-level mathematics.

Course Outcomes

These courses are guided by course outcomes, created by mathematics faculty on all three campuses. At the end of these courses, students will be able to

➢ Evaluate algebraic expressions.
➢ Apply the order of operations to numerical expressions.
➢ Solve quadratic and similar equations.
➢ Translate, solve, and interpret application problems.
➢ Define functions verbally, numerically, graphically and algebraically.
➢ Solve linear, quadratic, rational, exponential, and radical equations, and systems of equations.
➢ Model real world applications, using single equations and systems of linear equations.

CHARACTERISTICS OF DEVELOPMENTAL COURSES

Class Size

Since most students in developmental courses have greater success when given personal attention, the number of students in developmental courses is limited to 20 (Shults).

Credit

Most community colleges (76%) provide institutional credit for developmental courses. These institutional credits allow students to apply for financial aid, but do not provide credit towards a degree (Shults).

Course Repeats

Most community colleges limit the number of times a student may enroll in one course. These limitations include the following: increasing tuition after multiple attempts (20%), restricting students from taking additional developmental courses (32%), ending non-federal funding

(30%), and limiting attempts or semesters (19%). Montgomery College limits the number of attempts to three. "Of those institutions that did set limits, 45% did so by state mandate and 54% by institutional policy" (Shults).

Con-Current Enrollment

In most community colleges, there are some college courses that students may take attempts to three. "Of those institutions that did set limits, 45 percent did so by state mandate and 54% by institutional policy" (Shults) while taking developmental courses; these college courses are limited in number (Shults). For example, at Montgomery College, students can take several courses in art, music, student development, and world languages, although they may be still enrolled in developmental reading and writing.

Computer Classrooms

Many community colleges are equipped with computer classrooms. In developmental writing computer classrooms, instructors can, for example, have students begin writing essays, allowing the instructor to intervene and guide. In developmental reading computer classrooms, instructors can have students read a passage on the computer and identify the main idea or have students complete exercises that accompany the textbook and reinforce the concepts being studied. In our developmental mathematics computer classrooms are essential to the learning process; see the case study for additional information.

Learning Centers

If developmental courses are not held in computer classrooms, then developmental courses have access to Writing, Reading, and Mathematics Learning Centers, where students can go as individuals to complete lab assignments or where the instructor can take the whole class. Having a dedicated space for student learners to ask questions is crucial to success in all developmental courses, in particular for academically vulnerable students.

INNOVATIVE MODELS

Developmental Learning Community

A developmental learning community often combines two courses, such developmental writing and reading or a developmental math and a student success course. Some community colleges have a developmental program that encompasses developmental reading, writing, and mathematics.

Contextualized Learning Community

In a contextualized learning community, a developmental course may be combined with a college-level course. For example, a high level developmental reading course may be combined with an introductory biology course. This results in students reading in context of the subject matter of the biology course. Contextualized learning communities "showed statistically significant gain in the proportion of main ideas identified and in accuracy" (Perin and Hare).

On-line Developmental Courses

It has been found that online developmental students who are older and who rank at the high end of the developmental reading and writing ladder did better in persisting and passing a developmental course on-line than did the younger students who were at the lower end of the developmental reading and writing ladder (Carpenter, Brown, and Hickman). The positive feature of a totally online course is that it can accommodate community college students who have work and family obligations. The negative feature is that it does not provide the face-to-face encouragement generally offered in the traditional classroom.

Hybrid Developmental Courses

A hybrid course is approximately 50% on line and 50% face-to-face. The hybrid course seems to be more successful than the completely online course for two reasons: it allows flexible scheduling for students who have busy work and personal lives; however, it also provides the opportunity for personal contact and instructor involvement often found in the traditional classroom.

INTERVENTION STRATEGIES

No Single Strategy Works--Developmental students need help from all sides, including non-academic help. These non-academic supports need to be "so intrusive that students are forced to encounter them"(Karp).

Providing a Graduation/Goal Plan

It has been found that if developmental students see the goals and the steps (courses) they need to achieve their goals, it is easier for them to persist and "to trade current pain for future gain" (Scott-Clayton). Montgomery College provides graduation work sheets so that students can see exactly which courses they need to take in order to fulfill their graduation requirements. (See Addendum for Montgomery College Curriculum for Civil Engineering, Nursing, Biotechnology, Bioengineering and General Studies.)

Providing Learning Communities

Since almost all community college students are commuters, often popping into classes and then going off to work, learning communities offer social integration into the college. Students in learning communities have other students in the same cohort with whom to discuss assignments and share ideas about college life. "Empirical tests demonstrate that integration and commitment are related to student success" (Karp).

Tinto argues "external communities may work against membership in college communities, either by providing competing demands on time and energy or by emphasizing norms that contrast with the norms of higher education" (qtd. in Karp). Thus, community colleges need to

help the student feel a part of a social community so that he or she can understand the new college norms and analyze how to prioritize competing demands.

Accelerated Course Work

Many community colleges, including Montgomery College, offer intensive accelerated reading and writing courses so that the developmental student can potentially move on to college level courses within one semester or less. For example, instead of taking a 14 week course in developmental reading, the student may take an accelerated reading course in 7 weeks, followed by an accelerated writing course, and thus be able to enroll in college level courses the next semester. If the developmental student tests into the higher range, the student can often take an accelerated writing and/or reading course in the first seven weeks of the semester and then take an accelerated college level writing course in the second seven weeks of the same semester. Thus, the developmental student has entered into college level courses in his or her first semester. This prevents the developmental student from being discouraged by several semesters of non-college credit course work. Additional information about pacing in developmental mathematics can be found in the case study.

Flexible Scheduling

Many community college students (54%) have reported that the main obstacle of attaining a credential or degree was the difficulty they had balancing work, school, and family commitments" (Karp). Thus, a flexible schedule is a strategy that assists students in completing their course work; many students mentioned that offering weekend and evening courses was very helpful.

Student Success Courses

Student Success Courses assist students in their academics and in acclimating to college life. Many colleges, including Montgomery College, offer a First-year Experience course, which the majority of entering students are advised to take. Many community colleges require this course since it familiarizes students with the services available at the college. Other student success courses at Montgomery College include Study Habit Development, Career Development, Building Math Confidence, and Success Group; the last course specifically targets those "students who are dissatisfied with their academic performance" (Montgomery College).

Personal and Intense Advising and Counseling—One on One

"Research is clear that students need a "human touch," and students themselves tell us that they do not want more technology, they want human contact" (Karp). Student who are first generation college students and students who are underrepresented minorities need help in navigating the academic world. However, the providing of information about the academic world does "not mean erasing students' home cultures or diminishing their import. Asking students to give up their identities and cultures is likely to be counterproductive" (Karp).

Providing Mentors

Mentors are experienced students, staff, or faculty members that can help a developmental student navigate the unfamiliar territory of the college world. This is often done on a voluntary basis.

Academic Alerts and Reduction of Hassles

- ✓ Established periodic academic alerts and reviews when students have completed a certain number of course credits: 12, 18, 24, etc.
- ✓ Targeted alerts, when counselors are notified if a developmental student is in danger of failing a course(s) or if his or her GPA is precarious.
- ✓ The elimination of long lines at registration and redundant paperwork can reduce barriers to enrollment.
- ✓ Assistance offered in the completing of federal aid forms is greatly appreciated by students, especially developmental students
- ✓ Some reports suggest limiting the choices for first-year students in order to diminish the confusion of too many options.

CASE STUDY: Mathematics Reform using Technology

Assessment & Placement

When students first enroll at Montgomery College, they are asked to take a placement exam that determines which mathematics, English, and reading courses they should take. As with any major stakes assessment, the placement does not always accurately reflect where the student should be properly placed. Being placed either too high or too low is problematic for students (either being a course that is too difficult or paying for courses that are unnecessary and/or too easy). The mathematics placement has four relevant levels: PreAlgebra, Elementary Algebra, Intermediate Algebra, and college-level.

Number of Students Affected

The number of students who participate in the developmental math program at Montgomery College is substantial; each fall, approximately 1 in 5 students enrolls in a developmental math course, and nearly 54% of all math classes offered at the College are developmental. Of the 4000 students new to college who enrolled at MC in fall 2009, two-thirds placed at the developmental level.

Success

Faced with many students and questionable placement, Montgomery College could not continue to use traditional classroom lectures to ensure student success in mathematics. We have turned to technology and a non-traditional classroom to help us resolve this situation. We now have a

single yearlong self-paced course covering the topics that were traditionally separated into two semester-long courses (Pre-Algebra and Elementary Algebra). The topics in this new course are the same as those in the two separate courses. The difference is that the lectures and homework are all delivered electronically allowing students in a class to individualize their learning. In addition, it is essential to have a qualified instructor in the classroom to answer questions, help the student see connections between topics and administer exams.

Self-pacing

This self-paced approach allows for misplaced students to self-correct their placements. Students who know the material but scored unfairly low on the exam have the ability to prove that they know the material by quickly progressing through the first part of the material and accelerating their path to college-level mathematics. Alternatively, students who placed too high will struggle with the beginning material and will be able to move back to where they need to start.

Methodology

A student moves through the material by first viewing a lecture. The lecture is presented in three different formats: a video, a PowerPoint slideshow, and the textbook. All three of these formats are given to the student, and the computer ensures that the student views all three prior to starting the homework on that section. Once students feel comfortable with the lecture, they progress to homework questions, which have been designed by the instructor. The advantage here is that each student's homework has unique numbers. That is, Student A will be asked to solve $3x+5=14$ whereas the same question will appear to Student B as $2x+6=10$. The mathematical skills to solve these problems are the same, but the answers are different preventing any copying. Furthermore, students are given immediate feedback by the computer if their answers are correct or incorrect. If students enter an incorrect answer, they have the ability to instantly review the lectures or choose among some additional learning aids, which help them learn the concept. The student is then given another problem similar to the first but with a different answer to try. The student can work through these homework assignments and lectures with as much or as little input from the instructor as the student needs. Once students have completed the lectures and homework, they will be prepared for an end-of-chapter exam. The exams are proctored in class and require a password input by the instructor. These exams are similar to homework questions but with key differences. They are not allowed a second chance at a question, and there are no lectures or learning aids to assist the students. Once the exam is finished, it is automatically scored by the computer, and students can see where they made mistakes, if any. Students who successfully passed the exam are allowed to move onto the next material. Students who were unsuccessful review the lectures and homework and attempt the exam again until they have mastered the material.

Mastery Learning

This approach not only highlights the self-paced nature of the course, but the high bar put on the exams represents a level of mastery for the students. Students cannot move on unless they have truly mastered the material. This mastery greatly improves students' abilities to succeed in subsequent courses.

Early Alert

An additional aspect to this course is that we have an academic counselor assigned to each section of this course. As mentioned, many of these students are academically vulnerable students and have issues not directly related to the mathematics they are learning. An additional person in the classroom to help address these non-academic concerns gives the instructors the ability to focus on the content while still allowing students to receive the support they need so they too can focus on the content.

Community

One of the many benefits that students achieve out of this course is a sense of community. As they work through a self-paced course they learn to ask their fellow students to help them. Common questions range from "How do you solve this?" to "Did you know you can easily review the lectures?" Once students realize that other people in the class have been successful it helps motivate them to work themselves as well as give them a point of contact for future questions.

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