Report No. 2
Best Practices to Ensure Quality of the Developmental Education Teaching-Learning Environment

Recommendations from the VCCS Developmental Education Implementation Task Force

Dr. Ann C. Bartholomay, Chair

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Best Practices to Ensure Quality of the Developmental Education Teaching-Learning Environment

BACKGROUND OF CURRENT REPORT

Important events in the Virginia Community College System’s history led to the current focus on developmental education. An initial event was a report completed in 1983 by a State Council of Higher Education of Virginia (SCHEV) Task Force. The title of the report was "An Assessment of Remedial Programs in Virginia." The report concluded the following:

- that institutions should develop a state-wide consensus on what constitutes minimal competencies for college-level work;
- that assessment of incoming students for academic deficiencies in reading, writing, and mathematics and placement of skill-deficient students in remedial courses should be mandatory;
- that remediated students should take a post-test to determine the success of remedial instruction;
- that remediated students' enrollment in college-level courses be restricted, with no college degree credit awarded for remediation; and
- that limits be placed on the time and opportunities for remediation.

The Task Force further urged each institution to

- examine its mission in order to determine whether or not remediation is consistent with it;
- identify a common basic skills floor below which it will not remEDIATE; and
- tighten admissions standards to meet minimum preparation requirements.

In January 1987, the State Board for Community Colleges and the State Council of Higher Education directed their respective staffs to undertake a joint study of remedial education. The purposes of the study were the following:

- to define the minimum levels of competence required of a student wishing to do college-level work for degree credit;
- to develop methods and criteria for assessing how much students are learning in remedial programs and how successful they are in degree credit work after remediation is complete; and
• to propose procedures by which even more of the remedial work done in the Virginia system of higher education can be undertaken by the community colleges.

The contents of the report included competencies and skills needed to enroll and succeed in college-level courses. The Task Force developed careful descriptions of the skills needed in writing, reading, and mathematics for use in providing students with developmental instruction needed for success in college-level courses.

The Task Force also recommended steps for assessing students’ success in developmental courses, as well as subsequent courses. At the time, comprehensive computerized tracking systems were not completed; however, the Task Force encouraged colleges to work toward systems that would provide them information on student success.

In 1994, J. Sargeant Reynolds Community College completed the 1992-1994 Funds for Excellence Project. The Project was a comprehensive study of students in developmental education in the Virginia Community College System. In addition to the literature search that established the growing need for developmental education, the final report consisted of two parts.

Part I of the Tracking Study was entitled "Student Demographics and Success Rates." It consisted of demographic data according to age, gender, race, level of education, type of curriculum, enrollment in developmental courses, semester hours, grade point averages, and number of semesters enrolled. Part I also contained success rates of students in English 01 (Preparing for College Writing), English 04 (Reading Improvement), Math 02 (Basic Arithmetic), and Math 03/04 (Basic and Intermediate Algebra) according to demographics categories.

The title of Part II was "Funds for Excellence Developmental Studies Tracking Data." It included data on students' levels of success in credit courses subsequent to developmental enrollment. As with Part I, Part II provided tracking data for students from English 01, English 04, Math 02, and Math 03/04 to subsequent credit courses. This expansive study was a contributor to several other statewide studies and to the faculty-in-residence project in 1996-1997.

During the spring of 1996, Chancellor Oliver selected developmental education as the topic for the 1996-97 academic year faculty-in-residence project. His charge was an analysis of student achievement data and collaboration with VCCS faculty in order to identify characteristics of the most successful developmental programs.

Dr. Ann Bartholomay served as Faculty-in-Residence in Developmental Education. Assigned the task of developing a document that would reflect the voice of developmental education practitioners throughout the VCCS, she developed a collaborative network designed to provide for the interactions needed to accomplish the goal. The network consisted of a faculty advisory team, an administrative advisory team, and contact persons at each campus. A review of the assessment reports from each of the community colleges yielded rich information in the search for teaching-learning practices that were resulting in student success in developmental courses, as well as in subsequent credit courses. The research of prior work, data from
assessment reports, college visits, and extensive collaboration led to the development of the *Teaching-Learning Model: A Program with a Mind and Heart - Attending to Students' Cognitive and Affective Needs*.

Several features are so predominant that they are interwoven throughout the collaboratively produced model. The student is at the center of all proposed interventions. All instructional activities focus attention on student involvement and interaction in the educational process. The model strongly emphasizes the dedication of the total institution in providing the environment that encourages student persistence.

Two other important elements visible throughout the model are the need for strong leadership and continued collaboration of all parties. Not only is the advocacy of the top administration at the local college and the System necessary, champions are necessary to provide the day-to-day guidance and encouragement needed. Leaders at local colleges and the System are vital for maintaining forward movement, continuous communication, use of assessment for improvement, and maintaining the teaching-learning model as a living document.

After reviewing the teaching-learning model, Dr. Oliver requested that Dr. Bartholomay propose policy recommendations on how the System should proceed in developmental education. The Advisory Committee of Deans and Provosts reviewed the recommendations and responded to Dr. Oliver with seven recommendations. The charges for the VCCS Developmental Education Implementation Task Force emerged from these recommendations.

**TASK FORCE RECOMMENDATIONS FOR BEST PRACTICES**

**CHARGE NUMBER ONE: GUIDELINES FOR COURSE PLACEMENT**

**RECOMMENDATIONS IN APPLYING PLACEMENT GUIDELINES: SUGGESTED MEASURES FOR DECISION ZONES**

The Task Force’s recommendation regarding placement of a student whose scores reside in the decision zone is the use of multiple measures. Instruments, such as LASSI, the Learning and Study Strategies Inventory (Weinstein, 1987), provide affective and study strategies information about students that is helpful in placement, as well as planning for subsequent student success in college.

Other possibilities include the following:

- COMPASS Diagnostic Assessments
- Writing Sample
- High School Transcripts
• Examination of Score on Reading Segment of Assessment Instrument

• Consideration of ACT’s research on use of the ASSET Reading score as a consideration for placement in a mathematics course

  - ACT research indicated that a Reading Score of 35-42 may be helpful in determining students’ placement in Math 151

  - ACT research indicated that a Reading Score of 42-49 may be helpful in determining students’ placement in Math 163

In addition, the Task Force recommends confirming students’ placement in developmental courses early in each semester to assure correct placement. Documenting incorrect placements and maintaining a collection of them would be beneficial for consideration when adjustments to placement ranges are made after the Fall, 1999, and Spring, 2000, semester data have been analyzed.

**REQUIREMENTS FOR ASSESSMENT AND PLACEMENT**

The Task Force determined that the assessment procedures or placement testing of students must be mandatory in writing, reading, and mathematics. Such assessment must take place for all students no later than

• enrolling in or planning to enroll in a college-level course in mathematics or English composition that will be required for a degree

• admission to any degree program

• accumulating nine semester hours of college credit at this or another institution (Report of the Joint Task Force on Remediation, 1989)

Students assessed as needing developmental education must be required to take and complete successfully developmental courses before taking any course for which they are a prerequisite. This policy would require institutions to identify courses for which basic skills in English grammar and composition, reading, and mathematics are needed. Institutions may wish to identify some courses in which the content does not require sequential learning, thus permitting simultaneous enrollment in developmental education and college work, in order to give students an intensive learning experience while concurrently taking developmental courses. Full participation in degree programs should be limited to students who have demonstrated competency in the basic skills needed for college-level work (Report of the Joint Task Force on Remediation, 1989).

Noted researchers’ advocacy for mandatory assessment and placement support the recommendation of the current and prior task forces. Edward Morante (1989) made the following two statements:

Testing should be mandatory because too many students, especially those who most need assistance, will avoid it wherever possible (p. 121).
It borders on unethical to know that a student lacks basic skills but is still allowed to enroll in college courses requiring that skill (p. 121).

Roueche and Roueche (1999) stated in their recent book, *High Stakes, High Performance: Making Remedial Education Work*, that students who were enrolled in colleges participating in their states’ required assessment and placement practices experienced increased retention and success in college after mandatory policies went into effect. Added incentives for initiating mandatory placement in developmental courses, according to Martha Maxwell (1997), reside in the system colleges may devise for placement. She describes the process as “automatic” (p. 28). Her system includes placement guidelines programmed into the computer; advisers assign students whose placement data fit the guidelines into developmental courses. She views the system of “compulsory enrollment in skills courses as cheap, simple for administrators and advisers, and efficient” (p. 28).

**LIMIT ON ENROLLMENTS**

A student should be limited to two enrollments in the same remedial course. In certain circumstances, a student may be allowed to enroll a third time.

**CHARGE NUMBER TWO: COURSE OBJECTIVES AND EXIT CRITERIA**

The Task Force’s response to the second charge for the project - to develop systemwide measurable objectives and exit criteria for developmental reading, writing, and mathematics - includes the following recommendations regarding content objectives:

It is recommended that

- the educational objectives of each remedial course be stated clearly by each institution
- insofar as possible, the objective be measurable without making the learning trivial
- a pre-test which measures performance related to the objectives be given for each remedial course
- a similar post-test to determine the amount of growth and/or changed behavior be administered
- the curriculum and pre- and post-tests be designed so that the results of testing programs can be used to improve the curriculum
• clear exit criteria be established for remedial courses (Report of the Joint Task Force on Remediation, 1989)

Three subcommittees – writing, reading, and math – collaborated with each other and with colleagues throughout the System to design the objectives and exit criteria for this report. The Task Force agrees that the proposal submitted here should be considered, as with placement guidelines, living proposals, always subject to changes when our assessment data merit changes.

RECOMMENDATIONS: WRITING

Applying Course Objectives

Colleges and instructional faculty have an obligation to share the Developmental Writing Objectives with students. Because it is difficult to standardize subsets of writing skills and to precisely differentiate the proficiency of these skills at various levels of instruction, the VCCS Developmental Writing Objectives necessarily describe competencies common to all writing. Students’ demonstration of every one of these competencies at minimum levels of proficiency defines readiness for college writing.

Colleges, faculty, and students must recognize the inherent limitations of standardized testing as well as holistic essay or portfolio assessment of students’ writing ability. To ensure the quality, fairness, and accuracy of assessment, colleges and faculty need to disclose the purposes and uses of assessment, base decisions about students’ ability on more than one indicator, and regularly evaluate the effectiveness of their assessment instruments and process.

Entering students will be assessed in basic skills, including verbal skills in reading and writing, to determine appropriate placement into developmental courses or college-level courses requiring intensive reading and writing skills. Assessment of entering students’ writing skills will generally include:

• the objective score earned on ASSET or COMPASS (using established ranges) or other standardized tests as appropriate, and

• a writing sample during the first week of class to confirm placement and provide diagnostic information.

Assessing Writing Programs

Assessment of an individual college’s Developmental Writing Program should include (at a minimum) the following activities and data with faculty review of and responses to these data:

• Placement results for entering students.

• Random sampling of results of exiting students’ outcomes in at least two of the following:
- Writing sample evaluation

- Portfolio evaluation

- Tracking of students’ performance in college-level English courses for two groups - students placing directly into college-level English and students exiting developmental writing

- Tracking of students’ performance in college-level writing intensive courses for two groups - students placing directly into college-level courses and students exiting developmental writing

- ASSET or COMPASS testing and/or other standardized tests

- Annual sessions within individual colleges, to include full- and part-time faculty, for discussion of program objectives and exit criteria and for common holistic scoring of samples of student work.

- Collaboration and program review at five-year intervals by a team of VCCS writing faculty (Note: Peer conferences could serve as opportunities to review programs.).

**RECOMMENDATIONS: READING**

**Applying Course Objectives**

Colleges and instructional faculty have an obligation to share the Developmental Reading Objectives with students. Because reading is the fundamental skill essential to success in all academic programs, the proficiency of reading skills at various levels of instruction becomes an integral part in the success of the students’ academic pursuits. Therefore, colleges should seek to identify the students’ levels of proficiency in the following ways:

- A developmental student possesses skills of mastery significantly below entry-level college reading as measured by valid qualitative or quantitative assessment tools identified by the VCCS. Students assessed as reading at levels which impede their ability to succeed in college level courses must take remedial/developmental reading as a **pre-requisite** to enrollment in any college-level courses, except those courses specifically identified and exempted from this requirement by their college.

- A **co-requisite** developmental student possesses marginal skills just below entry-level college reading as measured by a valid qualitative or quantitative assessment method adopted by the VCCS. Institutions are encouraged to provide supplemental reading instruction for students assessed at this level. Institutions should require students to participate in supplemental reading instruction to assure their success in college-level course work.
• An unrestricted student should possess mastery in entry-level college reading skills as measured by a qualitative or quantitative assessment method adopted by the VCCS. Such a student should have unrestricted enrollment in college-level courses, except for enrollment in programs with specific entrance requirements.

The skills and competencies included in the Developmental Reading Objectives listed in the VCCS Task Force Report reflect a balanced instructional program requiring proficiency in reading, writing, listening, speaking, and research skills. Students will learn and use this knowledge to make meaningful connections between their academic, professional, and personal lives. In addition, students will develop self-confidence in their ability to be effective readers of college material by participating in an academic learning-study group, developing goal-setting strategies, identifying individual strengths in reading, and recognizing the need for flexible reading and processing rates.

Assessing Reading Programs

Assessment of an individual college’s Developmental Reading Program should include (at a minimum) the following activities and data with faculty review of and responses to these data:

• Placement results for entering students

• Random sampling of results of exiting students’ outcomes in at least two of the following:
  - Portfolio evaluation
  - Tracking of students’ performance in college-level English courses for two groups - students placing directly into the college-level English and students exiting developmental reading
  - Tracking of students’ performance in college-level reading intensive courses for two groups - students placing into college-level credit courses and students exiting developmental reading
  - ASSET or COMPASS and/or other standardized tests
  - Annual sessions within individual colleges, to include full- and part-time faculty, for discussion of program objectives and exit criteria
  - At two-year intervals, collaboration and program review at the peer group conferences.
RECOMMENDATIONS: MATHEMATICS

Applying Mathematics Objectives

The mathematics subcommittee was charged with developing system-wide measurable objectives and exit criteria for developmental mathematics. Realizing that much has changed in mathematics education nationwide since the Joint Task Force Report of 1989, the mathematics subcommittee attempted to begin with the 1989 report and build in the necessary updates for a set of minimum competencies for VCCS developmental mathematics subject areas.

The professional obligation of mathematics faculty to assist in solving the national problem of citizenry innumeracy required that the subcommittee examine the National Research Council’s 1989 report called "Everybody Counts-A Report to the Nation on the Future of Mathematics Education." The Council defined "numeracy" as "...the ability to cope confidently with the mathematical demands of adult life" (p.7). In addition to the National Research Council’s report, the subcommittee considered the Virginia Standards of Learning (SOL) (Board of Education, 1995) to determine the mathematics background of future high-school graduates and to reflect these in developmental mathematics courses. Although a thorough review was made, the SOL’s did not entirely determine the objectives in this report. The American Mathematical Association of Two Year Colleges (AMATYC)(1995) in Crossroads in Mathematics warns that "The Foundation must be designed for the needs and interests of adult students...[and]...should not replicate the high school curriculum" (p. 26). The subcommittee considered the latest standards as set forth by the National Council of Teachers of Mathematics (NCTM) and by AMATYC.

After the subcommittee developed a first draft using the members’ knowledge of the above sources, the draft was sent to the mathematics departments of all VCCS community colleges for input. Also, the subcommittee discussed the draft thoroughly at four one-hour sessions at the spring conference of Virginia Mathematical Association of Teachers of Two-Year Colleges (VMATYC). This conference was also the annual VCCS Mathematics peer-group meeting. The VMATYC sessions were well attended and provided for excellent input, which resulted in changes to the original draft.

The VCCS requires that Algebra I, Geometry, and Algebra II be prerequisites for all college transfer mathematics courses; it was not the charge of this task force to change prerequisites. The subcommittee chose to divide minimum competencies for developmental mathematics into two lists. The first list applies to all Associate Degrees, diplomas, and one-year certificates and includes numeracy skills. The second list provides additional minimum competencies that apply to Associate of Science, Associate of Arts, and Associate of Arts and Sciences Degrees and includes algebra and geometry skills. The subcommittee believes that the individual community college should be allowed to divide the competencies into developmental courses as it deems appropriate for its institution as long as the college can verify that the competencies are met by students before the students enter college level mathematics courses. For exit, each college should develop a uniform exam, certified by the college as testing basic competencies.
In the process of establishing minimum competencies, the math subcommittee requested and reviewed current objectives for the developmental mathematics courses in different VCCS colleges. Developmental mathematics’ specific objectives vary among the colleges. It is the hope of the subcommittee that the mathematics faculty across the state respect the input of not only the subcommittee but of VMATYC members and will be willing to adjust to some change in what is being done presently at their institutions. It is the trust of the subcommittee that non-mathematics members of the VCCS join the mathematics community in striving to better prepare community college students for the college-level mathematics courses and meeting the demands of society for more mathematical knowledge, increased technological expertise, and a higher level of numeracy.

The subcommittee recommends emphasis in developmental mathematics courses on practical applications and modeling real life throughout the course of study. Oral and written communication concerning the language of algebra, logic of procedures, and interpretation of results also should permeate the courses. Students and faculty will use graphing utilities (graphing calculators or computer graphing simulators or spreadsheets). Faculty should use any other available technology that will enhance student learning. A function approach should be emphasized. Detailed descriptions of the mathematics objectives are presented below.

GENERAL CONSIDERATIONS FOR OBJECTIVE ONE

The Task Force recommends that the skills described in Objective One emphasize attention to practical applications and modeling real life throughout the course of study. The skills in this objective are appropriate for students enrolled in Associate of Applied Science Degrees, Certificates, and Diplomas. Within each objective, the bulleted items are those listed in the Developmental Mathematics Objectives in the Task Force Report; items under the bulleted ones labeled with dashes are detailed statements needed for implementation of the objectives.

Objective 1: Upon completion of developmental arithmetic, students will be able to demonstrate basic numeracy concepts by

- performing operations on whole numbers, including reading, writing, identifying place values, and rounding
  - The student will read, write, and identify the place values of whole numbers and of decimals.
  - The student will add, subtract, multiply, and divide whole numbers, fractions, mixed numbers and decimals. Answers will be expressed in simplest form.
  - The student will round whole numbers and decimals to any specified place value.

- performing operations on decimal numbers, including reading, writing, identifying place values, and rounding
- The student will add, subtract, multiply, and divide whole numbers, fractions, mixed numbers and decimals. Answers will be expressed in simplest form.

- performing operations on fractions and mixed numbers

- The student will add, subtract, multiply, and divide whole numbers, fractions, mixed numbers and decimals. Answers will be expressed in simplest form.

- describing and comparing data using ratios

- using proportions to solve practical problems

- performing operations combining whole numbers, fractions, decimals, percents, and proportions

- The student will compare pairs of whole numbers, decimals, and fractions using the symbols >, <, or =.

- The student will convert among fractions, decimals, and percents.

- In the contexts of proportions and percent problems, the student will use a variable to represent a quantity and will write mathematical expressions and relationships using variables.

- applying appropriate geometric formulae for area, perimeter, and volume

- The student will differentiate among area, perimeter, and volume, and will identify the appropriate concept with appropriate units of measure for a given situation.

- The student will find the perimeter and area of polygons.

- applying appropriate geometric formulae for circumference and area of circles

- The student will find radius, diameter, circumference and area of circles.

- solving problems involving measurement of length, weight/mass, liquid capacity, and temperature

- The student will identify an appropriate measuring device and unit of measure to solve problems involving measurement of:
  
  - length – part of an inch (1/2, 1/4, and 1/8), inches, feet, yards, miles, millimeters, centimeters, meters, and kilometers
  
  - weight/mass – ounces, pounds, grams, and kilograms
- liquid capacity – cups, pints, quarts, gallons, milliliters, and liters
- temperature – Celsius and Fahrenheit units
- The student will compare and convert units of measures for length, weight/mass, and liquid capacity/volume within the U.S. Customary system and within the metric system.
- The student will estimate and then determine length, weight/mass, area, and liquid capacity/volume, using U.S. Customary and standard metric units of measure.

• using the concepts of prime and composite numbers.
• simplifying expressions by using order of operations, mental mathematics, and appropriate tools
  - The student will simplify expressions by using order of operations, mental mathematics, and appropriate tools. Exponents will be included.
• identifying and representing integers on a number line
• using information displayed in graphs, tables, and charts
  - The student will use information displayed in graphs, tables, and charts to make comparisons, predictions, and inferences.
• finding the range, mean, median, and mode of a set of data.
• solving practical problems
  - The student will solve practical problems of varying complexities, involving real-life data, using estimation to determine reasonableness of the answer.

GENERAL CONSIDERATIONS FOR OBJECTIVE TWO

The Task Force recommends that emphasis be placed on practical applications and modeling throughout the course of study. Oral and written communication concerning the language of algebra, logic of procedures, and interpretation of results also should permeate courses. Students and faculty will use graphing utilities (graphing calculators or computer graphing simulators or spreadsheets). Any other available technology that will enhance student learning should be used. A function approach should be emphasized. The skills described in Objective Two are appropriate for students enrolled in Associate of Arts, Associate of Science, or Associate of Arts and Sciences Degree Programs.
Objective 2: Upon completion of developmental algebra, students will be able to demonstrate algebra concepts by

- performing operations required for Objective One

- representing and evaluating verbal quantitative situations algebraically
  - The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables. Students will choose an appropriate computational technique, such as mental mathematics, calculator, or paper and pencil.

- applying the laws of exponents
  - The student will apply the laws of exponents to perform operations on expressions with rational exponents, using scientific notation where appropriate.

- performing operations on polynomials
  - The student will add, subtract, multiply, and divide polynomials.
  - The student will identify and factor completely polynomials including the difference of squares, perfect square trinomials, the sum and difference of cubes, and general trinomials.

- analyzing a given set of ordered pairs for the existence of a pattern and representing the pattern appropriately
  - The student will analyze a given set of ordered pairs for the existence of a pattern, represent the pattern algebraically and graphically, if possible, and determine if the relation is a function.

- solving linear equations and inequalities in one variable and literal equations for a given variable
  - The student will solve linear equations and inequalities in one variable, solve literal equations (formulas) for a given variable and apply these skills to solve practical problems. Graphing calculators may be used to confirm algebraic solutions.

- performing operations involving graphing linear functions in two variables
  - The student will select, justify, and apply an appropriate technique to graph a linear function in two variables. Techniques will include slope-intercept, x- and y-intercepts, and the use of the graphing calculator.
  - The student will determine the slope of a line when given an equation of the line, a graph of the line, or two points on the line. Slope will be
described as rate of change and will be positive, negative, zero, or undefined. The graphing calculator will be used to investigate the effect of changes in the slope on the graph of the line.

- The student will write an equation of a line when given the graph of the line, two points on the line, or the slope and a point on the line.

- The student will solve systems of linear equations and apply these techniques to solve practical problems. Graphing calculators will be used both as a tool in solving problems and to verify algebraic solutions.

- The student will, given a set of data points, write an equation for the line of best fit, use the equation to make predictions, and discuss the reliability of the predictions.

• performing operations on rational expressions
  - The student will add, subtract, multiply, divide, and simplify rational expressions.

• solving equations containing rational expressions
  - The student will solve equations containing rational expressions algebraically and graphically. Graphing calculators will be used for solving and confirming algebraic solutions.

• analyzing a relation to determine existence of direct or inverse variation and performing appropriate operations for practical use
  - The student will analyze a relation to determine whether a direct or inverse variation exists and represent it algebraically and graphically, if possible. The student will solve practical problems involving variations.

• performing operations involving square roots and radical expressions
  - The student will solve equations containing radical expressions algebraically and graphically. Graphing calculators will be used for solving and confirming algebraic solutions.

  - The student will estimate a square root, find the consecutive whole numbers between which it lies, and use a calculator to compute decimal approximations of radicals.

  - The student will simplify radical expressions and write radical expressions as expressions containing rational exponents, and vice versa.

• solving quadratic equations in one variable
The student will solve quadratic equations in one variable both algebraically and graphically. Graphing calculators will be used both as a tool in solving problems and to verify algebraic solutions. The student will select, justify, and apply a technique to solve a quadratic equation. Graphing calculators will be used for solving and confirming algebraic solutions.

- performing geometric operations using algebraic techniques
  - The student will be familiar with basic terminology and notation of geometry.
  - The student will recognize a circle from its equation, develop the \((h, k)\) form and sketch the graph.
  - The student will solve practical problems involving complementary, supplementary, and congruent angles that include vertical angles; angles formed when parallel lines are cut by a transversal; and angles in polygons.
  - The student will identify congruence and similarity relationships between pairs of triangles.
  - The student will solve practical problems involving right triangles by using the Pythagorean Theorem and its converse. Calculators will be used to solve problems and find decimal approximations for the solutions.
  - The student will use properties of circles and polygons to solve practical problems.
  - The student will use formulas for perimeter, area, volume, and surface area of two-dimensional or three-dimensional objects to solve practical problems. Calculators will be used to find decimal approximations of these results.

- recognizing various representations of functions and converting among a graph, a table, and an algebraic form
  - The student will recognize various representations of functions and convert among a graph, a table, and an algebraic form. These functions should include linear, quadratic, absolute value, and square root.

- performing algebraic operations on functions

- solving absolute value equations graphically and algebraically

- determining the domain and range of a relation and performing algebraic and graphing operations
- The student will determine the domain and range of a relation given a graph or a set of ordered pairs and will identify the relations that are functions.

- The student will, given a rule, find the values of a function for elements in its domain and locate the zeros of the functions both algebraically and with a graphing calculator. The value of f(x) will be related to the ordinate on the graph.

- classifying arguments as either deductive or inductive reasoning

- solving problems involving symmetry and transformation

- The student will use pictorial representations, including coordinate methods to solve problems involving symmetry and transformation. This will include:
  - using formulas for finding distance, midpoint, and slope
  - investigating and determining whether a figure is symmetric with respect to a line or a point
  - determining whether a figure has been translated or reflected

**ADDITIONAL RECOMMENDATIONS FOR GOOD PRACTICE**

- Students should be encouraged to continue their study of developmental mathematics in consecutive terms.

- Students should not be given a second placement test while enrolled in developmental studies. In other words, developmental placement should not be overridden by a subsequent attempt at COMPASS without appropriate permission.

- Only students with a passing average should be allowed the privilege of taking the final competency exam.

- Each college should develop uniform exams for faculty use in each course.

- Multiple forms should be developed. The Virginia Mathematical Association of Two-Year Colleges (VMATYC) should be asked to serve as a repository for test bank items to be shared among the colleges.

- VMATYC should be asked to review the outcomes of this effort and make recommendations for improvement.
CHARGE NUMBER THREE: PERFORMANCE INDICATORS AND ASSESSMENT METHODS TO MONITOR SUCCESS OF PROCEDURES

In response to Dr. Oliver's third charge – to make recommendations concerning performance indicators and assessment methods that can be implemented systemwide for the purpose of monitoring the success of these new procedures – the Task Force developed guidelines for collecting and utilizing data for continuous improvement of the teaching-learning environment in VCCS developmental education courses. The recommendations include both affective and cognitive measures, as well as lists of vital assessment measures and suggested additional ones. The Institute for Higher Education Policy (Phipps, 1998) provides a list of questions colleges need to include in their evaluation of the effectiveness of their programs. The questions are the following:

Do students successfully complete remedial education courses?

Do students move from remedial education to college-level courses?

Are students who took remedial education courses eventually completing college-level courses?

Are remedial education students persisting and reaching their academic goals?

The report further stressed the importance of a systematic evaluation process. Roueche and Roueche (1999) state that colleges do not evaluate their programs adequately and, as a result, do not maintain clear and useful data for measuring effectiveness. Before Roueche and Roueche stated these findings, Donovan (1975) reported that most successful developmental programs participate in evaluation. Further supporting these findings are Boylan, Bliss, and Bonham (1997), Casazza and Silverman (1996), Maxwell (1985,1991), and Roueche and Snow (1977).

A point emphasized in the report of the National Study of Developmental Education (Boylan, 1997; Boylan, Bonham, Claxton, & Bliss, 1992) was the importance of a comprehensive, systematic plan for evaluation. The research brings to light the positive relation of comprehensive, systematic evaluation to academic success of students in developmental programs (Boylan, Bliss, & Bonham, 1997). These programs have carefully planned and stated goals and objectives (Donovan, 1975; Roueche & Snow, 1977) and, as a result, have more information available for planning needed changes to programs (Casazza & Silverman, 1996; Maxwell, 1991).

As a result of the recommendations of Task Force members in collaboration with VCCS colleagues and experts in the field, the Task Force offers the following recommendations for a systematic plan for assessment of instructional effectiveness.
## Performance Indicators and Assessment Methods: Quantitative and Qualitative

<table>
<thead>
<tr>
<th>Quantitative Assessment</th>
<th>Data That Will Provide the Information</th>
<th>Specific Collection</th>
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<td><strong>Information to Assess Program Success</strong></td>
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<tr>
<td>Students’ achievement in Developmental Courses</td>
<td>Students’ performance in Developmental Courses</td>
<td>% of S, R, U, W grades by college and system</td>
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<tr>
<td>Students’ achievement of needed competencies for subsequent developmental and credit courses</td>
<td>Tracking of student success in targeted developmental and credit classes</td>
<td>Suggested targeted courses: English – 01→03→111 Reading – 04→05→HIS 101, HIS 121, SOC 200, SOC 215, BUS 100 Math – 02→03→04→06 02→03→06→04 02→120→126→103 03→120 04→115→151→163→166 06→115→151→163→166</td>
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<td><strong>Appropriateness of Placement Instrument and Guidelines</strong></td>
<td>ACT Research Center reports on student placement and achievement</td>
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<tr>
<td><strong>Quantitative Assessment</strong></td>
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<tr>
<td>Student achievement of VCCS Exit Criteria</td>
<td>Documentation by Program Faculty on assessment of students’ entry and exit level skills Use of success rates of students who place directly into the credit courses as a benchmark for measuring the success of the developmental student when enrolled in the same course</td>
<td>In-house and standardized pre- and post test results, student portfolios and files of completed work, success records on students as they move into subsequent courses to verify appropriate exit criteria and skill levels Success rates of non-developmental students</td>
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</tbody>
</table>

**USES OF THE DATA**

Appropriate uses of the above data include comparing the data to past VCCS developmental studies data, the national ACT information, and national developmental studies trends. The Task Force recommends that the data be collected and analyzed by each college. The Task Force recommends use of the RADSS Tracking System, as well as other systems developed by individual colleges, and special studies that have been conducted by the VCCS.
Additional data collection for consideration includes the following:

- Analysis of performance in credit courses by
  - former developmental students
  - students who were advised to take developmental courses but did not
  - students who placed directly into credit classes
- Comparison of students’ reading placement scores and performance in math and writing courses
- Grade Point Averages of students by program after completion of developmental courses
- Rate of retention
  - From first semester in developmental to next enrollment
  - From last required semester of developmental to next enrollment
  - From number of semesters to complete a particular course in developmental
- A long-term retention study over an eight year period
- Achievement of students’ personal goals, such as employment, transfer, personal satisfaction
- Withdrawal rates in developmental vs. credit classes
- Surveys of employers, graduation classes, withdrawal students, and fellow faculty in the academic disciplines to determine level of satisfaction with program and goals
- Examination of performance of special populations, such as minorities and students with physical and learning disabilities
- Documentation of students placed incorrectly in both developmental and credit courses.
- Examination of students’ numerical scores for developmental courses, rather than the S, R, U to determine students’ success in subsequent classes.
QUALITATIVE ASSESSMENT

The Task Force recommends the following qualitative assessment activities as necessary upon students’ college entry:

- Use of a pretest, such as a writing sample or reading summary, during the first week of class to verify placement

- Assessment of students’ interests, attitudes, characteristics, and/or learning styles using LASSI, customized questions in COMPASS, and/or other surveys that provide qualitative information helpful in assessment of students’ needs.

The Task Force also recommends that the following assessments be completed in order to enrich the information available for colleges as they plan for continuous improvement in their developmental teaching-learning environments:

- Survey of non-developmental faculty about preparation of developmental students in curricular classes

- Survey of developmental students after entry into regular curricular courses for information regarding their preparedness for their credit courses

- Survey of faculty and students for appropriateness of developmental objectives

- Assessment of the quality and validity of COMPASS, particularly reading questions

- Assessment of the institutional aspects of using COMPASS, for example, effects on staffing, budget, and use of physical space.

The Task Force suggests the following assessment activities for consideration by the colleges:

- Documentation of students incorrectly placed

- Systemwide examination of placement documentation data

- Systemwide assessment information for use in maintaining an overall view of developmental instruction in the VCCS.

Good practices and other recommendations include the following:

- All colleges should have a procedure in place to orient students before taking the placement test. This orientation should include test structure, purpose, and possible outcomes.
• Colleges should assess the skills required in college-level courses and define which courses developmental students can and cannot take.

• To increase the success of developmental students, all colleges should focus on the overall model of planning and evaluation as proposed by the Task Force.
List of References


# APPENDIX

## DEVELOPMENTAL EDUCATION IMPLEMENTATION TASK FORCE

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>College</th>
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<tbody>
<tr>
<td>Dr. Ann C. Bartholomay</td>
<td>Coordinator, Learning Assistance Center</td>
<td>SWVCC</td>
</tr>
<tr>
<td>Dr. Robert L. Bashore</td>
<td>Dean of Student Services</td>
<td>CVCC</td>
</tr>
<tr>
<td>Mr. James E. Burns</td>
<td>Assistant Professor, English</td>
<td>MECC</td>
</tr>
<tr>
<td>Dr. John S. Capps</td>
<td>Interim Division Chair, Humanities, Professor, English</td>
<td>VWCC</td>
</tr>
<tr>
<td>Dr. Barbara F. Chambers</td>
<td>Professor, Mathematics</td>
<td>NVCC (WO)</td>
</tr>
<tr>
<td>Dr. Gayle F. Childers</td>
<td>Professor of Mathematics</td>
<td>JSRCC</td>
</tr>
<tr>
<td>Ms. Mary M. Dubbe</td>
<td>Assistant Professor of Reading</td>
<td>TNCC</td>
</tr>
<tr>
<td>Ms. Nuala M. Glennon</td>
<td>Instructor, Developmental Mathematics</td>
<td>RCC</td>
</tr>
<tr>
<td>Mr. James A. Grigsby</td>
<td>Counselor</td>
<td>GCC</td>
</tr>
<tr>
<td>Ms. Sally Harrell</td>
<td>Coordinator of Assessment and Developmental Education</td>
<td>TCC</td>
</tr>
<tr>
<td>Dr. Tom Hyder</td>
<td>Professor of Developmental Reading and English</td>
<td>PVCC</td>
</tr>
<tr>
<td>Ms. Patricia Leonard</td>
<td>Associate Professor of Reading</td>
<td>CVCC</td>
</tr>
<tr>
<td>Ms. Glenda S. W. Lowery</td>
<td>Assistant Professor of English and Reading</td>
<td>RCC</td>
</tr>
<tr>
<td>Ms. Donna Mayes</td>
<td>Assistant Professor, Reading/English</td>
<td>BRCC</td>
</tr>
<tr>
<td>Dr. Carolyn S. Mayfield</td>
<td>Program Head, Developmental Studies, Associate Professor, English</td>
<td>PDCCC</td>
</tr>
<tr>
<td>Dr. Edward C. Polhamus</td>
<td>Professor of Mathematics and Chair, Division of Arts and Sciences</td>
<td>DCC</td>
</tr>
<tr>
<td>Ms. Edith M. Ruben</td>
<td>Associate Professor of Mathematics</td>
<td>NRCC</td>
</tr>
<tr>
<td>Dr. Barry M. Selinger</td>
<td>Professor, Reading</td>
<td>NVCC (AL)</td>
</tr>
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<tr>
<td>Dr. Richard F. Thompson</td>
<td>Professor, English</td>
<td>NVCC (AN)</td>
</tr>
<tr>
<td>Mr. Patrick M. Tompkins</td>
<td>Associate Professor, English</td>
<td>JTCC</td>
</tr>
<tr>
<td>Ms. Kathleen L. Wax</td>
<td>Associate Professor, Assistant Division Chair, ESL/Developmental Studies</td>
<td>NVCC (AL)</td>
</tr>
<tr>
<td>Dr. Pansy Waycaster</td>
<td>Professor, Mathematics</td>
<td>SWVCC</td>
</tr>
<tr>
<td>Mr. Warren E. Wise</td>
<td>Assistant Professor, Mathematics</td>
<td>BRCC</td>
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**VIRGINIA COMMUNITY COLLEGE SYSTEM**  
**ACADEMIC SERVICES AND RESEARCH STAFF**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Anne-Marie McCartan</td>
<td>Vice-Chancellor Academic Services &amp; Research</td>
<td></td>
</tr>
<tr>
<td>Ms. Linda Carr</td>
<td>Director, Educational Planning</td>
<td></td>
</tr>
<tr>
<td>Dr. Earl McHewitt</td>
<td>Director, Research</td>
<td></td>
</tr>
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