A Description of the Computer Assisted Assessment Program in University Elementary Algebra at Norfolk State University

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Abstract

Many colleges and universities today are faced with the problem of low student academic achievement in math. Some of them are trying to improve student academic achievement through the use of technology. Their proposed solution is to teach children how to use the technological tools available to them and integrate that technology into the curriculum to improve student achievement.

The Department of Mathematics at Norfolk State University (NSU) realizes that the use of technology (and its integration into the mathematics curriculum) may be a possible solution to the problem of low student academic achievement in undergraduate mathematics programs. As a result, the Department integrated a computer-assisted assessment (CAA) system to expose students to new advances in technology and to improve student achievement in mathematics courses. The present CAA system has been in effect since the fall semester of 2000 for their Mathematics 101 course, a one semester developmental course in university elementary algebra. This paper is a description of that system.

INTRODUCTION

Computer-Assisted Assessment

Many educational institutions are developing new methods of teaching and testing the knowledge of students as a result of the increase usage of computer technology as an aid in the learning process. The traditional method of "pencil and paper" tests is quickly fading away as institutions are now implementing computer-based testing (CBT) into the curriculum to assess students' knowledge as a method of assessment. This procedure is called computer-assisted assessment (CAA). CAA refers to the use of computers to assess students' progress. The computers can be used to deliver, mark, read, and analyze assignments or examinations. There are two formats of CAA: (a) preprinted paper test on to which students mark their responses, which are then processed automatically using an optical mark reader, or (b) the students directly input their responses into a computer terminal.

Advantages of CAAs Over Pencil and Paper Assessments

CAA has several features that surpass the benefits of traditional assessment methods. CAA has truly objective marking; meaning human error and prejudice are eliminated in the grading process. Computer-supported scoring models have met and exceeded the accuracy of human raters across a range of content areas. Along with the cost of the personnel to grade, store, analyze, and report the students' results for "pencil and paper" assessment, the administration must also spend thousands of dollars for printing and shipping of test booklets and answer documents. This major expense in the traditional testing program is absent in CAA systems. Another advantage is CAA saves time for teachers and other professionals who are responsible for grading and reporting students' assignments. It saves time because CAA systems provide both instant marking and instant feedback. As a result, teachers are able to immediately identify problem areas that need addressing. Also students are able to focus on topics in which they need to improve.

Disadvantages of CAAs Over Pencil and Paper Assessments

The primary disadvantage is the cost associated with start-up and maintenance of technology and the database of test questions (www.ecs.org, 2004). The educational institutions must have ample and sufficient hardware for whichever software they decide to use. In addition, CAA systems require administrators and student to be reasonably proficient in that area of computers. If they are not computer literate, the institution must train them or hire computer specialists to provide technical support such as uploading, maintaining, and troubleshooting any problems that may arise while using the computer based system.

Another concern is the reliability of technology itself. If the computers crash, the assessment data may be lost.

Still another much debated topic, regarding CAA systems, is the levels of learning that are tested. The different levels of learning are: knowledge, comprehension,

application, analysis, synthesis, and evaluation. Some CAA systems are only capable of designing objective test questions that are presented in the form of multiple-choice questions. In some of these types of tests, only what some consider the lowest level of learning, knowledge, is tested. The reason for this is that some of these types of tests only assess the ability of the student to recall facts. If the administrators wish to test higher levels of learning, the time saved on grading tests by hand can be spent writing high quality assessment questions for the test item bank.

The last major disadvantage of CAA systems, of importance to this study is that of security. With the traditional methods (pencil and paper tests), test administrators feared the possibility that the students may share the paper exam with others. The security issue with the CAA systems is more complex because just a click of the mouse can publish copies of tests worldwide.

THE ELEMENTARY ALGEBRA CAA PROGRAM AT NORFOLK STATE UNIVERSITY

Introduction

In 2002, the Mathematics Department of Norfolk State University (NSU) implemented a computer assisted assessment program Mth 101, Elementary Algebra course. Elementary Algebra is a course intended for students that are proficient in arithmetic skills, but have not previously had a course in algebra. It also serves as a refresher course for those students who may have already had a course in elementary algebra, but, for whatever reason, need to sharpen their elementary algebra skills before attempting higher level mathematics courses. The Elementary Algebra syllabus, which can see be seen in Appendix 1, states that this course is intended to:

1. Provide an interactive learning experience for students
2. Provide real-data applications (verbal problems) to aid in motivating students to solve problems found in everyday situations
3. Have students perform mathematical computations and manipulations with understanding, accuracy, and efficiency in arithmetic and elementary algebra
4. Incorporate student use of the computer for review and reinforcement
5. Use synthesis exercises as an aid in building critical thinking skills

The Elementary Algebra course, offered by the Mathematics Department at Norfolk State University is also intended to prepare students for a course in intermediate algebra.

In order to accomplish these goals, the mathematics department began offering additional learning opportunities (additional to classroom lectures) to students, in order to strengthen their mathematical foundation. One of these additional learning opportunities is computerized interactive tutorials. They (the computerized tutorials) provide students with an interactive environment wherein they may review, and reinforce elementary algebra concepts and skills, learned in the classroom, through the use of computers.

The computer assisted assessment (CAA) component of Norfolk State University's Mathematics Department's Elementary Algebra course is also a key

ingredient in the accomplishment of the above stated goals. It is designed to electronically determine to which the above stated goals are being accomplished. It is also designed to ascertain the extent to which students are accomplishing the objectives of the course, as stated in the course syllabus.

Presently, there are 10 sections of Elementary Algebra being taught at the University. It is an interdisciplinary course comprised of a total of about 280 students from almost every department and school of the University. The classes range in size from 19 to 25 students. There are morning, afternoon, and evening classes of the course. The textbook presently in use is Developmental Mathematics by Bettinger et al. The publisher is Pearson and Pearson. The teaching faculty for the CAA Elementary Algebra course at NSU consists of 5 full-time and 2 part-time mathematics professors.

Components of the Program

Traditional Lectures and Tests

Traditional lectures are a major part of the Mathematics Department's CAA Elementary Algebra Course. The course is a three semester hour lecture course. Students are required to attend all traditional classroom lectures, given by his or her Elementary Algebra professor. Traditional homework and classwork, from the textbook or other sources, are assigned by the professor. For example, for a homework assignment, the professor may tell the students to do all of the odd exercises on a certain page in the textbook. Classwork may consist of a worksheet of problems related to the lesson for the day, or for a previous day. The specific type of assignments given to the students is left to the discretion of the Elementary Algebra professor.

Traditional in-class tests are also a major part of the Mathematics Department's CAA Elementary Algebra course. Students are required to take all traditional in-class tests given by his or her Elementary Algebra professor. Students usually have to show all work on these tests. Sometimes, they don't get any credit unless the work is complete and correct. Traditional tests, unlike many CAA tests, give Elementary Algebra professor a chance to see if students are really using algebra to solve problems. Many of the problems on CAA tests can be solved using simple arithmetic. Because of this, it is possible for a student to do very well on CAAs, but poorly on professor-made in-class tests. Because of the way CAA tests are structured, mostly multiple choice, traditional in-class tests are used by the Elementary Algebra professor to assure that students are really learning what they are supposed to learn. Traditional in-class tests usually cover the material covered on several CAA tests combined. There are a total of 15 CAA tests given during the semester, as opposed to only 8 traditional (pencil-and-paper) in-class tests.

Computer Assisted Instructions

Computer assisted instructions (CAI) are available on the University's LAN (local area network) through the use of video clips and PowerPoint presentations. Students may

access them at several labs on campus, including, 107 WSB (Woods Science Building), 201-202A BMH (Brown Memorial Hall), and 218 LBB (Lyman Beecher Brooks) Library. Such resources are also available at the textbook publisher's website, the ACCESS tutoring center, and, in some cases, on reserve in the University's library. some CAA Elementary Algebra classes are even held in "technology smart" classrooms. These are classrooms wherein the professor and each student have access to a computer that is connected to the internet. Additionally, equipment is available, in the classroom, for multimedia presentations. Students in these classes have even more access to CAI than students in traditional classrooms, i.e., classroom without such equipment.

Computer Assisted Tutoring

Computer assisted and traditional Elementary Algebra tutoring is available through at least two of the University's tutoring programs, viz., the STARS tutoring program and the ACCESS tutoring program. "STARS" is an acronym for Science and Technology Academicians on the Road to Success. Its tutoring program is a student peer tutoring program. The peer tutors receive remuneration for their services. The program is free for the tutees. Tutees may sign up for the program themselves, or they may be referred by their professor. "ACCESS" is an acronym for Academy for Collegiate Excellence and Student Success. Its tutoring program is also a student peer tutoring program. As in the case of the STARS peer tutors, the ACCESS peer tutors receive remuneration for their services also. Also, like the STARS tutoring program, it is free for the tutees. ACCESS tutees may sign up for the program themselves, or they may be referred by their professor. The STARS tutoring lab is opened from 8 am to 6 pm, M-F. The hours of operation, for ACCESS, are M-F, 7 am to 7 pm. The ACCESS program is located in Rm B191 BMH and Suite 100 NCH. The STARS program is located in Rm 318 NCH.

Computer Assisted Assessment

CAA Component's Purpose and Relationship to Other Components

After Elementary Algebra students attend lectures on a certain number of topics, usually, homework is assigned from the textbook and/or from the online exercises. The online homework follows the adaptive model of testing. If a student does an online homework problem incorrectly, the step-by-step solution can be viewed. Alternatively, if preferred, the student can get computerized, step-by-step, interactive help with the solution to the incorrectly solved problem.

After completing the homework assignment(s), the student has to go to the Mathematics Testing Center (Rm C227 BMH) and take a proctored CAA test. The CAA tests are proctored by two Mathematics Testing Center technicians. The Center consists of 28 desktop computers. It is dedicated to CAA testing only. The purpose of the Mathematics Testing Center's CAA Elementary Algebra tests is twofold, first, to determine whether the student learned what he or she was supposed to learn, and, second,

to diagnose any deficiencies that the student might still have as far as the material covered on the CAA test is concerned. The student is expected to obtain the necessary help and thus eliminate any diagnosed deficiencies before taking the in-class test or the next CAA test in the Mathematics Testing Center.

Protocol and Deadlines for CAA Tests

The tests that the student takes in the Mathematics Testing Center fit the linear-on-the-fly test delivery model, i.e., each student's test is unique, but not adaptive. CAA Elementary Algebra tests are administered on an individual basis. The tests are proctored. Each student, within the framework of the CAA deadline schedule (Appendix 2), goes to the Mathematics Testing Center and takes the test, virtually, whenever he or she wants. An example of a CAA deadline schedule is shown in the. The Mathematics Testing Center is opened from 8:15 a.m. to 6:20 p.m., Monday and Wednesday, and 8:15 a.m. to 4:50, Tuesday, Thursday, and Friday. Each student, upon arrival in the Mathematics Testing Center, logs on to a computer and accesses the appropriate test. The items on each students test are randomly selected from a pool of test items. The pool of test items is generated by the computer and is virtually unlimited. Usually the test questions are objective, i.e., they require users to choose or provide a response to test questions that have very specific and exact answers, usually a, b, c, or d. These tests illustrate the LOFT model because they are not adaptive; but, each student receives one that is unique. A sample CAA test is shown in the Appendix 3. After completion of a CAA test, students receive immediate feedback on their performance.

Minimum Proficiency Level for Success on CAA Tests

If the student makes a score of 70% or better on the CAA test, the test does not have to be re-taken. If he or she makes less than 70%, he or she must re-take the CAA test. Within the framework of the test deadline schedule, the student that does not make at least 70% on the CAA test, the first time that it is taken, has two more chances to do it. That's a total of three chances. If he or she does not make at least 70% on the third try, or by the date of the in-class test, he or she must move on to the next lesson or to the in-class test, whichever is appropriate. Between successive tries, the student must seek help his or her notebook, the textbook, the ACCESS or STARS tutors, the online or telephone tutors (provided by the textbook publisher), the professor that teaches the course, or other source of help to get more practice and a better understanding of the material that he or she missed on the preceding CAA test.

CAA Tests vs. In-Class Tests

The CAA Elementary Algebra course is individualized, or self-paced, only within the framework of the deadlines for the CAA tests. In other words, on (or near) the deadline date of a CAA test, or group of CAA tests, all students must take the in-class test and/or move on to the next lesson, whichever is appropriate. As the name suggests,

the “in-class” test is given in class. All students, in a particular professor’s class, that meets a certain time of the day, must take it at the same time. This means that all students must at least have taken the CAA tests by the deadlines indicated on the CAA test deadline sheet shown in Appendix 2. The in-class tests are not individualized or self-paced. Otherwise, the student can work ahead of the class as far as he or she likes

Impact of CAA Tests on Final Grade

Each time a student makes 70% or higher on a CAA Elementary Algebra test, he or she is awarded 1 point. If a student makes a 100% on a CAA Elementary Algebra test, he or she is still only awarded 1 point. There are a total of 15 CAA tests that Elementary Algebra students take during the semester. This means that, if a student makes at least 70% on all fifteen CAA tests, at the end of the semester, he or she will have accumulated a total of 15 points. Figure 12 shows the weights for various aspects of the CAA Elementary Algebra course. As indicated in the figure, the CAA (or lab) component of the course counts 15% of the final semester grade.

Designing and Developing CAA Tests

The design of the Elementary Algebra CAA tests is based on the objectives of the course, and the types of questions available in the test bank of QuizMaster-EQ software. The QuizMaster-EQ is used to view and select problems from its test bank that may be included in a particular CAA test. The present CAA Elementary Algebra tests were developed by the first Elementary Algebra course coordinator and the professors that were teaching it at the time. They selected problems, from the test bank, for each main objective covered in class lectures. These problems are stored in QuizMaster-EQ system. It uses them to generate unlimited different, but similar, objective test questions. The objective test questions, thus compiled, require users to choose, or provide a response to, questions whose correct answer is predetermined.

Making the CAA Tests Available to Students

After a CAA test is designed and developed for the Elementary Algebra course, it must be made available to students on the University’s LAN (local area network). This is accomplished by “Saving and Assigning” the test. In saving and assigning the test, there are many decisions that must be made. The test developer must decide

1. How many times students will be allowed to take the test.
2. Whether students will be required to enter a password in order to access the test
3. How much time students will be allowed to take the test
4. Whether the students will be allowed to print the test results
5. Whether students will be allowed to print the test
6. What students can see when they review their test

7. When students will be able to review their test results, e.g., after each problem or at the end of the test
8. Whether students can access an incomplete test without a password.

Testing Center technicians or the test developer must also set the date and time of availability of the test. After these questions are answered, the test is saved and assignment, thus, giving students online access to it.

In the Elementary Algebra CAA system, students are allowed three chances to take any given test. They are required to enter a password, in order to take a CAA test in the Mathematics Testing Center. The amount of time that a student can spend working on various CAA tests varies according to the level of difficulty of the problems and the number of problems on the test. Students are allowed to print summary of the results of each of their tests, but they are not allowed to print the actual tests, themselves. When students view their submitted test they can see their answers and the correct answers. Students in the Elementary Algebra CAA system can review their test results only after they have completed and submitted the entire test. Students can not access an incomplete CAA test unless they are given permission and a special password by one of the Mathematics Testing Center technicians.

CAA tests' passwords are changed frequently. If they are not, the possibility exists that a student may, somehow, obtain them and take the CAA tests at home or elsewhere. Presently, once the test is made available on the University's LAN, students can access it by entering a password.

Role of Mathematics Testing Center Technicians

The Mathematics Testing Center is staffed by two full-time testing technicians. They are responsible for, among other duties and responsibilities, maintaining the Mathematics Department's Elementary Algebra CAA test bank, controlling students' access to CAA tests, administering CAA tests to students, maintaining records of CAA test results, and providing students that have taken CAA tests with the results of those CAA tests. Testing Center personnel is also responsible for maintaining various other technical aspects of the Elementary Algebra CAA system.

Action Taken if Student Fails the CAA Test

As mentioned elsewhere in this paper, if a student makes less than 70% on a CAA test and it is not time for the in-class Elementary Algebra test, he or she may try the CAA test again. At the present time, students have three chances to pass any given CAA test.

Action Taken if Student Passes the CAA Test

If students pass a given CAA test, they can move on to the next topic in the course. They do not have to wait for the rest of the class. Students are generally encouraged to work ahead and finish the CAA component of the course as soon as possible.

The Final Exam

The final semester exam for the CAA Elementary Algebra course is not a CAA test. It is a traditional pencil-and-paper test. Students are allowed to do their scratch work directly on the test paper and the back of the answer sheet. It is a multiple choice exam. The answer sheet is a scantron answer sheet, i.e., the exam can be graded by a machine. All Elementary Algebra students (at present, about 280 students) at the University take the final semester exam on the same day, at the same time, and in the same location. It is administered and proctored by the Elementary Algebra professors and Mathematics Testing Center personnel, assisted by a few mathematics majors, usually in their senior year at the University.

Final CAA Report from the Mathematics Testing Center

At the conclusion of the final semester exam, all exam materials are delivered to the Mathematics Testing Center, where they are machine scored and entered into the computer by the Mathematics Testing Center technicians. A final CAA report is then compiled and distributed to each Elementary Algebra professor, for the class(es) that he or she teaches. The CAA information in this final CAA report is used by the professor as a part of each student's final semester grade. The final CAA report includes information on the final exam and all CAA tests taken by each student. A sample CAA final report is shown in Appendix 4. The names of the students have been omitted to protect their identities.

DISCUSSIONS AND RECOMMENDATIONS

The CAA portion of the Elementary Algebra course has been evaluated many times in terms of student usage and student satisfaction. There is a need to evaluate it in terms of whether it has an impact on student learning. In other words, do students learn more or better because of it?

At the present time, students that earn a 69% or less on a CAA test do not earn any credit for their effort. The type of system being used is an "all-or-none" system, i.e., the students make a 70% or higher and earn all of the credit (1 point) for the CAA test, or they make less than 70% and earn none of the credit (0 points). Perhaps the success rate in the CAA Elementary Algebra course could be improved simply by giving the students the amount of credit that they really earn on the CAA tests, based on the percent of the problems that they answered correctly on the test, in stead of using an "all-or-none" system. There is a need for research in this area to determine whether this will make a difference.

Some of the answers to the CAA test may be incorrect. Some of the questions on the CAA tests may be incorrectly stated or ambiguous. There is a need to thoroughly review all question and solutions in the computerized test bank.

At the present time, Elementary Algebra professor do not have online access to their students work on the computer. They have to rely on the midterm and final CAA reports from the Mathematics Testing Center to officially monitor students' progress. It is hoped that this lack of access will be corrected in the not too distant future. Other

issues that need to be examined in the future include: the use of calculators, the elimination of CAA tests deadline, the extension of some CAA test deadline, the use of alternative assessments, the use of the project approach to instructions, accommodations for nontraditional students, course content, to name a few.

Subsequently the students report to the Mathematics Computer Lab again to retake the test. Under the circumstances that the students cannot successfully pass the test after three attempts, they must proceed to the in-class test without receiving any credit. For those students who were unable to pass the in-class test, they are again encouraged to report to the ACCESS Lab for more assistance. After the in-class test, the instructor will begin the lessons for the next course objective. This process is repeated until the end of the semester.

IMPLICATIONS FOR FUTURE CAA ELEMENTARY ALGEBRA RESEARCH

This study only described the CAA system implemented in the Elementary Algebra course by the Mathematics Department at Norfolk State University. Future studies need to look the usage and effectiveness of the CAA system. There is a need to look at the effect of the CAA program on student success and student achievement. A longitudinal study needs to be conducted to determine its long-term as well as short-term effects. Research needs to be conducted in order to answer many more questions. Some additional research projects that could be initiated include, but are not limited to, the following:

1. Compare the students that passed the final exam and those that didn't pass the exam in terms of the average number of packages that both group did. Which group, on the average, did more packages?
2. Divide the students into four or five classes, based on the number of packages that they completed. Compare the average, standard deviation, and variance on the final exam of the students in the different classes.
3. Conduct a linear regression model, using the number of lab tests completed successfully is the independent variable and the score on the final exam as the dependent variable.
4. An experimental design to study the design of the flow chart to see if the CAA system is effective. The control group will attend classes in which the traditional testing method is implemented. The experimental group will follow the CAA implementation design.
5. Divide the classes by teachers and compare these groups in terms of average number of CAA tests completed, average score on the final, and the standard deviations and variances of the same. This will act as an analysis to evaluate the teachers and see if the differentiation between teaching styles during instruction affects the scores.

APPENDIX 1

SPRING 2008
MTH 101 – Elementary Algebra (3 credit hours)

Professor: **Office Location:**
Office Telephone: **E-mail:**

Website for Mathematics Faculty Information: http://math.nsu.edu

Website for Accessing Online Assignments: http://www.coursecompass.com

Professor's Website:

Tentative Office Hours:

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Course Description:
Elementary Algebra is a comprehensive course intended for use by students needing a review in arithmetic skills before covering algebra topics. Interactive Math Tutorial Software or **MyMathLab** Software provides an interactive environment to assist students in mastering mathematical concepts. Credits do not count toward the mathematics requirements of a student's major. The technology (laboratory) component of the course has two parts, viz., a Computer Assisted Assessment part and an online tutorial/homework part. **The CAA (Computer Assisted Assessment) part is administered by the Mathematics Testing Center, C227, BMH. The online tutorial/homework component is on the World Wide Web at www.coursecompass.com.**

Prerequisite: University Placement.

Course Rationale:
This is a first course in the essentials of Algebra, necessary for more advanced study of courses mathematics, natural science, and other disciplines. We continue an exploration of the arithmetic concepts, such as, fractions, decimals, and percents, and spend some time exploring the more advanced concepts of equations and inequalities, algebraic expressions, and factoring. Many of the concepts and techniques covered in this course are used to tackle real-world application problems. We expect the student to understand how the various applications present themselves as questions to which people want to know the answer, how those questions can be translated into mathematics, and, hence, how they can be solved using arithmetic and/or algebra.

We begin with a study of fractions. This is followed by a treatment of the order of operations, operations with decimals, and percents. We also include a treatment of

operations with signed numbers and simplifying algebraic expressions. The course then turns to techniques of solving equations, formulas, inequalities, and graphing equations in the rectangular coordinate system. Operations with polynomials (adding, subtracting, multiplying, dividing, and raising to a power) then serve as introductions to the next portion of the course, where we give a treatment of factoring. In this course, we also study applications of various topics to real-world situations.

Goals & Measurable Intended Student Learning Outcomes:

To make full use of the student's previous mathematical experiences, to provide an adequate foundation for the student's success in Math 105, and to enable the student to acquire the understanding necessary for applying the course experiences in subsequent situations.

At a competence level not less than **70%,** the student will

1. Solve problems involving
   a. Fractions
   b. Order of Operations

2. Evaluate expressions containing decimals and percents.

3. Compute the answer to expressions with signed numbers and algebraic expressions.

4. Graph 2-variable equations in the rectangular coordinate system.

5. Determine the solution to problems involving exponents, and adding, subtracting, multiplying, and dividing polynomials.

7. Demonstrate the ability to factor various types of polynomials.

8. Apply the mathematical concepts and techniques learned in this course to real world problems.

Course Materials/Requirements/ Required Text:

-Each student **MUST** obtain textbook and **MyMathLab Access Kit**, available in the University Bookstore.
-Each student must complete all Math Testing Center CAA (Computer Assisted Assessment) tests, all assignments (online and otherwise), and all In-Class tests, in a timely manner.
-Students not attending the first three weeks will be dropped from the course.
-Cheating will result in a grade of "F".
-Students who miss 20% or more of the classes may receive an "F" in the course. Thus, attendance will be taken daily by the Professor (Please Read *NSU Student Handbook*).
-As adults we expect you to govern yourselves accordingly.

(Please Read *NSU Spartan Code of Ethics*)

Textbook:

1. Developmental Mathematics (shrink wrapped with MyMathLab Kit), Custom Edition for University Elementary Algebra at NSU, by M.L. Bittinger, J.A. Beecher (with Supplemental Materials by A. W. Earl and W. H. Parker: Available in NSU Bookstore)

Important Dates

-Instruction begins: Aug 12th and ends May 2nd -Holidays: Martin Luther King, Jr. Birthday Celebration (Jan 21st), Spring Break (Mar 10th – Mar 16th)
-Last day to drop course: Mar 28th
-Final Exam: Mon, May 5th , 8:00 to 10:00 am. Location: TBA

Available Supplements:

"Steps to Success" Videotapes (LBB-Reserve Room); InterAct Math Tutorial Software (ACCESS Labs, BMH A201-202, LBB 218, WSB 107); *MyMathLab Kit* (Must be purchased at the University Bookstore when purchasing textbook.)

Primary Method(s) of Instruction / Methods to Engage Students:

1) For a 3-hour week: 3 hour lecture/discussion/demonstration
2) MyMathLab software assignments
3) Computer Assisted Assessments in the Math Testing Center

Course Outline:

Chapter	Topic
2(2.1-2.4,1.6,2.6)	*Fraction Notation*
3(3.1-3.5)	*Decimal Notation*
4(4.1-4.3,4.5)	*Percent Notation*
7(7.1-7.8)	*Introduction to Algebra*
8(8.1-8.4,8.7)	*Solving Equations and Inequalities*
9(9.1,9.2)	*Graphs and Linear Equations*
10(10.1-10.8)	*Polynomials: Operations*
11(11.1,11.2,11.5,11.6)	*Polynomials: Factoring*
1,2,3,4,8(1.5, 2.5,3.7,4.7 a-d,8.6)	*Applications*

Related University-Wide and Course- Specific Requirements

- **Writing:** The student will be required to write the solutions and algorithm for solving problems in a logical and orderly fashion.
- **Information Technology Literacy:** The student will explore various websites to gain a better understanding of math concepts and problems. The student is also

required to do math labs online and take computer assisted assessments. Students are encouraged to communicate (outside of class) with the professor or classmates through electronic means.

- **Quantitative Reasoning:** Most of the math concepts have applications that require quantitative reasoning.
- **Scientific Reasoning:** Most of the math applications require the use of scientific reasoning.
- **Oral Communication:** The student demonstrates this through classroom discussions and explanations at the board.
- **Critical Thinking:** Most of the math concepts and applications require critical thinking.
- **Other Requirements:** The student is required to maintain a mathematics notebook of all assignments and class notes.

Evaluation: Final grades are determined as follows:

Course Grading:	**Grades Assigned:**
In-Class Tests (40%) **Lab Tests (20%)** **Quizzes and Homework (20%)** **Final Exam (20%)**	A(-) : 90 and above B(-,+): 80 to 89 C(-,+): 70 to 79 D(-,+): 60 to 69 F : 59 and below

*Classwork includes all in-class tests.
Additional Work includes online (MyMathLab**) homework.

******The CAA Component (20% of Final Grade) is a Computer Technology Requirement for MTH 101. Upon completion of in-class instructions and assignments and online assignments, on certain topics, students MUST report to BMH, Room C227, to complete the required tests on the topics. Students have 3 chances to achieve 70% mastery on each C227 test. If one does not make a 70% on the first or second try, he or she must do the remedial assignment(s) related to the topic. Such individuals may also benefit from tutoring. The CAA Test should be successfully completed before students proceed to the In-Class Test covering that material.***

The instructor reserves the right to revise the grading criteria as appropriate and will make reasonable attempts to notify students as time permits.

Class Policies and Procedures:

1. **In-Class Make-up Tests:** In-Class tests can be made up with a valid excuse and **PRIOR** to the return of the test papers (usually before the next class period).

2. **C227 Make-up Tests:** Because the tests in C227 are individualized and you have many opportunities to take them, they cannot be made up after the deadline for any reason.

3. **Cheating of any kind will not be tolerated and will result in an automatic grade of "F" for the semester (further disciplinary actions may be taken by the university**).

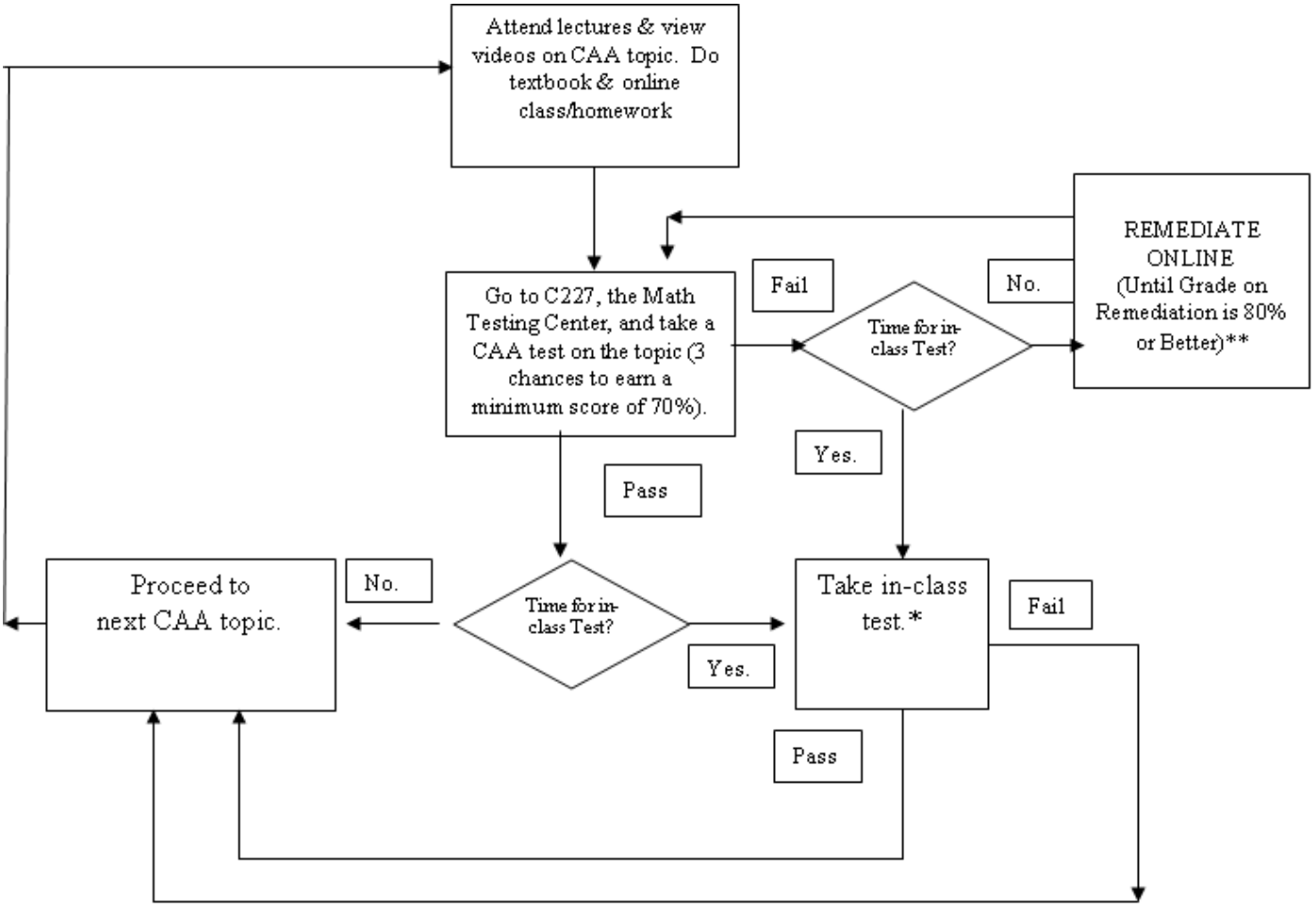
ACADEMIC INTEGRITY POLICIES:
Students are expected to attend all class sessions. Further information regarding academic or academically related conduct and disciplinary procedures and sanctions regarding misconduct may be obtained by consulting the NSU Student Handbook.

MyMathLab Instructions: (See Attachment)

Americans With Disabilities Act (ADA) Statement
In accordance with section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act (ADA) of 1990, if you have a disability or think you have a disability please make contact with Supporting Students through Disability Services (SSDS) Office**.**
Location: 2nd floor/Lyman B. Brooks Library, Room 240
Contact Person: Marin E. Shepherd, Disability Services Coordinator
Telephone: 823-2014

University Assessment Statement
As part of NSU's commitment to provide the environment and resources needed for success, student may be required to participate in a number of university-wide assessment activities. The activities may include tests, surveys, focus groups and interviews, and portfolio reviews. The primary purpose of the assessment activities is to determine the extent to which the university's programs and services maintain a high level of quality and meet the needs of the students. Students will not be identified in the analysis of results. Unless indicated otherwise by the instructor, results from University assessment activities will not be computed in the student grades.

Mth 101
CAA Flowchart



*In-class tests usually cover several CAA topics.
**Students may also need to seek help from STARS, ACCESS, a Mathematics Testing Center technician, the professor, or other source.

ATTACHMENT

My Math Lab Instructions:

You are expected to complete online assignments and supervised online computer labs (Computer Assisted Assessments) during the semester. You will need:

1. *Internet access and an email address(provided by the University)*
2. *A student access code (included with your textbook, if you purchased it at the NSU Bookstore)*
3. *A course ID (You will receive your course ID from your professor during the first week of classes.)*

Getting started:

1. *Visit this site: www.coursecompass.com*
2. *Click Register, click next*
3. *Type in your six-word access code (do not type the hyphens)*
4. *Select, No, I am a new user, and Next*
5. *Type in your course ID number and Next*
6. *Enter your contact information, click Next*
7. *Click the drop down arrow next to the Institution Name box*
8. *Click NSU*
9. *Enter you desired login name and password (do not use blank spaces or punctuation marks)*
10. *Click the arrow next to the Question box to select a question that only you can answer to help verify your identity if you forget your login and password*
11. *Click the license agreement link to open and read the license agreement*
12. *Click, I agree and Next*
13. *A page will be displayed confirming your registration. Print this page.*

Now you are ready to use MyMathLab!

Do you want a user's guide?

1. *Go to http://www.mymathlab.com and click "Getting Started" on the "Tours & Training Menu".*
2. *Scroll down to the bottom of the screen and click Getting Started Guide for Students .*

If you are having problems with the MyMathLab software, please contact your instructor and Amanda Roach (MyMathLab representative). Amanda's contact information is:

email: amanda.roach@pearson.com
phone: (804) 539-2818.

APPENDIX 2

DEAD LINES – Spring 2008
MTH 101 LAB TESTS

February 28th

1-5 **FRACTIONS; ORDER OF OPERATIONS DECIMALS; PERCENTS & SIGNED NUMBERS**

March 27th

6 - 10 **ALGEBRAIC EXPRESSIONS; EQUATIONS; FORMULAS; INEQUALITIES & GRAPHING**

May 1st

11 –15 EXPONENTS; ADD/SUBTRACT POLYNOMIALS; MULTIPLY & DIVIDE POLYNOMIALS FACTORING & APPLICATIONS

TESTING CENTER HOURS

Monday and Wednesday
8:15 a.m. – 6:20 p.m.

Tuesday, Thursday and Friday
8:15 a.m. – 4:50p.m.

Saturday 9:00 a.m.-11:50 a.m.
February 2nd & 23rd
March 8th & 22nd
April 12th & 26th

NO EATING, DRINKING, SMOKING, CELL PHONES, MATH NOTES OR CALCULATORS (MATH 101) ARE PERMITTED IN THE CENTER!

ONLY TWO (2) TEST CAN BE TAKEN PER DAY

MTH 101 – University Elementary Algebra Lab

Computer Assisted Assessment Form (CAAF)

Student Name _ **Instructor**

Student ID _ **Section** _ **Semester** **SPRING 08**

Lab Test	Completed (Signature/Date)
1. Fractions	
2. Order of Operations	
In-Class -TEST #1	
3. Decimals	
4. Percents	
In-Class - TEST #2	
5. Signed Numbers	
6. Algebraic Expressions	
In-Class - TEST #3	
7. Equations	
8. Formulas	
9. Inequalities	
In-Class - TEST #4 – Midterm Week	
10. Graphing	
In-Class - TEST #5	
11. Exponents	
12. Addition/Subtraction of Polynomials	
13. Multiplication/Division of Polynomials	
In-Class - TEST #6	
14. Factoring	
In-Class - TEST #7	
15. Applications	
In-Class - TEST #8	

***Tests must be taken in consecutive order.**

****No credit awarded for Lab Tests not passed.**

APPENDIX 3

LT 8 - FORMULAS

Name:_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve for the given letter.

1) $A = P(1 + nr)$ for r

A) $r = \frac{A - P}{Pn}$ B) $r = \frac{Pn}{A - P}$ C) $r = \frac{P - A}{Pn}$ D) $r = \frac{A}{n}$

2) $a + b = s + r$ for s

A) $s = \frac{a + b}{r}$ B) $s = a + b - r$ C) $s = r(a + b)$ D) $s = \frac{a}{r} + b$

3) $S = 2\pi rh + 2\pi r^2$ for h

A) $h = S - r$ B) $h = 2\pi(S - r)$ C) $h = \frac{S}{2\pi r} - 1$ D) $h = \frac{S - 2\pi r^2}{2\pi r}$

Find the value of the variable that is not given.

4) $I = prt$; $I = 12.5$, $p = 250$, $r = 0.01$

A) 5 B) 31.25 C) 0.3125 D) 0.5

5) $P = 2L + 2W$; $P = 26$, $W = 8$

A) 13 B) 18 C) 5 D) 9

6) $A = \frac{1}{2}(b + B)h$; $A = 104$, $b = 14$, $B = 12$

A) 8 B) 168 C) 13 D) 78

Solve for the given letter.

7) $F = \frac{9}{5}C + 32$ for C

A) $C = \frac{9}{5}(F - 32)$ B) $C = \frac{5}{F - 32}$ C) $C = \frac{F - 32}{9}$ D) $C = \frac{5}{9}(F - 32)$

Find the value of the variable that is not given.

8) $V = \frac{1}{3}Bh$; $V = 20$, $h = 5$

A) 4 B) 25 C) 12 D) 100

9) $d = rt$; $t = 8$, $d = 24$

A) 0.3 B) 32 C) 16 D) 3

10) $C = 2\pi r$; $C = 31.40$, $\pi = 3.14$

A) 34.54 B) 10 C) 5 D) 197.19

[redacted]

11) $V = \frac{1}{3}Bh$; $V = 45$, $h = 9$

A) 5 B) 54 C) 405 D) 15

12) $d = rt$; $t = 7$, $d = 21$

A) 3 B) 14 C) 28 D) 0.3

13) $C = 2\pi r$; $C = 50.24$, $\pi = 3.14$

A) 53.38 B) 16 C) 8 D) 315.51

APPENDIX 4

Name	Math	Lab	Final	Exam
	Completed	% Points	Raw Score	Converted Score
XXXXXX,XXXXXX	3	4	0	0
XXXXXX,XXXXXX	12	16	43	15
XXXXXX,XXXXXX	1	1	31	11
XXXXXX,XXXXXX	7	9	39	13
XXXXXX,XXXXXX	10	13	38	13
XXXXXX,XXXXXX	5	7	0	0
XXXXXX,XXXXXX	8	11	46	16
XXXXXX,XXXXXX	8	13	32	11
XXXXXX,XXXXXX	11	15	38	13
XXXXXX,XXXXXX	10	13	31	11
XXXXXX,XXXXXX	2	3	0	0
XXXXXX,XXXXXX	9	12	0	0
XXXXXX,XXXXXX	0	0	0	0
XXXXXX,XXXXXX	3	4	0	0
XXXXXX,XXXXXX	0	0	0	0
XXXXXX,XXXXXX	0	0	0	0
XXXXXX,XXXXXX	10	13	32	11
XXXXXX,XXXXXX	0	0	0	0
XXXXXX,XXXXXX	4	5	36	12
XXXXXX,XXXXXX	14	19	59	20
XXXXXX,XXXXXX	2	3	0	0
XXXXXX,XXXXXX	8	12	43	15
XXXXXX,XXXXXX	3	4	33	11

References

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Brown, S., Race, P., Bull, Joanna (1999). ***Computer-assisted Assessment in Higher Education.*** New York: Routledge.

Bull, J. & McKenna, C. (2004). ***Blueprint for Computer-assisted Assessment.*** New York: Routledge.

Earl, A. W. (1993). How to develop, implement, and evaluate a computerized test bank. ***High Tech Higher Education***. Suffolk, Virginia: International Educational Improvement Center Press.

Groth-Marnat, G. (2003***). Handbook of Psychological Assessmen***t. New York: John Wiley and Sons.

Khandia, Farzana, editor, (2008). ***12th International Computer Assisted Assessment Conference (Proceedings Of).*** Loughborough University:: Professional Development,

Patelis, Thanos (2000). An overview of computer-based testing. ***Research Notes***. RN-09, April 2000, The College Board. New York.

ABOUT THE AUTHORS:

Dr. Archie W. Earl holds a BS from Norfolk State University, in Norfolk, Virginia, USA; an MA from Hampton University, in Hampton, Virginia, USA; and a CAS and an EdD from the College of William and Mary, in Williamsburg, Virginia, USA. He is presently an Associate Professor, in the Mathematics Department, of the College of Science, Engineering, and Technology, at NORFOLK STATE UNIVERSITY. He developed his first computerized test bank during the period between 1987-1990 while working as a mathematics professor at Christopher Newport University, in Newport News, Virginia, USA. In 1989, he presented a paper, on the same, at the Seventh International Conference on Technology in Education, in Brussels, Belgium. Since then, he has written many papers and books, on the use of technology in colleges and universities, and has presented instructional technology related papers at many regional, national, and international conferences. In 2002, he presented a paper entitled “The

Meeting of Education and Technology: A Critical Assessment of the Distance Learning Strategies in the Higher Education and Library Learning Center Environments," at the Meeting of the Society of Research Administrators (SRA) International, in Orlando, Florida, USA. In that paper, he outlined the history and "present" status of the use of technology in college and university instructions. In 2005, he presented a paper entitled "A High-Tech In-Service Graduate Math Course" at the meeting of the Mathematical Association of America, in Albuquerque, New Mexico, USA. One of his more recent (2007) instructional technology papers was presented at the 85th Annual Meeting of the Virginia Academy of Science, at James Madison University, in Harrisonburg, Virginia, USA. At that meeting, he discussed how college and university professors can use a computer software program called Mathcad to do basic statistical analyses. Dr. Earl has continued to remain up-to-date with what's going on in the field of the use of technology in college and university teaching. He is presently teaching the only online mathematics course offered at his university.

Prof. Ronald L. White holds a BS and a MA from Norfolk State University. He is also ABD at Regent University, in Virginia Beach, Virginia, USA. He is presently an Assistant Professor, in the Mathematics Department, of the College of Science, Engineering, and Technology, at NORFOLK STATE UNIVERSITY, in Norfolk, Virginia, USA. In this post, he serves on several school and departmental committees including, but not limited to, assessment, teacher education, and critical thinking. Additional duties include supervising student teachers and coordinating service courses for liberal arts majors. He has garnered experience teaching high and upper elementary school; however, most of his career has been spent teaching math at the undergraduate level. Finally, his research interests include investigating the use of mathematical modeling techniques to develop tests of mathematics and quantitative reasoning as well as demonstrating the effectiveness of computer-assisted assessment in developmental mathematics education. Through the years, he has been recognized for his charismatic style of teaching by *Who's Who Among America's Teachers* and for his outstanding service to the community.

Mrs. Shadana Myers holds a BS from Norfolk State University in Applied Mathematics. During the years of 2004 – 2007, she worked as a Mathematical Statistician with the U.S. Census Bureau in Washington, DC USA. In 2007, she co-presented a paper entitled "Measuring and Adjusting for Frame Undercoverage of the State and Local Value Put-In-Place (VIP) Survey", at the Federal Committee on Statistical Methodology (FCSM) Research Conference. Presently, she is an Information Technology Specialist at the Census Bureau with an emphasis in Software Application Development for federal surveys.