

Course Level Assessment

**Intermediate Algebra – MTH 123
Fall 2008**

4.14.2009

Approved by LOT May 18, 2009

Submitted by Sharon Gott

Introduction

The purpose of this report is to present the methodology and findings for the course level assessment of Intermediate Algebra (MTH 123) during the fall 2008 semester. Intermediate Algebra serves as a college level course that meets the degree requirements for all programs at Eastern. This course presents fundamental algebraic concepts providing students with the foundation to advance to higher level mathematic courses or meet a 2-year degree requirement. To assure that Intermediate Algebra is meeting its intended purpose in the curriculum and that students are in fact achieving the defined course learning outcomes identified on the Master Course Record Form (See Attachment A), this course was selected for an ongoing course level assessment project to discern attainment of specified learning outcomes across multiple class sections. Instructors of Intermediate Algebra provided input as to which course outcomes to include in this assessment.

Methodology

Intermediate Algebra course outcomes will be assessed on a cyclical basis over three years beginning with the fall 2007 semester. Each year, a minimum of four course learning outcomes will be selected for evaluation. Dependent upon assessment findings, some outcomes will be assessed over multiple years to validate effectiveness of changes in curriculum or course materials. Exam questions addressing the target learning outcomes serve as indicators of student attainment of course learning outcomes. These exam questions are incorporated across all sections of MTH 123 during the assessment cycle. The minimum performance standard is set at 80%. At least 80% of the students completing the common indicators administered via the course examination will provide

the correct response. In the event that the minimum performance standard is not met, the unmet learning outcome will be targeted for further monitoring. The results may also trigger an evaluation of course materials supporting the learning outcome, revision of course materials or further curriculum revision.

In the fall 2008 semester, seven course learning outcomes were selected for assessment in all sections of Intermediate Algebra. The target learning outcomes include:

- Outcome 1: Graph parabolas
- Outcome 2: Use rules of exponents
- Outcome 3: Solve systems of linear equations
- Outcome 4: Solve logarithmic equations
- Outcome 5: Factor quadratic equations
- Outcome 6: Simplify radical expressions
- Use quadratic formula

To assess these learning outcomes standard questions were administered in two sections of Intermediate Algebra. All students enrolled in these sections completed the standard questions. Ten students were included in this sample. The outcomes and corresponding indicators are listed in Figure 1. Results were compiled for each indicator denoting the percent of student's response for each indicator as scored using a rubric. Findings from the data for each outcome are presented in the results section of this report.

Learning Outcome	Indicator
Outcome 1: Graph parabolas	13. Graph. $y = 3x^2$
Outcome 2 : Use rules of exponents	Use the laws of exponents to simplify. Do not use negative exponents in your answer. 18. $x^{\frac{1}{4}} \cdot x^{\frac{3}{4}}$ 19. $z^{-\frac{2}{7}} \cdot z^{\frac{3}{7}}$
Outcome # 3: Solve systems of linear equations	6. Use the substitution method to solve the system of linear equations. $x + y = -5, x - y = 13$ 7. Solve using the elimination method. $x + 8y = -42, 2x + 8y = -44$
Outcome # 4: Solve logarithmic equations	21. Use a calculator and the change-of-base formula to find the logarithm to four decimal places. $\log_7 x = -4$ 22. Solve the equation. $5^x = 625$
Outcome # 5: Factor quadratic equations	14. Solve. $4x^2 - 20x + 25 = 0$
Outcome # 6: Simplify radical expressions	Simplify by taking the roots of the numerator and the denominator. 16. $\sqrt{\frac{5}{x^4}}$ 17. $\sqrt[4]{\frac{81x^5}{y^{10}z^{16}}}$
Outcome # 7: Use quadratic formula	15. Solve. $x^2 - 14x + 58 = 0$

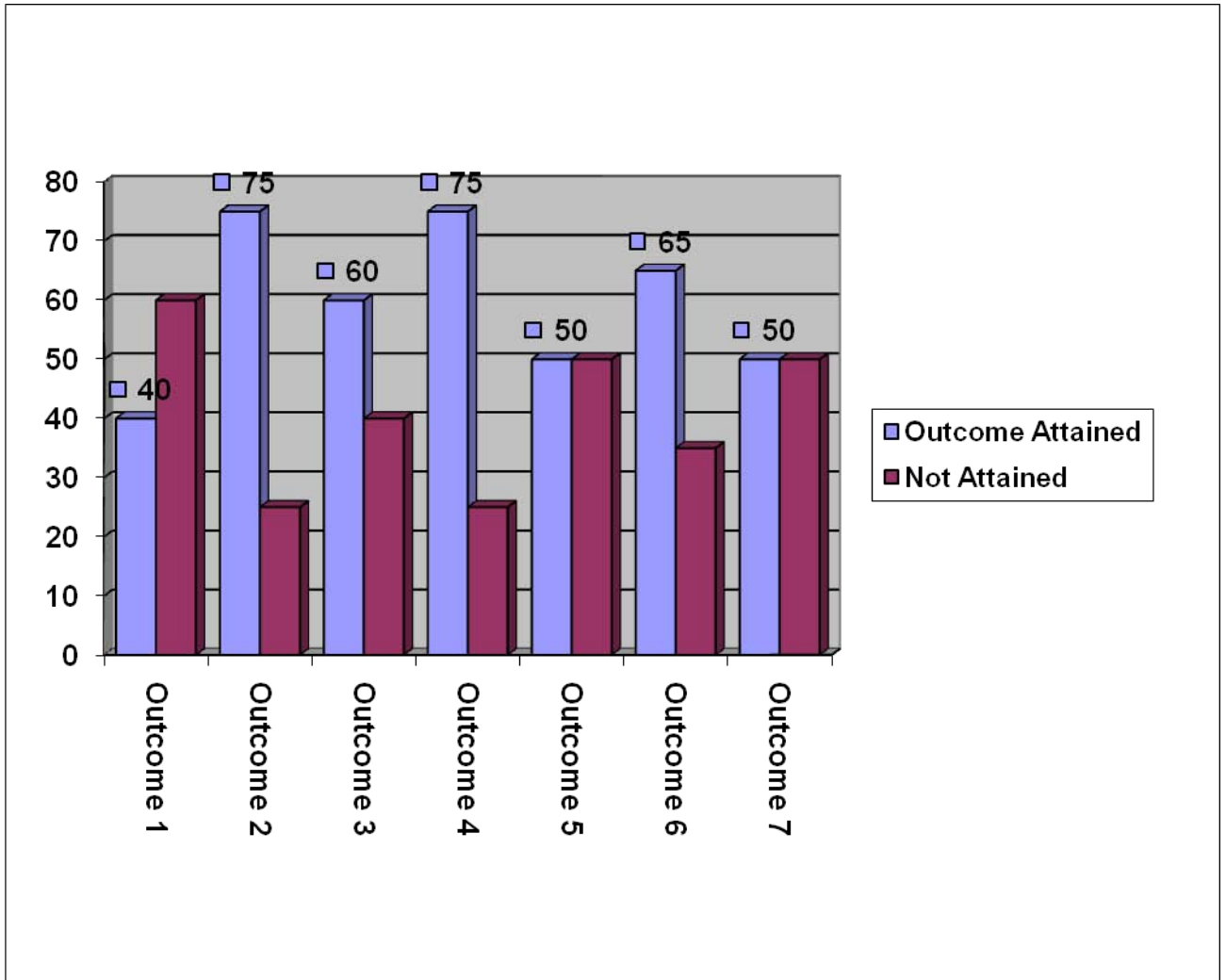
Figure 1: Assessed Outcomes and Indicators

Results

Based on the existing data, none of the seven learning outcomes were successful at the minimum performance standard (See Table 1). Learning Outcomes 4 (solve logarithmic equations) and 5 (factor quadratic equations) were the highest with seventy-five percent student success rate. The remaining five outcomes failed to meet the

minimum performance standard established for the assessment activity by lower rates ranging from 40% to 65%.

Table 1: Distribution of Performance Standards for Outcomes 1 Through 4



Outcome 1: Graph parabolas

One question was included on the final exam covering this outcome (Figure 1). The percentage awarded for correct responses was 40% which is below the desired 80% attainment level.

Outcome 2: Use rules of exponents

Two questions were included on the final exam covering this outcome (Figure 1). The percentage awarded for correct responses was 75% which is slightly below the desired 80% attainment level.

Outcome 3: Solve systems of linear equations

Two questions were included on the final exam covering this outcome (Figure 1). The percentage awarded for correct responses was 75% which is slightly below the desired 80% attainment level.

Outcome 4: Solve logarithmic equations

Two questions were included on the final exam covering this outcome (Figure 1). The percentage awarded for correct responses was 60% which is below the desired 80% attainment level.

Outcome 5: Factor quadratic equations.

One question was included on the final exam covering this outcome (Figure 1). The percentage awarded for correct responses was 50% which is below the desired 80% attainment level.

Outcome 6: Simplify radical expressions.

Two questions were included on the final exam covering this outcome (Figure 1). The percentage awarded for correct responses was 65% which is below the desired 80% attainment level.

Outcome 7: Use quadratic formula.

One question was included on the final exam covering this outcome (Figure 1). The percentage awarded for correct responses was 50% which is below the desired 80% attainment level.

Conclusion and Action Plan

In conclusion, this course level assessment of Intermediate Algebra for fall 2008 finds that none of the seven outcomes are being met at the minimum performance standard of 80%. Discussions will be held with faculty teaching this course in upcoming sections to determine what, if any, adjustments need to be made to the curriculum to boost performance on course outcomes.

The participating faculty members have been made aware of the course level assessment and attainment of the outcomes for the classes they taught. Their continued input as to which outcomes to monitor will be utilized in future course level assessments.

**Eastern WV Community & Technical College
Master Course Record**

Course Prefix and Number: MTH 123
Course Title: Intermediate Algebra
Recommended Transcript Title Intermediate Algebra
Date Approved/Revised 30 June 2005
Credit Hours: 3 Contact hours per week (Based on 15 week term): Lecture: 3 Lab:
Prerequisite: RDG 090, MTH 95 and MTH 96 OR MTH 099 OR minimum acceptable test scores for placement in college-level math: 1) Math ACT score 19 or higher; 2) SAT math score 460 or higher; 3) Introductory Algebra Placement Exam score 80% or higher.
Co requisite: Pre/Co requisite:
Grading Mode: Letter Grade
Catalog Description: This course covers a study of linear and absolute value equations and inequalities in one and two variables; polynomial operations and graphing; linear, quadratic, exponential, and logarithmic functions with application and graphing; and formula manipulation. This course is designed to prepare students for college algebra or career opportunities.
Course Outcomes: <ol style="list-style-type: none"> 1. graph parabolas 2. solve linear inequalities 3. graph exponential functions 4. solve absolute value inequalities 5. graph linear equations 6. graph linear inequalities 7. perform binary function operations 8. classify relations 9. solve proportions 10. form inverse functions 11. solve exponential equations 12. manipulate formulas 13. graph logarithmic functions 14. use a graphing utility to analyze functions 15. solve logarithmic equations 16. classify quadratic solutions 17. evaluate functions

18. evaluate radical expressions
19. factor quadratic equations
20. solve linear equations
21. use logarithmic properties
22. form composite functions
23. solve linear applications
24. solve exponential applications
25. solve linear systems
26. solve logarithmic applications
27. use quadratic formula
28. use interval notation
29. use set-builder notation
30. perform binary polynomial operations
31. solve absolute value equations
32. participate in collaborative projects
33. find slope
34. recognize function graphs
35. write linear equations
36. find the greatest common factor
37. use internet resources
38. use written communication skills to express algebraic ideas
39. simplify radical expressions
40. use dimensional analysis
41. solve quadratic applications
42. solve systems of linear inequalities
43. use rules of exponents
44. simplify algebraic expressions

Implementation Cycle: Fall semester

Role in College Curriculum: (Check all that apply)

- General Education Core: Mathematics**
- Technical Core (Specify Program)**
- Restricted Elective (Specify Program)**
- General Elective**

Course Fee:

Instructor's Qualifications: Master's Degree plus 18 graduate level mathematics credits.

Expanded Course Description: In this course, the focus will be on problem solving skills and developing abilities to think mathematically. This course will prepare students for future math and science courses or job opportunities.

**Appendix B:
Summary of Outcomes, Indicators, Performance Standards and Results**

Course Level Assessment: Fall 2008 Intermediate Algebra – MTH 123				
Learning Outcome	Indicator	Percent of Correct Awarded Responses	Percent of Incorrect Responses	Performance Standard Met (80%)
Outcome 1: Graph parabolas	13. Graph. $y = 3x^2$	40%	60%	No
Outcome 2 : Use rules of exponents	Use the laws of exponents to simplify. Do not use negative exponents in your answer. 18. $x^{\frac{1}{4}} \cdot x^{\frac{3}{4}}$ 19. $z^{-\frac{2}{7}} \cdot z^{\frac{3}{7}}$	75%	25%	No
Outcome # 3: Solve systems of linear equations	6. Use the substitution method to solve the system of linear equations. $x + y = -5, x - y = 13$ 7. Solve using the elimination method. $x + 8y = -42, 2x + 8y = -44$	60%	40%	No
Outcome # 4: Solve logarithmic equations	21. Use a calculator and the change-of-base formula to find the logarithm to four decimal places. $\log_7 x = -4$ 22. Solve the equation. $5^x = 625$	75%	25%	No
Outcome # 5: Factor quadratic equations	14. Solve. $4x^2 - 20x + 25 = 0$	50%	50%	No

Course Level Assessment: Fall 2008
Intermediate Algebra – MTH 123

Learning Outcome	Indicator	Percent of Correct Awarded Responses	Percent of Incorrect Responses	Performance Standard Met (80%)
Outcome # 6: Simplify radical expressions	Simplify by taking the roots of the numerator and the denominator. 16. $\sqrt{\frac{5}{x^4}}$ 17. $\sqrt[4]{\frac{81x^5}{y^{10}z^{16}}}$	65%	35%	No
Outcome # 7: Use quadratic formula	15. Solve. $x^2 - 14x + 58 = 0$	50%	50%	No