

# AYA Program/Integrated Mathematics

Summary of Assessment Accomplishments  
2007-2008 Academic Year

**Submitted by:**

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## Learning Outcomes:

Upon completion of the baccalaureate degree, students in the adolescent/young adult teacher education program are expected to:

- Demonstrate competence of subject matter in the content area of specialization;
- Demonstrate competence in the theories and practices of sound pedagogy
- Apply theories of human development and learning to plan, implement and assess daily lessons and units of instruction
- Exhibit professional and ethical behavior when working with students, their parents, other educators and community members.

## Annual Report

### 1. Learning (or Service) Outcomes assessed this year:

- Demonstrate competence of subject matter in the content area of specialization
- Apply theories of human development and learning to plan, implement and assess daily lessons and units of instruction

### 2. Assessment Methods and Procedures:

#### *Subject Matter – Grade Point Average*

The candidate is required to maintain a 2.80 (out of 4.0) grade point average and pass all required courses in order to be admitted to the AYA Integrated Mathematics program's Professional Year. One capstone mathematics course (MATH 417) is ordinarily taken during the methods block, in the first semester of the Professional Year. However, all of the other required courses are taken prior to this time, and the GPA is calculated based on those courses.

The GPA of teacher candidates, as well as an accounting of individual grades earned and grades assigned in required courses are tabulated and reported as a means of assessing content knowledge in mathematics for the AYA Integrated Mathematics major.

Grades earned in mathematics courses by students who were enrolled in the mathematics methods block in the Fall of 2007 are as follows (n = 24):

	131	232	233	322	332	339	341	402	411	417	Elect
<b>A</b>	7	7	8	10	12	6	19	16	16	10	14
<b>B</b>	7	8	14	10	8	9	5	4	8	13	7
<b>C</b>	3	4	2	4	4	7	0	3	0	0	1
<b>D</b>	0	0	0	0	0	0	0	0	0	0	0
<b>F</b>	0	0	0	0	0	0	0	0	0	0	0
<b>TR</b>	5	3	0	0	0	0	0	0	0	0	0
<b>S</b>	1	1	0	0	0	1	0	0	0	0	2
<b>U</b>	0	0	0	0	0	0	0	0	0	0	0

*Key:* 131: Calculus I, 232: Calculus II, 233: Calculus III, 322: Discrete Mathematics, 332: Linear Algebra, 339: Abstract Algebra, 341: Probability and Statistics, 402: Modern Geometry, 411: History of Mathematics, 417: Capstone Course; Elect: 300- or 400-level Elective (most commonly MATH 313: Introduction to Logic)

The average mathematics GPA for this group was 3.52, with a standard deviation of 0.40.

### ***Subject Matter – Praxis II Examination***

The Praxis II: Mathematics Content Knowledge (0061) offered by the Educational Testing Service (ETS) is the test required for state licensure in Ohio. The test includes 50 multiple-choice questions designed to test the ability to understand and solve problems involving numerous mathematical concepts, to reason mathematically, to integrate knowledge of different areas of mathematics and to develop mathematical models to analyze real-life situations. There are five main content areas measured by the test: Algebra and Number Theory; Measurement, Geometry, and Trigonometry; Functions and Calculus; Data Analysis, Statistics, and Probability; and Matrix Algebra and Discrete Mathematics.

Beginning with the 2005-2006 academic year, all students must now pass the exam to be admitted to the Professional Year; therefore the passing percentage is currently 100% for all students admitted to the AYA Integrated Mathematics Program. The passing rate in the 2006-2007 academic year (the latest data we have) was 95%. Beginning in 2007, we now receive a Category Data Report, rather than the All Examinees Report. This report for 2006-2007 shows BGSU students to be strongest in measurement, geometry, and trigonometry (62% correct), and lowest in algebra and number theory, as well as matrix algebra and discrete mathematics (57% correct). These relative strengths and weaknesses match those of the State of Ohio as a unit.

### ***Planning and Implementing Lessons***

Teacher candidates develop their lesson planning skills through a sequence of three courses: EDTL 370 in the junior year (general teaching methods), EDTL 474 in the first semester of the Professional Year (methods block), and during student teaching. In the methods block, students develop unit outlines as well as specific daily lesson plans and teach the lessons in the field, generating written reflections after teaching episodes.

Upon returning from the field, each student’s lesson plans are scored using a standardized rubric. The Lesson Planning Rubric was developed jointly across curriculum areas in the Adolescent/Young Adult program, including faculty from Foreign Language, Language Arts, Mathematics, Science, and Social Studies. The same rubric is used throughout the AYA program for consistency.

A maximum score of 24 points is possible on the Lesson Planning Rubric. All teacher candidates are expected to score acceptably while in the methods block in the Professional Year. Intervention by university and local school personnel is provided if candidates are deficient in their lesson planning skills. The rubric was used for data collection in the Fall of 2007 with 24 AYA Integrated Mathematics methods students. Every student scored in the Target range on this assessment, which is remarkable. This compares to 18 of 21 scoring within the Target range in the previous year. No lesson plans in either year were Unacceptable. The Fall 2007 mathematics methods class was, in general, an extremely intelligent and motivated group of students, and this showed in their class and field work.

The average score/subscores on the Lesson Planning Rubric (out of 3 possible points in each subscore area) for the Fall of 2007 were as follows:

General Considerations	3.00
Goals and Objectives	3.00
Materials and Resources	2.96
Motivation	2.29
Procedure	2.58
Closure	2.50
Extension	2.88
Assessment	2.92
TOTAL Score	22.13

The relative strengths and weaknesses were consistent with the previous year, but all scores (other than General Considerations and Goals and Objectives, which had reached their ceiling) showed improvement.

### **3. Inferences from Assessments:**

#### ***Subject Matter – Grade Point Average***

There is no question that raising the GPA requirement for admission to the program to 2.80 has resulted in a higher quality of student in the methods block and student teaching. Students who struggle in mathematics content courses tend to exit the program, leaving only those with a solid mathematics background in the pipeline. To have a class with an average GPA of 3.52 in mathematics is outstanding. The Spring 2007 methods block had an average mathematics GPA of 3.23, which was much lower (though the number of students was less than half of the Fall group, so the n size was too small to be used throughout this report). The average mathematics GPA in the Fall of 2006 was 3.37, so again we see an upward trend.

### ***Subject Matter – Praxis II Examination***

Praxis II results are consistent with state level performance but are still not where BGSU would like to see them. While students are performing well in areas such as geometry and trigonometry, scores in algebra, discrete mathematics, and matrix operations need to improve. We also recognize that about half of the content of the exam is drawn from what would be considered “high school level” mathematics. For many of BGSU’s students, it has been six or more years since they took the courses from which this content is drawn. In addition, since a variety of instructors teach the mathematics courses at the university, it is difficult to achieve consistency (in content, assessments, classroom activities, etc.) from one semester to the next.

### ***Planning and Implementing Lessons***

Earned rubric scores on the Lesson Planning assignment allow the Integrated Mathematics program to track candidates’ ability to write, implement, and reflect on lessons designed to meet the developmental needs of students.

Subscores on this project indicate that teacher candidates struggle the most with opening a lesson effectively so that their students will be motivated to learn the topic of the day, as well as to create a meaningful conclusion to a lesson that wraps-up the topic for the day and assesses whether students have learned the intended objective for the day. Looking at two years worth of scores, it is evident that lesson-planning skills, in general, have improved. Candidates are writing stronger Procedures and Extensions than a year ago. Yet, their Motivation and Conclusion sections still need improvement. Additional models and practice with writing detailed lesson plans are needed throughout the professional year (methods and student teaching).

## **4. Actions Taken/Program Improvements:**

### ***Subject Matter***

The Department of Mathematics and Statistics is well aware of the difficulty students are having in Math 322 (Discrete Mathematics) and Math 339 (Modern Algebra). The data for the AYA Integrated Mathematics program support that these are the two most difficult mathematics courses in the program for most students. In a self-study conducted by the Mathematics Department in 2007 (into which mathematics educators from EDHD had input), the conclusion was that both of these courses rely heavily on early introductions to proof and that students were not adequately prepared to write effective proofs at that level. Math 322 is often considered the gateway to proof-oriented, more rigorous mathematics. In response, the Department is considering new textbooks and teaching approaches to nurture students’ ability to design structured mathematical arguments. The discussion has been ongoing and appears to have a very positive direction.

Beginning in the Fall of 2008, AYA Integrated Mathematics majors will, for the first time, be required to take a new mathematics course – EDTL 274. This course will serve as a refresher to

high school mathematics, viewed from an advanced standpoint, as well as an introduction to the mathematics teaching profession. One of the goals of this course is to help students to prepare for the Praxis II examination. In the two pilot semesters of the course, students reported that the class provided deep insights into the content and structure of the Praxis II exam and, therefore, made it much easier to pass than if they had not taken the course. Coupled with an annual Praxis II workshop, sponsored by COSMOS, BGSU has stepped up its efforts to provide significant support to teacher candidates in the AYA Integrated Mathematics program. Now that all candidates must pass the examination to enter the professional year, it is very important that we continue to provide the best possible preparation for the contents of the test. We anticipate the overall passing rate to increase over the next three years due to these efforts.

### ***Planning and Implementing Lessons***

The hallmark of a successful teacher preparation program is a teacher who can write effective and flexible lesson plans. The lesson plan is the key to preparing to teach, for managing classroom behavior, and for assessing the teacher's sense of developmental appropriateness. Overall gains in lesson planning scores on the rubric indicate that the program has improved over the past year. This improvement is due, in part, to the institution of the EDTL 370 general methods course that has lesson planning at its focal point. We finally have a situation in which all teacher candidates have the course on their checksheets. (Up until this year, we still had candidates in the program who were following the old checksheet that did not require this course.) So, by the time teacher candidates enter the professional year, they have already learned to write, teach, and reflect on lesson plans in an earlier course. Furthermore, the current sophomores and incoming freshmen have a new Student Teaching Seminar – EDTL 484 – on their checksheets. This course will continue to hold student teachers accountable for writing effective lesson plans. By the time they exit the program, we will know that each candidate has had three semesters worth of courses that required them to practice writing lesson plans within the past two years.

In addition, the mathematics education faculty has stepped up efforts to teach the candidates how to more effectively write the opening and closure for a lesson plan. A new book is being used in the EDTL 274 course, beginning in the Fall of 2008, that features model lessons, including directions on how to motivate and close rich mathematics lessons with middle and high school students. Therefore, even at the sophomore level, teacher candidates will begin to explore the components of well-written lesson plans. In the methods block, candidates will be exposed to additional models and examples of well-structured lesson plans to help them visualize the product and create similar work. As the next three years unfold, these efforts are expected to make scores increase on the Lesson Planning assignment rubric, particularly in those areas where the subscores are the lowest.