AYA Program/Science
Summary of Assessment Accomplishments
2006-2007 Academic Year

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Learning Outcomes:

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

1. Demonstrate competence of subject matter in the content area of specialization including: biology, geology, physics, chemistry, or a combination of two or more areas of specialization;
2. Demonstrate competence in the theories and practices of sound pedagogy;
3. Apply theories of human development and learning to plan, implement and assess daily lessons and units of instruction;
4. 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:**

Based on data from last year, we chose to focus on two areas focusing on the assessment tools and the data collected to inform changes specifically to the science education courses. They are outcomes #1 and #3:

1. Demonstrate competence of subject matter in the content area of specialization including: biology, geology, physics, chemistry, or a combination of two or more areas of specialization;
3. Apply theories of human development and learning to plan, implement and assess daily lessons and units of instruction;

The AYA science program participated in the rigorous National Science Teachers Association (NSTA) NCATE assessment this year. Results are pending, however, based on the data analysis completed we feel strongly that this program is working towards or meeting all of NSTA's requirements as well as functioning well to meet the high expectations that the College of Education and Human Development has for its teacher education program. The conclusions of this assessment directly correlate to the College's conceptual framework. Five main assessment tools were used to assess content knowledge and a candidates ability to plan, implement and assess daily plans. For content knowledge PRAXIS II content scores and GPA represent the knowledge AYA science candidates have. For planning AYA science candidates must successfully, plan, implement and reflect on a 10 day unit. A modified unit student teaching rubric is used by AYA science to document their candidates skills planning, implementing, and reflecting on good science teaching. Finally, AYA science candidates compile an extensive project which documents their effect on student learning which documents their ability to assess learning. These assessments and our findings are documented in the next section.

2. Assessment Methods, Data Collection and Analysis:

Outcome #1: Demonstrate competence of subject matter in the content area of specialization including: biology, geology, physics, chemistry, or a combination of two or more areas of specialization;

Content Knowledge: PRAXIS II data.

The Ohio Department of Education requires the passage of content specific PRAXIS II tests for all AYA science candidates. There are several licensure options (11 total) for AYA science candidates and they complete one or more tests depending on their area of specialization. Each test regardless of content

specialty is two hours in length and contains a combination of multiple choice and essay questions. The data table attached titled PRAXIS II tests alignment to licensure areas will provide more detailed information about the licensure areas, the PRAXIS II test/s they are required to take and the pass rate expected by the state of Ohio for licensure.

There are eleven program areas possible at Bowling Green State University. At this time, the majority of graduates are finishing the integrated licensure or the single field, Life Sciences programs that were common in the past. Bowling Green State University no longer offers the Integrated Science degree as an option for incoming students. We made this decision as a faculty after careful consideration of the preparedness of these students. This license allowed students with only 10 hours in a content area to teach that subject and we determined this was not enough content knowledge. There are still approximately, 20 students in our pipeline who will begin with this degree option. Once completed we will only offer two choices, single field or dual field degrees as the check sheets in the context piece suggested.

Since the 2003-2004 our candidates have taken more than 220 PRAXIS II AYA Science content exams. 149 of these 220 have been passing scores on a variety of content tests. Beginning in the 2005-2006 academic year, all students must now pass the appropriate content exam to be admitted to the Professional Year. Therefore, the passing percentage is currently and will continue to be 100%.

There are several different exams that have been commonly selected by our students over the past three years that we have historical data from ETS on. The Data Derived Document documents these specialty tests. Overall, the Biology and General Science test (0030) has been a successful exam for BGSU AYA science candidates. The test has been taken 55 times over three years and has been passed each time. We are well above the national average of about 80% passage.

The AYA faculty felt it was important that all students show their content preparation, not only with GPA scores, (discussed in Assessment #2), but by also passing the required State PRAXIS content tests. No candidate can be licensed in the State of Ohio without the passage of these exams. In order to ensure that our candidates can be licensed we as a faculty decided the only way to guarantee this success was to require the passage of these tests before entering their professional year. The table below documents AYA science passage rates in the various content areas.

Historical Data of Passage Rates for Praxis II: Biology and General Science (30)

ACADEMIC YEARS	**Number of Tests Taken**	**Number of Tests Passed**	**BGSU Passing Rate**	**National Passing Rate**	**Methods Students' Passing Rate**
2005-2006	18	18	100%	81.5%	100%
2004-2005	21	21	100%	79.0%	100%
2003-2004	16	16	100%	75.8%	100%

Historical Data of Passage Rates for Praxis II: Biology Content Knowledge (235)

ACADEMIC YEARS	**Number of Tests Taken**	**Number of Tests Passed**	**BGSU Passing Rate**	**National Passing Rate**	**Methods Students' Passing Rate**
2005-2006	19	17	88.2%	73.5%	100%
2004-2005	28	22	77.3%	74.7%	100%
2003-2004** old test	41	23	56.5%	56.5%	85%

Historical Data of Passage Rates for Praxis II: Earth Science Content Knowledge (571)

ACADEMIC YEARS	**Number of Tests Taken**	**Number of Tests Passed**	**BGSU Passing Rate**	**National Passing Rate**	**Methods Students' Passing Rate**
2005-2006	33	26	76.9%	77.7%	100%
2004-2005	26	17	58.8%	74.9%	100%
2003-2004	19	12	58.3%	72.7%	No methods students

Outcome #1: Demonstrate competence of subject matter in the content area of specialization including: biology, geology, physics, chemistry, or a combination of two or more areas of specialization;

Content Knowledge: GPA

A second assessment of student content knowledge and perhaps more central to Bowling Green State University is the cumulative science GPA. AYA science candidates are required to maintain a minimum of a 2.8 overall and content GPA. All undergraduate science candidates must successfully pass, with a C or better an interdisciplinary core consisting of: BIOL 104 or 205; GEOL 101; CHEM 125/135; PHYS 201/211; ENVS 415; and BIOL 450- Teaching Evolution and the Nature of Science. Given the number of courses and their credit hours, students would have to earn a "C" or better in their core subject areas as well as the interdisciplinary courses in order to enter the program.

The students are specifically engaged in two courses that were developed through collaboration between Science Education faculty and Arts and Sciences faculty. The first of these courses is ENVS 415; *Investigating the Environment.* Identification and use of resources; methods associated with learning process; field-based experiences. This course is an interdisciplinary where students design, conduct, and report on investigations focusing on the environment. The students must pass each course requirement with a 70% "C" or better in order to complete the course. In addition, must complete data analysis and organization of the data that involves mathematics and statistics

A second course co-developed is the BIOL 450 (Previously BIOL 400- special topics); Teaching Evolution and the Nature of Science. All secondary science candidates complete this course and must attain a 70% or better on specific skills in the course to pass the course. Students in this course complete two major projects that demonstrate their understanding of the nature of science and their ability to teach topics regarding the nature of science. The first is a virtual poster presentation. In this presentation they demonstrate their knowledge and understanding of the philosophical nature of science and conventions of scientific explanation. Next, they teach a lesson they develop in a formal or informal (schools, COSI, ZOO, Women and Science Day, etc.). The instructor for this course organizes the field experience each semester. In addition, the AYA science candidates are required to develop and peer teach a nature of science lesson plan that is discipline specific during the BIO 450 course.

The assessment for this key assessment is content specific GPA's. These GPA's are acquired by accessing students Degree Audit Report Service (DARS) that lists overall and content GPA. As was discussed above there was a change in the entrance requirements and the Fall 2006 cohort was the final group to enter methods without an overall or content GPA of a 2.8. The data derived chart shows the student data for three semesters, Spring 2006, Fall 2006, and Spring 2007. Beginning in the Spring 2007 all students entering methods must have a 2.8 GPA, overall and in their content.

Of the 32 reported scores there was a GPA range of 2.50 to a 3.85 GPA. Several students in these cohorts were held to a previous GPA requirement of 2.3 in content and 2.5 overall. Only four students (two each semester) did not meet the 2.8 requirements for content, thus resulting in the 82% and 83% meeting the current standard of 2.8 content and overall GPA. The mean scores by semesters were; Spring 2006-3.4, fall 2006-3.5, and spring 2007-3.4. These scores are fairly consistent with more than 80% of the AYA science candidates earning a 2.8 GPA or higher.

The courses that the AYA science candidates at Bowling Green State University take are closely aligned with the NSTA standards and the Ohio Board of Education. Additionally, the core courses in each of the main content areas we also have developed and require two interdisciplinary courses for all graduates beginning in Spring 2007. These two courses enable the science education faculty to work closely with the Arts and Science faculty to help future teachers understand the interrelatedness of content, the unifying concepts of science, as well as have a depth of understanding of inquiry and the nature of science. We have been committed to a strong preparation, and this is apparent in our students pass rates on the PRAXIS II tests, as well as their content GPA's.

Because of the interdisciplinary courses, as well as the required core courses with interdisciplinary focuses we can be assured that Bowling Green State University AYA science students understand and can apply the unifying concepts of science, the nature of science, the social contexts of science, as well as the applications of science in the community. Specifically, the interdisciplinary courses address these topics in a way that all content majors can apply to their own focus. AYA science candidates have done an

exceptional job of earning and maintaining solid GPA's and we will continue this tradition with high expectations for entrance to the Professional Year.

The science education faculty continue to work closely with the A&S faculty, especially with the upper level content courses. There have been several designed specifically for our students to prepare them not only to understand the content, but also to be able to teach it to others. One example is the Geology 306-Rocks and Minerals for teachers. This course was specifically designed to model ways that teaching about rocks and minerals can be done in the High school setting. The faculty member teaching this course has worked closely with science education faculty to make sure that the activities, laboratory experiences, and even class projects are meaningful and represent reform-based science teaching and learning. This commitment to course alignment, course content and to teaching is strength of our program and something we are very proud of. The GPA data for the past three semesters is indicated below.

Historical Data for Entry to Methods Professional Year

Semester Cohort	**Number of Students**	**Mean Overall GPA**	**Range of Overall GPA**	**Mean Content GPA**	**Range of Content GPA**	**Percent Meeting Standard**
Spring 2007	4	3.58	3.22-3.75	3.4	2.97-3.66	100%
Fall 2006 *	11	3.46	2.76-3.96	3.5	2.5-3.96	82%
Spring 2006 *	12	3.35	2.86-3.74	3.4	2.67-3.85	83%

Outcome #3- Apply theories of human development and learning to plan, implement and assess daily lessons and units of instruction.

Planning

AYA science teacher candidates learn the skills of lesson planning throughout their Bowling Green State University Experience. They begin with planning experiences in a common required Arts and Science course, BIO 450 Evolution and the Nature of Science, continue in EDTL 370, General Teaching Methods, and then finally in Science Methods, EDTL 475. It is in this course were they begin to take their individual lesson plan skills and learn to write full unit plans. They are evaluated on these skills during their Professional Year (PY) in Methods and in Student Teaching. This assessment is compiled during Methods, where students plan, implement and reflect on their unit plan.

The unit plan is developed by candidates based on a topic chosen by the mentor teacher and is implemented during the methods field experience, 5 full weeks in the classroom. The candidates must plan and implement a 10-14 day unit, be observed teaching the unit by both the university supervisor and the mentor teacher, as well as assess the student learning of the planned and implemented unit. This assessment requires candidates to understand and communicate to students the big ideas of the unit of study, as well as the application of these ideas to their students. Secondly, the unit requires that the candidates understand the nature of science themselves as they engage students throughout their units in the principals of the Nature of Science. Candidates must demonstrate by planning and implementing the various levels of inquiry: structured, guided, and open-ended inquiry throughout their plan and implementation. Next, candidates must imbed issues and values of science related to their topic of study throughout the unit. In addition, the candidates must plan for and implement various ways to relate science to everyday endeavors and local resources or applications. Finally, the science candidates must demonstrate their plan for assessment, both pre and post the learning episode. This assessment includes a check of these standards in the planning and implementation stages as is noted in the key assessment description and rubrics.

The unit plans are evaluated before and after a preservice teacher teaches the unit to make recommendations and to note reflective growth and changes based on daily reflection of student progress. The rubric that is used to evaluate the unit plan is based on seven main characteristics: introductory information, content analysis of topic, student learning outcomes, procedures, resources and references, reflective analysis, classroom observation. The total possible score on this rubric is 50 points. In order for a student to meet target they must earn 43 points, acceptable, 30 points. The methods instructor completes this rubric and students who do not meet the acceptable level have the opportunity to redo and resubmit based on instructor and cooperating teacher comments.

A maximum score of 50 is possible on the Unit Plan Rubric. All teacher candidates must achieve an acceptable rating on all areas before teaching their units in the field. They are permitted to rewrite sections of their lesson plans for rescoring after conferencing with their methods instructor and mentor teacher. This rubric has been used for data collection for the past two semesters. Findings from the three semesters show that out of 29 total candidates, 17 achieved a target score, while the remaining 12 achieved an acceptable score. No unit plans were unacceptable. These scores are shown by content area below.

AYA Unit Planning Overall scores
N = 29

Licensure Area	Target		Acceptable		Unacceptable	
	Number	Percentage	Number	Percentage	Number	Percentage
Life Science	6	75.0%	2	40.0%	0	0.0%
Earth Science	2	100%	0	0.0%	0	0.0%
Physical Science	0	0.0%	1	100%	0	0.0%
Integrated Science	9	50.0%	9	50.0%	0	0.0%
Overall	13	52.0%	12	48.0%	0	0.0%

Target 44-50 points	Acceptable 35-43 points	Not Met 34-0 points

Outcome #3- Apply theories of human development and learning to plan, implement and assess daily lessons and units of instruction.

Implementation

AYA science candidates are also evaluated on the effectiveness of their implementation of the planned unit, both during methods and student teaching. In order to formally evaluate this implementation candidates are observed multiple times during student teaching and the university supervisor and the cooperating teacher with the candidate determine areas of strength and weakness. This rubric serves as a tool to evaluate overall teaching effectiveness as well as content specific effectiveness.

The standard BGSU rubric clearly emphasizes specific areas for achievement and clearly delineates the differences between unacceptable, acceptable and target behaviors in and out of the classroom. However, this form does not clearly address several key components of science teaching and learning. Therefore, two additional Domains have been added for AYA science candidates to be evaluated by their cooperating teacher and university supervisor during student teaching. They are: Domain H: Science Content Knowledge and Processes and Domain I: Safety in the Science Classroom. These domains specifically address Standard 1: Content, Standard 7:, Science in the Community and Standard 9: Safety and Welfare.

This rubric was used for the first time during the Fall of 2006 with 14 AYA Science students. This rubric has changed with the addition of several areas at the unit level including diversity, technology, and collaboration. In addition, two science areas have been added: science content and safety. The data shows that 12 out of 14 students were in the target area for all Domains. The two students that remained scored in acceptable or target ranges for all of the Domains. No students were considered unacceptable in any area. Further the overall mean score was a 2.88 for all students on a 3 point scale. We are still waiting on final reports from Spring 2006 that should be available mid summer.

In the table below you will find the data scores show that the AYA science candidates are performing well and meeting or exceeding expectations in their planning, implementation, and reflection of lessons. In all domains the AYA science candidates have greater than 80% target scores. The rubric clearly shows that students ability to plan, implement, and adjust lessons based on student understanding is being met. Students are able to create an effective environment where all students can learn (environment, diversity). They demonstrate an ability to safely plan and implement science investigations (safety). As well as, reflect on their effect on student learning and their own teaching as part of reflective practice (Professionalism, Environment, and Teaching for Student Learning). The AYA science candidates are documenting their abilities throughout a semester experience and they are implementing what they have learned throughout

their program. The scores are high and we feel this demonstrates an area of strength and our students should be commended.

The highest overall means were in collaboration with all candidates meeting the target mark. Areas of strength with 13 out of 14 students meeting the target scores were professionalism, diversity, and science safety. The lowest scores were in the areas of organization, environment, teaching, technology, and science content knowledge. However, it should again be noted that 10 out of 12 students did meet target expectations.

It is difficult to generalize with such small numbers of students. However, areas that will be addressed in more detail in the future will be classroom management and technology. These are consistent requests of students and mentor teachers as well as important induction year issues. The future addition of a regular student teaching seminar will aid our ability to support these key concepts and to spend more time helping our AYA science candidates share ways in which they were successful so that others may learn from these experiences as well.

AYA Science Student Teaching Evaluations:

Number of Students= 12

Domain	Target	Acceptable	Unacceptable	Mean 3=Highest 1= Lowest
Organization	**83.3%**	**16.7%**	**0.0%**	**2.83**
Environment	**83.3%**	**16.7%**	**0.0%**	**2.83**
Teaching	**83.3%**	**16.7%**	**0.0%**	**2.83**
Professionalism	**91.7%**	**8.3%**	**0.0%**	**2.92**
Diversity	**91.7%**	**8.3%**	**0.0%**	**2.92**
Technology	**83.3%**	**16.7%**	**0.0%**	**2.83**
Collaboration	**100%**	**0%**	**0.0%**	**3.00**
Science Content Knowledge	**83.3%**	**16.7%**	**0.0%**	**2.83**
Safety	**91.7%**	**8.3%**	**0.0%**	**2.92**
Overall	**87.7%**	**12.3%**	**0.0%**	**2.88**

Outcome #3- Apply theories of human development and learning to plan, implement and assess daily lessons and units of instruction.

Assessment

Finally, in order to understand how well AYA science candidates assess student learning and understand their effect on student learning all candidates compile a paper and participate in an interview about their effect on student learning. This project requires student teachers to show evidence, lesson plans, student data, and reflections of student learning in six core areas: unifying concepts, personal and technological applications of science, the nature of science, inquiry, issues and values, and science in the community. The student teachers are required to submit to their student teaching seminar faculty member a detailed paper that provides evidence of lessons taught, student learning, and reflection for changes in the future. The AYA candidates are also required to participate in an exit interview where they answer questions regarding their paper and impact on student learning.

The effect on student learning rubric was used for the first time during the fall of 2006. There is a total of 55 points that can be earned on this assignment. 50 of the 55 points must be earned in order to reach a target performance; 39 points must be earned for an acceptable rating. Any candidate that earns below a 39 has an opportunity for remediation with help from the instructor of record, the university clinical faculty and the mentor teacher. All candidates must reach an acceptable score in each sub-standard in order to successfully complete this assignment and to receive a passing grade in student teaching.

There were 25 AYA science candidates in this cohort and all completed the assignment and met required expectations of at least an acceptable in all sub areas. The data derived tables indicate the extent of student success on this project. Overall, 80% of the candidates were target in their projects, with another 20% at an acceptable range. No candidates scored unacceptable overall or on sub scores.

The data about the individual sub scores are provided to highlight the standards covered by this assessment. From the sub score data it is clear that there were areas of strength and areas for improvement for the future. For example, 19 or more of the students earned a target rating in the following areas: Philosophy of teaching science, classroom management, content focus, science in the community, and reflections. However, four or more students were acceptable in the following standards; social context, unifying concepts, personal and technological applications of science, nature of science, inquiry and issues.

It is important to begin with our successes. All 25 candidates successfully completed this assignment. They were able to provide lesson plan, student data and even thoughtful reflection on their student's learning and their teaching. This was an important addition to our student teaching seminar and we all learned many lessons about interpreting data, remediation, and time for reteaching.

There is a clear delineation between the standards on this assessment. The standards that were in candidate control; philosophy, science in the community and reflection were well received by the candidates, as well as their students. However, many of the other areas met with challenge. Noting that many of the sub scores that were low were main standards by NSTA candidates were asked why these were difficult areas for them. Many candidates reported that because of time constraints, pressure from mentor teachers and administration, they did not feel they had time to devote to these ideas. Those that were successful and met target expectations suggested that they had more freedom to plan and implement their units of study as they wanted to. Not all of our candidates had this freedom and were given less latitude. These placements have been noted and greater communication with mentor teachers has resulted from this project.

A student teaching seminar was piloted in Spring 2007 and candidates reported the course requirements helped them to push for more freedom and flexibility. This seminar will now be offered during all student teaching semesters. In addition, to requiring this assignment, a more rigorous discussion of these topics and ways to integrate them in the classroom will occur in future seminars.

N= 25 (PY- Student Teaching Cohort Fall 06 and Spring 07)

Standard	**Target (5-4)**		**Acceptable (3-2)**		**Not Met (1-0)**	
	%	**#**	**%**	**#**	**&**	**#**
Social Context	80.0%	20	20.0%	5	0.0%	0
Philosophy of Teaching Science	84.0%	21	16.0%	4	0.0%	0
Classroom Management	84.0%	21	16.0%	4	0.0%	0
Content Focus	84.0%	21	16.0%	4	0.0%	0
Unifying Concepts	80.0%	20	16.0%	5	0.0%	0
Personal & Technological	72.0%	18	28.0%	7	0.0%	0
Nature of Science	76.0%	19	24.0%	6	0.0%	0
Inquiry	76.0%	19	24.0%	6	0.0%	0
Issues	76.0%	19	24.0%	6	0.0%	0
Science in the Community	80.0%	20	20.0%	5	0.0%	0
Reflection	92.0%	23	08.0%	2	0.0%	0
Overall Scores	80.0%		20.0%		0.0%	

3. Inferences from Assessments:

Outcome #1: Demonstrate competence of subject matter in the content area of specialization including: biology, geology, physics, chemistry, or a combination of two or more areas of specialization;

Effective teachers of science need to have a firm grasp of the content that they are **PREPARED** for teaching. As a result, teacher candidates at BGSU are required to take between 59-63 hours of science content courses, including an interdisciplinary core of 23-25 hours. The content courses required for AYA science majors are very similar to their content major specific counterparts in the College of Arts and Science. This has been an important factor our ability to meet NSTA content standards by changing or developing needed courses in A&S.

In order to be admitted to the Professional Year, which includes the methods block and student teaching, AYA science majors must have earned at least a 2.80 GPA in science content (and overall) and have passed the appropriate content Praxis II examination (which is also required by the State of Ohio for licensure). These two assessments are designed to ensure that teacher candidates at BGSU have substantial science understanding before being placed in a field setting as a teacher. Based on the data presented here we can feel confident that we are doing a good job and moving in the right direction. To this end all AYA science candidates have demonstrated their content knowledge of the NSTA and Ohio Department of Education content standards by successfully passing the aligned PRAXIS II content exam. Furthermore, the passing rates compared to national averages are at or above means, which suggests that they are well prepared to take these exams. In addition to content preparation, BGSU also offers study sessions each year to help students prepare for their first PRAXIS II exam. Students have reported that these sessions are useful for helping them prepare. In addition, when any students experience difficulty they are paired with an appropriate A&S faculty member for remediation of the content for the exam. In addition, students are meeting the GPA requirement to document that they have a firm and prepared foundation for teaching their content.

Through analysis of the data in this report, it is evident that two areas of content improvement can be made, in the research experience and in applying nature of science and issues into implemented lessons. Recognizing these areas for improvement has led to two significant changes in our program. First, science candidates could use additional remediation in data analysis and interpretation in their research projects. The A&S NCATE content committee has met and discussed additional ways and courses where the research rubric (Assessment #7) can be utilized. The more experiences candidates can have with these concepts, the better prepared they will be. In addition, future program completers will be required to complete the ENVS 415 course, which will allow them to participate in four research investigations, which should also strengthen their abilities in this area. Second, BGSU has instituted a new science content course EDTL 275, which will be co-taught by science educators and A&S faculty members. The focus of this course will be on unifying concepts of science, NOS, and Issues and Values in Science. In addition, faculty from A&S are willing to work individually with students in this course on independent research projects from their laboratories, further providing research experiences. We believe these courses and changes will greatly enhance the AYA science program and candidate learning and ability to apply to the classroom setting.

Outcome #3- Apply theories of human development and learning to plan, implement and assess daily lessons and units of instruction.

In regards to planning and REFLECTIVE practice, the overall scores, as well as the sub score ratings from both semesters demonstrate AYA science students ability to plan units that not only include the NSTA standards for science teaching, but that also address state and local standards for teaching and learning. From the two semesters of data it is clear that there is consistency in preparing BGSU AYA science candidates to plan and implement quality, reform-based science lessons in their content areas. The strongest areas for our students include, use of state standards, safety, and professional planning. Many students, more than 70% were able to meet target levels in 5E planning, inquiry, science in the community,

and science and technology. In the future, additional practice and earlier experiences with the nature of science, issues, and assessment will help to accomplish higher scores in these areas.
Bowling Green State University AYA science candidates according to this rubric and the data collected have met the high expectations required of them. They are able to plan conceptually based lessons, following the state and local standards that are required for state level content graduation exams. They are able to imbed in these plans a variety of inquiry activities, explore the relationships of the content to real life, address the nature of science, issues and values surrounding the content, and understand the relationship of the content to the big idea or unifying concepts of science. This assessment not only documents the AYA science students ability to plan these units, but also to implement then and evaluate them for a variety of learners in the classroom setting. BGSU AYA science students are well versed and prepared to extend students learning beyond basic memorization of science content and will be able to aid student learning of key concepts to the application of science in their everyday lives. We excited about the positive results of these assessments will continue to challenge our students to these high standards in the future.

AYA candidates were ENGAGED in the field during their Professional Year. They had more than 20 weeks of engaged practice in the field. It was no surprise that our candidates did well on the final student teaching assessment with supervisor feedback and time to practice and grow. The field component of our program is a true strength. Key assessment data confirm that BGSU holds high expectations for teacher candidates in terms of lesson planning, student teaching classroom competencies, diversity, use of technology, and overall professionalism and the development of positive dispositions. The cross-curricular development of the lesson-planning and student teaching rubrics that are available to all disciplines have been helpful in standardizing expectations, as has been the recent addition of the EDTL 370 general teaching methods course (which is taught by faculty of all content areas). BGSU teacher candidates performed at the
Target or Acceptable levels on all of the key assessments in these areas of professionalism and pedagogy.

Support for the students throughout the Professional Year is critical. As a result, a student teaching seminar has been piloted the past two semesters, where university supervisors and mentor teachers are invited to participate so they can better understand the important influences of reform in science education. Information from the pilots was so positive it is already being processed to make the student teaching seminar a 3-hour requirement for all AYA majors (not just science), beginning in the fall of 2007. The seminar will be content specific and will be taught by a science educator with secondary science teaching experience. Candidates will return to campus throughout their student teaching experience to reflect, write, and assemble a portfolio of performances. The science educator will serve as a co-supervisor for fieldwork, and key assessments such as the Effect on Student Learning can be moved from the methods block to the student teaching semester. In turn, the program will provide candidates with a full year of contact with a qualified, university-level science educator. In addition, the Director for the School of Teaching and Learning is working on a plan that would include hiring science specialists in the field to supervise student teachers in the program. These changes would guarantee that teacher candidates are exposed to quality science educators both on campus and while being supervised in the field. Thereby giving the support needed by our candidates to plan AND implement the units designed to model and foster reform-based science teaching.

Finally, the AYA candidates demonstrated PROFESSIONAL practice and REFLECTION throughout their student teaching experience as they met weekly to discuss successes and failures as well as shared ideas with one another. These discussions were the foundation for their paper on their effect on student learning. As was indicated by the data, 80% of AYA science candidates met target marks, while the other 20% were at the acceptable level. The ultimate plan for any teacher preparation program in science is the learning of the content by secondary-age students and an interest or at least respect for the impact science has on their everyday lives. The process of gathering and analyzing key assessment data for the AYA science program atBGSU has brought about much discussion in terms of what students in school are actually learning and how their learning can be enhanced through the improvement of the program.
The Effects on Student Learning Paper and Interview– focuses teacher candidates on the science learning of their students. Assisting a candidate to accurately and deeply reflect on practice is essential in the teacher preparation process. However, results of key assessments indicate that candidates are still having difficulty imbedding some of the key concepts of science into their daily planning and investigations.
Inquiry is an area that makes sense for secondary science teachers to embrace, it is a term that they hear and that mentor teachers have been bombarded with as well. However, it is not necessarily the same for

the Nature of science or science technology and society. It was interesting to note that almost all of the textbooks used by candidates had sections in them about STS, Science in the community or even nature of science, but the candidates and the mentor teachers still do not view these areas as "content" or value them in student learning. As far as student learning of the content is concerned our candidates do exceptionally well. However, when it comes to the "big ideas" of science our program has work to do.
We believe that the sophomore year program will aid us in beginning the conversations sooner. Followed by the, Integrated courses ENVS 415, BIO 450 taken in the junior year, as well as the Professional Year should have a long-term impact on these ideas and implementation. In addition, more connections between these ideas and the content courses they take will also improve in the long-term these conflicts. However, at least in Northwest Ohio this is still a reform that will take time to evolve completely.

4. Actions Taken/Program Improvements:

Outcome #1: Demonstrate competence of subject matter in the content area of specialization including: biology, geology, physics, chemistry, or a combination of two or more areas of specialization;

The development of new courses, specifically EDTL 275 will help AYA science candidates better understand the breadth and depth of the field of science. In addition, it will forefront the Nature of Science and teaching science through inquiry so that they can begin to apply these concepts throughout their content courses well before reaching the professional year.

In addition, through discussions with the Department Chairs and faculty from Chemistry, Biology, Physics and Geology has led to meaningful changes in course development and changes in approach. A whole new dialogue has opened up between faculty in the Colleges of Education and Arts and Sciences. As a result, an online- safety seminar for ALL science majors as well as individual research requirements for all students are agenda items for future discussion and implementation. A continual renewal of the program to benefit student learning will result from these ongoing conversations between the two colleges.

Outcome #3- Apply theories of human development and learning to plan, implement and assess daily lessons and units of instruction.

The continued development and modification of the student teaching seminar is essential. The changes in product of the Effect on Student Learning document with a seminar and without were remarkable. Having time to process and modify based on feedback from faculty and peers helped the candidates be successful. In addition, having content specific supervisors who can work with cooperating teachers and candidates to follow NSTA and the Ohio Department of Education standards will improve the quality of the experience in the field. This is in process and we should see significant changes in the future.

The purpose for completing an NCATE/NSTA report of this magnitude is to thoroughly examine all aspects of the program, to determine weaknesses, and to develop plans for ongoing improvement of the system. This report has shown that we have a very solid teacher preparation program in AYA science at BGSU. Our candidates have strong science content knowledge and perform well on lesson planning and other field experiences. They join professional organizations and are committed to long-term development of their skills. At the same time, the program has some flaws rooted in gaps in the big ideas of science including NOS and issues and values. Inclusion of new or enhanced units in pre-existing courses, the establishment of new courses, and an ongoing dialogue across Education and Arts and Sciences faculty are the means by which changes will be made to the program. Ultimately, the strength of the program can be measured by the gains shown by secondary students in the classroom. At BGSU we remain committed to improving our teacher preparation program to ensure ongoing progress toward that aim.