A. ACTIONS TAKEN TO IMPROVE STUDENT LEARNING
What actions did you take in 2012-2013, based on previous assessment findings, to improve student learning in your program? (Refer back to plans indicated in “Response to Assessment Findings ” in 2011-2012 Assessment Report.)

Last year, we identified four main challenges – three of these challenges were based on communication of expectations and observed outcomes through the use of instructions and rubrics within the program. Specifically, we discussed the Not Applicable/Not Observable rating in the student teaching observation rubric which resulted in candidates having lower scores than anticipated in the NSTA report data. We decided that since these are measured elsewhere (safety module) we will include a written explanation of the not observable rating in the next NSTA report. Secondly, we revised the rubric for the ED 6760 Scientific Investigation to reflect that some candidates may not have a written copy of a report created during their content area studies. The revision allowed for candidates to present the elements orally if a written report was not available. The third instructions/rubrics based issue was several errors were identified in the reporting of SCIENCE GPAs. Candidates were reporting overall GPAs instead. Detailed instructions with a sample set of calculations have been provided to the teacher candidates in a revision of the portfolio instructions regarding calculations of SCIENCE GPAs. The fourth challenge we identified was that cooperating teachers needed to have a better grasp on what it means for a candidate to be “ready for residency”. In the past year, there has been much more professional development made available both through our partner districts and informally through field supervision conferencing and teacher candidate course based materials shared with cooperating teachers about what it means to be ready for residency. Emphasis has been placed on the similarities between the edTPA, expectations of Resident Educators and assessments of the practice of cooperating (and other) teachers through the OTES.

B. STUDENT LEARNING OUTCOMES ASSESSED AND EXAMINED
Which Program Level Student Learning Outcomes did you assess and examine during 2012-2013?
ED 6660 Standards Based Lesson Plan (NSTA Key Assmt #3a) -
ED 6660 Standards Based Unit Plan (NSTA Key Assessment #3b)
ED 6560 Student Teaching SPA Addendum NSTA Key Assessment #4
ED 6960 SPA Effects on Student Learning NSTA Key Assessment #5
ED 6760 Legal/Safety/Ethical Issues Module Key Assessment #6
ED 6760 Scientific Investigation NSTA Key Assessment #7
ED 6760 Contextual Content of Science Module NSTA Key Assessment #8
Graduate students will be able to demonstrate each of the NSTA Standards identified in the tables below. Each row represents a standard assessed, and marked columns indicate the Key Assessment, which examines the graduate students’ evidence of having demonstrated the standard.

1. NSTA Standards

Content. Teachers of science understand and can articulate the knowledge and practices of contemporary science. They can interrelate and interpret important concepts, ideas, and applications in their fields of licensure; and can conduct scientific investigations. To show that they are prepared in content, teachers of science must demonstrate that they

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<tr>
<td>(a) understand and can successfully convey to students the major concepts, principles, theories, laws, and interrelationships of their fields of licensure and supporting fields as recommended by the National Science Teachers Association</td>
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<td>(b) understand and can successfully convey to students the unifying concepts of science delineated by the National Science Education Standards</td>
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<td>(c) understand and can successfully convey to students important personal and technological applications of science in their fields of licensure</td>
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<td>(d) understand research and can successfully design, conduct, report and evaluate investigations in science</td>
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<td>(e) and understand and can successfully use mathematics to process and report data, and solve problems, in their field(s) of licensure</td>
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2. Nature of Science. Teachers of science engage students effectively in studies of the history, philosophy, and practice of science. They enable students to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science. To show they are prepared to teach the nature of science, teachers of science must demonstrate that they:

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<tr>
<td>(a) understand the historical and cultural development of science and the evolution of knowledge in their discipline</td>
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<td>(b) understand the philosophical tenets, assumptions, goals, and values that distinguish science from technology and from other ways of knowing the world</td>
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<td>(c) engage students successfully in studies of the nature of science including, when possible, the critical analysis of false or doubtful assertions made in the name of science</td>
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3. Inquiry. Teachers of science engage students both in studies of various methods of scientific inquiry and in active learning through scientific inquiry. They encourage students, individually and collaboratively, to observe, ask questions, design inquiries, and collect and interpret data in order to
develop concepts and relationships from empirical experiences. To show that they are prepared to teach through inquiry, teachers of science must demonstrate that they:

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<td>(a) understand the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge;</td>
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<td>(b) engage students successfully in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner.</td>
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4. Issues. Teachers of science recognize that informed citizens must be prepared to make decisions and take action on contemporary science- and technology-related issues of interest to the general society. They require students to conduct inquiries into the factual basis of such issues and to assess possible actions and outcomes based upon their goals and values. To show that they are prepared to engage students in studies of issues related to science, teachers of science must demonstrate that they:

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<tr>
<td>(a) understand socially important issues related to science and technology in their field of licensure, as well as processes used to analyze and make decisions on such issues;</td>
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<td>(b) engage students successfully in the analysis of problems, including considerations of risks, costs, and benefits of alternative solutions; relating these to the knowledge, goals and values of the students.</td>
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5. General Skills of Teaching. Teachers of science create a community of diverse learners who construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies, and methodologies. To show that they are prepared to create a community of diverse learners, teachers of science must demonstrate that they:

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<td>(a) vary their teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding;</td>
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<td>(b) successfully promote the learning of science by students with different abilities, needs, interests, and backgrounds;</td>
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<td>(c) successfully organize and engage students in collaborative learning using different student group learning strategies;</td>
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<td>(d) successfully use technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science;</td>
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<td>(e) understand and build effectively upon the prior beliefs, knowledge, experiences, and interests of students; and</td>
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<td>(f) create and maintain a psychologically and socially safe and supportive learning environment.</td>
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6. Curriculum. Teachers of science plan and implement an active, coherent, and effective curriculum that is consistent with the goals and recommendations of the National Science Education Standards. They begin with the end in mind and effectively incorporate contemporary practices and resources into their planning and teaching. To show that they are prepared to plan and implement an effective science
curriculum, teachers of science must demonstrate that they:

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<td>(a) understand the curricular recommendations of the National Science Education Standards, and can identify, access, and/or create resources and activities for science education that are consistent with the standards;</td>
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<td>(b) plan and implement internally consistent units of study that address the diverse goals of the National Science Education Standards and the needs and abilities of students.</td>
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7. Science in the Community. Teachers of science relate their discipline to their local and regional communities, involving stakeholders and using the individual, institutional, and natural resources of the community in their teaching. They actively engage students in science-related studies or activities related to locally important issues. To show that they are prepared to relate science to the community, teachers of science must demonstrate that they:

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<td>(a) identify ways to relate science to the community, involve stakeholders, and use community resources to promote the learning of science;</td>
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<td>(b) involve students successfully in activities that relate science to resources and stakeholders in the community or to the resolution of issues important to the community.</td>
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8. Assessment. Teachers of science construct and use effective assessment strategies to determine the backgrounds and achievements of learners and facilitate their intellectual, social, and personal development. They assess students fairly and equitably, and require that students engage in ongoing self-assessment. To show that they are prepared to use assessment effectively, teachers of science must demonstrate that they:

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<td>(a) use multiple assessment tools and strategies to achieve important goals for instruction that are aligned with methods of instruction and the needs of students;</td>
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<td>(b) use the results of multiple assessments to guide and modify instruction, the classroom environment, or the assessment process;</td>
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<td>(c) use the results of assessments as vehicles for students to analyze their own learning, engaging students in reflective self-analysis of their own work.</td>
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9. Safety and Welfare. Teachers of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field. To show that they are prepared, teachers of science must demonstrate that they:

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<td>(a) understand the legal and ethical responsibilities of science teachers for the welfare of their students, the proper treatment of animals, and the maintenance and disposal of materials;</td>
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10. Professional Growth. Teachers of science strive continuously to grow and change, personally and professionally, to meet the diverse needs of their students, school, community, and profession. They have a desire and disposition for growth and betterment. To show their disposition for growth, teachers of science must demonstrate that they:

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<tr>
<td>(a) engage actively and continuously in opportunities for professional learning and leadership that reach beyond minimum job requirements;</td>
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<td>(b) reflect constantly upon their teaching and identify ways and means through which they may grow professionally;</td>
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<td>(c) use information from students, supervisors, colleagues and others to improve their teaching and facilitate their professional growth;</td>
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<td>(d) interact effectively with colleagues, parents, and students; mentor new colleagues; and foster positive relationships with the community.</td>
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(Please note that due to specialized accreditation requirements, accredited programs may be required to assess and report on all program level student learning outcomes every year; accredited programs should report in a manner that will align with their accreditation. Programs not carrying specialized accreditation may assess all of their learning outcomes every year but may choose to report on 2-3 per year, looking at several years of data.)

C. METHODS FOR COLLECTING DATA
Which students were included in the assessment? (For example, all seniors completing Course X in Spring 2013, all graduating seniors, etc.)
Seven candidates were included in some of the data provided, however four sets of candidate data are included in this report. Three candidates took selected courses but were not part of the AYA Science Education Program. AYA Science Education teacher candidates included in this assessment report are four teacher candidates who were all program completers as of Spring 2013. Specifically, the candidates are Marianne Bruns, Michelle Davis, Shannon Putthoff and Samantha Hunt.

D. ASSESSMENT MEASURES
What key assessments/assignments/student work did you examine to directly assess the Program Level Student Learning Outcomes listed above?

1. ED 6660 Standards Based Lesson Plan (NSTA Key Assmt #3a)

Standards 6a, and 8b were identified as a particular strength in that all four candidates scored at the target level. In the area of engaging students in reflective self-analysis (8c) two of the four candidates scored at the acceptable level whereas the other two scored at the target level. Conversations with the candidates revealed that their classroom placements displayed variety in the extent to which their cooperating teachers regularly engaged the students in such practices. Additional support for cooperating teacher facilitation of these aspects of lesson design can be built into the activities of the Ed 6660 course by engaging the teacher candidates in the development of appropriate questions that can be asked of teacher candidates to elicit more focused conversation around student reflection. The area evidencing greatest challenge was use of assessment tools to achieve goals (8a), in which all four teacher candidates scored at the acceptable level. Increased practice at using assessment to inform instruction is likely to be modeled more in the classroom contexts now that OTES which requires this is in full implementation in Ohio.

2. ED 6660 Standards Based Unit Plan (NSTA Key Assessment #3b)

Standards 3b, 2c, 6b, 1b. – Each of the four candidates scored at the target level. which identified the candidates’ ability to design developmentally appropriate inquiries using observations, data and inferences(3b), Nature of Science/Critical Analysis of Assertions (2c), Planning and Implementation (6b), and Unifying concepts of science delineated by the National Science Education Standards (1b)as key strengths. Two of the four candidates, however were rated as “acceptable” in terms of their ability to evidence analysis of problems, risks, costs and benefits (4b), which identifies this area as an area of potential growth for our program.

3. ED 6560 Student Teaching SPA Addendum NSTA Key Assessment #4 (needs the number added in the files data form)

Candidates’ teaching actions were assessed twice using this rubric. Scores are reported as #of “Met/Target”Scores Reported/# of “Not Observed” Scores Reported/# of “Progressing” Scores Reported

2. Successfully promoting the learning of science by students with different abilities, needs, interests, and backgrounds. 8/0/0 Strength

6. Creating and maintaining a psychologically and socially safe and supportive learning environment. 8/0/0 Strength

11. Engaging actively and continuously in opportunities for professional learning and leadership that reach beyond minimum. 8/0/0 Strength

1. Varying teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding. 7/0/1 Strength based on that we find it appropriate for candidates to develop skills over the course of instruction as long as they ultimately reach the target level.

4. Successfully uses technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science. 7/0/1 Strength based on that we find it appropriate for candidates to develop skills over the course of instruction as long as they ultimately reach the target level.

7. Legal and ethical responsibilities of science teachers for the welfare of their students. 7/0/1 Strength based on that we find it appropriate for candidates to develop skills over the course of instruction as long as they ultimately reach the target level.
9. Following emergency procedures, maintaining safety equipment, and ensuring safety equipment, and ensuring safety procedures are appropriate for the activities and the abilities of students. 7/0/1 Strength based on that we find it appropriate for candidates to develop skills over the course of instruction as long as they ultimately reach the target level.

10. Treating all living organisms used in the classroom or found in the field in a safe, humane and ethical manner and respecting legal restrictions on their collection, keeping, and use. 7/1/0 Strength based on that we recognize that not all classroom activities provide candidates an opportunity to demonstrate how they treat living organisms used in the classroom or field. In some content areas such as chemistry and physics, few if any opportunities to demonstrate this aspect of teaching arise across the course of student teaching. However, all candidates demonstrate knowledge of this aspect of science teaching through completion of the safety module.

12. Reflecting on teaching and identifying ways and means through which to grow professionally. 7/0/1 Strength based on that we find it appropriate for candidates to develop skills over the course of instruction as long as they ultimately reach the target level.

13. Using information from students, supervisors, colleagues and others to improve their teaching and facilitate their professional growth. 7/0/1 Strength based on that we find it appropriate for candidates to develop skills over the course of instruction as long as they ultimately reach the target level.

14. Interacting effectively with colleagues, parents, and students; mentor new colleagues; and foster positive relationships with the community. 7/0/1 Strength based on that we find it appropriate for candidates to develop skills over the course of instruction as long as they ultimately reach the target level.

3. Successfully organizes and engages students in collaborative learning using different student group learning strategies. 6/0/2 Strength based on that we find it appropriate for candidates to develop skills over the course of instruction as long as they ultimately reach the target level.

5. Understanding and building effectively upon the prior beliefs, knowledge, experiences, and interests of students. 6/0/2 Strength based on that we find it appropriate for candidates to develop skills over the course of instruction as long as they ultimately reach the target level.

8. Practicing safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instructions. 6/2/0 Strength based on that we recognize that not all classroom activities provide candidates an opportunity to demonstrate how they prepare, store, dispense or supervise materials (chemicals) that field supervisors would recognize as applicable to this aspect of science teaching. In some content areas such as Earth Science, few if any opportunities to demonstrate this aspect of teaching arise across the course of student teaching. However, all candidates demonstrate knowledge of this aspect of science teaching through completion of the safety module.

Overall, this rubric did not identify areas of focus for program improvement as all observed areas were regarded as program strengths. We plan to continue with the teacher preparation strategies that we have observed to be effective.

4. ED 6960 SPA Effects on Student Learning NSTA Key Assessment #5

The following Standards-based assessments resulted in scores at the target level for all four teacher candidates and thus are regarded as key strengths:
Assessing students regarding important personal and technological applications of science in their fields of licensure (1c)

Assessing students regarding the major concepts, principles, theories, laws, and interrelationships of their fields of licensure and supporting fields as recommended by the National Science Teachers Association (1a)

Assessing students regarding the unifying concepts of science delineated by the National Science Education Standards (1b)

Assessing students in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner (3b)

In the area of assessing students in activities that relate science to resources and stakeholders in the community or to the resolution of issues important to the community (7b), three of the four students scored at the target level while one scored at the acceptable level. We plan to continue to reinforce the importance of resources and stakeholders in the community and community issues. We recognize that this may not be a typical focus in all classroom contexts, so we plan to emphasize this through the provision of copies of the related assignments to cooperating teachers along with focused preparation of our candidates for being able to explain what it is that they are aiming to do in conversations with school faculty.

A challenge emergent from this assessment was within the area of assessing students in the analysis of science related issues and problems, including considerations of values, risks, costs, and benefits of alternative solutions; relating these to the knowledge, goals, values and decisions of students (4ab)3 of the 4 students scored at the target level, while one scored at the unacceptable level. Again this is likely due to issues of access and consistent focus across the campus and field. Building communication and collaboration in this area is an ongoing goal.

In relation to assessing students in studies of the nature of science and technology including the philosophical, historical, and when possible, the critical analysis of false or doubtful assertions made in the name of science (2abc), only one candidate scored at the target level while the other three scored at the acceptable level. We recognized based on our required revisions for National Recognition, that more information is needed in this area. Because this rubric assessed the three areas together, we do not yet have convincing evidence of whether it is philosophical, historical or critical analysis of doubtful assertions that candidates struggle with. These areas have been separated in the rubrics as designed for future use so that we will have and respond to this information in the future.

5. ED 6760 Legal/Safety/Ethical Issues Module Key Assessment #6

Safety in science teaching has been identified as a strength for our candidates. All four candidates scored at the target level in each of the following areas:

Care and Treatment of Living Organisms (9d)

Emergency Techniques, Maintenance of Safety Equipment, and Proper Safety Procedures (9c)

Legal and Ethical Responsibilities (9a)

Safe and Proper Techniques Regarding Materials Used in Science Teaching (9b)

6. ED 6760 Scientific Investigation NSTA Key Assessment #7
Designing and conducting scientific investigations has been identified as a strength for our candidates. All four candidates scored at the target level in each of the following areas:

- Analysis and Interpretation of Data (1d,1e)
- Conclusions (1d)
- Data Collection and Organization (1d)
- Discussion of Possible Investigations (1d)
- Experimental Design (1d)
- Literature Review (1d)
- Oral Report (option if no written report) (1d)
- Research Problem (1d)
- Use of Math to Analyze and Interpret Data (1e)
- Written OR Oral Report (1d)

7. ED 6760 Contextual Content of Science Module NSTA Key Assessment #8
Understanding and conveying the contextual content of science has been identified as a strength for our candidates. All four candidates scored at the target level in each of the following areas:

- Historical and Cultural Development of Science and the Evolution of Knowledge (2a)
- Personal and Technological Applications of Science (1c)
- Philosophical Tenets, Assumptions, Goals, and Values that Distinguish Science from Technology (2b)
- Processes, Tenets, and Assumptions of Multiple Methods of Inquiry Leading to Scientific Knowledge (3a)
- Relating Science to the Community, Involving Stakeholders, and Using Community Resources (7a)
- Social Issues Related to Science and Technology and the Processes Used to Analyze and Make Decisions (4a)
- Unifying Concepts (1b)

- What, if any, indirect assessments (e.g. exit survey, alumni survey, focus groups, etc.) did you use to indirectly assess the Program Level Student Learning Outcomes listed above?

Teacher candidate focus groups embedded in ED 6990 post edTPA submission

E. SIGNIFICANT FINDINGS
What did you find from your assessments? What did your data reveal about how well students are achieving the Program Level Student Learning Outcomes that you listed above?

Key Findings included:
In most areas, our candidates excel.
Based on the data, key findings related to ongoing growth include:

8. ED 6660 Standards Based Lesson Plan (NSTA Key Assmt #3a)

In the area of engaging students in reflective self-analysis (8c) two of the four candidates scored at the acceptable level whereas the other two scored at the target level. The area evidencing greatest challenge was use of assessment tools to achieve goals (8a), in which all four teacher candidates scored at the acceptable level. ED 6660 Standards Based Unit Plan (NSTA Key Assessment #3b)

Two of the four candidates, however were rated as “acceptable” in terms of their ability to evidence analysis of problems, risks, costs and benefits (4b), which identifies this area as an area of potential growth for our program.
In the area of assessing students in activities that relate science to resources and stakeholders in the community or to the resolution of issues important to the community (7b), three of the four students scored at the target level while one scored at the acceptable level.

A challenge emergent from this assessment was within the area of assessing students in the analysis of science related issues and problems, including considerations of values, risks, costs, and benefits of alternative solutions; relating these to the knowledge, goals, values and decisions of students (4ab)3 of the 4 students scored at the target level, while one scored at the unacceptable level.

In relation to assessing students in studies of the nature of science and technology including the philosophical, historical, and when possible, the critical analysis of false or doubtful assertions made in the name of science (2abc), only one candidate scored at the target level while the other three scored at the acceptable level.

F. DISCUSSION OF RESULTS
How were results shared? With whom were they discussed?
The results were shared through communication with all program faculty in which each faculty member was engaged in a collaborative discussion of the data and of activities related to each Standard in each course. Future action will include a stakeholder meeting in which Cooperating teachers, program completers, and cooperating teachers and district administrators if willing will be provided opportunities to discuss the data and ways in which candidate work toward the Standards can support practicing teacher efforts toward both student learning and OTES conceptualizations of teaching for value added student learning.

G. ACTIONS PLANNED TO IMPROVE STUDENT LEARNING
Based on what you learned from your assessment of the Program Level Student Learning Outcomes, what actions do the faculty in your program plan to take to improve student learning in your program/area?
Describe the steps faculty have taken/will take to use information from the assessments for improvement of student performance and the program. List additional faculty meetings or discussions and planned or actual changes to curriculum, teaching methods, approaches, or services that are in response to the assessment findings.

Based on the data, we will continue the strong program features which contribute to our teacher candidates’ areas of strength. Key actions to address areas of ongoing growth include:

9. ED 6660 Standards Based Lesson Plan (NSTA Key Assmt #3a)

In the area of engaging students in reflective self-analysis (8c) two of the four candidates scored at the acceptable level whereas the other two scored at the target level. Conversations with the candidates revealed that their classroom placements displayed variety in the extent to which their cooperating teachers regularly engaged the students in such practices. Additional support for cooperating teacher facilitation of these aspects of lesson design can be built into the activities of the Ed 6660 course by engaging the teacher candidates in the development of appropriate questions that can be asked of teacher candidates to elicit more focused conversation around student reflection. The area evidencing greatest challenge was use of assessment tools to achieve goals (8a), in which all four teacher candidates scored at the acceptable level. Increased practice at using assessment to inform instruction is likely to be modeled more in the classroom contexts now that OTES which requires this is in full implementation in Ohio.
10. **ED 6660 Standards Based Unit Plan (NSTA Key Assessment #3b)**

Two of the four candidates, however, were rated as “acceptable” in terms of their ability to evidence analysis of problems, risks, costs and benefits (4b), which identifies this area as an area of potential growth for our program. We will incorporate in-class activities and discussions as a further effort to make this aspect of science teaching explicit to our candidates.

2. **ED 6960 SPA Effects on Student Learning NSTA Key Assessment #5**

We plan to continue to reinforce the importance of resources and stakeholders in the community and community issues. We recognize that this may not be a typical focus in all classroom contexts, so we plan to emphasize this through the provision of copies of the related assignments to cooperating teachers along with focused preparation of our candidates for being able to explain what it is that they are aiming to do in conversations with school faculty.

A challenge emergent from this assessment was within the area of assessing students in the analysis of science related issues and problems, including considerations of values, risks, costs, and benefits of alternative solutions; relating these to the knowledge, goals, values and decisions of students (4ab). Again, this is likely due to issues of access and consistent focus across the campus and field. Building communication and collaboration in this area is an ongoing goal.

In relation to assessing students in studies of the nature of science and technology including the philosophical, historical, and when possible, the critical analysis of false or doubtful assertions made in the name of science (2abc). We recognized based on our required revisions for National Recognition, that more information is needed in this area. Because this rubric assessed the three areas together, we do not yet have convincing evidence of whether it is philosophical, historical or critical analysis of doubtful assertions that candidates struggle with. These areas have been separated in the rubrics as designed for future use so that we will have and respond to this information in the future.

**H. SUPPORTING DOCUMENTS (recommended)**

Please attach minutes of program faculty meeting where discussion of results and action planning occurred and any other relevant documents.