

Assessment 5: [Assessment of Candidate Effect on Student Learning] Methods Science Project

1. A brief description of the assessment and its use in the program.

The Methods Science Project is one of 3 content-specific projects required of candidates enrolled in ESEC 383/386 – the Methods course block that precedes student teaching and is the first extended field experience for Elementary Education majors at Keene State College. Working with their supervisors, peer cohort and cooperating teachers, candidates apply what they have learned about curriculum development and integration and the teaching of science from earlier, required education courses (ESEC 320 and at least one laboratory science course) as they research, develop and teach a hands-on science lesson in their classroom settings. A primary emphasis of the project is to determine the effect of their work on student learning. As they build their lessons, candidates are required to develop a scoring rubric that is based on the learning objectives they have identified. They apply the scoring rubric to student work samples to determine the effect of their work on student learning. Candidates formally analyze and discuss the effect of their lessons in written reflections and in discussion with their cooperating teachers and field supervisors.

2. A description of how this assessment specifically aligns with the standards it is cited for in Section III.

The Methods Science Project is a multi-layered learning experience for Keene State College Elementary Education majors. The project aligns with the following (14) **ACEI standards: 1, 2.1, 2.2, 2.8, 3.1- 3.5, 4, 5.1- 5.4.** Particular emphasis is put on Standard 4 (Assessment) and Standard 2.2 - the teaching of science, including many of the elements within this standard. To offer content-specific guidelines for candidates, Standard 2.2 and targeted elements are listed at the end of the Methods Science Project Overview (Attachment A). The numbers of all standards related to the project are embedded in the Methods Science Project Overview (Attachment B) with each standard written in its entirety at the end of the rubric. In this way, candidates are made aware of the importance of adhering to standards as they complete each phase of the project. The project is described in the following narrative with ties to specific standards offered in parenthesis at the end of each paragraph.

There are a number of readings and in-class activities Methods candidates experience both before and during their work on the Methods Science Project. The project is introduced at the beginning of the 14-week Methods semester but candidates do not build and teach a science lesson until they have been in their field placements for at least 8 weeks. Candidates have already used the Keene State College Lesson Plan form (Attachment A.1) four times before they are required to use it within the Methods Science Project. Prior to the science project, a primary task for the candidates is to get to know each candidate within their particular classroom setting in order establish a basis for communication and trust and to determine the specific learning needs and cultural considerations that will impact their approach to teaching—for each child as well as for the entire group. Candidates work closely with their cooperating teachers in getting to know the students and are encouraged to attend parent/teacher conferences, I.E.P. meetings (as appropriate) and after school, family-related activities such as reading nights, book fairs and curriculum-related presentations. Candidates also write a letter of introduction at the outset of the semester that is sent home to all families inviting candidate and/or family-related input that might encourage student interest and/or learning. Additionally, candidates refer to learning, motivation and development theories

studied in earlier required courses (ESEC 150 and 250) in order to understand and target the general learning needs of the age group and to enhance candidate engagement in the science project (and all other Methods projects). **(Standards: 1, 2.2, 3.1, 3.2., 3.5, 5.1, 5.3, 5.4)**

Early in the semester and prior to the official start of the science project, candidates meet with their cooperating teachers to discuss possible science topics in light of the curricular demands, expectations and materials used in their particular classrooms and school districts. At this time, candidates and cooperating teachers select a general topic for the project and cooperating teachers share site-specific materials including children's literature that relate to the selected topic and might be of interest to the group as a whole and/or certain students. They also discuss students who may need differentiated instruction; this may include remediation and/or extension as well as issues involving timing and collaboration. Differentiation (both cognitive and behavioral) is a key component of the Keene State College Lesson Plan form. This form serves as a consistent instructional framework for the lesson required within the science project and in all other Methods projects as well. KSC Lesson Plan steps include (but are not limited to): aligning plans with curriculum standards; meeting with cooperating teachers and field supervisors to determine diversity considerations and lesson objectives; researching materials and students' prior knowledge before teaching; creating formative and summative assessments that align with lesson objectives; being mindful of classroom management issues; and reflecting on the effects of the lesson on student learning.

After meeting with their cooperating teachers, candidates are required to extend their research to include Web resources, hands-on science materials and kits (available through the Keene State College Curriculum Materials Library) and additional children's literature in order to foster the use of current technologies and curriculum/literacy integration. The Curriculum Material Library (CML) coordinator at Keene State College offers ongoing support for candidates as they design content-specific lessons in both Methods and student teaching. The Methods semester begins with a visit to the CML for a general overview of both established and new materials. The CML coordinator remains available for more specific advice and support throughout the semester. **(Standards: 1, 2.1, 2.2, 2.8, 3.1, 3.2, 3.4, 3.5, 5.1, 5.4)**

The Methods Science Project on-campus work begins with candidates' shared responses to readings from the science Methods textbooks *Science Stories* (Koch, 2005) and *Teaching Science as Inquiry* (Carin, 2004). Responses are kept in a semester-long, multi-content Reading Response Journal. Science responses are targeted toward revisiting candidates' prior science learning experiences as well as exploring opportunities for teaching and learning within their current field placements. Following the sharing of responses, candidates take part in an interactive, inquiry-based workshop led by Great Experiences in Math and Science (GEMS®) co-directors, Dr. Debbie Black and Mr. Erik Bell. The GEMS program is a leading resource for innovative science and mathematics education. Developed at the Lawrence Hall of Science, the public science education center at the University of California at Berkeley, and tested in thousands of classrooms nationwide, over 80 GEMS Teacher's Guides and Handbooks offer a wide range of supplementary learning experiences for preschool through eighth grade. GEMS co-director Dr. Debbie Black is a Keene State College faculty member and long-time Methods instructor. **(Standards: 1, 2.2, 2.8, 3.3, 3.4, 5.1, 5.4)**

After the shared readings and the GEMS workshop, Methods supervisors work with candidates as they design their lessons, examining both formative and summative means of assessing the scientific learning of the range of candidates within their classrooms and designing a scoring rubric to assess student work samples. (There are approximately 20 candidates in each team-taught section, with a maximum ratio of 1 faculty member to each group of 10 candidates.) Before teaching in their classrooms, candidates conduct micro-teaching sessions; they bring their materials to their Methods class and practice teaching their science lessons to their peers. Candidates use feedback forms to assess strengths and weaknesses of their peers' work then engage in constructive feedback sessions during which the cohort works together on strengthening their lessons and sharing their ideas and materials. The goal of this experience is to build a community of learners that develop scientific teaching skills for a range of learners in a variety of classroom settings. After sharing their plans with their peers, candidates are required to present their finalized plans to their cooperating teachers for additional feedback and suggestions. **(Standards: 1, 3.1, 3.3, 4, 5.1, 5.2, 5.4)**

Candidates then teach their lessons while being observed by their cooperating teachers and their field supervisors. Immediately following the observed lesson, candidates and their supervisors discuss the outcome of their work, carefully examining successes as well as areas for improvement. When possible, cooperating teachers take part in these conversations. Before turning in their final projects, candidates gather and respond to student work samples using the scoring rubrics they have developed, thereby determining the effectiveness their efforts in terms of student learning. Finally, candidates write a reflection of the Methods Science Project in its entirety – what they have gained in terms of content knowledge as well as pedagogy and how they might improve their work in the future in order to enhance candidate engagement and learning. **(Standards: 1, 3.3, 3.4, 3.5, 4, 5.1, 5.2, 5.4)**

3. Brief Analysis of the Data Findings

The data from the pilot of the Methods Science Project, including 21 students from 2 cohorts, offer an initial picture of areas of strength as well as areas for further development within the Methods field experience. Performance categories are assessed using the following descriptors: EE (Exceeds Expectations), ME (Meets Expectations) and NI (Needs Improvement). Each category is fully explained in the Methods Science Project scoring rubric (Attachment B).

Our findings determine that 76% of our candidates in the pilot cohort met or exceeded the expectations of the Methods Mathematics Project in the category of *planning and preparation* (focus on selecting and researching a topic that meets state and national standards and meets the needs of all students and developing a lesson plan). Within this category, areas of weakness (with 24% of the candidates ranked as NI) involved the ability to develop learning outcomes and assessments and the ability to thoroughly research a science topic.

In the *instructional* category, 84% of our candidates met or exceeded expectations. The distribution of rankings was uneven in this category with an average of 60% of the candidates exceeding expectations and an average of 16% needing improvement. From the data, it is apparent that the majority of students were able to teach their lessons very effectively while a few were not. This may call for some differentiated instruction on the part of our Methods faculty.

In the final assessment category, *professionalism* (self assessment, final reflection and quality of work), 92% met or exceeded expectations. While data from the pilot group was limited, it gave us an initial idea of areas to target for further work. Designing age-appropriate assessments that measure stated objectives, teaching science lessons effectively (for the small percentage who find this challenging), and fully researching science topics are areas that will need closer attention in the future.

4. Interpretation of how data provides evidence that ACEI standards have been met.

Our (pilot) findings demonstrate that candidates involved in this project successfully met ACEI standards: 1, 2.1, 2.2, 2.8, 3.1-3.5, 4, 5.1-5.4. These standards are aligned with each step of the project; they are addressed during on-campus study and through field work in an elementary classroom. The project calls for candidate application of: 1) CONTENT knowledge (science); 2) PEDAGOGICAL and PROFESSIONAL KNOWLEDGE, SKILLS and DISPOSITIONS (the design and teaching of a hands-on science lesson), and; 3) FOCUS ON STUDENT LEARNING (designing a scoring rubric and applying it to student work samples).