Objectives and Assessment of the MSE-Science Program

Objectives

On completion of the MSE-Science program, teachers will be able to

A) perform the following as part of the MSE coursework which requires the completion of at least three 4-credit core courses, at least 9 credits of science electives, and at least 6 credits of educational pedagogy

1. demonstrate content knowledge by solving problem sets (appropriate to the content area; e.g. balancing chemical equations, completing word problems, using keys to identify geologic or biologic materials).

2. demonstrate science skills by properly keeping a laboratory notebook or field notebook or writing a formal laboratory report

3. use technology to collect and analyze data as appropriate to the discipline (this could include, for example, graphing and analyzing data using computer software or collecting data using a computer interface)

4. demonstrate use of information resources within a discipline

B) design/adapt (i.e. need not be original) and use the following with their students; all must be related to or inspired by MSE coursework

1. two science laboratory activities, separated in time by at least one year, to show whether MSE preparation contributed to improvement

2. two science demonstrations, separated in time by at least one year, to show whether MSE preparation contributed to improvement

3. unit plan for the development of a concept

C) perform independent original work for 3 graduate credits (thesis, action research project, curriculum development project, or 3 original activities, latter two options to include a reflection of how the projects worked)

Assessment

Teacher participants will assemble samples of artifacts to include in a portfolio. Every science elective course in the MSE program will provide the opportunity to produce at least one artifact for at least one of the 1st 7 points above (A1, A2, A3, A4, B1, B2, B3).

The required number of artifacts for each objective are shown here. If there are more artifacts produced, students may choose which to include. Other artifacts than those specified below may be substituted if approved in writing by the advisor.

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A1. 3 artifacts with at least one from a 4-credit course. The artifact may be a test, solved problem set, or other discipline-specific content task.

A2. 1 artifact; The artifact should be copies of pages documenting a complete experiment, project, or study.

A3. 1 artifact; The artifact may be a printout of a graph or data table, collected data, or captured screen image.

A4. 1 artifact; The artifact can be a bibliography of sources used for a particular project.

B1. 2 artifacts; laboratory activity directions separated in time by at least one year.

B2. 2 artifacts; demonstration directions separated in time by at least one year.

B3. 1 artifact; The artifact will be a written unit plan including objectives, labs, methodology, educational model/pedagogy employed, and assessment methods.

For each objective met, there must be a reflection statement explaining how the objective was met in the submitted artifact including how coursework in the MSE program contributed to the development and use of each. Typical reflections are no more than 2 paragraphs.

The MSE-Science coordinator will check the portfolio for completeness and appropriateness of reflection statements. The Graduate Office will check the completion of credits into the correct categories.

The independent project will be evaluated by a three-person committee to review the project, the candidate’s coursework, and its connections to the teaching experience.

**Evaluation Rubric for MSE-Science Portfolios** (The phrases in bold are the key ideas for each rubric step.)

I. Characteristics of the reflections
   A. Each reflection draws a clear **connection between** the objective and the artifact and does not simply state that the requirements have been met or agreed with.

   B. Each reflection has been **proofread** for grammar, spelling, and other errors.

II. Specific requirements for reflection for each objective
   A1. These artifacts and reflection show your **content knowledge** gained from MSE content courses.

   A2. This artifact and reflection shows your development of discipline-specific **skills as documented** in a lab notebook, field book, or formal lab report.

   A3. This artifact and reflection shows that you can use **technology** to manipulate experimental data.
A4. This artifact and reflection shows that you can find, use, and evaluate the validity of discipline-specific information sources including libraries and websites.

B1. The artifacts and reflection show that you can design/adapt a laboratory activity for your students, carry it out with students, assess the success or failure of the activities, and critique your own growth in the success of this objective; i.e. include whether, as time went on, you got better at doing this and how. Both laboratory activities must be related to or inspired by MSE coursework with the connection described in your reflection.

B2. The artifacts and reflection show that you can design/adapt a demonstration for your students, carry it out for students, assess the success or failure of the demos, and critique your own growth in the success of this objective; i.e. include whether, as time went on, you got better at doing this and how. Both demonstrations must be related to or inspired by MSE coursework with the connection described in your reflection.

B3. The artifact and reflection show that you can plan and carry out a coherent sequence of lessons on one unit of study. Some part of the unit plan must be related to or inspired by MSE coursework with the connection described in your reflection.