Materials Development and the ATE Program

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Executive Summary

The development of high-quality materials to support the delivery of curricula and promote educational change is critical to the goals of the National Science Foundation (NSF) Advanced Technological Education (ATE) program. Several curriculum development models were reviewed and adapted into a comprehensive framework to guide the development and assessment of high-quality materials under this program. The framework indicates that high-quality materials should:

- Reflect the results of a formal needs analysis
- Be industry verified
- Reflect learning goals and objectives
- Be developed/adapted as a part of a systematic curriculum development process
- Support and identify instructional strategies including pedagogy and assessment
- Undergo pilot and field-testing
- Be continuously evaluated
- Be revised based on evaluation evidence

In the analysis of survey results and site visit reports provided by the Western Michigan University (WMU) evaluation project, there was not ample evidence to make a general judgment of the status of materials development for the ATE program using this framework. In some instances, there was no data available, and in other cases, the evidence was too vague to justify interpretation. Conclusions reached include:

1. Materials developed focused primarily on course and/or module development.
2. Although content experts were generally consulted in the identification and/or verification of skills that were the focus of the materials, there was little evidence that they were involved in the evaluation of the materials after their development.
3. There was only some evidence that professional curriculum designers and/or a systematic curriculum development process was used in the development of materials.
4. Although 14 percent of the materials have been commercially published, most of the materials had not been disseminated beyond the *project*.
5. *Project* personnel generally judged the effectiveness of materials developed based on anecdotal or indirect measures and not direct measures of student learning through pilot and field-testing.
6. Generally, grantees fell considerably short of their goals for production of materials.
7. There was little evidence that sites were using external standards of best practice for the development of materials in either print or digital format.

Based on the search of the literature, survey results, and site visit reports; the following recommendations are made to improve the outcomes of the ATE program related to materials development:

1. Those submitting proposals to the ATE program that have materials development as a focus should be directed to (or NSF should provide) resources identifying best practices in the development of high-quality text and digital materials.
2. The review criteria for funding should require that materials development proposals show an understanding of the processes required for the development of high-quality materials and that the budget and time line are realistic for the deliverables indicated.
3. The current reporting process for funded *projects* should be revised to include reports on the materials development processes included in the framework provided for best practice. This information will encourage accountability and reinforce the need to use best practices. It will also provide NSF with the data needed to assess the overall effectiveness of ATE funding in producing high-quality materials.
4. NSF should provide workshops for ATE *projects* that have materials development as one of their primary objectives.