Chapter 27
Setting Trends for Educational Technologies within the National Science Foundation

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ABSTRACT

Our research team evaluated 18 months of National Science Foundation (NSF) program announcements and awarded programs to discern the amount and type of emphasis placed upon educational technologies. NSF issued 65 solicitations for proposals with 53.8 percent calling for educational technology components. A sampling of 366 of the 1,180 funded projects, showed that 34.7 percent included educational technology. Twenty-five percent of the projects were in biology and cognitive science, with another 40% in general science, computer science, technical education, engineering, and math. Many types of educational technologies were funded, with an emphasis on cognitive tutors/intelligent agents, distance learning, and online communities.

INTRODUCTION

In the United States the National Science Foundation (NSF), with its $5.5 billion annual budget, funds approximately 20 percent of all federally supported basic research, and it is a major funding source for new educational initiatives as well. An essential element of NSF's mission is integrating this research with education to help ensure a skilled workforce and plenty of capable teachers.

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In 2004 the NASA Learning Technologies group presented a benchmarking study in which it examined the funding trends for K-16 education taking place within the NSF's Division of Elementary, Secondary, and Informal Education (ESIE). The survey found that three programs in particular have a large number of awards and significant overall funding: the Informal Science Education Program, the Instructional Materials Development Program, and the Teacher Enhancement Program. Additionally, the report cited significant support for funding the Centers for Learning and Teaching Program and

the Urban Systemic Program. Extrapolating from these findings, the report concluded that the overall trends for NSF's K-16 educational efforts in science, technology, engineering, mathematics, and geography (STEM-G) were (a) development of tools/applications for STEM-G education outside of the classroom; (b) development of instructional classroom material that is compelling, hands on, and standards based that will advance science, math, and technology education in schools; (c) teacher professional development; (d) the research of teaching methods in STEM-G; and (e) improvement of STEM-G education in urban schools.

We set out to update and extend the 2004 study by conducting an analysis across multiple divisions within NSF, focusing particularly on educational technologies. The National Science Foundation includes an education component in all of its program announcements/solicitations (also commonly known as requests for proposals or requests for applications). We presumed an analysis of how this money was allocated over the past 18 months would yield conclusions about emerging trends in STEM-G education. In particular, we examined the trends from two perspectives. First, we wanted to determine the degree to which program solicitations prescribed or recommended the use of educational technologies. This would yield an indicator of the federal agency's emphasis on educational technology. Second, we sought to examine the emphasis placed on educational technologies by those who received the awards. Presumably this would yield a broader range indicator of the emphasis placed on educational technologies by proposal reviewers and the practitioners themselves across the country.

METHOD

Data Source

There are 11 program areas and one cross-cutting area within NSF generally arranged by science discipline. Education is included as a program area called Education and Human Resources (EHR). All EHR programs are in support of research conducted in the other 10 program areas. NSF program announcements/solicitations (hereafter, "solicitations") for EHR programs were accessed from an online database (http://nsf.gov/funding/). There were 506 solicitations in the database, 65 of which fell into the 18-month period of interest.

We conducted three stages of analysis, using two types of data: the text from *solicitations* for each of the 65 programs and *abstracts* from awarded proposals. In stage one we wanted to develop an operational definition of educational technology to be used in the subsequent stages. We derived the definition from the data to control for the varying perspectives of the investigators. We randomly selected 100 abstracts from awarded proposals from among the 65 programs. Four investigators read the abstracts and wrote down the terms indicating an educational technology was included. The group reached consensus around the terms and then used them to create the operational definition. The results section explains this process in more depth.

In stage two we used the definition to examine the text of the 65 solicitations to determine the degree to which they included educational technologies. For the subset of solicitations that did include educational technologies, we developed a dataset of abstracts from the awarded proposals. In stage three we analyzed the text of the abstracts to identify specifics of the proposed educational technologies. Figure 1 provides an illustration of the process.

RESULTS

Stage One: Defining Educational Technologies

A review of 100 abstracts from EHR programs provided the context for creating an operational