

## Individually Paced Curricular Materials for Developing Science Process Skills in Preservice Elementary School Teachers

JON R. HENDRIX, Ed.D.  
Ball State University, 1974

The primary goal of this research project was to produce and test individually paced curricular materials designed to develop basic science process skill competency in preservice elementary school teachers. The four basic science process skills of observing, measuring, classifying, and predicting were identified for the study. Evidence accumulated through three approaches substantiated preservice teachers' needs for further development of these four process skills. The need for science process skill study was based upon recommendations of The American Association for the Advancement of Science, upon the results of a science process measure for teachers administered to a population of preservice elementary school teachers, and upon nine years of personal observation by the researcher in his capacity as a public school science supervisor.

In developing the project a sequence of performance steps was established, taking into consideration current trends in elementary science education, individualization of instruction, and educational accountability. This systems model embodied the development of specifically stated performance objectives for each process skill identified for the study. Eight prototype process skill tests were constructed consisting of a pre/post-test for each of the four process skill areas. The tests were validated by expert opinion. Four individualized learning guides, one for each process skill area, were created to be used with preservice elementary school teachers in elementary science methods courses. An instructors' guide was developed to accompany the student materials. The format for each student guide included a rationale, performance objectives, and a sequence of activities designed to facilitate the attainment of the objectives. A different content carrier was selected to be used in developing each of the four process skill areas. Selected content from the Elementary Science Study program was used in the development of the observation process skill. Selected content from the Science-A Process Approach program was used in the development of the measuring process skill. Selected content from the Science Curriculum Improvement Study program was used in the development of the classifying process skill. And materials of the researcher's design, problem-solving activities related to the concept of change, were used in the development of the predicting process skill. The prototype materials were tested during the Spring and Summer Quarters of 1973 and revisions were made on the basis of this testing. The revised materials were pilot tested during the Fall Quarter of the 1973-74 school year with six sections of Ball State University elementary science methods students. As a result of the pilot testing a new multiple choice process pre/post-test was created and revisions in the teachers' guide were made. Final testing of the curricular materials occurred during the Winter Quarter

of the 1973-74 school year with four sections of elementary methods students.

Statistical treatment of the data collected during the final testing of the materials included analysis of individual pre/post-test scores, pre/post-test variance, per cent of growth applied to an established competency criterion and the application of a one-tailed *t* test testing the null hypothesis that the mean of the difference between the paired measures (pre/post-test scores) is zero.

The feasibility of creating individually paced, science process skill curricular materials using a systems approach and merging selected content goals of elementary science methods with science process skill acquisition goals was established in this study. The population of pre-service elementary school teachers who used the curricular materials met the established competency criterion for all four process skills. Data from this study provide a model for further development of other science process skill building curricular materials for preservice elementary school teachers.

