

# Apangea Learning Research Summary: Writing

## Multi-Year, Large-Scale Field Studies of the Fundamental Skills Training Project's Intelligent Tutoring System

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### Project Background

Since 1990, the Air Force has been engaged in a long-term research effort, the Fundamental Skills Training (FST) project, designed to bring state-of-the-art intelligent tutoring technology to bear on literacy skills problems in writing; help school children attain basic literacy skills; and evaluate the effectiveness of the software in enhancing critical thinking skills.

To accomplish this goal, an intelligent tutoring system (ITS) called MAESTRO, the Writing Process tutor was developed. This system was evaluated in 15 year-long field studies involving 40 schools in 10 states over a 10 year period. Each year these studies have involved 40-50 teachers and nearly 3,000 students.

The goal of this paper is to present to researchers, teachers, administrators, and managers a quick summary of the methods and results of the research conducted from September 1991 through May 1999.

### The Suite of FST Intelligent Tutoring Systems

The MAESTRO: The Writing Process Tutor, was created to facilitate the development of basic writing process skills. MAESTRO is a student-oriented writing process tutor that facilitates learning about the writing process through a series of instructional presentations and real-life writing assignments performed in composing workspaces that, when properly used, help the student acquire the writing processes of an expert writer. MAESTRO allows the student to control the workspaces through a simple menu system that facilitates the development of cognitive processes often associated with expert-level writing. During use of the MAESTRO composing workspaces, the student's writing process is monitored, and the student is coached by an intelligent advise system (Rowley, 1995; Rowley, Miller, & Carlson, 1997; Rowley, K. & Crevoisier, 1997).

### Research

In the studies, the focus of the research has been on three sets of questions including:

- 1.) Instructional effectiveness of the tutor (i.e., "Do students gain more using the tutors vs. traditional educational approaches?")
- 2.) Effectiveness of individual tutor components
- 3.) Implementation issues in the use of educational technology

This paper primarily focuses on the instructional effectiveness of the tutor.

## Subjects

In general, the subjects were seventh, ninth, and tenth grade students enrolled in English classes at 40 junior and senior high schools in states across the nation. Students were demographically diverse (e.g., inner city youth, suburban youth, varying levels of SES, gender, etc.) and participated in this research as part of their normal English classes. On average, classes spent 15-20 hours in the computer lab throughout the school year.

## Methods

Since random assignment was not feasible, (i.e., the schools having designated students to classes and teachers) the studies employed a quasi-experimental design.

In each of the studies, to determine instructional effectiveness, students devoted a partial class period to pretesting during the first six weeks of the academic year. After taking the pretest, the experimental students attended a computer lab approximately one day, every two weeks during their normal class time for an average of 15-20 contact hours during the academic year.

Control group subjects returned to their normal classes where instructors covered the same material. At the end of the academic year, students were given a posttest measure to quantify instructional gains.



## Results

**Description:** A large-scale operational test of R-WISE was conducted in 8 schools in 5 states across the nation. The treatment group (N=700 students, 17 teachers, 57 sections) used R-WISE for an average of 20 hours during the academic year. The control group consisted of 451 students and 13 teachers (37 sections) from the same high schools. The control group used a word processor for an average of 20 hours during the academic year (Rowley, Miller, & Carlson, 1997).

**Outcome:** The students using R-WISE significantly outperformed students learning to write using a word processor on all 5 measures of writing performance. The attitudes towards writing of students using R-WISE were significantly more positive than those using a word processor.

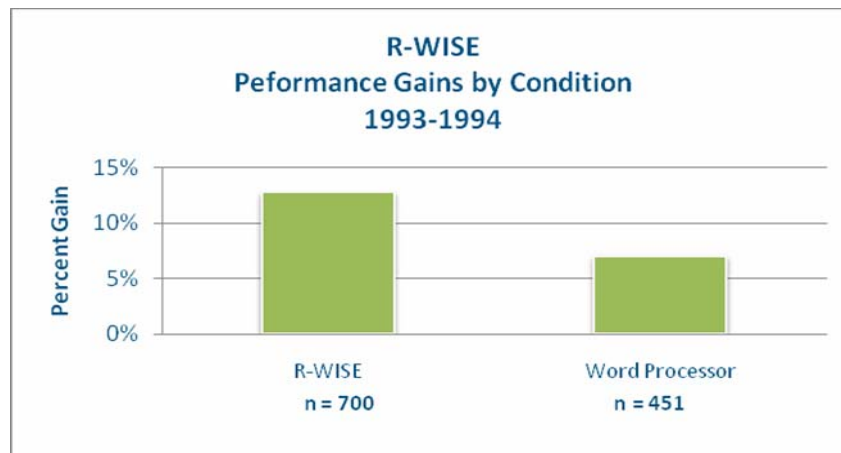


Figure 4. 1993-1994 R-Wise performance gains by condition