Introduction

In seeking to provide highly individualized instruction on a universal basis, educators have increasingly looked toward technology. In this area the emergence of PLATO IV is a major breakthrough, for it has not only caused radical changes in the spectrum of CAI by registering significant advances, but also has allayed the skepticism about its future which has been voiced in some quarters. (See (Alpert and Bitzer, 1970) and (Smith and Sherwood, 1976) for details.)

PLATO IV, an abbreviation for Programmed Logic for Automated Teaching Operation, is an economically feasible, largescale, computer-controlled teaching system. The more advanced stage of PLATO III is currently in operation at the University of Illinois. More than just another laboratory curiosity, it is presently being employed in twenty fields, from astronomy to the medical sciences. Foreign language teaching includes both western languages (such as English as a second language, French, German, Italian, Latin, Russian, Spanish) and non-western languages (such as Chinese, Hindi, Hebrew, Japanese, Arabic and Swahili). This paper deals primarily with the teaching of a non-western language, Hindi, and presents some of the salient features of the Computer-Based Hindi Pedagogy Project at the University of Illinois. In addition to this specific goal, the paper also aims at two general goals: (1) to bring out the role of PLATO IV as a computer-controlled teaching system in language pedagogy and (2) to indicate the scope of computer-based language pedagogy. Before proceeding toward them, a brief description of PLATO as a computer-controlled teaching system is in order.

PLATO IV configuration

The PLATO system consists of a central computer and several hundred terminals, through which students communicate with the computer. Each terminal has an inherent memory, a plasma display panel, and an attached keyboard. The display panel is an 8½-inch square of glass containing a 512 × 512 matrix display. Any individual dot can be selectively lighted. The keyboard looks like that of an electric typewriter with the addition of some functional keys such as NEXT, BACK, HELP, DATA, the pressing of which allows the student to branch to a designated section of a lesson. Watching the display on the panel, the student communicates with the computer mainly through the keyboard. Four types of additional equipment are available: an audio device permitting random access to messages recorded on a disk, a touch panel attachment enabling the student to respond by touching the display screen instead of typing, a slide selector allowing a microfiche to be rear-projected and superimposed on the panel, and an external input capability of interfacing with other machines. Terminals are connected by telephone wires to a CDC CYBER 73 computer with two central processors.

A specially designed programming language, called TUTOR can be quickly learned by people who have no expert knowledge of computers (see Sherwood (1974)). The software system has the ability to interact with students, asking questions and correcting their errors. It can tell them what word contained the error and what type of error (spelling or otherwise) was made. Responding within a fraction of a second, the computer can force students to review areas of difficulty. In addition, it can record their responses, generate questions, and examine responses to those questions.
Goals of the computer-based Hindi teaching project

The project for computer-based Hindi teaching (henceforth, CBHT) currently being developed at the University of Illinois can be divided into experimental, developmental and final stages. The experimental work, \(^2\) initiated by the author of this paper under the supervision of Professor Y. Kachru in 1974, entered its developmental stage as the result of the joint effort with Mr. Cecil Nelson. Currently, it is being used to teach Hindi as a second language and at the same time being subjected to rigorous editing, supplementation and testing procedures. During the last two stages, technical development was carried out by Dr. R. Hart.

The main goals set for the current project have been:

1. to identify potential areas of Hindi and Sanskrit language courses where computer-based pedagogy could efficiently supplement the non-computer-based teaching;
2. to provide individualized instruction, especially at the early stages (such as script-learning), so as to make classroom instruction more efficient and economical by eliminating problems of non-synchronic learning;
3. to supplement non-computer-based Hindi teaching with additional lessons in grammar, cultural background, vocabulary, and other topics, and
4. to provide for instant review of basic material for advanced students.

General design and organization

When a student signs for the lessons, the computer asks his name and greets him in Hindi. The student is then presented with an index page, which contains a table of contents and the list of lessons. The student can then choose a lesson by typing a number corresponding to his choice. Each individual lesson also has a table of contents listing its sections.

The planning of our Hindi lessons on PLATO utilized the concept of sequencing, which involves selection, grading, presentation and testing. All the lessons programmed so far are followed by exercises, some of which are generative in nature. In other words, some exercises randomly select questions out of a given set so that whenever the student signs his name, he comes across a new quiz. Built into these exercises is an option for a student to review his material in case he is not prepared for a quiz.

Creation and teaching of the Devanāgari script

In developing a computer-based Hindi teaching system, our first task was to create the Devanāgari script on PLATO. The very large number of the Devanāgari characters and the complexity of their strokes posed a serious programming challenge. The strict limitations of character set space in the system required many crucial decisions, often forcing a choice between traditional pedagogical practice and methods that would accommodate the characters within the limited space of the PLATO keyboard. In addition, the nonlinear nature of the Devanāgari script presented several technical problems. Our three main problems were first, to program each character in an adequate manner; second, to overcome the inadequacies of graphemic representation of the Devanāgari script resulting from algorithmic properties of the machine; and, third, to achieve speed and graphic precision in writing the Devanagari script on