INSTRUCTOR’S PLAN
A COMPUTER-BASED SYSTEM
FOR LESSON PLANNING

By Dennis A. Wilkins and Paul F. Cook

Instructor’s Plan is a smart productivity tool aimed at helping teachers deal with the many complex instructional design decisions they frequently face.

Teachers need methods and tools for creating effective lesson plans. If these tools do the job quickly and easily, that is even better. One reason for this is the limited amount of time available to teachers for planning and writing lessons. Another reason has to do with the difficult task of fitting a given lesson to the many different types of students found in a typical classroom. In teacher-based instruction, this means being able to identify critical learning variables.

Recognizing this need, researchers at Brigham Young University have spent several years developing a computer-based, expert system for rapid lesson design and authoring. The system, Instructor’s Plan (IP), has received about two years of beta-testing by a large number of teachers. Its primary audience is preservice and inservice school teachers, with potential secondary audiences of higher education professors and corporate trainers.

The main purpose of IP is to provide teachers with an intelligent productivity tool and job aid. A secondary purpose is to teach instructional design principles. For example, consider the complex learning conditions of a typical fourth-grade class of about 30 students. The teacher of such a class is faced with a wide variety of content areas and learning outcomes. Additionally, the teacher must consider the cognitive and affective makeups of the students, the time available for teaching a given lesson, and student learning style preferences. This instructional complexity makes it very difficult for a teacher (especially a novice) to design productive lessons using proven instructional design strategies. Instructor’s Plan seeks to help teachers with these complex learning decisions quickly and easily.

Dennis A. Wilkins is a Software Engineer with WordPerfect Corporation in Orem, Utah. Paul F. Cook is an Associate Professor of Elementary Education at Brigham Young University in Provo, Utah.

Figure 1: Instructor's Plan's Expert System Architecture
EXPERT SYSTEM ARCHITECTURE

The central feature of IP is its expert system possessing the primary components typically found in other expert systems—the knowledge base and inference engine.

The Knowledge Base

The knowledge base (KB) has two main aspects contained in several files (see Figure 1). The strategy selection aspect of the knowledge base resides in an executable file along with the rest of the compiled source code. This greatly increases the speed at which the computer can process the data related to the instructional conditions at hand. The instructional strategies aspect of the knowledge base is contained in structured files read by the program. This permits the teacher to directly access the strategies and make modifications to that aspect of the knowledge base.

Inference Engine

The inference engine in IP manages the knowledge base and the inferencing process. It governs the questions posed to the teacher and the searching of rules, and tests the goals of the expert system to see if they have been accomplished. IP's inferencing process is based on basic human problem solving (see Figure 2).

INSTRUCTIONAL STRATEGIES

The knowledge base of IP is founded on instructional theory that proposes that specific learning conditions require different instructional strategies or strategy modifications in order to optimize learning. IP considers two main categories of learning conditions when determining the best instructional strategy: (1) learning outcome and (2) instructional mode.

Learning Outcomes

Based on scholarly literature, Instructor's Plan employs eight levels of learning outcomes (see Figure 3):

1. Response outcomes refer to paired-associate learning such as learning mathematics tables, Morse code, sight words in reading, etc. This also can refer to low level physical responses such as learned reflexes.
2. Recitation outcomes are demonstrated through verbatim recall of verbal information, for example, reciting a poem, the Preamble to the Constitution, or foreign language phrases.
3. Explanation outcomes refer to paraphrasing verbal information. Examples are telling the story of Columbus in your own words, or describing the quadratic equation according to your understanding. Discussing your opinions and values can also be part of this outcome.
4. Classification outcomes refer to grouping examples of concrete and defined concepts. Properly classifying red objects (when mixed with other objects of different colors) into a group labeled "red" is an example.
5. Prediction outcomes correspond to applying an understanding of principles or laws of nature (e.g., cause and effect relationships). An example of this would be predicting what will happen to the density of air as temperature or altitude decrease. Another example is predicting the tendency of student retention of a given subject area as a student’s interest for that subject increases.

MODES

<table>
<thead>
<tr>
<th>DIRECT INSTRUCTION</th>
<th>INDIRECT INSTRUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>Strategy 1</td>
</tr>
<tr>
<td>Recitation</td>
<td>Strategy 2</td>
</tr>
<tr>
<td>Explanation</td>
<td>Strategy 3</td>
</tr>
<tr>
<td>Classification</td>
<td>Strategy 4</td>
</tr>
<tr>
<td>Prediction</td>
<td>Strategy 5</td>
</tr>
<tr>
<td>Decision</td>
<td>Strategy 6</td>
</tr>
<tr>
<td>Performance</td>
<td>Strategy 7</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Strategy 8</td>
</tr>
</tbody>
</table>

Figure 3: Instructional Outcomes and Modes Matrix