

# **A Consultant Tutor for Personal Development**

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## **Abstract**

We have designed a consultant system that formulates a psychological assessment model of its user and engages him/her in a dialogue about personal productivity. The system analyzes an inventory of questions concerning attitudes, skills, and knowledge, generates a personality profile based on those answers, and uses the profile to tailor a dialogue in response to the client's needs. The goal is to clarify a person's knowledge about time and resource management, to broaden his/her range of time perspectives, and to respond appropriately and sensitively to a user's unique problem. The learned behavior should have positive practical consequences in daily life. In designing this system, we have borrowed techniques from artificial intelligence and the domain of psychological intervention, thus extending the paradigm of one-on-one machine tutoring to the realm of consultation.

# 1 A Consultant for Personal Development

We live in an increasingly complex world—people handle multiple and conflicting responsibilities and work against very real deadlines. Maintaining productivity under such circumstances requires the ability to manage one's commitments, to organize and prioritize activities, and to monitor projects. Taking time to learn such skills is often difficult because other demands, which seem more concrete, are always pressing. However, lack of such skills leads to confusion, disorganization, and increased stress. People at every level of society, from CEOs to new employees, from professors to students, need to learn these organizational skills in order to regulate their own activities.

We have designed a computer system to be used by individuals seeking to improve their competence in the area of organizing personal resources, setting goals, and using time efficiently. The system provides tools and techniques that broaden a person's range of time perspectives and that encourage the holding of present as well as future-oriented time perspectives. By using technology borrowed from expert systems, intelligent tutors, and psychological assessment, the system reasons about the person's unique set of attitudes, knowledge, and skills and then customizes its own response based on a moment-to-moment on-line analysis of the person's response pattern and psychological profile.

Interest in the area of time and resource management is reflected in the number of lectures, books, and workshops that have emerged in the last fifteen years, i.e., Lakein [1973] and Fanning and Fanning [1979]. It is estimated that hundreds of thousands of people have participated in time management courses in the past ten years. Yet traditional forms of time management training are constrained by time and space. People must show up at specific times and places for courses (this is very difficult for people already pressed for time) and are asked to conscientiously perform activities that may be irrelevant to their individual needs. The system we are building will make training for personal development more personal, more available, and more easily affordable.

A major goal of this work is to mirror the continued exploration and unfolding of a person's self-knowledge which is the essence of expert consultation. A major objective of this system is to provide opportunities for the person to clarify her/his intentions, motivations, and goals, relative to time and resource management. An effective system will make each person feel that his/her unique situation has been responded to appropriately and sensitively and that he/she has learned some behavior that will have positive practical consequences in daily life. One of the greatest challenges of this work is to be able to precisely present exercises, activities, and interventions that relate directly to the individual's personal time perspective, learning style, and on-line experience and to increase the person's repertoire of productive and fulfilling behaviors.

## 2 Interactions with TEV

The system we are building is named TEV for Time, Energy, and Vision. It uses a series of questions, as well as the ensuing and on-going dialogue to generate a personality profile of the user. The profile is the primary determining knowledge base for joining with the client. While we use the profile to begin the consulting process, neither the tutor nor the consultee are bound by this initial reading of the consultee. A psychological assessment model is formulated from the profile and then a dialogue designed to provide initial interventions, tasks, or activities tailored to the individual. The dialogue strategies are derived from a large repertoire of similar activities used in one-on-one personal and group counseling over the last 15 years by the first author. These activities have proven effective with large numbers of people in improving their ability to manage time.

**Goal of the Interaction.** The primary goal of the system is to increase a person's awareness of his/her specific attitudes and behaviors related to time and self-management. A person spends 20-30 minutes answering questions about his/her own attitudes toward time and time management and the system generates a simplified profile of the person (see Section 3). The questions ascertain a person's knowledge and skill such as "has made a 'to-do' list," "has completed a task," and "has made a plan to accomplish a goal." Once a person has completed an intervention, TEV uses scores above a 75% response rating on criterion performance tasks (e.g., "can specify priorities") to determine a person's mastery of each skill. Two suggested dialogues are presented in Figures 1 and 2. The psychological profiles generated for each person, which in turn motivate the following dialogues, are explained in Section 3.

**Interaction with Person A.** The first subject has indicated that he/she frequently does things impulsively and doesn't worry about getting projects done on time. In addition, he/she tells TEV that he/she never keeps a "to-do" list and rarely writes down appointments.

Based on these and other responses the system initially assigns to this person a present-oriented time perspective and associates with them a strong tendency to value pleasure-seeking, partying, and risk-taking. Based on this profile the dialogue in Figure 1 results.<sup>1</sup> One of the features to notice about this dialogue is that TEV can provide on-line help to enable users to become more present-oriented and to deal with the immediacy of particular problems. It can help people look at what has to be accomplished on a given day and to face concerns of the moment.

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<sup>1</sup>The dialogue is not generated through natural language processing, rather through menu input and canned text output. This might be a limitation of the system. However, prior work in the area of computer-based therapy [Servan-Schreiber, 1986] shows that clinically significant therapy can be achieved in spite of this limitation.

Figure 1: Interaction with Person Showing Present-Oriented Behavior

**Person A:** I want to learn practical ways to manage my time. I would like to accomplish more work.

**Tutor:** OK. Your answers to the questionnaire indicate that you are not familiar with daily to-do lists and priorities. Would you like some instruction in using daily to-do lists?

**Person A:** Yes.

**Tutor:** OK. Begin by making a list of the tasks or jobs you need to do for the rest of today. Please type the list along with the approximate number of hours required for each job..

**Person A:** Types in the following:

Prepare final report-3 hrs.

Do problems for night class-2 hrs.

Wash my clothes-1-1/2 hrs.

Do food shopping-1 hr.

**Tutor:** You need to decide which is the most important task in order to manage your time effectively. Even though it is difficult, do the best you can.

**Person A:** Types in the following: (#1) Prepare final report; (#2) Do food shopping; (#3) Do problems for night class; (#4) Wash my clothes.

**Tutor:** Will you be able to do everything?

**Person A:** No. What should I do?

**Tutor:** If your priorities have not changed, do as much as you can of your highest priority task.

**Person A:** This is frustrating.

**Tutor:** Perhaps your expectations of yourself are unreasonable. Have you ever thought that you demand too much of yourself?

**Person A:** Yes I have. What does that have to do with managing my time effectively?

**Tutor:** Setting reasonable goals is an essential part of effective time management. One way to determine whether or not you are setting reasonable goals is to notice how often you have too much to do. For example, today you had too many time-consuming activities to complete. If you are satisfied with completing your top priorities then you are being more reasonable in your expectations of yourself. Is this clear?

**Person A:** Sort of. How can I learn to set reasonable goals?

**Tutor:** It takes frequent practice with a daily to-do list. Are you willing to begin using a daily to-do list for a few days or week?

**Person A:** Yes. I'll try it for a week.

**Tutor:** Great. When you sign on again we will discuss your experience with the daily to-do list and your daily time log. Talk to you then.

**Figure 2: Interaction with a Person showing Future-Oriented Behavior**

**Person B:** I really need help managing my time. I'm doing well at work and I get all my projects done. However, I don't have time for my friends and I don't have much fun.

**Tutor:** Sounds like you want to meet more of your personal priorities.

**Person B:** Yes. How do I go about doing that?

**Tutor:** Your answers to the initial questionnaires indicate that you are familiar with and regularly use a variety of time-management strategies. Is that accurate?

**Person B:** Yes, it is true. All my time is usually filled up with activities and tasks.

**Tutor:** In many ways that makes your life easier and you probably feel more in control of it. However, you might want to learn how to plan more social and enjoyable activities into your day.

**Person B:** That sounds great, but how do I do it?

**Tutor:** How much time are you willing to spend working on this today?

**Person B:** I only have 45 minutes to spare.

**Tutor:** Great! You can begin an exercise on learning to be more flexible and to have fun. It will take about 30 minutes of your time today. Please feel free to choose either of the following activities.

- **I. Life Goals:** An opportunity for you to reflect on your most important lifetime goals as well as very short-term goals.
  - Requires some reflection on what you really want out of your life.
  - Provides specific action steps you can take in the next week.
- **II. Life Plan and Pattern:** Describes the major roles you play each day.
  - Asks for clarification of persons, objects, and activities involved in these roles.
  - Results in a pattern analysis of your life which can be used to establish new priorities.

**Person B:** I choose Life Pattern and Plan.

**Interaction with Person B.** A second client indicates that he/she sets sub-goals when he/she wants to achieve something and that he/she frequently makes to-do lists. Other answers suggest that this person has a future-oriented time perspective characterized by a tendency to follow a rigid approach toward daily planning. After the profile is developed the conversations in Figures 2 and 3 are generated.

### 3 Methodology

The system moves through three phases in generating the dialogues of Figures 1-3. These phases are Client Assessment, Client Profile, and Intervention/Evaluation (see Figure 4). During the first phase, TEV gathers information about the person's attitudes, knowledge, and skills using an assessment instrument which, in a non-computerized version, has been tested with 11,000 individuals. During the second phase TEV generates a personality profile based on an established interpretation of the instrument. In the third phase the system begins its interaction with and evaluation of the person.

**Phase I: Client Assessment.** In the first phase, the system prompts the user with statements drawn from two sources. These statements focus on attitudes, knowledge, and skills related to time perspective (Stanford Time Perspective Inventory [Gonzalez and Zimbardo, 1985]) and effective time management (Time Behaviors Inventory [Slovin and Woolf, in preparation]). The first instrument asks about attitudes toward time and the second asks about familiarity with time management tools. In each case the person is asked to indicate "How characteristic is this of you?" Example statements include the following:

- Thinking about the future is pleasant to me.
- If things don't get done on time, I don't worry about them.
- I do things impulsively, making decisions on the spur of the moment.
- I try to live one day at a time.

The following scale is used: very characteristic, somewhat characteristic, slightly characteristic, somewhat uncharacteristic, and very uncharacteristic. A value is assigned to each response and a personality profile developed in the next phase.

Figure 3: The Life Pattern and Plan Exercise (Based on Fanning and Fanning [1979])

**Tutor:** Here is the exercise called Life Pattern and Plan. Please begin by drawing a circle with the mouse. Return to the program by pressing F3 or typing TEV.

**Person B:** (Presses F9 and then F3 when done to continue.)

**Tutor:** Begin by drawing a circle with the word "life" in the center.

**Person B:** (Responds by drawing circle and typing the word "life" in the center.)

**Tutor:** Now draw some lines or spokes from the circle. Label each with one of the important roles you play in your daily life. For example, person, daughter, worker, runner, etc. What are the most important roles in your life? When you have finished this step please touch any key to continue. If you have a question or need help press Q.

**Person B:** (Presses Q and types.) How will I know whether I have put down enough roles?

**Tutor:** Whenever you feel ready to continue is fine. You can always add roles later. Is that clear?

**Person B:** Yes. (Presses a key to continue.)

**Tutor:** Once you are satisfied that your major roles are in the pattern, branch out from the roles. Start by naming the persons or objects connected with the role, or by naming the activities involved in those roles—whatever pops into your mind. Keep branching away from the center. The more you list, the more you'll think of. If you think of another role, put in another spoke from the center. Are the instructions clear? Please continue with the exercise if you have no questions. If you require assistance press Q. When you are finished press Print so you can have a copy of your work. It would be most helpful for you to reflect on what you may have learned from doing the exercise.

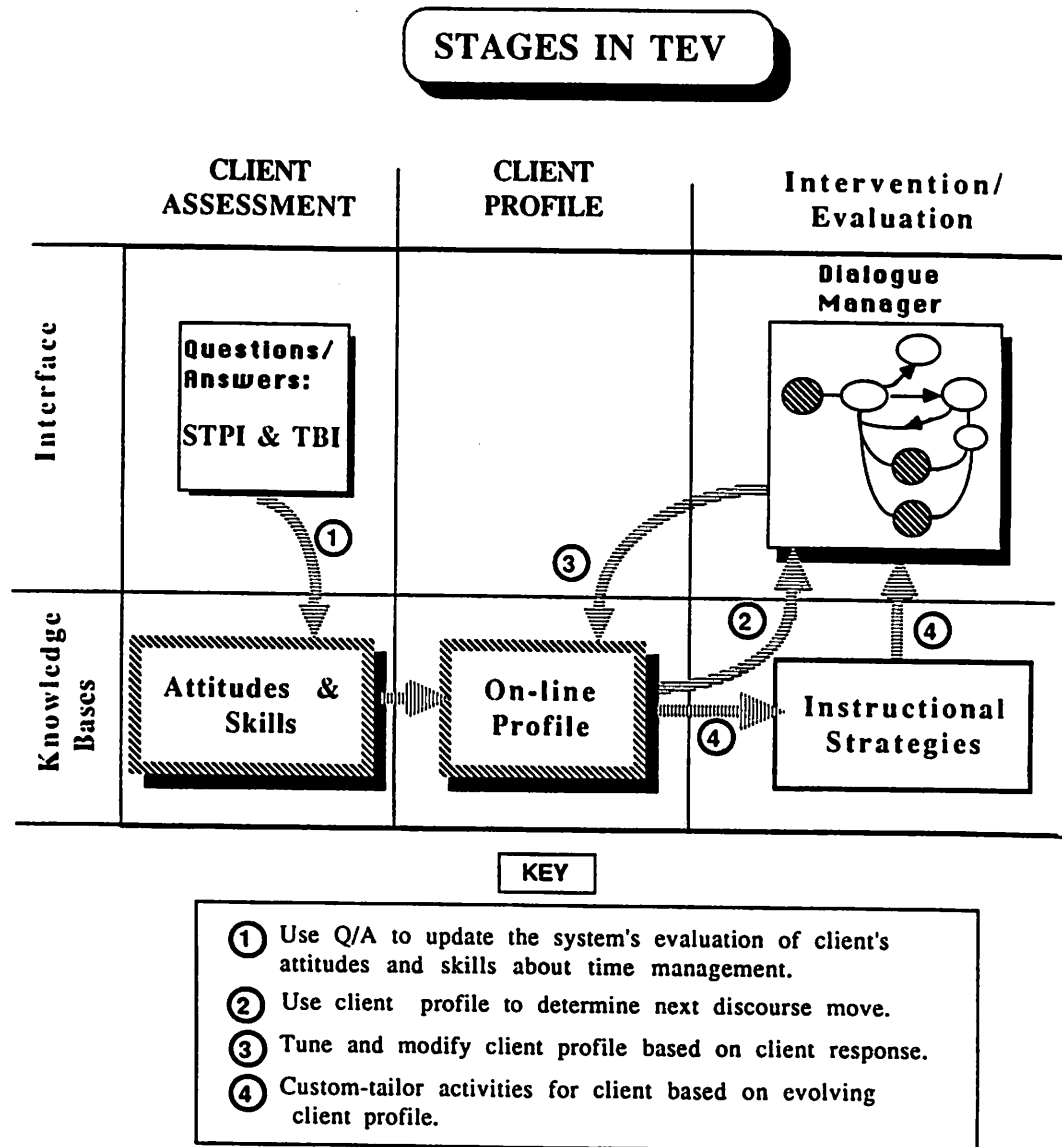


Figure 4: The Components of TEV

**Phase II: Client Profile.** In the second phase, scores from the two instruments are encoded into an individual profile of the client's attitudes, knowledge, and skills in the areas of time perspective, effective time management, and learning and personality styles. This phase establishes a simplified profile of the person, which is then updated to a more complex analyses in the intervention phase.

Profile descriptions are drawn from the Stanford Time Perspective Inventory. Example attributes are as follow:

- Attitudes
  - Pays great attention to daily planning.
  - Lives one day at a time in order to avoid planning for the future.
- Knowledge
  - Has awareness of steps involved in effective time management, e.g., listing goals, setting priorities, and maintaining a daily To-Do list.
  - Has lack of knowledge of the goal-setting process.
  - Has awareness of steps in time management.
- Skills
  - Is able to complete important tasks on time.
  - Has difficulty dealing with deadline pressures.
  - Makes plans ahead to accomplish goals.

Each of these attributes is further put together into dimensions that help identify features of the person's time perspective and experience with time management tools. This information is helpful in focusing in on a range of initial intervention strategies. During this and the intervention phase, data about individual dimensions is continually updated as the client continues to interact with the tutor. For each assessment, dimensions of that assessment are updated. Thus, if a person identified a significant number of hedonistic attributes as being very characteristic of him/her, then the assessment of hedonism would move above threshold, and a profile would be generated describing the individual as very present-oriented and one who avoids planning. The planning approach, time focus, and characteristic of each dimension is used to identify the proper initial intervention strategy (see Phase III below).

The previously presented dialogues in Figures 1 and 2 describe interactions with people who scored in the extreme on several subscales of the Stanford Time Perspective Inventory. For example, Person A had a profile that indicated that he/she endorses a fatalistic and hedonistic approach to life. Such a person would be presented with intervention strategies that cause him/her to acknowledge his/her current tendency to focus on the present to the exclusion of the future. Alternative interventions, in addition to those shown in Figure 1, include activities that elicit Life Goals, daily to-do-lists, or definitions of terms such as "goal," "priority," "objective."

Other activities might be to ask Person A about time-schedules and how to set them, or to provide an exercise called "Delay has its Costs."

On the other hand, Person B is an extreme example of someone who exhibits a strong work-motivation perspective. This person appears to be focused on the future and requires some relaxing activities and exercises. For him/her the system suggests exercises such as:

- Positive Procrastination
- Creating quiet time for yourself
- Do Your Best and Consider it a Success
- Distinguish Urgency and Importance
- 12 Tapes You Want to Turn Off

Both persons need to visualize the payoff of their exercises in concrete terms. They need to know that these exercises answer their problems uniquely.

**Phase III: Intervention/Evaluation.** After the profile has been generated, production rules reason about which consulting advice to suggest. Intervention advice has been codified according to dimensions of personality profiles. Antecedents based on above-threshold assessments of time perspective orientations are linked with explicit intervention strategies. A sample set of production rules used for intervention is given in Figure 5.

Managing the dialogue between consultant and client requires sophisticated knowledge about the client, the profile, the dialogue, and the intervention strategies. This knowledge is different from domain knowledge in that it includes decision logic and rules to guide the tutor's ability to be responsive to the client.

We have developed a framework for managing discourse in an intelligent tutor [Woolf and Murray, 1987; Woolf and McDonald, 1984] that dynamically reasons about a discourse, the client's responses, and a variety of possible intervention techniques (see Figure 6). The client's responses to suggested interventions cause the profile to be updated and modified, which in turn changes the tutor's approach in its next response.

The framework reasons about which intervention response to produce and which discourse move to make. Discourse is planned by passage through a collection of discourse groupings, as shown in Figure 5, each of which was derived empirically through cognitive research into learning, teaching, and discourse [Grosz & Sidner, 1985; Clancey, 1982; VanLehn, 1983].

Figure 5: Production Rules for Selecting Intervention Strategies

Example Intervention I:

A person approaches the system with a present-oriented time perspective with a strong tendency to value pleasure seeking, partying, and risk-taking. He/she has endorsed the following items as being either somewhat or very characteristic of him/herself:

- Getting together with friends to party is one of life's important pleasures.
- It is more important to enjoy what you are doing than to get the work done.
- Things should be done impulsively and decisions made on the spur of the moment.

The tutor's initial intervention is to suggest that the individual enumerate his/her:

- lifetime, 3-5 year, or 6 month goals;
- major sources of motivation; and, if appropriate,
- resistance to practicing time management skills.

Example Intervention 2:

A person with a future-oriented time perspective characterized by a tendency to follow a rigid approach toward daily planning approaches the system. Evidenced by positive responses for items such as the following, he/she has endorsed the following items as being either somewhat or very characteristic of him/herself:

- When I want to achieve something, I set sub-goals and consider specific means for reaching those goals.
- I make lists of things I must do.
- I believe that "A stitch in time saves nine."

The tutor's initial intervention is to suggest that the client try relaxation exercises; practice the "Learn to Say No" game that encourages setting appropriate limits on activities; and play "Are you sufficiently irrational?" exercises that offer an opportunity to be creative, humorous, and outrageous.

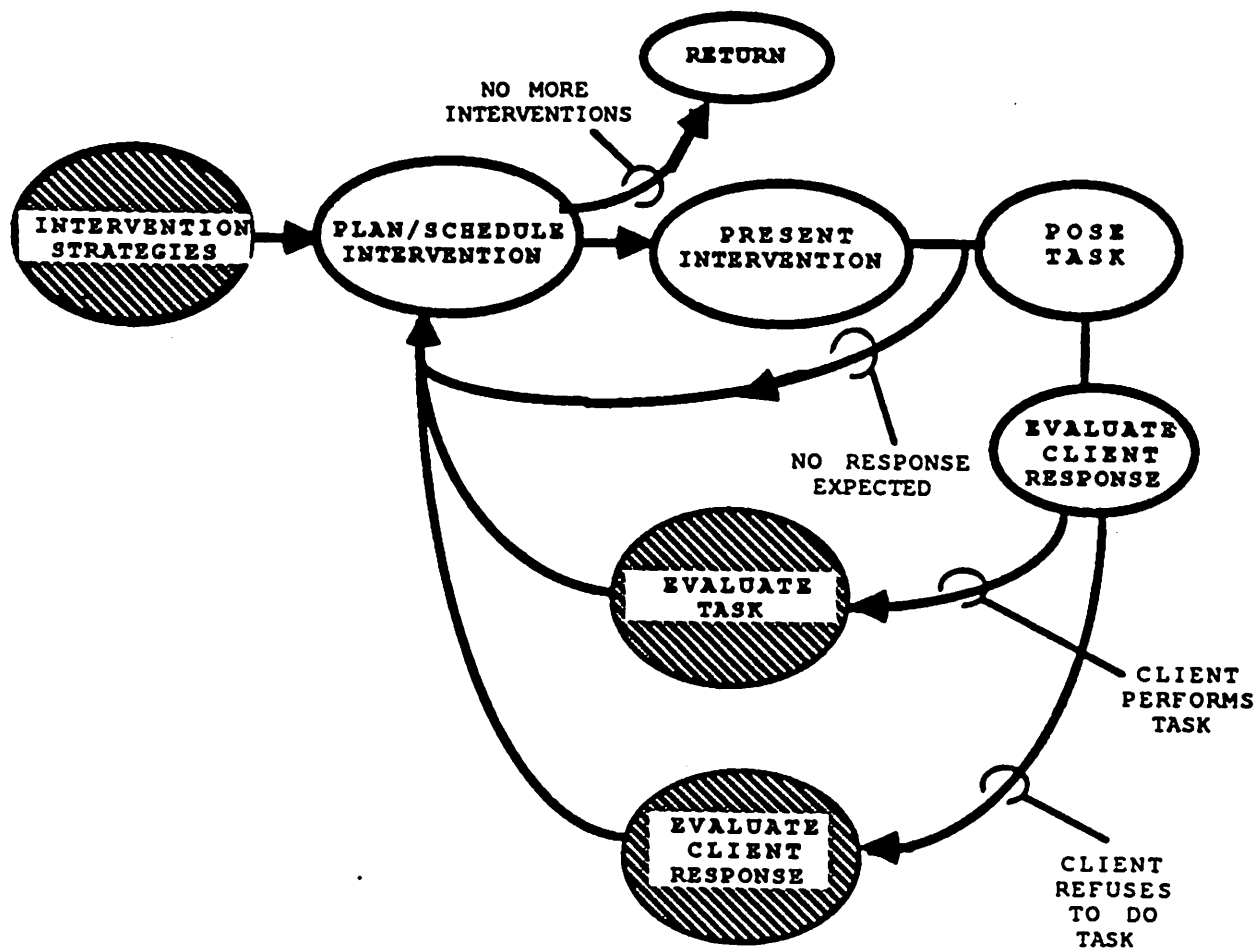


Figure 6: Discourse Management Framework

## 4 Other Consultation Systems

Several computer programs deliver psychological consultation (Servan-Schreiber [1986] provides a good review). For example, a PLATO system [Wagman, 1980] provides "dilemma counseling" for university persons. Systems by Gosh et al. [1984] and Selmi [1983] provide self-help intervention systems for phobias and depression respectively, and Shaw [1980] developed an interactive program that assists people in making explicit their constructions (views and opinions) of the world, thus enabling them to make more deliberate personal choices.

However, these systems are not intelligent in the sense that they do not tailor their responses to the personality of the individual. Such systems that tailor their responses to the individual are beginning to appear. Hedlund et al. [1987] describe an expert psychiatry system used by medical corpsmen to evaluate and suggest treatment for mental disorders. Other systems for individual tutoring are being used in industry [Woolf et al., 1986], education [Anderson et al., 1985; Shute and Bonar, 1986; Burton and Brown, 1982], and medicine [Clancey, 1982]. These systems separate domain and teaching knowledge from a model of the user.

## 5 Discussion and Status

The training system we are building makes two potentially important contributions to the learning/training experience: it increases a person's ability to become self-disciplined and organized, and it stimulates a person's self-motivation. Ability to organize one's time and resources enables a person to work with complex and sometimes conflicting responsibilities. It also enables him/her to manage stress, express intentions, and achieve self-directed behavior.

During the past year we have extracted and codified consulting advice geared specifically to personality profiles and on-line responses. The knowledge acquisition stage is complete and we are ready to move to the implementation and controlled demonstration phase, and to begin dissemination of our design process and prototype to universities, colleges, and adult learning centers. Ultimately we would also like to include a variety of interactive media in our system (e.g., videodisc, hypertext, and audio and videotape cassettes) and to include a variety of instructional strategies (e.g., case study, simulation, and collaborative learning).

The consulting knowledge was codified by the first author who is an experienced counseling psychologist and time-management workshop designer. He has a large repertoire of interviewing techniques, remedial activities, and intervention strategies which have been used with large numbers of persons over more than 15 years of counseling. In one-on-one consultation sessions and workshops, these tools have been successful in moving persons to increased self-confidence, motivation, self-esteem, and management of stress.

The second author is a skilled knowledge engineer and builder of intelligent tutoring systems. One of the completed tutoring systems she designed is in daily use in more than 60 industrial site [Woolf et al., 1986].

The structure of the TEV system is based on work in intelligent tutoring systems. Through

separate and explicit knowledge bases the system selects its teaching procedure, strategy, or tactic warranted by a presumed personality profile and the client's on-going responses to the tutor. In this way, the system borrows technologies from consultation theory and practice, intelligent tutoring systems, and psychological assessment in modeling and responding to a client.

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