Part Two

Motivation and Methods

This chapter describes the application of an instructional design process that provides methods and guidelines for incorporating motivational tactics into computer-based and distance learning environments.

Using the ARCS Motivational Process in Computer-Based Instruction and Distance Education

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It is one thing to design for learner motivation in a classroom setting where teachers or facilitators can respond to changes as soon as they sense them. It is a greater challenge to make self-directed learning environments responsive to the motivational requirements of learners. It requires both a systematic motivational design process that provides adequate guidelines and methods of incorporating feasible and effective motivational tactics into the environment, and knowledge of the dynamics of human motivation.

The ARCS model of motivational design (Keller, 1987a, 1987b) provides a systematic, seven-step approach (Keller, 1997) to designing motivational tactics into instruction. It incorporates needs assessment based on an analysis of the target audience and existing instructional materials, supports the creation of motivational objectives and measures based on an analysis of the motivational characteristics of the learners, provides guidance for creating and selecting motivational tactics, and follows a process that integrates well with instructional design and development. The analysis of motivational needs and corresponding selection of tactics are based on four dimensions of motivation. These dimensions were derived from a synthesis of research on human motivation and are known as attention (A), relevance (R), confidence (C), and satisfaction (S), or ARCS. Numerous reports and studies have described and confirmed the validity of this model (for example, Means, Jonassen, and Dwyer, 1997; Small and Gluck, 1994; and Visser and Keller, 1990).

This model has been applied to various types of learning environments, such as classroom instruction, self-paced print, computer-based instruction

(CBI), and multimedia, but these applications have been limited in scope and function. Furthermore, the full seven-step model can be time-consuming and confusing to a person who is not trained in its use. A recent development in Japan (Suzuki and Keller, 1996; Keller, 1997) provides a simplified and effective approach to motivational design and has subsequently been applied in two innovative applications to the improvement of self-directed learning. The first application was to the development of motivationally adaptive CBI (Song, 1998). In addition to incorporating the simplified motivational design approach, this application builds on concepts and approaches initiated in the United Kingdom and Italy by del Soldato and du Boulay (1995) and in Austria by Astleitner and Keller (1995). The prototype of the adaptive CBI was developed in the United States and will be cross-validated in Korea. The second application was in the student support methods for a distance learning course in Europe (Visser, 1998). It is interesting to note the multinational representation in these studies.

In Sendai, Japan, a team of twenty-five teachers in eight subject areas at Sendai Daichi Junior High School had been developing computer application projects for several years as part of a demonstration project sponsored by the Japanese national government. During the last two years of the project, they were asked to incorporate systematic motivational design into their process. Suzuki (Suzuki and Keller, 1996) developed a simplified approach to motivational design because the full seven-step model would require too much time for training and implementation. The goal of the simplified approach was to ensure that the teachers would identify key motivational characteristics in the learners, in the content area to be taught, and in the hardware or software to be used. The teachers then evaluated this information and prescribed tactics based on identified motivational problems. This process helped to ensure that teachers avoided the inclusion of excessive numbers of tactics or of tactics derived from their own preferred areas of interest without regard to the characteristics of the students and the situation.

The resulting design process is represented in a matrix (Table 4.1). In the first row, the designer lists salient characteristics of the learners' overall motivation to learn. The second row contains the designer's judgments about how appealing the learning task will be to the learners. The third and fourth rows ask about learners' expected attitudes toward the medium of instruction and the instructional materials. Each of the entries in these rows has a plus or minus sign to indicate whether it is a positive or negative motivational characteristic. Based on the information provided in these first three rows, the motivational designers decide how much motivational support is required and what types of tactics to use. They refer to reference lists of potential tactics (for example, Keller and Burkman, 1993; Keller and Suzuki, 1988) and also create their own tactics based on the identified needs.

In this example, the teacher determined that confidence is the only real problem area and he listed some specific things to deal with it. He also listed some specific tactics for the other categories, but they serve to maintain motivation instead of solving a specific problem.

Table 4.1. ARCS Motivational Design Matrix 1: Elective Unit on Using International E-mail

	ARCS Categories			
Design Factors	*Attention*	*Relevance*	*Confidence*	*Satisfaction*
Learner characteristics	Elective course, high interest (+)	High commitment (+)	Low skills in typing and in conversational English (–)	Newly formed group of students (–) but familiar teacher (+)
Learning task (Learners' attitudes toward)	New, attractive, adventurous (+)	High public interest to the Internet (+) Useful in future (+) Limited access to computers (–)	Seems difficult (–) First exposure (–)	High applicability of acquired skills (+) Exciting outcome (+)
Medium: Computer in this lesson (Learners' attitudes toward)	Interesting new use as a networking tool (+)	Familiar as a stand-alone learning tool (+)	Unstable network connection may make students worried (–)	Immediate feedback (+)
Courseware characteristics (e-mail software)			English usage (–)	Participatory for every student (+)
Motivational tactics for the lesson	Minimal tactics required: Emphasize opportunity to communicate worldwide Demonstrate immediate transmission and response features	Minimal tactics required: Demonstrate how it extends one's communication capabilities	Necessary to build confidence: Set objectives cumulatively from low to high Team teaching with an assistant English teacher Use translation software	Minimal tactics required: Provide reinforcement by receiving messages from "network pals"

A benefit of his application of this process was that in his initial motivational plan, created before he applied this process, he had a much longer list of tactics that he thought would be exciting and motivational. After doing the analysis and applying various selection criteria that are listed in the training materials on motivational design, he realized that his list of tactics would be too time-consuming and would actually distract from the students' intrinsic interest in the subject as revealed in his analysis. By using the design process, he was able to simplify the motivational design and target it to specific needs.

An evaluation of the effectiveness of this motivational design process (Suzuki and Keller, 1996) verified that the teachers were able to use the matrix

accurately, with only a few entries not being placed appropriately, and more than two-thirds felt that it definitely helped them produce a more effective motivational design. Some teachers had difficulties with the analysis phase, which indicates that this is a critical area to address in training people to use the process.

This simplified design process was modified and used in two subsequent projects. The first of these was to develop a prototype of motivationally adaptive CBI. The formal motivational design process requires an audience analysis, which influences which motivational tactics will be included in the learning environment. Learner motivation changes over time, however, and sometimes in unpredictable ways. In a classroom or other instructor-led setting, an expert instructor can continuously gauge the audience's motivational condition and make adjustments as appropriate. But in self-directed learning environments, this type of continuous adjustment has not been a feature. Once the instruction has been designed and "packaged," everyone receives the same program, with the exception of limited branching and other learner-control options. These options can have a positive effect on motivation, but they do not adequately reflect the range of motivational conditions that characterize learners at different points in time.

It would be possible to include a large number of motivational tactics to cover a broad range of motivational conditions, but this would most likely have a negative effect on motivation and performance. The reason is that when students are motivated to learn, they want to work on highly task-relevant activities. They do not want to be distracted with unnecessary motivational activities. For this reason it would be nice to have computer or multimedia software that can sense a learner's motivation level and respond adaptively.

Song (1998) designed and tested an approach to motivationally adaptive computer-based instruction. He built checkpoints into an instructional program on genetics for junior high school students. At predetermined points, students in the primary treatment group received a screen asking several questions about their motivational attitudes. Based on the responses, which were compared to actual performance levels, students would receive motivational tactics designed to improve attention, relevance, or confidence. Song used a variation of the simplified ARCS model design process to create specifications for tactics to be included in the adaptive treatment. The resulting motivation and performance of this group were compared to those of a group that received highly efficient instruction with only a minimum of motivational tactics that centered primarily on acceptable screen layout. A second comparison group received the maximum number of tactics; that is, they received all of the tactics that were in the pool of potential tactics for the treatment group.

The results indicated that both the adaptive and full-featured treatments were superior to the minimalist treatment. In most instances, the adaptive treatment was superior to the full-featured one. There were limitations on the types of computer features that could be used in this study (for example, there was no sound), but based on these results, a more sophisticated treatment and

also one that was longer than one hour would be expected to show even stronger treatment effects.

This study was a pioneering effort. Earlier papers that discussed or tested adaptive motivational design (Astleitner and Keller, 1995; del Soldato and du Boulay, 1995) were extremely rigorous but more limited in their approach; that is, they tended to focus on a particular aspect of motivation, such as persistence or confidence. Song's study is more holistic and provides a good foundation for a series of follow-up studies. One of the first of these will be a cross-cultural development and comparison to be conducted in Korea.

The second extension of the simplified design process is in distance learning (Visser, 1998) and provides another example of the multicultural nature of this work. Visser, who lives in France, conducted her research with a distance learning course offered by a university in the United Kingdom and is working under the sponsorship of her university in the Netherlands. Furthermore, her study includes an adaptation of a motivational strategy developed and validated in an adult education setting in Mozambique (Visser and Keller, 1990).

There is no doubt that there are serious motivational challenges among distance learners. The attrition rate alone can be viewed as an indication of motivational problems. Students' comments often focus on their feelings of isolation, lack of feeling of making steady progress, and great doubts about being able to finish the course given their other responsibilities and time constraints. Visser (1998) used the simplified ARCS model design process to analyze the audience, conditions, and potential solutions. Her application of this process was contextualized in two ways. First, it was restricted to a somewhat formal and traditional distance learning course that uses textual material supplemented by an occasional audiocassette or videocassette. Based on her global assessment of the motivational problems in this situation, she concluded that it might be possible to have a positive effect on motivation by focusing on the student support system rather than on the instruction, which could not be revised easily.

The second way in which her study is contextualized is in its focus on the validation of a particular motivational strategy, although it does allow for the incorporation of multiple tactics. Her approach was to implement a program of "motivational messages" that would be sent to students according to two schedules. The first schedule was a set of fixed points based on predictions of the points during the course when these messages might have the strongest effect. The messages were the same for everyone. The second schedule consisted of personal messages sent to students when the tutor deemed it appropriate. These messages were in the form of greeting cards, which conveyed messages of encouragement, reminders, empathy, advice, and other appropriate content areas.

Design of the messages was based on the results of her application of the simplified design process (see Table 4.2), in which she changed some of the specific design factors while keeping their basic intent. The first two rows contain predictions of students' entering attitudes toward distance learning in general and of what their attitudes might be after they have been in the course for

Table 4.2. Mini-Design for the Development of Motivational Messages in Distance Education Courses

	ARCS Categories			
Design Factors	*Attention*	*Relevance*	*Confidence*	*Satisfaction*
Precourse attitudes of students toward distance learning	New students: strong in the beginning (new materials/new topic), gradually diminishing as novelty wears off. Probably low level of attention for repeaters.	Decision to take the course is, most of the time, voluntary, not imposed. No big problems expected in relevance. May improve as learners apply what they have learned, or decrease if not what was expected.	A very sensitive area, as the mode of instruction is new and unfamiliar. Generally satisfactory for experienced and successful distance education learners. Repeaters anxious about pitfalls; newcomers uncertain. Also, there is no peer support.	Successful completion of the course is an important step in the direction of a degree.
Midterm attitudes toward distance learning	Initially high attention and curiosity wear off as courses are often not really exciting and sometimes even boring.	Continues to provide an interesting possibility to make a career move or to show what has been learned. Time conflicts with other activities occur.	If they are confident in the beginning, this wears off. Evaluation system is not very encouraging. No motivational support included in course. Very low level of confidence for beginners.	Reasonable, but dissatisfaction sometimes sets in. Both repeaters and new students soon disappointed about the limited interaction and about studying in isolation.
Student reactions to this course content	Initially high, but soon decreases due to lack of novelty and variation in content and learning strategies.	Course content is relevant, but too little interactivity to help students learn how to apply it. Some material is outdated.	Confidence that it can be done soon fades due to volume of work, lack of support, and lack of opportunity to see growth and application.	Remains reasonable.
Characteristics of student support during the course	Minimal, only contact is through feedback on assignments. Nothing unusual or unexpected happens.	Feedback is usually limited strictly to course content. No creative feedback to show connections to students.	Feedback is mostly worded in a positive way, but occasionally too general.	Low because of lack of meaningful and personal contact.

Table 4.2. ***(continued)***

Summary	Initial attention soon slips.	Relevance usually continues through the course, although it becomes less important.	Confidence depends heavily on results, but is generally low. This area needs extensive motivational treatment.	Satisfaction is not a big problem, or would not be if the other issues were resolved.
Examples of motivational tactics to be used in motivational messages	Bring pacing into the course and offer tutor's assistance. Use student's name and include personal comments in feedback messages. Provide an unexpected communication to students from time to time.	Provide occasional extra material such as a publication. Provide creative feedback and link feedback to learner's work and daily circumstances.	Emphasize that they can do it if effort is put into the course. Reassure the learners by showing personal interest and concern. Make them feel part of a group who are all struggling to get it done. Show empathy. Provide encouragement and personal challenges at times that are known to be low points in the term.	Make turnaround time for assignments short. Ensure that tutors are accessible. Refer to positive feelings a learner will have when the course is completed successfully. Reward early completion through complimenting learners personally.

a while. Designers' responses to these questions will come primarily from the instructor's background experiences with the target audience. The third row predicts attitudes toward the course content, and the fourth row asks about students' attitudes toward the support they receive while taking the course. Visser's fifth row is new. It provides an opportunity to summarize the results of the first four rows. In the earlier version of the matrix (Table 4.1), the summarizing comments were included with the motivational tactic recommendations in the final row. As in that version, the final row in this table contains a general summary of tactics or tactic considerations to guide the detailed design process. Visser included statements of both positive and negative features of each situation and did not use the convention of pluses and minuses.

To assess the effectiveness of this intervention, Visser compared retention rates in the experimental section of the course to three other sections that did not receive motivational messages, and she did a qualitative review of students' responses to various course evaluation and feedback instruments. She did not ask students directly about the effects of the motivational messages to avoid stimulating attitudes that may not have been present spontaneously in the students' minds. Improved retention rates of 70 to 80 percent, which are similar to conventional education, and student comments both offered clear support for the motivational messages.

These three studies have extended systematic motivational design in three directions. The first is further refinement of systematic approaches to motivational design. In this case, the simplified model provides an efficient and effective means of supporting educators in improving the motivational aspects of learning environments. It is to be stressed, however, that in each case there were one or more persons who had expert knowledge of motivational theory and application. It remains to be seen how effectively the simplified design process can be used by persons with no knowledge of the research and theory behind the four dimensions of motivation (attention, relevance, confidence, and satisfaction) or knowledge of the detailed elements of the motivational design process.

The second extension of motivational design refers to contexts of application. These studies illustrate how systematic motivational design can be incorporated into formal instructional design and curriculum development projects, how it can serve as a basis for motivationally adaptive CBI, and how it can increase student motivation and performance by improving the student support system in distance learning.

The final extension is the multicultural one. The ARCS model, together with other approaches to motivational improvement, is being used in many different countries in the world, but there are few publications that describe systematic applications. The studies in this report encompass at least five different countries in Asia and Europe and illustrate that the basic process can apply multinationally.

In conclusion, motivation, which has traditionally been viewed by many people as an "untouchable," that is, as a highly idiosyncratic and variable con-

dition, can be approached systematically. Research on motivation and motivational design shows that there are stable elements of motivation, and even some of the unstable elements are predictable. Educators can manage learning environments to stimulate and sustain motivation, even though they cannot control it. Ultimately, each human being is responsible for his or her motivational condition, but it is abundantly clear that the environment can have a strong impact on both the direction and intensity of a person's motivation.

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