Motivation in Cyber Learning Environments

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Abstract

Although the novelty and potential capability of cyber learning environments attract us, We need to address motivational problems as indicated by low completion rates. This article describes, first, issues associated with motivating students to learn in cyber learning environments. Second, the ARCS model is overviewed as a basis for systematic motivational design. Third, a simplified motivational design is described to help practitioners design attractive cyber learning environment. Finally, two recent developments are introduced: one is 'motivationally-adaptive CAI', the other is 'use of motivational messages in distance education'.

Introduction

As technology expands so do learning environments. This has been true since the invention of paper and will continue for as long as people populate the earth. As learning environments expand, we as educators face two basic phenomena. The first is the attraction of the novelty and potential capability of new technology to provide interesting, efficient, and effective opportunities for learning. The second is the fact that we, as human beings, still have the same fundamental sets of capabilities and motivational requirements that we have had for as long as we have existed. Sometimes the attraction associated with the first phenomenon leads us to forget the second one, and we develop hugely unrealistic expectations regarding opportunities made available by technological advances. We are now experiencing this problem with distance learning and other cyber learning environments where low completion rates indicate that there are large problems with motivation and/or learning design.

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In this presentation, I will describe some of the characteristics and problems associated with motivating students to learn in a set of conditions that can be characterized as "cyber" learning environments. Second, I will provide an overview of the ARCS model, which can provide a basis for systematic motivational design. Third, I will describe a simplified motivational design process that was developed in a context of computer course development, which had elements of cyber settings. And, finally, I will describe some recent developments in other cyber-related settings such as distance learning and web-based instruction.

Issues

One of the primary characteristics of cyber learning environments is that learners are typically isolated-in space if not in time. Sometimes, their feelings are probably not too different from those expressed by E. G. Valens in Part III of "Cybernaut," which he wrote in 1968 and calls "a space poem." It captures the subjective reflections that he imagines would be true of the first cybernaut; that is, a person to be sent on an exploratory manned flight into deep space.

I by nature am a human
Ill equipped
For loneliness of this
Abysmal magnitude.

Major object of the mission nonetheless is
Search
For ways of searching.
Also ··· to determine
If the searcher can survive
The search.

It is characteristic of many distance learners to feel this isolation. And, it may become an even bigger problem given the increasing requirements for learners to be more responsible for their own learning, to explore the internet and other sources of information, and to create their own representations of knowledge. It is not hard to imagine the challenges they feel in "searching for ways of searching," and wondering if they will survive the search with regard to achieving a satisfactory outcome.

Distance learners typically approach this learning environment with enthusiasm because of its convenience and the degree of personal control they expect to have. However, problems are readilly apparent by the non-completion rate. Learners report the causes of their problems as being due to boredom, lack of support whereas their need support in their isolated conditions is even greater than normal, and the lack of guidelines or incentives for staying on schedule.

In the literature, motivation is typically cited as a major cause of the problem. This is probably true, but the quality of the instructional design is also an important factor. However, the focus of this presentation is on motivation and how to improve it. 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 (1) a systematic motivational design process that provides adequate guidelines and methods of incorporating feasible and effective motivational tactics into the environment and (2) knowledge of the dynamics of human motivation. However, this process is based on some key assumptions.

Assumptions

There are three assumptions that underlie systematic motivational design. The first is that people's motivation can be influenced by external events. Even though this assumption may appear to some to be a truism, it runs counter to the operating assumption of many teachers, supervisors and managers. They often assume that it is the individual's responsibility to be internally motivated for training or work. These persons believe that unless they have direct control over extrinsic rewards such as financial incentives, they have no direct control over motivation.

In contrast, it is easy to demonstrate that effective teachers and leaders can inspire motivation by positive modeling, attention to individual behavior, and motivating feedback, while ineffective teachers or managers can kill motivation by misusing of the same opportunities. To develop motivational systems, the educator must assume that motivation is influenced by others and is not purely a

matter of self-motivation.

The second assumption is that motivation in relation to performance is a means, not an end. The goal of a motivational system is to stimulate optimal levels of productivity, not to stimulate pleasure or entertainment for its own sake. Optimal motivation for productivity means that people, in a holistic sense, derive feelings of challenge, effectiveness, importance, and satisfaction while achieving at an acceptable level. It does not mean that people are driven to maximum levels of output without regard to their personal motivational requirements.

The third assumption is that systematic design and implementation can predictably and measurably influence motivation. Teachers sometimes, maybe often, believe that motivation requires charisma. Our experience and research in motivational design provides evidence to the contrary. There are fundamental characteristics of motivation and processes for influencing them that can assist teachers in developing satisfactory levels of motivation providing that the students are not overwhelmed by non-school related stresses in their lives. In that case, there are other problems to be solved before the motivation to learn can become a primary goal in a person's life. This third assumption directly supports the purpose of this presentation, which is to describe the components and operation of motivational systems.

Overview of the ARCS Model

The ARCS model of motivational design (Keller, 1987a, 1987b) provides a systematic, ten-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. The process also 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 four dimensions were derived from a synthesis of research on human motivation, and are known as attention (A), relevance (R), confidence

(C), and satisfaction (S). 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).

Motivation and Performance

Motivation is not an isolated element in the dynamics of human performance. A motivational system consists of people, with their internal motivational characteristics, and the environment with its tactics and strategies that affect goal directed effort and affect. However, a motivational system cannot be understood nor functional without considering how it is integrated into the larger system of influences on performance. Such a macro-level representation of a human learning and performance system must include both the internal, psychological factors and the external, environmental factors that influence performance. This is based on the assumption that an adequate explanation of human behavior cannot be based solely on behavioral observations or on inferences about human affect, attitudes, and cognition, but must account for the influences and interactions of them both. The model portrayed in Figure 1 illustrates how these various factors influence performance.

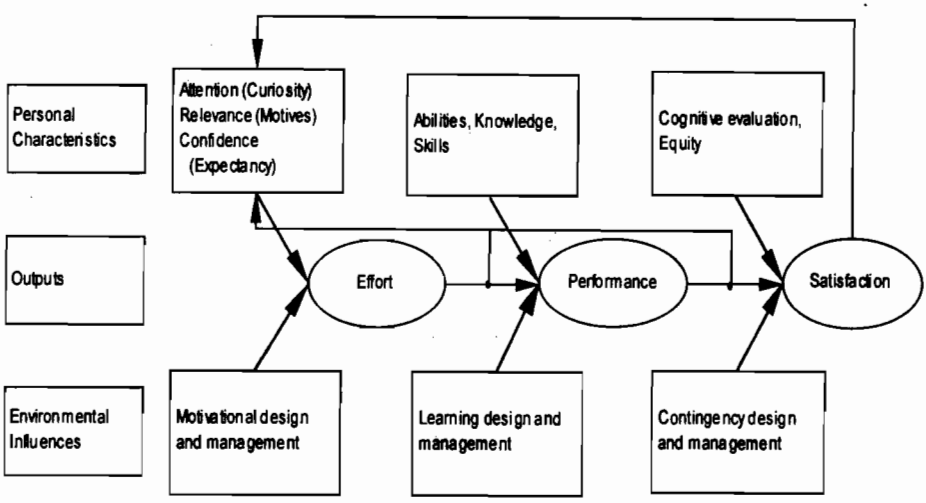

Figure 1. Macro model of motivation and performance

This systems view can help an educator diagnose a learning environment to plan the most effective combinations of motivational, instructional, and rein-

forcement tactics. Motivation is but one influence on performance, which is also affected by the learner's ability, prior knowledge, and environmental factors such as the availability of resources.

One can see from this systems view (Figure 1) that one of the influences on performance is effort, which is the primary indicator of motivation. Effort is influenced by both internal and environmental factors. Internal factors include the learner's level of attention, or curiosity, perception of personal relevance, and internal feelings of confidence, or expectancy for success. When these elements are in a positive direction, there is a greater likelihood of high levels of effort. Environmental factors refer to whether the teacher is using tactics that appeal to and enhance the learner's attention, relevance, and confidence. The absence of appropriate tactics will have a detrimental effect on effort.

Another set of influences on performance (Figure 1) consists of personal ability, prior knowledge, and existing skills. This category includes, in a broad sense, such things as native ability, cognitive strategies, cognitive style, learning strategies, and other internal capacities that affect the learner's performance.

The third set of direct influences on performance consists of environmental factors that directly affect the learner's opportunity to learn. In other words, if we assume that learners are trying to succeed and have the ability to succeed, their performance could still be low. Why? Because, for example,

- they are not given clear instructions as to what the learning task is,
- they do not know what kind of test will be given,
- they do not have enough time to master the skills,
- they are not given opportunities to practice, or
- they do not have sufficient or accurate instruments to use in an experiment.

This category of factors is called "learning design and management" because it refers to the properties of the instructional methods and resources that enable students to achieve given that they are motivated and capable.

Teachers are concerned about helping students learn new behaviors, but an equal or greater goal is that students retain and use their knowledge and skills, and that they desire to continue learning. The remaining parts of the macro model of motivation and performance (Figure 1) address this concern for con-

tinuing motivation. Following a learner's performance, a variety of consequences can occur that can be positive or negative. Environmental influences on satisfaction include positive reinforcement contingencies to reward desired behavior and the creation of strategies to enhance the learners' intrinsic motivation. The teacher must support intrinsic motivation by providing opportunities for learners to enjoy positive feelings of success at a valued task, and reward achievement with tangible consequences of success. However, as indicated in the upper right-hand corner of the model, the student also applies an internal set of evaluations to the consequences. This personal evaluation is based on perceptions of fairness, or equity. If the student believes her grade on an assignment was not fair based on the level of her effort and the quality of her results, then her satisfaction level might be low even if the actual grade was relatively high. It is the actual magnitude of the outcome combined with the student's cognitive evaluation of it that determines satisfaction.

In this system perspective, leaner motivation is an element at the beginning of the model with attention, relevance, and confidence, and at the end when the learner's evaluation of consequences results in positive or negative satisfaction. These represent the four categories of the ARCS model.

ARCS Categories

These four categories of the ARCS model represent a sets of conditions that are necessary for a person to be fully motivated, and each of these four categories has component parts, or subcategories, that represent specific aspects of motivation.

First, the instruction must gain the learner's ***attention.*** Tactics for this can range from simple unexpected events (e.g. a loud whistle, an upside-down word in a visual) to mentally stimulating problems that engage a deeper level of curiosity, especially when presented at the beginning of a lesson. Another element is variation, which is necessary to sustain attention. People like a certain amount of variety and they will lose interest if your teaching strategies, even the good ones, never change.

The second requirement is to build ***relevance.*** Even if curiosity is aroused, motivation is lost if the content has no perceived value to the learner. Relevance results from connecting the content of instruction to important goals of the learners, their past interests, and their learning styles. One traditional way to do this is to relate instructional content to the learners' future job or academic requirements. Another, and often more effective approach is to use simulations, analogies, case studies, and examples related to the students' immediate and current interests and experiences. For example, secondary school children enjoy reading stories with themes of stigma, popularity, and isolation because these are important issues at that time of their lives.

The third condition required for motivation is ***confidence.*** This is accomplished by helping students establish a positive expectancy for success. Often students have low confidence because they have very little understanding of what is expected of them. By making the objectives clear and providing examples of acceptable achievements, it is easier to build confidence. Another aspect of confidence is how one attributes the causes of one's successes or failures. Being successful in one situation can improve one's overall confidence if the person attributes success to personal effort or ability. If the student believes that success was due to external factors such as luck, lack of challenge, or decisions of other people, then confidence in one's skills is not likely to increase.

If the learners are attentive, interested in the content, and moderately challenged, then they will be motivated to learn. But to sustain this motivation, the fourth condition of motivation is required--***satisfaction.*** It refers to positive feelings about one's accomplishments and learning experiences. It means that students receive recognition and evidence of success that support their intrinsic feelings of satisfaction and they believe they have been treated fairly. Tangible extrinsic rewards can also produce satisfaction, and they can be either substantive or symbolic. That is, they can consist of grades, privileges, promotions or such things as certificates, monogrammed school supplies, or other tokens of achievement. Opportunities to apply what one has learned coupled with personal recognition support intrinsic feelings of satisfaction. Finally, a sense of equity, or fairness, is important. Students must feel that the amount of work required by the course was appropriate, that there was internal consistency between objectives, content, and tests, and that there was no favoritism in grading.

These four conditions encompass the various concepts, theories, strategies, and tactics that pertain to the motivation to learn (Keller, 1987a). They represent the first major part of the ARCS model, which is the synthesis of the vast motivational literature into a simple and useful number of macro-level concepts. They also provide the basis for the second major feature of the ARCS model which is the systematic design process that assists you in creating motivational tactics that match student characteristics and needs (Keller, 1987b).

ARCS Design Process

The ARCS model contains a ten-step design process for the development of motivational systems in work and learning settings (Figure 2). The first two steps, which are parts of the overall analysis components of the process, produce information about the status quo and provide the basis for analyzing gaps and their causes which are done in the third and fourth steps. Based on these analyses, in Step 5 one prepares objectives for the performance improvement project and specifies how they will be assessed. There are then two steps in design. Step 6 consists of brainstorming within each motivational category to generate a rich list of potential solutions. Step 7 is more critical and analytical for the purpose of selecting solutions that best fit the time, resource, and other constraining factors in the situation. The final step includes both development and evaluation, and is similar to any other development model.

Analysis. As in any systematic design process, motivational system development begins with collecting information (Steps 1 and 2) and analyzing it (Steps 3 and 4) to identify motivational characteristics and gaps which lead to objectives (Step 5). In this process, there are two difficulties in determining the degree and nature of a motivational problem. First is that problems resulting in symptoms of demotivation may not be due to motivational causes. People can become demotivated as a consequence of what is, in fact, a capability or opportunity problem. For example, people who do not have and cannot get the skills required to perform satisfactorily will soon learn that they cannot succeed to a satisfactory degree. They will develop low expectations for success, or even feelings of helplessness, and will be demotivated as evidenced by lowered levels of effort and performance. However, the cause of the problem in this example is lack of skills.

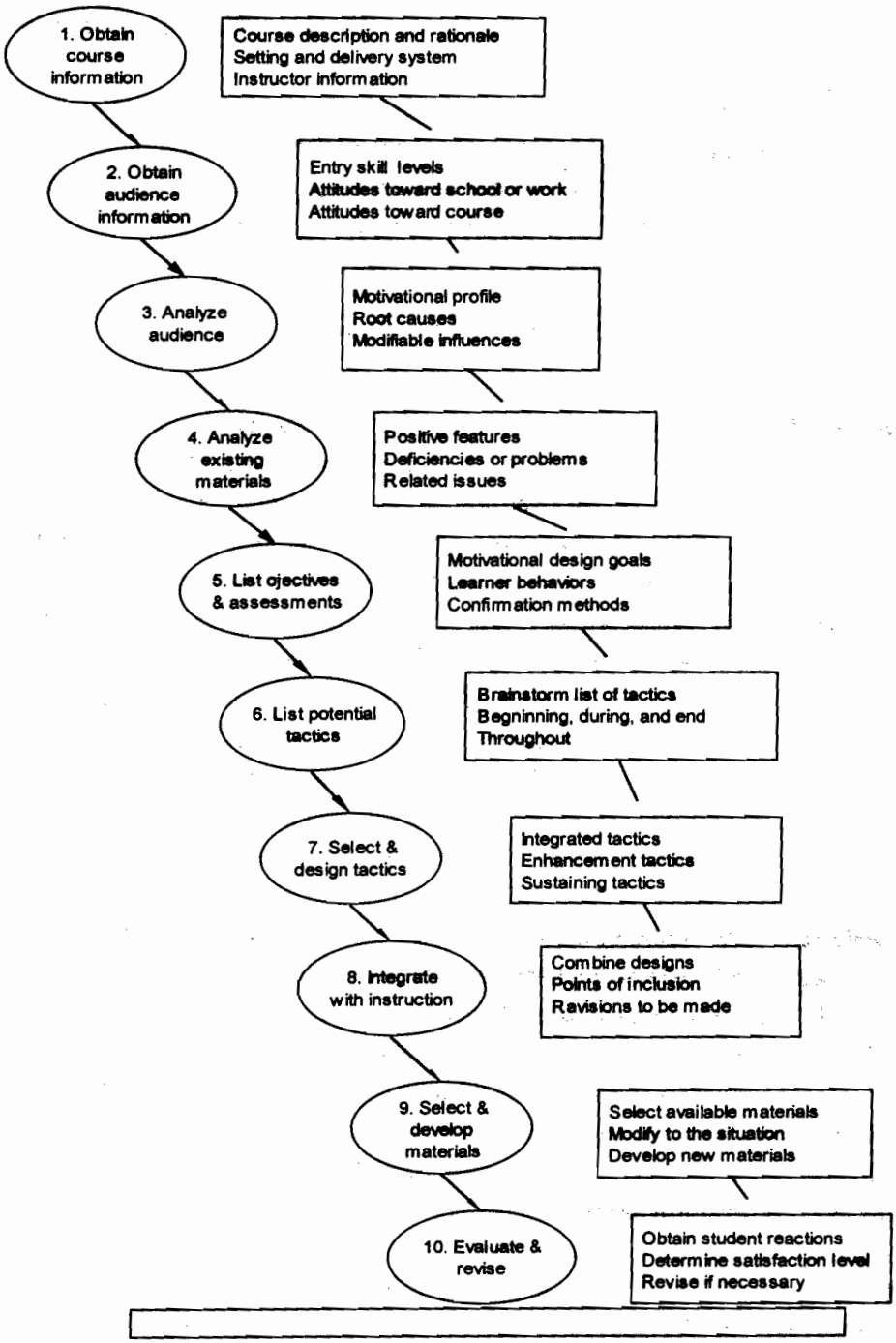

Figure 2. Steps in Motivational Design

The second difficulty in identifying a motivational problem lies in the nature of motivation. Motivation follows a curvilinear relationship with performance. As motivation increases, performance increases, but only to an optimal point. Afterward, performance decreases as motivation increases to levels where excessive stress leads to performance decrements. There is always some level of tension, or stress, associated with motivation. On the rising side of the curve it is sometimes referred to as facilitative stress and on the downside as debilitating stress.

Given that there is a motivational problem, one then classifies it according to the four categories described earlier, and determines whether the learners or employees are under-or over-motivated in each case. For example, in the case of attention, people might be demotivated because they are bored and not paying attention to the task, or because they are so over-stimulated by the job opportunity or requirements that they are trying to pay attention to too many things at once. In both cases, they do not focus their attention on the critical task, but solutions differ depending on whether the cause is under-or over-stimulation. Comparable problems occur in the other categories of motivation and require tactics to modify learner motivation into a more productive range.

In conducting motivational analysis, it is important to identify the nature of motivational gaps in these terms, and to realize that the problems might be different in one subgroup or individual than in another. It is also important to identify the presence of any positive motivational factors. A motivational system has to be capable of solving motivational problems, but it also has to sustain desirable levels of motivation. The output of analysis indicates where there are motivational gaps to be closed and where satisfactory levels of motivation need to be sustained rather than changed.

Design. In motivational design (Figure 2, Steps 6-8), it is best to work on specifically defined problems. This needs to be stated because it can be more of a problem in motivational design than in some other performance areas. Often, people will try to deal with the global issue of how to improve motivation by adopting a global solution, such as a new set of curriculum materials or an entirely new approach to teaching. This approach may be successful for awhile, but after the novelty wears off, the old motivational problems tend to re-emerge.

After choosing a specific problem to solve, the primary task in the first design step (Step 6) is to brainstorm possible solutions. At this point, all potential solutions should be listed without regard to their presumed feasibility. The goal, as in any brainstorming process, is to produce as many ideas as possible.

The second task (Step 7) is to define the ideal solution without regard to constraints. The ideal solution might be constructed from several of the specific suggestions that were made during the brainstorming process, or it might emerge as a new idea from the stimulation provided by brainstorming. An important element at this point is to not worry about expense, organizational policies, or other constraints that might inhibit the discovery of an ideal solution.

Then, in Step 8, one selects the most feasible tactics listed in Step 7 and integrates them into a motivational system. The reason for making this a multi-step process is that Step 6 encourages one to envision, without restraint, all potential solutions, including those that might initially seem to be too grandiose or "ideal." By so doing, one is more likely to approximate an ideal than if one had narrowly focused from the beginning on the first possible solution. In Step 7 of the process, one creates the best possible solutions by combining ideas from step 6 and by applying several selection criteria pertaining to expense, policy, acceptability, and proportionality (the motivational activities should support the learning goals, not distract from them).

Development and evaluation of the solutions, which occurs in Steps 9 and 10, follow the same process that one would employ for any other area of application. The first activity is to prepare a plan of work for writing, media development, developmental reviews, and preparations for implementation. As with any effective system development activity, it is important to have motivational tactics and strategies well integrated with other system components. For example, tactics such as case studies at the beginning of a lesson can be a total waste of time if they do not meet specific needs of the audience and help prepare them for the topics and objectives of the course. Audience evaluation provides the means for determining the effectiveness of the tactics.

This design process is comprehensive and effective, but it has two limitations. First is that it requires that the motivational designer have quite a bit of knowl-

edge of the different motivational factors represented by the four categories and all the subcategories. Second, it can be time consuming to implement all the steps. In situations where there are serious motivational challenges, or when it is highly critical to maximize the motivational effectiveness of a lesson or course, then the full ten-step process can be the best approach to follow. But, in many situations these conditions are not met. With teachers or instructional designers who have little or no formal knowledge of motivational concepts and principles, or in settings where a quick approach can result in adequate improvements, it would be good to have a simpler model. Such a model has been created and tested in several cyber-related learning environments.

A Simplified Approach

A recent development in Japan (Suzuki and Keller, 1996; Keller, 1997) provides a simplified and effective approach to motivational design, and it has subsequently been applied in innovative applications to the improvement of self-directed learning in two additional cyber-related environments. The first was in the development of motivationally adaptive computer-based instruction (Song, 1998). 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 25 teachers in 8 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, the content area to be taught, and the hardware or software to be used. The teachers then evaluated this information and prescribed tactics based on identified motivational problems. This process helped ensure that teachers avoided the inclusion of excessive numbers of tactics, or 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 1). In the first row, the designer lists salient characteristics of the learners' overall motivation to learn. The second row contains the designer's judgements 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 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, 1992; Keller and Suzuki, 1988) and also create their own 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.

A benefit of his application of this process was that in his initial motivational plan, 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.

Table 1. ARCS motivational design matrix 1: elective unit on using international e-mail

DESIGN FACTORS	ARCS CATEGORIES			
	Attention	Relevance	Confidence	Satisfaction
LEARNER CHARACTER-ISTICS	Elective course, High interest(+)	High commit-ment(+)	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 applica bility 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 connec-tion may make students worried(−)	Immediate feedback(+)
COURSEWA-RE CHARAC-TERISTICS (E-mail software)			English usage (−)	Participatory for every students(+)
MOTIVATION-AL 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 communi cation capabil ities	Necessary to build confide nce: -Set objectives cumulatively from low to high -Team teaching with an Assista nt English Teacher -Use translation software	Minimal tactics required: Provide reinfor cement by receiving messages from "network pals"

Application in Motivationally-Adaptive Instruction

This simplified design process was modified and used in two subsequent projects. The first of these was to develop a prototype of motivationally adaptive computer-based instruction. The formal motivational design process requires an audience analysis which influences which motivational tactics are included in the learning environment. However, learner motivation changes over time, and in sometimes 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 multi-media software that can sense a learner's motivation level and respond adaptively.

Song (1998) designed and tested an approach to motivationally adaptive 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. He 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

was compared to 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 a more sophisticated treatment and also one which was longer than one hour would, based on these results, 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.

Application in Distance Learning

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. Student 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 was its restriction to a somewhat formal and traditional distance learning course, which uses textual material supplemented by an occasional audio or video cassette. 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 easily revised.

The second way in which her study is contextualized is 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" what would be sent to students according to two schedules. The first was a set of fixed points based on predictions of the points during the course when these messages might have the strongest effect. These 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 (Table 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 about what their attitudes might be after they have been in the course awhile. Designers' responses to these questions will come primarily from 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 (Table 1), the summarizing comments were included with the motivational tactic recommendations in the final row. As in the previous sample (Table 1), the final row contains a general summary of tactics or tactic considerations to guide the detailed design process. Visser included statements of both

Table 2. Mini design for the development of motivational messages in distance education courses

DESIGN FACTORS	ARCS CATEGORIES			
	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 washes 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.
Summary	Initial attention is soon slipping	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 turn-around 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.

positive and negative features of each situation and did not use the convention of plusses and minuses, To assess the effectiveness of this intervention, she 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 student responses to various course evaluation and feedback instruments. She did not ask them 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%, which are similar to conventional education, and student comments both offered clear support for the motivational messages.

Application in Web-Based Instruction

Motivational challenges in web-based instruction include those that are characteristic of both distance learning in general and computer-based instruction if the web instruction includes tutorials. This means that students normally have to work for long periods without social reinforcement and have to be able to learn effectively from text and graphics. Many people require multi-modal interaction to learn effectively. That is, they like to hear the content and discuss it in addition to or instead of reading it.

Consequently, the motivational challenges in web instruction fall into three broad categories. This first is learning environment design. In web-based instruction, it is desirable to include all of the features that are known from previous research in computer-based instruction and other self-directed learning research. These include basic principles of instructional design such as clearly describing the goals and content of the instruction, providing concrete examples, and application exercises with feedback. Exercises are especially important because they provide the only means for students to know if they are mastering the material.

From a motivational perspective, the learning environment must have features that both get and sustain student attention. To "re-energize" the students from time to time, it is necessary to provide variation in sequencing and types of activities, and to include unexpected features, such as "pop-up" windows with

interesting facts or anecdotes about the content. The relevance and confidence dimensions are also critical because of the isolation of the student and the student's temptations to avoid the lesson in favor of other more immediate demands of their lives.

A second category of challenges is student support. This can be in the form of instructor-student interactions and student-student interactions. In addition to the problems and techniques described above in relation to the Visser (1998) study which focused on instructor-student interactions, it is helpful to provide opportunities for students to interact via the web. This can be in the form of collaborative learning projects, reviews of each others work, discussions of course-related matters such how to approach a given assignment, locations of resources, or dialogs about given issues. All of these things can help learners feel less isolated and create a social demand for participation.

The third area of challenge is developing and supporting students' self-motivation. It can be helpful to acquaint students with the concepts of self-motivation and self-regulation, and to provide tactics that support these motivational perspectives. For example, one might include a goal-setting activity in web-based instruction that asks students to reflect on (1) their goals, (2) factors that will assist them in sustaining their motivation, (3) motivational obstacles that they will encounter, and (4) how they will overcome the obstacles. This type of thinking is characteristic of people who are high in need for achievement and has long been used in achievement motivation workshops. It seems to be particularly applicable in this setting.

In summary, web-based instruction, which is currently popular and offers much promise for extending new opportunities for delivering and receiving instruction, also contains numerous motivational challenges. However, these problems seem to be very similar to those traditionally encountered in distance learning and other forms of self-paced instruction. A benefit of web-based instruction is the potential for high levels of interaction with an instructor and other students. Careful design that incorporates both instructional and motivational components are critical to success in this medium.

Conclusion

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