

John M. Keller

A Significant Contributor to the Field of Educational Technology

Greg Francom
Thomas C. Reeves

...motivational design aims to enable the dream of educators, other behavioral change agents, and managers of human performance to stimulate and sustain people's efforts to make positive changes in their lives. More specifically, it refers to the process of arranging resources and procedures to bring about changes in people's motivation. Consequently, motivational design is concerned with connecting instruction to the goals of learners, providing stimulation and appropriate levels of challenge, and influencing how the learners will feel following successful goal accomplishment, or even following failure. (Keller, 2009, p. 22)

John M. Keller has been central in helping educational technology refocus on motivation as an important element of any learning situation. Reacting to inadequacies in both behaviorist and cognitive theories of learning to account for learner motivation, Keller developed a comprehensive motivational model that synthesized and integrated prior motivation theory, research, and practice. Concluding that motivation was educational technology's neglected "heart" (Shellnut, 1996), Keller (1979) created an enhanced theoretical foundation for explaining learner motivation, a concise and accessible list of motivational concepts and strategies, and a systematic motivational design model for improving motivation to learn. His ARCS model (Attention,

Relevance, Confidence, and Satisfaction) is a central reference for many efforts to improve learner motivation. Recently, Keller (2009) has built upon his previous work to develop an integrative theory of motivation, volition, and performance to better explain the dynamic interrelationships between motivation, learning, and achievement.

Brief Biography

After graduating from high school in 1956, John Keller briefly attended college and then joined the marines in 1957. Keller was assigned to an aviation wing, responsible for flight simulator procedures. After his military service, Keller enrolled in college and graduated with a bachelor's degree in Philosophy with a minor in English from the University of California, Riverside in 1965. In 1971, after six years of teaching high school in California, Keller began his doctoral studies at Indiana University. He completed his Ph.D. in 1974 with a major in instructional systems technology and minors in organizational behavior and research and evaluation. Keller's dissertation focused on locus of control and learned helplessness, constructs which were foundational for his interest in motivation (Keller, Goldman, & Sutterer, 1978).

After receiving his Ph.D. in 1974, Keller became an assistant professor in the Area of Instructional Technology at Syracuse University. While at Syracuse, Keller consulted for a variety of business, education, and government clients on learning and instructional issues, and began developing ideas on motivation in learning situations, which would ultimately lead to the ARCS model of motivational design (Keller, 1979, 1983). While at Syracuse, Keller became an Associate Professor in 1979, and served as Chair of the Division of Instructional Design, Development, and Evaluation for the Syracuse University College of Education from 1983–1984.

In 1985, Keller accepted a position at Florida State University (FSU) as Associate Professor of Instructional Science and Technology. He became a full Professor in 1988 and also served as a Program leader for the Instructional Systems Program at FSU from 1990–1992 and 1996–2003. In the first years at FSU, Keller continued to publish seminal works on the ARCS model of motivation and conduct research on its use (Keller, 1987a, 1987b; Visser & Keller, 1990). He also continued to provide consultation on a variety of business, government, and academic learning issues for clients, including IBM, the Florida Department of Education, Citibank, the Federal Aviation Administration, and Samsung Corporation. Throughout his career, Keller has continued to focus on research, theory, and practice in the area of motivation. Currently, Keller is a Professor at FSU's Department of Educational Psychology and Learning Systems, where he is recognized as an outstanding teacher, incorporating many of the elements of his ARCS model into his teaching practices. Professor Keller has mentored numerous graduate students at both Syracuse and FSU.

Keller has received many awards, including the Outstanding Young Researcher Award from the Association for Educational Communications and Technology in 1975, Encore Presenter at the National Society for Performance and Instruction in 1987 and 1989, best article of the year in *Performance & Instruction*, 1989, Instructor of the Year,

Greg Francom is a Ph.D. student in the Learning, Design, and Technology Program at the University of Georgia. **Thomas C. Reeves**, a Contributing Editor, is Professor Emeritus of Learning, Design, and Technology at the University of Georgia. Correspondence concerning this article should be sent to Greg Francom at: greg.francom@gmail.com.

1989–1990, at Florida State University, and a Distinguished Alumnus Award in 1992 from the Instructional Systems Technology Program at Indiana University. Professor Keller has published four books, scores of book chapters and refereed journal articles, and has been an active participant and presenter in organizations such as the Association for Educational Communications and Technology, the International Society for Performance Improvement, and the American Educational Research Association.

Major Contributions

Keller is best known for his work on motivation to learn. His ARCS model (Keller, 1987a, 1987b) was a reaction to inadequate attention to learners in instructional settings and more specifically the lack of understanding about how to influence motivation to learn (Keller, 1979). Keller (1983) criticized instructional design models as overly focused on consequences and stimuli in the environment and showed that ultimately behavior is a function of the person and the environment. Keller referred to his work on the motivational design of instruction as a macro-theory, combining a wide range of theoretical bases derived from social learning theory, field theory, self-efficacy theory, and other motivational theories (Keller, 1983). Prior to Keller's work, there was no comprehensive theoretical framework that could fully explain or illustrate how to foster learner motivation (Keller, 1979). The goal of Keller's work has been to provide an enriched theoretical basis for understanding motivation in learning, offer an overview of motivational concepts found in research and practice, and provide systematic ways to positively influence learner motivation (Keller, 1983, 1987a).

Keller's careful synthesis of theory and practice yielded the ARCS model (Keller, 1987b), which provides: (a) four main motivational concepts and instructional strategies within each concept; and (b) a model for analyzing, designing, developing, and evaluating motivational strategies in an instructional situation (Keller, 1987b). The ARCS model asserts that learners have individual differences with regard to motivation, which should be taken into account if possible (Keller, 1983).

As illustrated in **Figure 1**, the four main motivational concepts in the ARCS model are Attention, Relevance, Confidence, and Satisfaction. Attention refers to directing and sustaining learners' attention to appropriate learning materials.

Keller offers several strategies for gaining and sustaining learner attention, including creating incongruity or conflict in information or events, expressing examples and visuals in concrete ways, varying presentation, media, format, and interaction styles, introducing humor in a lesson, supporting inquiry, and requiring learner participation (Keller, 1987b).

The Relevance concept of the ARCS model deals with the perceived relevance of subject matter to learners. Strategies for increasing the perceived relevance of subject matter include relating what is being learned to learner prior interest or experience, stating the present worth of the subject matter, relating subject matter to future experiences that learners may have, matching student needs to instructional strategies, modeling enthusiasm for the subject matter, and providing learners with meaningful choices

Motivational Concept	Motivational Strategies
Attention	<ul style="list-style-type: none"> • Incongruity and conflict • Concreteness • Variability • Humor • Inquiry • Participation
Relevance	<ul style="list-style-type: none"> • Experience • Present worth • Future usefulness • Need matching • Modeling • Choice
Confidence	<ul style="list-style-type: none"> • Learning requirements • Difficulty • Expectations • Attributions • Self-confidence
Satisfaction	<ul style="list-style-type: none"> • Natural consequences • Unexpected rewards • Positive outcomes • Negative influences • Scheduling

Figure 1. Motivational concepts and strategies (Keller, 1987b).

for learning (Keller, 1987b).

The Confidence concept in the ARCS model refers to a learner's level of confidence that he or she will succeed. Highly confident individuals may decide to persist in learning, while those with low confidence may easily give up. Keller (1987b) suggests making learning requirements clear to students, organizing materials to gradually increase difficulty level, helping learners to expect success, attributing learner success to effort, allowing learners to become more independent in learning activities, and practicing tasks in realistic settings as strategies to increase learner confidence.

The Satisfaction concept in the ARCS model refers to how learners feel about their accomplishments. Satisfaction deals with appropriately rewarding learning performance based on extrinsic and intrinsic motivation. Satisfaction strategies include providing positive natural consequences for learning, providing students with unexpected rewards for learning, giving learning feedback and praise, avoiding negative influence on learning, and scaffolding the frequency of reinforcements based on learner experience with a task (Keller, 1987b).

In addition to the motivational concepts, the ARCS model provides a motivational design process that can be used to help improve the motivational appeal of instruction and address motivational problems. As illustrated in **Figure 2**, this process has 10 steps in its latest version, focused on motivational design of instruction (Keller & Suzuki, 2004). This motivational design process features analysis, design, development, and evaluation phases.

Analysis	Step 1: Obtain course information	Course description and rationale Setting and delivery system Instructor information
	Step 2: Obtain audience information	Entry skill levels Attitudes toward school or work Attitudes toward course
	Step 3: Analyze audience	Motivational profile Root causes Modifiable influences
	Step 4: Analyze existing materials	Positive features Deficiencies or problems Related issues
	Step 5: List objectives and assessments	Motivational design goals Learner behaviors Confirmation methods
Design	Step 6: List potential tactics	Brainstorm list of tactics Beginning, during, and end Throughout
	Step 7: Select and design tactics	Integrated tactics Enhancement tactics Sustaining tactics
	Step 8: Integrate with instruction	Combine designs Points of inclusion Revisions to be made
Development	Step 9: Select and develop materials	Select available materials Modify to the situation Develop new materials
Evaluation	Step 10: Evaluate and revise	Obtain student reactions Determine satisfaction level Revise if necessary

Figure 2. The ARCS motivational design process (adapted from Keller, 2008).

In the Analysis phase (steps one through five), motivational gaps are determined in both the instruction and the students. Step one involves gathering information about the course, including reviewing the course description, delivery system, and instructor. Step two involves obtaining audience information, including entry skill levels, attitudes toward school/work, and attitudes toward the course in particular. These elements of the model provide the motivational designer with a baseline to further analyze learner motiva-

tional levels and needs (step three). Analyzing the audience (step three) should lead to a description of the motivational problem that must be addressed. Step four, analyze existing materials, involves determining the motivationally positive and deficient features of current instructional materials. The combination of learner motivation analysis and existing materials analysis should help the motivational designer determine gaps in the motivation between desired and existing motivational states and their causes. The final step in the Analysis phase of the ARCS motivational design process includes listing objectives and assessments. This step yields a list of motivational objectives for a course and enables building assessment tools aligned with the objectives.

The Design phase of the ARCS motivational design process has three steps that involve the designer in selecting, designing, and integrating motivational tactics. In step six, the designer makes a list of different tactics that could be used to fill learner and instruction motivational gaps (as determined in the analysis phase). In step seven, the designer chooses tactics from among those listed that are appropriate to the situation, including tactics for integrating, enhancing, and sustaining motivation in a course or curriculum. The potential and selected tactics (steps six and seven) are strategies that can be chosen from the motivational concepts in the ARCS model (strategies to enhance attention, relevance, confidence, and satisfaction). The last step of the design phase (step eight) is to integrate the chosen motivational tactics into the instruction. This process of integration might involve combining motivational design elements with instructional design elements and revising the original instruction.

The Development phase of the ARCS motivational design process includes selecting and developing motivational materials (step nine).

In the Evaluation phase, the motivational designer evaluates and revises the motivational design (step ten). This is done by obtaining student reactions to the new motivational design and determining student satisfaction level. This information can be used to inform any necessary revisions to the motivational design.

Much of Keller's work after the creation of the ARCS model has focused on validating the model in differing situations as a way to improve the motivational appeal of instructional materials and improve learner motivation. The ARCS model has been used and validated in many geographically and culturally diverse settings (Keller & Suzuki, 2004). It has been applied in distance education and online learning (Keller, 1999), computer assisted instruction (Song & Keller, 2001), multimedia learning (Deimann & Keller, 2006), and in a variety of other settings and technologies (Keller & Suzuki, 2004).

Conclusion

In addition to the specification of concise motivational concepts and a motivational design model, Keller continues to contribute to the field of educational technology. For example, his seminal 1983 chapter on the motivational design of instruction has been cited more than 750 times in refereed journals, magazines, books, dissertations, and other publications. His most recent work moves toward the

creation of a model of learning that takes into account motivation, volition, and performance (Keller, 2009). This work represents an attempt to combine environmental and psychological influences on learners to better explain the dynamic interrelationships between motivation, ability to sustain action toward a goal, and performance in learning settings (Keller, 2008).

Keller's work continues to be a major influence in the field of educational technology in business and industry, academia, and government. Undoubtedly, the ARCS model of motivational design, combined with his new theory of motivation, volition, and performance, will continue to influence practitioners and researchers concerned with motivation to learn for many years to come. □

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