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AUTHOR Small, Ruth V., And Others
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ABSTRACT

Stimulating interest and reducing boredom are important goals for promoting learning achievement. This paper reviews previous research on interest and boredom in educational settings and examines their relationship to the characteristics of emotion. It also describes research which seeks to develop a model of learner interest by identifying sources of "boring" and "interesting" learning situations through analysis of learners' descriptions. Participants in the study were 512 undergraduate and graduate students from two universities. Descriptive responses were elicited from 350 students through brainstorming sessions on past learning experiences. The remaining 162 students answered written questionnaires. The students who completed the questionnaire also undertook subjective evaluation by completing two Likert-type scales rating their "boring" and "interesting" learning situations and emotions during those situations. Responses were categorized using Keller's ARCS Model motivation components--Attention (A), Relevance (R), Confidence (C), and Satisfaction (S)--and also grouped by where respondents felt the responsibility lay for the learning situation--instructor, learners, materials. or environment. One interpretation of the results indicates that feelings of pleasure and arousal are linked to generating and sustaining current learning interest. Competence and self-determination, on the other hand, are more closely related to fostering a continuing motivation to learn. The major findings include: (1) colorful instruction that incorporates a variety of attention-gaining and maintaining strategies appears to be the most effective way to generate interest and prevent boredom; (2) instruction that incorporates surprise, novelty, and variety may help reduce predictability, which appears to promote learning boredom; (3) instructional materials that do not capture students' attention and are not relevant to content and goals of the instruction may promote boredom; and (4) instructors are perceived by learners as having the prime responsibility for learner interest or boredom. (Contains 49 references.) (SWC)

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Dimensions of Interest and Boredom in Instructional Situations

Authors:

Ruth V. Small, Associate Professor
Syracuse University

Bernard J. Dodge, Professor
San Diego State University

and

Xiqiang Jiang, Doctoral Student
Syracuse University

Abstract

Keller (1983) has described motivation as "the heart" of our understanding of how to design effective instruction. Stimulating interest and reducing boredom are important goals for promoting learning achievement. This article explores boredom and interest in educational settings, examines their relationship to the characteristics of emotion, and describes the results of a research study intended to identify motivating factors and their sources in education.

Introduction

Much of the literature on instruction and learning focuses on cognitive outcomes that support one theory or another. Even though a learner's attitudes and motives can affect the results of even the most carefully planned and executed instructional intervention and continuing motivation has been called *the* major educational outcome of significance" (Sorensen & Maehr, 1976), educational researchers seldom examine the motivational antecedents and outcomes of learning (Engelhard and Monsaas, 1988). As a result, we know much more about the cognitive elements of instruction than about learners' feelings of involvement and enjoyment (Dodge, 1980).

Motivation is what Keller (1983) calls "the heart" of our understanding of how to design effective instruction. White (1959) wrote of an innate need to feel effective, while Deci (1975) described motivation as a need to feel competent and self-determining. Both of these needs were used to explain why we do things that have no subsequent extrinsic rewards, why we are interested in some activities for their own sake. Furthermore, emotional factors (combined with motivation, ability, and personality factors) have been found to contribute to learning and performance (Boyle, 1983). One possible explanation for the lack of substantive research is the multifaceted nature of learner motivation.

This article (1) examines the research on interest and boredom, (2) explores interest and boredom as emotional states, (3) describes some motivational elements and sources of boring and interesting learning situations through analysis of learners' descriptions, and (4) examines the attributions for those descriptions.

Interest and Boredom

Interest encompasses curiosity, engagement, and arousal (Berlyne, 1963). Sorensen & Maehr (1976) describe interest as the basis for the continuing motivation to learn. Keller (1983) links interest to the arousal and sustaining of a learner's curiosity. Malone (1981) asserts that intrinsically motivating environments depend on how well they continue to arouse and satisfy our curiosity.

Keller's ARCS Model of Motivational Design (e.g. 1987) designates four factors (Attention, Relevance, Confidence, Satisfaction) as critical preconditions to a learner's motivation to learn. Keller defines attention as a broad term encompassing interest and curiosity. The ARCS Model has as its foundation expectancy-value theory—that motivation is predicated on the importance (value) of the task and the perceived ability to achieve it (expectancy for success). There is evidence that the Attention and Relevance factors contribute to the valuing of a learning task while the Confidence and Satisfaction factors contribute to the learner's expectation for learning success (Small & Gluck, 1994). The ARCS Model is the only instructional design model to examine learner interest and prescribe a range of instructional strategies that promote it.

Duffy (1972) found links between reported interest and value. He found that not only did adolescents claim greater interest in what they found valuable, but they also asked more questions and learned and remembered more. Arnone & Small (1995) theorize that without learner attention and interest, there can be no relevance, confidence, and satisfaction potential. They reason that a lack of learner interest results in failure to pay attention to instruction and, therefore, none of the other motivations could emerge. They perceive learner interest, specifically curiosity, as a foundation of motivation.

Damad-Frye & Laird (1989) concede that as an emotion, boredom shares many of the same processes as other emotions (e.g. happiness, anger). Berlyne (1960) and others (e.g. Fiske & Maddi, 1961; Geiwitz, 1966) agree with Damad-Frye & Laird's contention that the basic element of boredom behavior is the "struggle to maintain attention"

(p. 316) and define boredom as "a metacognitive judgement about one's attentional activity" (p. 320). When learners are bored, they pay less attention, resulting in lower retention and less ability to apply information.

Berlyne (1960) describes boredom as a state that occurs when external stimuli are excessively scarce or monotonous, or what Keller (1987) might describe as "a lack of perceptual arousal." Robinson (1975) found that monotony and repetition were perceived major causes of boredom. Bernstein (1975) provides one view of boredom as "a feeling, an affective response to an appropriate external situation" (p. 513). Fenichel (1951) claims that boredom arises "when we must not do what we want to do or must do what we do not want to do" (p. 359). Marsh (1983) found that students engage in certain behavioral patterns simply to mask their boredom and attempt to appear interested. Boredom may also be a result of information underload—too little information that is interesting or information overload—too much information that is not interesting (Klapp, 1973).

However, boredom, like interest, is a complex feeling state in which inattention may only be one dimension. Perkins & Hill (1985) found that although boredom was not significantly correlated with "meaningless stimulation," the term "meaning" may have been interpreted differently by different subjects; i.e., a stimulus might be "meaningful" if it is perceived as *relevant* to the perceiver's motive satisfaction or frustration. Dodge's (1981) "Boredom Analysis Flowchart" provides some links between boredom and instruction that is too complex, too difficult, and/or too detailed. The result may be lack of *confidence* and feelings of incompetence. Farmer & Sundberg (1986) found, among other things, a negative relationship between boredom and life *satisfaction*. All of these infer a relationship between interest (or attention) and the other ARCS components.
Both pleasantness and self-determinism may also be conditions of interest, while lack thereof may point to conditions of boredom (Kopp, 1982). Kopp's first step for designing boredom out of instruction is to analyze the potential for arousal, pleasantness, and self-determinism. He recommends instructional strategies such as novelty, surprise, incongruity, and uncertainty as anti-boredom strategies.

The Study of Emotion

For much of this century, psychologists tended to avoid the empirical study of emotion. There were three reasons for this avoidance: 1) behavioral scientists tended to view emotion as a unitary, global concept, which made operationalization difficult; 2) stimulus-response drive-reduction principles dominated psychology; and 3) there was no adequate theory dealing with separate and distinct emotions, each definable as a construct that could be studied by specified and repeatable operations. As a result, the realm of emotion remained a relatively unexplored territory (Izard, 1971).

When emotion was discussed within theories of motivation and behavior, it was often regarded as unidimensional. Hedonistic theories of motivation tended to view emotion along a single continuum of pleasantness-unpleasantness (e.g., McClelland, Atkinson, Clark, and Lowell, 1953). Activation theorists redefined emotion as arousal, varying along a sleep-tension dimension. One even advocated abandoning the term "emotion" altogether (Duffy, 1962).

One aspect of emotion that lent itself to scientific study was the area of facial expressions. Typical experiments involved the rating of paired photographs of an actor displaying a range of emotions. In those studies, two dimensions appeared: Pleasant-Unpleasant, and Sleep-Tension (Schlosberg, 1954; Gladstones, 1962). A third dimension sometimes appeared in such studies, but it was usually weak and difficult to interpret. Abelson and Sermat (1962) concluded that a two-dimensional model adequately accounted for differences in facial expression.

In contrast to studies of facial expression, research on verbal reports of emotion has often shown a three-dimensional structure. Izard (1972), for example, gave subjects the names of the eight fundamental emotions (fear, shyness, interest, distress, anger, guilt, joy, and surprise) in his typology and asked them to recall a situation in their lives in which each emotion was strongly experienced. For each situation, subjects also filled out a rating scale which asked them how active, deliberate, tense, impulsive, controlled, self-assured, extraverted, and pleasant they felt.

Analysis of the ratings showed that the Pleasantness, Tension, and Self-Assurance dimensions were the best combination to distinguish the eight emotional situations. Joy, for instance, was characterized as being high in

Pleasure and Self-Assurance, and low in Tension. Izard concluded that the three dimensions of Pleasure, Tension, and Self-Assurance represent the underlying structure of subjective experience of which emotion is one aspect.

In another attempt to uncover the dimensions of emotion, Bush (1973) asked subjects to rate pairs of emotional adjectives (e.g., sleepy, outraged, delighted) on a 10-point similarity scale. The ratings were analyzed by multidimensional scaling analysis. Three dimensions emerged: the first two were Pleasantness-Unpleasantness and Level of Activation. These are similar, if not identical to the Evaluation and Activity dimensions found in semantic differential research, (Osgood, Suci, & Tannenbaum, 1957), as well as to factors found in studies of facial expression.

Bush (1973) labeled the third factor found in his study "Aggression," though he noted that the scale was not easily interpreted. At one end were adjectives like "outraged" and "delighted," while at the other were "sympathetic," "needed" and "desperate." He concluded that this dimension was closely related to the Potency scale of the semantic differential and, more specifically, seemed to refer to interpersonal potency.

Additional support for a three-factor model of emotion comes from work by Mehrabian and Russell (1974) in the field of environmental psychology. Based on previous research, they theorized that the emotional response to an environment can be described along the dimensions of Pleasure, Arousal, and Dominance, in parallel to Evaluation, Activity, and Potency (Osgood, Suci, & Tannenbaum, 1957). They constructed an 18-item measure based on these factors and used it both as a measure of personality and as a state measure of emotional response. As they predicted, the measure was found to relate to measures of anxiety (high Arousal, low Pleasure and Dominance), sensitivity to rejection (low Dominance), and several other measures. A state emotional response scale (Mehrabian & Russell, 1974) was used to measure reactions to a number of environmental situations, and the three dimensions of emotion were significant predictors of various approach and avoidance behaviors.

A later study (Russell & Mehrabian, 1977) used the same scale to rate adjectives which depicted a full spectrum of emotions. A total of 151 terms were used, and each subject rated 10 to 20 of them. Again, the Pleasure, Arousal, and Dominance scales showed high reliability (.97, .89, and .87) and all three scales were necessary to distinguish among the emotional adjectives.

Interest and Emotion

With the exception of work by Csikszentmihalyi (e.g., 1975), there have been few attempts to examine in depth what interest and involvement *feel like* to an individual.

> Intrinsic motivation presents a fascinating case of the state of the art. Theories and data abound. Are we making major advances in understanding motivation? Let us suggest that they are minor. We continually overlook our major source of knowledge—a personal, non-objective source which is at the heart of every minitheory but not acknowledged. Our methodologies fall short because they lead us into more and more detailed specification of external conditions for producing behavioral effects and ignore the critical variable, namely, the way the person experiences (not perceives) the conditions that we so elaborately contrive. (DeCharms & Muir, 1978, p. 107)

This is not to say that emotion has been *totally* ignored by those doing research on learner interest. Several theoreticians have called upon emotions as explanatory variables in their writings. Berlyne (1960), for example, said that curiosity comes as a result of a desire to maintain an optimal level of arousal. Things that are puzzling or incongruous cause a rise above this optimal level, and the individual studies and processes the stimulus in order to reduce uncertainty and bring arousal back to a more comfortable tonus level.

Day (1982) extended Berlyne's work, describing a "zone of curiosity" as a state of activation (arousal) in which a person is interested and excited, as demonstrated by exploration and approaching behaviors. When not in this zone, the person is either in a "zone of relaxation" (boredom) or "zone of anxiety," (avoidance behaviors and disinterest).

Another line of research on interest has involved the development and use of interest inventories: scales to measure preferences among sets of school subjects or vocations. The interest inventory can be viewed as a technological extension of hedonistic theories of motivation. That is, they assume implicitly that we are pleasure-seeking creatures who arrange our activities to maximize pleasure (Travers, 1978).

The major work to date which studied the actual experience of interest and involvement has been conducted by Csikszentmihalyi (e.g. 1975; 1980). Csikszentmihalyi surveyed and interviewed chess players, rock climbers, surgeons and others to examine what made their activities self-rewarding. He discovered several qualities that seemed to characterize the occurrence of intrinsic motivation, a state of mind that he called "flow." Among these were a merging of action and awareness, the centering of attention, and the loss of self-consciousness. In emotional terms, the flow experience combined enjoyment, a feeling of mastery and control, and a level of arousal midway between boredom and anxiety.

Within this sample of inquiry in the area of interest, several different emotional variables have been cited as causes or correlates of interest. One might infer from this that interest is not a simple, pure emotion like happiness, for example, but a complex combination of feelings. If this is so, then perhaps the existing mini-theories of curiosity and intrinsic motivation are accurate but incomplete, like the fabled blind men's description of the elephant. The tendency to regard interest as one-dimensional has held back progress toward understanding it, and prevented the building of a cumulative body of research. We posit, then, that learner interest may indeed be a multidimensional construct.

A Model of Learner Interest

If interest is multidimensional, what are its dimensions? A logical analysis of the concept would suggest that the three factors underlying other emotions also make sense as dimensions of interest. The Pleasure-Displeasure dimension, for instance, is clearly relevant. To be interested is a pleasant feeling, to be bored is not.

The Arousal dimension seems applicable to interest as well. Any definition of interest would have to include notions of a heightened awareness and level of attention, both of which are associated with moderate to high levels of arousal. Drowsiness and lack of interest, on the other hand, are states of low arousal. As already noted, arousal also figures prominently in previous research. Perhaps the best articulated theory of curiosity, that of Berlyne (1960, 1963), is built around the concept of arousal. Furthermore, both Day and Berlyne theorize that only aroused persons learn and, when aroused, they learn better. In addition, the "flow" state studied by Csikszentmihalyi (1975) was characterized by a facilitative level of arousal.

Thus, an argument for Pleasure and Arousal as factors underlying learner interest is justified. But what about the third dimension, one that is related to the Potency (strong-weak) dimension of semantic differential research? This question might be rephrased for our purposes as: In an educational setting, what does it mean to feel stronger or weaker?

Learning adds to one's skills and abilities and thus enables one to deal more effectively with the world. In a sense, an increase in competence is an increase in power. To feel more competent is to feel stronger, while incompetence and weakness are inextricably linked. Thus it would seem that a dimension of Competence-Incompetence feelings is an appropriate translation of Potency within the context of learning.

The Competence Feeling dimension is tied to interest by some of the theoretical work already cited. Learners need to actively explore situations where they feel competent and self-determining (Deci, 1975; Keller, 1983; Lepper, 1985). Deci's (1975) cognitive evaluation theory proposes that activities which enhance a feeling of competence and self-determination are intrinsically motivating. Learners want to feel personally effective in managing their learning environment and seek out intrinsically motivating activities (Kinzie, 1990); i.e. activities done for their own sake, without the need for external compensation.

In an essay on interest and effort in education. Dewey (1913) made a distinction relevant to the Competence Feeling dimension. He said that there are two types of pleasure. One arises from contact with pleasurable stimuli such as

bright colors and agreeable sounds. The second accompanies activity and is found wherever there is successful achievement and mastery occurring. These two types of pleasure are reflected in the present model as the Pleasure and Competence Feeling dimensions, respectively.

Dewey had few kind words for school activities which excite the senses but do not engage the learner in activity geared toward mastery. This same concern is echoed today when some argue that instruction, which produces high levels of Arousal and Pleasure but does not arouse Competence Feelings, can be said to be more entertaining than educational. High levels of Pleasure, Arousal, and Competence Feelings, on the other hand, would indicate genuinely engrossing instruction that promotes learning outcomes.

Some empirical evidence for the appropriateness of a Competence Feelings dimension comes from a study of what makes an educational television program interesting (MacLean et al, 1960). In an analysis of viewer ratings of several program segments, factors of Evaluation (good-bad) and Activity (fast-slow) emerged which are closely linked to the Pleasure and Arousal dimensions discussed above. In addition, a third factor appeared which had to do with how well the program was understood. The researchers named this factor Simplicity, but it is clear from the items which loaded on the factor that it could as easily have been interpreted as a dimension of Competence Feelings.

Thus far, we have described learner interest as having underlying dimensions of Pleasure, Arousal, and Competence Feelings. There is one more dimension yet to be described, one which also has to do with Potency.

Strength and weakness in an educational context can also be conceptualized in another way. One is strong when one controls the content and mode of presentation of what is being learned. Weakness is having no such control. This second type of Potency dimension is linked to learner interest by the widely held assumption that learner control enhances motivation. This feeling of being in charge of one's learning is closely akin to the Origin-Pawn theory of deCharms (1968, 1976). To use Deci's (1975) terminology, this dimension might be referred to as one's Self-Determination Feelings.

Kinzie (1990) states that "when actively exercised in a responsive environment, options for learner control can promote perceptions of personal control and further strengthen continuing motivation." (p. 8) She sees learner control as contributing to learner interest and engagement. Kinzie further asserts a direct relationship between competence and selfdetermination and links them to control, describing them as factors that influence the learner's interest in the instruction and contribute to the learner's continuing motivation.

Thus, a four-factor model of learner interest is proposed, consisting of the three-factor structure of emotion and a logical analysis of the concept of learner interest. These four factors related to the Evaluation, Activity, and Potency dimensions of semantic differential research (Osgood, Suci, & Tannenbaum, 1957) appear in Table 1.

Semantic Differential Dimensions	Learner Interest/Emotional Factors
Evaluation	Pleasure
Activity	Arousal
Potency	Competence/Dominance & Self-Determination

Table 1. Emotional Factors Related to the Semantic Differential Dimensions

Uses of the Model

A model of learner interest may be useful both as a conceptual tool and as a guide toward the solution of instructional problems. At the conceptual level, the model helps to bring diverse theories and approaches together within one framework. This provides a more holistic view of interest, affect and motivation and makes it easier to compare theories or to combine different theoretical perspectives.

This model also enables one to make finer distinctions than is possible with a single dimension ranging from boredom to high interest. The four factors can economically portray a wide range of affective/motivational responses to instruction. For example, one form of boredom might be represented by a combination of negative pleasure and low arousal. A closely related state would be drowsiness, which is mildly pleasant and low in arousal. The combination of high pleasure, moderate arousal and neutral competence and self-determination feelings might constitute a sort of passive fascination. Perhaps the optimum response for designers to strive for would be what Csikszentmihalyi (1975, 1990) calls "flow," a state of total involvement consisting of moderate arousal and high pleasure, competence, and self-determination feelings.

It should be pointed out that the emotions associated with interest and boredom are less powerfully felt than are other well researched emotions like fear. Affective reactions to instruction are subtle. Lipson (1979) calls them "aesthetic emotions" and notes the total lack of research on them.

In summary, research on motivation in learning situations has rarely looked at:

- student perceptions of what they find motivating.
- the various dimensions of interesting and boring instruction.
- the feelings and emotions learners experience in boring and interesting learning situations.
- the instructional causes of interest and boredom and their attributed sources.

The research questions in this study were:

1. What specific instructional factors contribute to learner boredom and interest?

2. To what underlying instructional source(s) do learners attribute those factors?

3. What are the dimensions of learning interest and boredom as they relate to emotion?

Methods

This research was conducted using 512 student subjects from two universities. Two methods of data collection were used:

1. *Descriptive responses*. Subjects were asked to reflect on past learning experiences in two ways:

   - Brainstorming sessions were conducted with 350 undergraduate and graduate students at a large northeastern university. Subjects were asked to voluntarily describe orally one boring and one interesting past learning experiences and the contributing factors. Responses ranged from single words (e.g. "dynamic," "disorganized") to phrases (e.g. "excited about subject matter," "content irrelevant"), to complete sentences (e.g. "The instructor used a variety of teaching methods." "There were no real-life applications.")

   - Written questionnaires were administered to 162 graduate students at a large western university. Subjects were asked to briefly describe one boring and one interesting learning experience and the critical factors contributing to each. Examples of each appear below.

Boring: "The subject of the lecture was "the relationship between ideas and other aspects of culture and social structure" in a class titled "Industrial Sociology." The classroom was fairly full, maybe 25-30 people. No-one seemed particularly interested. The whole lecture seemed to me to be a history of religion more than anything else and I could not understand its relevance to what we were to learn. He did not seem to care about the fact that no-one was interested in what he was saying. He never gave us a chance to ask questions, and he just talked on and on. He seemed to be totally wrapped up in himself and the fact that he knew so much about the subject. He did not take the particular audience into consideration."

Interesting: "The most interested I have been in any one classroom situation was in a graduate level statistics class on probability. It was a large class of about 50 students. The instructor did not use a text but supplemented his lectures with handouts and tasks to be completed each week. This particular class I recall not understanding well before class but the instructor was able to give examples and used a story about tea leaves so well that I knew I understood by the end of the 3 hours. I appreciated the teacher's style and ability to explain a difficult subject area in a clear and interesting way.

2. *Subjective evaluations*. Subjects who completed the open-ended, written questionnaire also completed two Likert-type scales.

   - Scale 1. This scale required subjects to rate their boring and interesting learning situations on a seven-point scale containing nine bipolar terms derived from the literature. These terms were *predictable-unpredictable, complex-simple, impersonal-personal, easy-impossible, colorless-colorful, changing-unchanging, ineffective-effective, familiar-unfamiliar, irrelevant to my needs-relevant to my needs.*

   - Scale 2. This scale required subjects to rate their emotions during each of the two learning situations they described on a seven-point scale containing 48 pairs of unrelated terms. The 57 terms reflected a wide range of emotional terms found in the literature that related to the emotional factors (i.e., *pleasure, arousal, competence, self determination*). The unrelated terms were randomly assigned to each scale item; as a result, 23 terms appeared more than once. Three terms appeared three times (*dull, excited, snobbish*) and one term (*cruel*) appeared four times. Some examples of paired terms appearing on this scale are *cruel-happy, excited-untroubled, dull-humiliated, in control-cared for, sad-frustrated.*

Results

Descriptive response data were used to answer both Research Question #1 (What specific instructional factors contribute to learner boredom and interest?) and Research Question #2 (To what underlying instructional source(s) do learners attribute those factors?).

Brainstorming responses were transcribed from overhead transparencies. Each response was reviewed and, when multiple ideas were represented, broken down into separate single ideas for analysis. For example, one subject volunteered the following complex response which was broken down into four separate ideas:

- His lecture consisted of telling us exactly what we had read the night before.
- He never translated the difficult textbook we had.
- He only made things foggier.
- He talked slowly and in a monotone.

All responses were analyzed by a panel of three motivation experts who were trained in the ARCS Model. Each expert categorized the responses in terms of Keller's ARCS Model motivation components [Attention (A), Relevance (R), Confidence (C), Satisfaction (S)] and attribution; i.e., to what/whom they attributed responsibility for the situation [Instructor (I), Learners (L), Materials (M), Environment (E)] Categorization continued until consensus was reached. In cases where no consensus could be reached, the items were eliminated from the analysis.

A total of 780 responses were analyzed (see Tables 2 and 3). There were slightly more interesting statements (407; 52%) than boring statements (373; 48%). The panel was unable to categorize 57 statements according to ARCS categories (e.g. "The instructor was handsome"). All statements were successfully categorized by attributed source.

	Instructor		Learner		Materials		Environment		TOTAL	
Attention	127	(66%)	35	(18%)	30	(16%)	1	(0%)	193	(51%
Relevance	40	(45%)	29	(32%)	20	(22%)	1	(1%)	90	(24%
Confidence	45	(63%)	22	(31%)	4	(06%)	0	(0%)	71	(19%
Satisfaction	13	(54%)	8	(33%)	3	(13%)	0	(0%)	24	(06%
Subtotal	225	(60%)	94	(24%)	57	(15%)	2	(1%)	378	
Unable to Categorize	11		2		16		0	(0%)	29	
TOTAL	236	(58%)	96	(24%)	73	(18%)	2	(0%)	407	

Table 2. Interesting Statements

	Instructor		Learner		Materials		Environment		TOTAL	
Attention	125	(58%	11	(05%)	73	(34%	7	(3%)	216	(63%
Relevance	22	(30%	5	(07%)	45	(63%	0	(0%)	72	(21%
Confidence	25	(63%	2	(05%	11	(27%	2	(5%)	40	(11%
Satisfaction	12	(70%	2	(12%	3	(18%	0	(0%)	17	(05%
Subtotal	184	(53%	20	(06%	132	(38%	9	(3%)	345	
Unable to Categorize	12		1		10		5		28	
TOTAL	196	(52%)	21	(06%)	142	(38%)	14	(4%)	373	

Table 3. Boring Statements

Results of this analysis related to Research Question #1 (What specific instructional factors contribute to learner boredom and interest?) indicated:

- Attention statements were the most common for both boring (63%) and interesting (51%) situations. As such, Attention may be the most influential for generating interest. Furthermore, attention and relevance accounted for the vast majority of boring (84%) and interesting (75%) situations. This may indicate that the *value* of the learning task is the predominant influence on both positive and negative motivations.

- In boring situations, instructional materials were perceived as most important for providing relevance (63%), while the instructor was most important for providing attention (58%), confidence (63%), and satisfaction (70%).

Results related to Research Question #2 (To what underlying instructional source(s) do learners attribute those factors?) indicated:

- The instructor was the overall source of more than half of the statements in both situations (boring: 52%; interesting: 58%); even higher for Attention alone (boring: 58%; interesting: 66%). However, although subjects attribute the majority of the responsibility for their motivation to the instructor's performance, other factors also play a role.

- Subjects considered themselves (the learners) a more influential factor in interesting situations (24%) than in boring ones (6%). That is, it appears that subjects believed that when a learning event is interesting, it is more often due to something they have done; but when it is boring, they assume almost no responsibility.

- Instructional materials were a more important factor in boring situations (38%) than in interesting (18%) situations. Materials that are not perceived as valuable or contributing to learning success may not be useful as motivational techniques.

- Environmental conditions (e.g. a cold classroom, uncomfortable seats) have almost no influence (boring: 4%; interesting: 0%) on the motivational level of a learning event .

Additional data related to Research Question #1 were collected from 162 subjects at one university. Subjects used a seven-point scale of nine bipolar terms (derived from the literature) to characterize both their interesting and boring learning situations. Values were assigned so that each item on the scale ranged from "most" to "least." For example, a score of 7 on *predictable* was interpreted as "the most predictable" while a score of 1 meant it was considered "the *least* predictable."

For the purpose of this analysis, all data were combined and interest was used as a dependent variable. Multiple regression analyses were performed (see Table 4). Among the nine independent variables, *colorful, effective*, and *personal* emerged as the best antecedents of an interesting situation. *Predictable* appears to be a complicated influence. Although *predictable* had some negative influence, it was not strong. One interpretation might be that in one sense too much predictability might cause boredom but some predictability may be a positive influence on interest. For example, organized instruction that is predictable (e.g., structured, organized) may be positive while use of the same instructional methods (e.g., lecture, role playing) all the time might be considered a negative type of predictability. Other independent variables had no significant influence upon the situation's degree of interest or boredom.

Variable	Beta	T	Sig T	Reject Null?
Colorful	.454	10.461	.000	Yes
Effective	.411	10.125	.000	Yes
Personal	.123	3.347	.001	Yes
Predictable	-.049	-2.276	.024	Yes
Complex	.021	1.079	.281	No
Easy	-.020	-1.042	.298	No
Changing	.022	.708	.479	No
Familiar	-.012	-.663	.508	No
Relevant	.044	1.608	.109	No

Table 4. Results of Multiple Regression Analyses for Nine Independent Variables

A series of correlations analyses were conducted to identify the causal relationships between interest and each of the independent variables. The results appear in Table 5. Results indicate that *colorful* is the best antecedent of an interesting situation while *predictable* appears to be the best antecedent of a boring situation.

Variable	Gamma	Pearson's R	Kendall's Tau-b	Kendall's Tau-c
Colorful	.980	.913	.774	.961
Effective	.945	.902	.776	.963
Personal	.946	.835	.716	.915
Changing	-.887	.767	.651	.836
Relevant	.886	.729	.647	.824
Complex	-.372	.292	.248	.324
Easy	.165	.164	.109	.140
Familiar	-.135	-.107	-.089	-.117
Predictable	-.671	-.549	-.461	-.602

Table 5. Correlation Analyses for Interest and the Independent Variables

Additional results indicate:

- *Colorful, effective*, and *personal* have a significant positive influence upon the degree of interest. These three terms might be seen as correlates of the three dimensions of our interest model; i.e. colorful-arousal, effective-pleasure, personal-competence.

- *Changing* and *relevant*, although not statistically significant, show a positive influence upon the degree of interest, while *predictable* has a significant negative influence on the degree of interest. Students appear to prefer instruction that is novel, surprising, varied—major characteristics of Keller's (1987) Attention factor.

- *Comple. easy*, and *familiar* have no significant influence upon the degree of interest. However, mean scores for both boring and interesting situations were almost the same for *complex-simple* (boring: 3.0; interesting: 3.3) and *easy-impossible* (boring: 3.7; interesting: 3.0). One possible explanation is that when learners feel competent, complexity and difficulty (challenge) heighten interest; otherwise they contribute to boredom.

Research Question #3 (What are the dimensions of learning interest and boredom as they relate to emotion?) was explored through administration of a second scale to the same 162 subjects. This scale, based on similar scales developed by Russell (1978) (with reliabilities ranging from .70 to .95) consisted of a set of 48 items each containing two non-bipolar terms (e.g. dull-troubled, friendly-scornful). Items contained terms randomly selected from a list of 69 terms, which meant that some terms appeared more than once in this scale.

Subjects were asked to describe their feelings by placing a check-mark somewhere along a nine-point line between the two terms, as in the example below.

Cruel ___ : ___ : ___: ___ : ___ : ___ : ___ : ___ : ___ *Happy*

Each subject was asked to rates both their interesting situation and their boring situation using this set of terms.

Before these data were analyzed, a set of assumptions were made about the process subjects used to complete this task. It was assumed that the subject would first choose one of the two terms as more descriptive than the other of each of their situations. Then, based upon the descriptive strength of the term selected, the subject would select a position along the scale. For example, in the item *cruel-happy*, the subject might believe that he felt more *happy* than *cruel*, decide to what degree of *happy* he felt, and place a check-mark in one of the four spaces closest to the term *happy* as in the example below.

Cruel ___ : ___ : ___: ___ : ___ : ___ : ___ : _x_ : ___ *Happy*

Furthermore since, generally speaking, the terms were not antonyms, we could not assume the score reflected the degree on two terms; i.e., if the subject had placed a check-mark on the space closest to *happy* it might be interpreted that the subject was at the highest degree of *happy* but could not be interpreted that he also felt at the lowest degree of *cruel*. It was assumed that once the subject chose *happy*, he would only concentrate on how to quantify his *happy* degree and didn't care about his *cruel* degree. The check-mark located on one side of the scale or the other reflects 1) the strength of this term alone as a suitable descriptor and 2) the failure of the other term to be chosen, with no designation of failure strength.

Based on the above rationale, all 48 items were broken into two one-term measures and scored according to the four closest spaces to that term. The middle space was coded as 0 for both terms. Two examples appear below (F means failure to be chosen)

Cruel _1_ : _2_ : _3_: _4_ : _0_ : _F_ : _F_ : _F_ : _F_ *Happy*

Cruel _F_ : _F_ : _F_: _F_ : _0_ : _4_ : _3_ : _2_ : _1_ *Happy*

The ten highest- and lowest-scoring terms were determined for both the boring and the interesting situations. Repeated terms were removed from each list leaving six highest-scoring terms and ten lowest-scoring terms for the interesting situations and nine highest-scoring terms and eight lowest-scoring terms for boring situations. (The terms and their scores appear in Table 6). Four highest-scoring terms for interesting situations were among the lowest-scoring terms for boring ones while two highest-scoring terms for boring situations were among the lowest-scoring terms for interesting situations.

Interesting (highest-scoring)		**Boring (highest-scoring)**	
Term	Score	Term	Score
interested	587	uninterested	479
wide-awake	532	unmotivated	417
happy*	496	frustrated	406
alert	481	angry*	355
friendly*	476	controlled	286
excited**	433	dull**	279
		distressed*	264
		adverse	261
		nasty*	255

Interesting (lowest-scoring)		**Boring (lowest-scoring)**	
Term	Score	Term	Score
enraged	-149	hopeful	-97
vicious	-149	friendly*	-97
spiteful	-153	excited*	-98
scornful	-154	affectionate*	-109
cruel***	-156	wide-awake	-113
adverse	-156	interested	-126
hateful	-158	sad*	-129
tyrannical	-159	calm	-138
nasty*	-160		
angry*	-162		

Table 6. Highest- and Lowest-scoring Terms for Interesting and Boring Situations
[appears twice; ** appears three times; *** appears four times]*

The results of this analysis indicate that subjects tended to use more extreme ranks to describe interesting (433-587) than boring (255-479) situations. Two possible explanations are: (1) the experimental situation was above average; i.e, the distance between subjects' interest feeling and their expectation of interest was shorter than the distance between their boredom feeling and their expectation of boredom and (2) subjects were more reluctant to rate negative terms highly than to rate positive terms highly.

Analyses (i.e., Pearson r correlation, Pearson r square) were conducted on each word term pair in order to yield a coefficient of nondetermination. A coefficient of nondetermination reflects that proportion of the variance which cannot be predicted by or determined by the other variable. Those word-pairs with a coefficient of nondetermination value equal to or greater than 0.90 were selected, yielding 34 orthogonal measure pairs. Similar terms were grouped together linguistically producing the boredom-interest model shown in Figure 1. This model is consistent with previous research on emotion. The terms along the horizontal axis reflect the Arousal dimension, while those along the vertical axis reflect the Pleasure dimension. The third axis reflects both factors (competence and self-determination) along the Potency dimension.

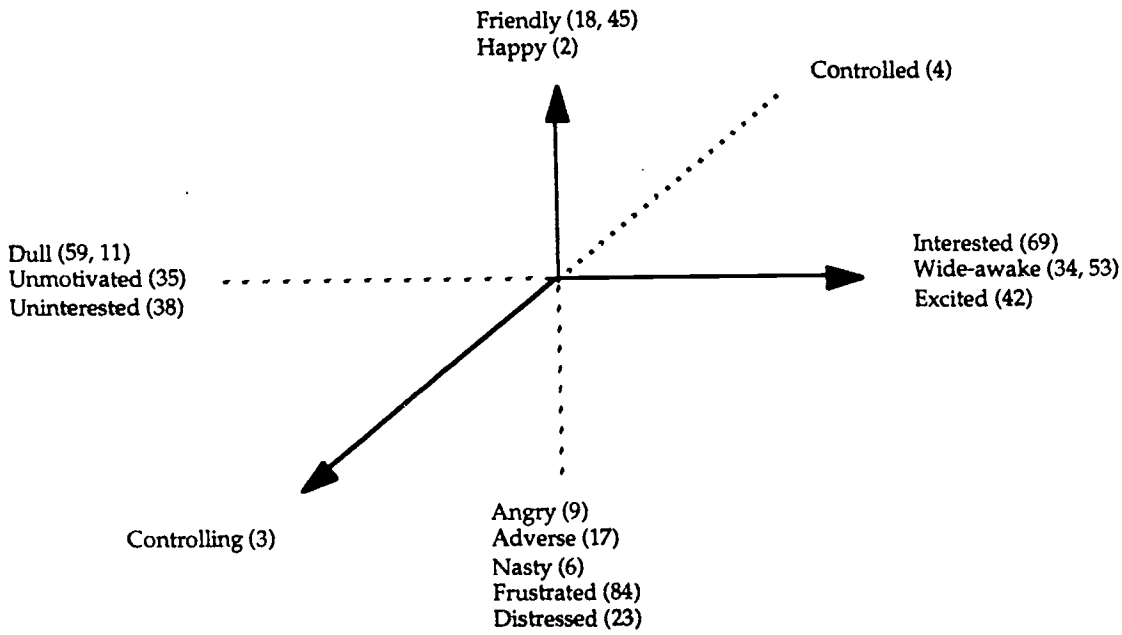

Figure 1. Boredom-Interest Model for Instructional Situations

Conclusions

This study explored the various emotions related to boring and interesting learning experiences, the impact of specific sources (i.e. instructor, learner, materials, environment) on resulting boredom or interest, and the influence of a range of instructional characteristics (e.g. predictability, complexity) on student perceptions of boring and interesting instruction.

One interpretation of the results indicates that feelings of pleasure and arousal are linked to generating and sustaining current learning interest while competence and self-determination are more closely related to fostering a continuing motivation to learn (Dodge, 1990).

There are potential applications of this type of research to the development of more motivating instructional materials and interactive computer-based learning systems. For example, results of this study may also be used as motivational guidelines for the design of effective instruction. Specifically:

- *Colorful* instruction that incorporates a variety of attention-gaining and maintaining strategies appears to be the most effective for generating interest and preventing boredom.
- Instruction that incorporates surprise, novelty and variety (the major element of Keller's Attention Component) may help reduce the *predictability* that appears to promote learning boredom.
- Instructional materials (e.g. videos) that do not capture students' attention and are not directly relevant to the content and goals of the instruction may promote boredom.
- Instructors are perceived by learners as having the prime responsibility for learner interest or boredom. Therefore, instruction must be designed to include motivational strategies that enhance learner interest and reduce learner boredom. At the same time, instructors need to incorporate ways to help learners take more responsibility for their own motivation, as currently learners do not perceive themselves as potentially influencing their own boredom levels.

One of the underlying goals of instruction is to motivate students to learn. Designers of instruction strive to motivate students to: (1) want to learn, (2) enjoy learning while it is occurring, and (3) continue learning after the instruction has formally ended. Research that illuminates what instructional factors promote interest and reduce boredom will move us closer toward our goal.

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