Development and Use of the ARCS Model of Instructional Design

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Abstract. The ARCS Model of motivation was developed in response to a desire to find more effective ways of understanding the major influences on the motivation to learn, and for systematic ways of identifying and solving problems with learning motivation. The resulting model contains a four category synthesis of variables that encompasses most of the areas of research on human motivation, and a motivational design process that is compatible with typical instructional design models. Following its development, the ARCS Model was field tested in two in-service teacher education programs. Based on the results of these field tests, the ARCS Model appears to provide useful assistance to designers and teachers, and warrants more controlled studies of its critical attributes and areas of effectiveness.

Can Motivation be Systematically Influenced?

Seldom do the arguments about the boundaries of a teacher’s responsibilities or whether teaching is an art or science become more animated than when discussing the motivation of students. Instructional designers have similar concerns. Typically, motivation is viewed as highly unpredictable and changeable, subject to many influences over which the teacher or designer has no control. Consequently, both teachers and designers often view their responsibility as providing good quality instruction, and assume it is the student’s responsibility to decide whether or not to take advantage of the opportunity to learn.

However, this is a rationalization in that we know that no matter how motivated learners are when they begin a course, it is not too difficult to bore them, if not kill their interest totally. Conversely, it is possible to stimulate or even inspire the students’ desire to achieve. Perhaps the rationalization results from the assumption that motivation is a largely uncontrollable state; therefore, it is easier to think of it as the student’s responsibility.

With respect to students’ social behavior most teachers do assume that motivation can be controlled by the appropriate application of rules and reinforcements. But when it comes to inspiring interest in a school subject, the popular view is that it requires intuition and native talent. How many times have you heard a teacher or designer say, “I know my subject, but I’m not really an entertainer?”

A concern for these issues led to the exploration of two specific questions. First, is it possible to synthesize the many concepts and theories of human motivation into a simple, meaningful model, or schema, that would be useful to a practitioner? Secondly, is it possible to develop a systematic, as opposed to intuitive, approach to designing motivating instruction? Exploration of these questions led to a review of the literature, the development of an approach called the ARCS Model, and field tests of the model with two different groups of teachers.

What is the ARCS Model?

The ARCS Model (Keller, 1984) is a method for improving the motivational appeal of instructional materials. It has three distinctive features. First, it contains four conceptual categories that subsume many of the specific concepts and variables that characterize human motivation. Second, it includes sets of strategies to use to enhance the motivational appeal of instruction. And third, it incorporates a systematic design process, called motivational design (Keller, 1987), that can be used effectively with traditional instructional design models. Each of these is described in further detail below.

Why the ARCS Model?

When work began (Keller, 1979) on the development of the ARCS Model, there were no macro theories or models that directly addressed the question of how to create instruction that would stimulate the motivation to learn. Most of the applications-oriented theory and research on motivation dealt either with psychological approaches to changing individual motivational characteristics (e.g. McClelland, 1965), or with job satisfaction and work performance (e.g. Steers & Porter, 1987).

In education, motivation was most generally studied in terms of classroom control (e.g. Doyle, 1985), reinforcement of learning (e.g. Skinner, 1961), or the affective outcomes of instruction (e.g. Krathwohl, Bloom, & Masia, 1964). There were some good applications-oriented materials (e.g. Mager, 1968; Wlodkowski, 1978), but they tended to be somewhat restricted in their approach and theoretical foundation. They did not help the designer or teacher know how many or what types of strategies to use with a given audience, and they did not incorporate important principles from several areas of motivational research that have been studied in recent years (e.g. curiosity, sensation seeking, and intrinsic motivation). Subsequently, work has been done to help students learn how to be self-motivated (e.g. McCombs, 1984), and Wlodkowski (1985) has expanded the scope of content and application of his work. But, none of these models takes a design, or problem-solving approach.

Where Did the ARCS Model Originate?

The ARCS Model is based upon the macro theory of motivation and instructional design developed by Keller (1979, 1983). It is grounded in expectancy-value theory which derives from the work of Tolman (1932) and Lewin (1938). Expectancy-value theory assumes that people are motivated to en-
gage in an activity if it is perceived to be linked to the satisfaction of personal needs (the value aspect), and if there is a positive expectancy for success (the expectancy aspect).

In the original model (Keller, 1979, 1983), these two categories were expanded to four. The category called value was subdivided into two categories called interest and relevance. The third category, expectancy, remained the same, and a fourth category called outcomes was added. Interest and relevance were separated to make a distinction between a set of variables, or constructs, that are concerned primarily with curiosity and arousal versus other motives such as "need for achievement" and "perceived utility." All of these variables have an influence on what people think is important, but interest refers more to attentional factors in the environment, and relevance refers more to goal directed activity.

The third category, expectancy, refers to one's expectation for being successful. It includes several areas of research that are concerned with people's self-confidence and their feelings of control over their lives and environment. There is no doubt that a person's perception of the likelihood of being successful influences the actual degree of success (Jones, 1977).

The fourth category, outcomes, refers to the reinforcing value of instruction. The outcomes of goal-directed behavior have an influence on subsequent levels of perceived value and expectancy for success and, therefore, form the final category of motivational variables in the ARCS model. The outcomes category includes the appropriate application of reinforcement as explained in operant conditioning theory, and the environmental outcomes that help maintain intrinsic motivation (e.g., Deci, 1975). More detailed explanations of this synthesis and its rationale are provided by Keller (1983).

Building on this conceptual foundation, the ARCS Model was created by generating a large list of motivational strategy statements, and sorting them to see whether the four categories of the model provided a conceptually valid typology. All of the strategies used in the development of the model were derived from research findings and from practices that have resulted in motivated learners. Strategy statements were obtained from research studies in the primary areas of research on human motivation, from practical handbooks, and from interviews with practitioners. The strategy statements were then sorted into the four categories, and were further divided into useful subcategories (see Tables 1, 2, 3, 4). Four people worked on the classification process, and the correspondence of judgments for the placement of strategies into categories was acceptable. The reliability estimate based upon the intraclass correlational method (Winer, 1971) was .78.

During the transition from the original model to the ARCS Model, the four categories were renamed as indicated below to strengthen the central feature of each and to generate a useful acronym. The resulting catalog of strategies is used in the process of identifying and solving motivational problems in instructional materials and methods (Keller & Kopp, 1987), and in computer assisted instruc-

& Suzuki, 1987). Following is a brief description of each of the four major conditions.

Attention. The first condition, attention, is an element of motivation and is also a prerequisite for learning. The motivational concern is for getting and sustaining attention. As an element of learning, the concern is for directing attention to the appropriate stimuli. At one level, it is fairly easy to gain attention. A dramatic statement, a sharp noise, a quiet pause—all of these and many other devices are used.

However, getting attention is not enough. A real challenge is to sustain it, to produce a satisfactory level of attention throughout a period of instruction. To do this, it is necessary to respond to the sensation-seeking needs of students (Zuckerman, 1971) and arouse their knowledge-seeking curiosity (Berlyne, 1965), but without overstimulating them. The goal is to find a balance between boredom and indifference versus hyperactivity and anxiety. The strategies listed under categories A5 and A6 (Table 2) are particularly useful in sustaining attention.

Relevance. How many times have we heard students ask, 'Why do I have to study this?' When a convincing answer is not forthcoming, there is a relevance problem. To answer this question, many course designers and instructors try to make the instruction seem relevant to present and future career opportunities for the students (categories R2 and R3, Table 2). Others, in a more classical tradition, believe that learning should be an end in itself, something that students come to enjoy and treasure. Both of these can be important, but there is a third way. It focuses on process rather than ends.

Relevance can come from the way something is taught; it does not have to come from the content itself (categories R4 and R5, Table 2). For example, people high in "need for affiliation" will tend to enjoy classes in which they can work cooperatively in groups. Similarly, people high in "need for achievement" enjoy the opportunity to set moderately challenging goals, and to take personal responsibility for achieving them. To the extent that a course of instruction offers opportunities for an individual to satisfy these and other needs, the person will have a feeling of perceived relevance.

Confidence. Some people never quite achieve success even when the odds are in their favor; others seem to excel through no matter what the odds.

The ARCS Model includes a systematic design process. It can be conveniently separated into the steps of define, design, develop, and evaluate.
### Table 1
#### Attention Strategies

<table>
<thead>
<tr>
<th>A1: Incongruity, Conflict</th>
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<tbody>
<tr>
<td>A1.1 Introduce a fact that seems to contradict the learner’s past experience.</td>
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<tr>
<td>A1.2 Present an example that does not seem to exemplify a given concept.</td>
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<tr>
<td>A1.3 Introduce two equally plausible facts or principles, only one of which can be true.</td>
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<td>A1.4 Play devil’s advocate.</td>
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<tr>
<th>A2: Concreteness</th>
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<tr>
<td>A2.1 Show visual representations of any important object or set of ideas or relationships.</td>
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<tr>
<td>A2.2 Give examples of every instructionally important concept or principle.</td>
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<tr>
<td>A2.3 Use context-related anecdotes, case studies, biographies, etc.</td>
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<tr>
<th>A3: Variability</th>
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<tr>
<td>A3.1 In stand up delivery, vary the tone of your voice, and use body movement, pauses, and props.</td>
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<tr>
<td>A3.2 Vary the format of instruction (information presentation, practice, testing, etc.) according to the attention span of the audience.</td>
</tr>
<tr>
<td>A3.3 Vary the medium of instruction (platform delivery, film, video, print, etc.)</td>
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<tr>
<td>A3.4 Break up print materials by use of white space, visuals, tables, different typefaces, etc.</td>
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<tr>
<td>A3.5 Change the style of presentation (humorous-serious, fast-slow, loud-soft, active-passive, etc.).</td>
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<tr>
<td>A3.6 Shift between student-instructor interaction and student-student interaction.</td>
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<tr>
<th>A4: Humor</th>
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<tr>
<td>A4.1 Where appropriate, use plays on words during redundant information presentation.</td>
</tr>
<tr>
<td>A4.2 Use humorous introductions.</td>
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<tr>
<td>A4.3 Use humorous analogies to explain and summarize.</td>
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<tr>
<th>A5: Inquiry</th>
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<tr>
<td>A5.1 Use creativity techniques to have learners create unusual analogies and associations to the content.</td>
</tr>
<tr>
<td>A5.2 Build in problem solving activities at regular intervals.</td>
</tr>
<tr>
<td>A5.3 Give learners the opportunity to select topics, projects, and assignments that appeal to their curiosity and need to explore.</td>
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<tr>
<th>A6: Participation</th>
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<tr>
<td>A6.1 Use games, role plays, or simulations that require learner participation.</td>
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### Table 2
#### Relevance Strategies

<table>
<thead>
<tr>
<th>R1: Experience</th>
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<tbody>
<tr>
<td>R1.1 State explicitly how the instruction builds on the learner’s existing skills.</td>
</tr>
<tr>
<td>R1.2 Use analogies familiar to the learner from past experience.</td>
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<tr>
<td>R1.3 Find out what the learners’ interests are and relate them to the instruction.</td>
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<tr>
<th>R2: Present Worth</th>
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<tr>
<td>R2.1 State explicitly the present intrinsic value of learning the content, as distinct from its value as a link to future goals.</td>
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<tr>
<th>R3: Future Usefulness</th>
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<tr>
<td>R3.1 State explicitly how the instruction relates to future activities of the learner.</td>
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<tr>
<td>R3.2 Ask learners to relate the instruction to their own future goals (future wheel).</td>
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<tr>
<th>R4: Need Matching</th>
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<tbody>
<tr>
<td>R4.1 To enhance achievement striving behavior, provide opportunities to achieve standards of excellence under conditions of moderate risk.</td>
</tr>
<tr>
<td>R4.2 To make instruction responsive to the power motive, provide opportunities for responsibility, authority, and interpersonal influence.</td>
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<tr>
<td>R4.3 To satisfy the need for affiliation, establish trust and provide opportunities for non-risk, cooperative interaction.</td>
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<th>R5: Modeling</th>
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<tr>
<td>R5.1 Bring in alumni of the course as enthusiastic guest lecturers.</td>
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<tr>
<td>R5.2 In a self-paced course, use those who finish first as deputy tutors.</td>
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<td>R5.3 Model enthusiasm for the subject taught.</td>
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<th>R6: Choice</th>
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<tr>
<td>R6.1 Provide meaningful alternative methods for accomplishing a goal.</td>
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<tr>
<td>R6.2 Provide personal choices for organizing one’s work.</td>
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Table 3
Confidence Strategies

C1: Learning Requirements
C1.1 Incorporate clearly stated, appealing learning goals into instructional materials.
C1.2 Provide self-evaluation tools which are based on clearly stated goals.
C1.3 Explain the criteria for evaluation of performance.

C2: Difficulty
C2.1 Organize materials on an increasing level of difficulty; that is, structure the learning material to provide a "conquerable" challenge.

C3: Expectations
C3.1 Include statements about the likelihood of success with given amounts of effort and ability.
C3.2 Teach students how to develop a plan of work that will result in goal accomplishment.
C3.3 Help students set realistic goals.

C4: Attributions
C4.1 Attribute student success to effort rather than luck or ease of task when appropriate (i.e., when you know it's true).
C4.2 Encourage student efforts to verbalize appropriate attributions for both successes and failures.

C5: Self-Confidence
C5.1 Allow students opportunity to become increasingly independent in learning and practicing a skill.
C5.2 Have students learn new skills under low risk conditions, but practice performance of well-learned tasks under realistic conditions.
C5.3 Help students understand that the pursuit of excellence does not mean that anything short of perfection is failure; learn to feel good about genuine accomplishment.

Table 4
Satisfaction Strategies

S1: Natural Consequences
S1.1 Allow a student to use a newly acquired skill in a realistic setting as soon as possible.
S1.2 Verbally reinforce a student's intrinsic pride in accomplishing a difficult task.
S1.3 Allow a student who masters a task to help others who have not yet done so.

S2: Unexpected Rewards
S2.1 Reward intrinsically interesting task performance with unexpected, non-contingent rewards.
S2.2 Reward boring tasks with extrinsic, anticipated rewards.

S3: Positive Outcomes
S3.1 Give verbal praise for successful progress or accomplishment.
S3.2 Give personal attention to students.
S3.3 Provide informative, helpful feedback when it is immediately useful.
S3.4 Provide motivating feedback (praise) immediately following task performance.

S4: Negative Influences
S4.1 Avoid the use of threats as a means of obtaining task performance.
S4.2 Avoid surveillance (as opposed to positive attention)
S4.3 Avoid external performance evaluations whenever it is possible to help the student evaluate his or her own work.

S5: Scheduling
S5.1 Provide frequent reinforcements when a student is learning a new task.
S5.2 Provide intermittent reinforcement as a student becomes more competent at a task.
S5.3 Vary the schedule of reinforcements in terms of both interval and quantity.

Differences in confidence, the third major component of the model, can influence a student's persistence and accomplishment. There are several factors that contribute to one's level of confidence, or expectancy for success. For example, confident people tend to attribute the causes of success to things such as ability and effort instead of luck or the difficulty of the task (Weiner, 1974; Dweck, 1986). They also tend to be oriented toward involvement in the task activity and enjoy learning even if it means making mistakes. Also, confident people tend to believe that they can effectively accomplish their goals by means of their actions (Bandura, 1977; Bandura & Schunk, 1981). In contrast, unconfident people often have more of an ego involvement; they want to impress others and they worry about failing (Dweck, 1986).

Fear of failure is often stronger in students than teachers realize. A challenge for teachers in generating or maintaining motivation is to foster the development of confidence despite the competitiveness and external control that often exist in schools.

The proceeding research results are reflected in the confidence building strategies (Table 3) that can be used by an instructional designer or teacher. The purpose of most of these strategies is to help the learner form the impression that some level of success is possible if effort is exerted. It is, of course, important to avoid creating this impression if it is false. If success is not possible with a rea-
sonable amount of effort, then the in-
struction should be redesigned or the
student should be given appropriate
counsel.
Satisfaction. This category incor-
porates research and practices that help
make people feel good about their ac-
ccomplishments. According to reinfor-
cement theory, people should be more
motivated if the task and the reward are
defined, and an appropriate reinforce-
ment schedule is used (categories S3 and
S5, Table 4). Generally this is true, but
people sometimes become resentful and
even angry when they are told what they
have to do, and what they will be given as
a reward. Why would this be so? An
important part of the answer seems to be
'control.'

When a student is required to do some-
thing to get a reward that a teacher con-
trols, resentment may occur because the
teacher has taken over part of the
student's sphere of control over his or her
own life. This is especially likely to
happen when the behavior you control is
one which the student enjoys for intrinsi-
cally satisfying reasons. The estab-
lishment of external control over an in-
trinsically satisfying behavior can de-
crease the person's enjoyment of the ac-
tivity (Lepper & Greene, 1979).

There are appropriate ways to use
extrinsic rewards in learning situations,
and to stimulate intrinsic reward. A
challenge is to provide appropriate con-
tingencies without overcontrolling, and
to encourage the development of intrin-
sic satisfaction (categories S1, S2, and S4,
Table 4).

In summary, these four categories
form the basis of the ARCS Model.
Within each are subcategories that in-
clude prescriptive motivational strat-
egies (see Keller & Kopp, 1987; Keller &
Suzuki, 1987). However, given the pur-
pose of this model for helping to identify
specific ways to make instruction more
appealing, there is still the question of
procedure: How is the ARCS Model
used in instructional development or
lesson planning? The following two sec-
tions provide a brief description of
this process, and the results of using the
model with two groups of teachers.

Using the ARCS Model

The ARCS Model includes a sys-
tematic design process that can be used
with typical instructional design and
development models. It can be conve-
niently separated into the steps of define,
design, develop, and evaluate (see Table
5).

Define. Prior to the field tests reported
in the next section, the define phase had
two purposes: audience analysis and
preparation of objectives. During the
field tests a third purpose called "pro-
blem classification" was added as the first
step in the process. It became clear that
an unstated but important constraint of
the ARCS Model is that, in its present
form, it is designed to help make a course
of instruction more motivating for a rea-
plying the ARCS Model is to classify the
motivational problem to be solved. If the
problem is one of improving the motiva-
tion appeal of instruction for a given
audience, then it is appropriate to use the
model.

The second step is to do an audience
analysis to identify motivational gaps. In
some situations, a group of students will
be highly motivated for a particular
course due to their intrinsic interest in the
topic, or because of external factors that

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whether teaching is an art or science become
more animated than when discussing the
motivation of students.
Table 5
The Motivational Design Model

<table>
<thead>
<tr>
<th>DEFINE</th>
<th>DEVELOP</th>
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<tbody>
<tr>
<td>Classify problem</td>
<td>Prepare motivational elements</td>
</tr>
<tr>
<td>Analyze audience motivation</td>
<td>Integrate with instruction</td>
</tr>
<tr>
<td>Prepare motivational objective</td>
<td></td>
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</tbody>
</table>

DESIGN
Generate potential strategies
Select strategies

EVALUATE
Conduct developmental try-out
Assess motivational outcomes

class will express confidence that they can finish the unit successfully if they try hard. “By creating specific motivational objectives, the designer or instructor is better able to choose appropriate strategies.

Design. The first step in design is to create a list of potential motivational strategies for each of the objectives. At this point, it is generally best to use a brainstorming approach to create a broad range of strategy ideas. The goal is to move away from the analytical thinking that characterizes the define phase, and to begin thinking in an uncritical, more creative mode. By creating a variety of possible strategies the likelihood of finding optimal strategies is increased.

The next step is to critically review the potential strategies, and select the ones to be used. Five guidelines that help accomplish this are that the motivational strategies should:
(a) not take up too much instructional time, (b) not detract from the instructional objectives, (c) fall within the time and money constraints of the development and implementation aspects of the instruction, (d) be acceptable to the audience, and (e) be compatible with the delivery system, including the instructor’s personal style and preferences.

All of these criteria exemplify the central concern for motivation as a means to an end, not an end in itself. For example, if students come to class already motivated, do not inject a large number of motivational strategies. This could slow the instruction, and cause the students to focus on the entertaining motivational strategies to the detriment of the instructional objectives. This is illustrated by a foreign language teacher who spent so much time with the students planning a culturally enriching banquet that she covered only half of the required content.

At first the students enjoyed it, but they became annoyed when they realized that they would not be properly prepared for the next level of study. Motivational strategies should stimulate the motivation to learn (Brophy, 1983), and not detract from the learning process.

The strategies included in the model are proven in that they are based on research and successful practices, but their effectiveness, and the exact way in which they are implemented depends on part on the personality of the instructor, and the type of atmosphere that he or she desires (e.g. formal versus informal). Consequently, the final selection of strategies for a given instructional event is based, in large part, upon the judgments of the designer and teacher rather than upon objective criteria. In this sense, even though the ARCS Model phase it is time to create any special materials that are required, and integrate them into the instruction. This usually requires revision of the instructional materials to ensure continuity and internal consistency.

Evaluate. It is important to base the evaluation of the materials on motivational as well as learning outcomes. Too often, decisions about the effectiveness of motivational strategies are based on gain scores or other achievement measures. This is not a good practice, because achievement is affected by many factors, not just motivation (see Keller, 1979, for a more complete discussion of this point). To judge motivational consequences, it is best to use direct measures of persistence, intensity of effort, emotion, and attitude.

Developmental Test of the ARCS Model: Two Case Studies

The ARCS Model was field tested in two teacher training workshops. The first was with 18 teachers of middle school children between the ages of 12 and 14. All of the teachers were from the same school district in central New York, and most were from the same school. The primary purpose of the overall inservice program was to improve instruction in problem solving, and the ARCS

Relevance can come from the way something is taught; it does not have to come from the content itself.
ucted by a trainer who was familiar with the motivational material encompassed by the ARCS Model, and included one session in which the author presented the specific strategies and procedures of the model.

During the four months of the project, the teachers went through the complete process of defining a motivational problem, formulating objectives, selecting strategies, preparing an implementation plan, enacting the plan, and reporting results. Most of the teachers worked on developing new modules of instruction to make them more interesting, but some worked on the motivational problems of specific students.

There were two criteria for success in this developmental test, both of which were attitudinal. First was that the participants would, after being taught the basic characteristics of the model, regard it as being comprehensible and useful. This criterion was important because the ARCS Model draws upon a broad base of psychological concepts and research that has not been studied by most teachers. For the ARCS Model to be acceptable to practitioners, it has to be presented in familiar, practical language. The second criterion was that after using the ARCS Model, they would believe that it helped them do a better job of improving the motivational appeal of instruction than they would have done otherwise.

In response to a questionnaire with 5 point response scales ranging from strongly disagree to strongly agree, all of the participants responded positively (agree or strongly agree) to the first criterion, and sixteen (89%) responded positively to the second. The other two were neutral. In a “Comments” section, they said that they gained some insights from learning and using the model, but they used more or lost the same motivational strategies that they would have used anyway. Both of these teachers, according to comments from the principal and other teachers, had excellent reputations as motivators. Given the overall positive responses, this test of the ARCS Model was judged to be supportive of its acceptability and utility.

An interesting consequence of using the ARCS Model in this setting occurred: Some of the teachers, in their conclusions, suggested that the key factor in the process was that they had simply paid more attention to the student, or class. At first, this seemed to be a disappointing result for the ARCS Model. Why have a reasonably complex, formalized model if “paying more attention” is all that is required?

Upon reflection, it became clear that the teachers were not giving themselves enough credit for what they had actually accomplished. After analyzing their action plans and logbooks, it was obvious that they had used specific strategies to bring about the change. For them, “attention” was simply a convenient word to summarize a great many specific acts.

A second test was conducted with another group consisting of 16 teachers from primary, middle, and secondary schools within a single school district in northeastern New York. This was a six-day workshop on motivational design conducted by the author and two assistants for two days each in three successive months. One day each month was spent in a working session with the teachers, and the other day each month was used for classroom visitations and individual consultation.

At the end of the first session, the teachers had defined their motivational problems. During the next four weeks, they were to work on collecting data to verify the problem, and to develop a preliminary strategy list. They were enthusiastic at the end of the first session, but by the beginning of second session one month later, several had encountered difficulties and become discouraged.

After analyzing their problem statements and progress reports, it appeared that the differences were due primarily to the type of problem chosen by the participant. The workshop leaders had encouraged the participants to work on instructional improvement problems that were fairly small in scope, that is, to chose a unit or lesson which they would analyze and improve with respect to its motivational characteristics. Instead, several of the teachers had chosen to work on the personal motivational problems of individual students. Some of these students had personal problems and family situations that would be a challenge even for an experienced psychotherapist.

In general, the teachers who chose instructional improvement projects had made better progress and felt more positive. However, some of these teachers enlarged the scope of the project after the first session, or failed to reduce the scope as recommended by the workshop leaders. Consequently, the first part of the second session was spent reviewing the chosen problems and scope of work. After the concerned teachers redefined their problems into something more manageable, their progress improved quickly.

The difficulties experienced with the second group were reflected in the ratings obtained from a questionnaire on the two criteria as described above in the first study. After the second session, 10 of the 12 teachers (83%) agreed that the model seemed comprehensible and useful. At the end of the workshop, 9 of the 12 teachers (75%) felt that use of the model had helped them improve the motivational appeal of their instruction.

Why, we wondered, did the ARCS Model work better with the first group, which included several teachers who chose behavior modification problems? In that group, the workshop leader had worked with the school district, and with the same group of teachers, on several other projects during the preceding three
years. The earlier projects were concerned with helping the teachers learn to use systematic development and research procedures for creating and validating instructional improvement projects in the areas of curiosity and cognitive problem-solving skills.

In the second group, most of the teachers had not had an inservice training program in many years, and some had never had one. Consequently, these teachers were starting from "scratch" in terms of orienting themselves toward a productive experience in the workshop, and toward the specific processes of systematic development. They had to learn the generic problem solving and design processes as represented in the specific context of the ARCS Model, and the content of the model itself. Furthermore, these teachers had to work independently during the four weeks between sessions. They could not get immediate personal advice from the workshop leaders because of the distance to their work location, and they did not mail materials to the workshop leaders for review as they had been invited to do. In summary, this group chose too many problems that, although interesting and important to them, fell outside the scope of the ARCS strategies or the time constraints of the workshop, and they had no prior experience in working independently on instructional improvement projects.

Conclusion

The results of these two field tests provide support for the comprehensibility and utility of the ARCS Model as a means of assisting in the motivational design of instruction, and they illustrate some of the requirements for its successful use. ARCS is a problem solving model, and it does require some time to acquire an understanding of the basic strategies and concepts included in it. If a potential user has never learned to work with a systematic instructional design model, then the concepts of problem identification, solution design, and implementation must be learned in conjunction with the content and processes of the ARCS Model.

Furthermore, care must be exercised in the first step of the application to ensure that participants select problems that are appropriate for the model. Those would be problems concerned with the improvement of instruction, and not with changes in the personalities of the students.

A limitation of this study is that even though positive support was found in two different settings and there is research support for the various elements of the model, there were many uncontrolled aspects to the field tests. For example, the author of the model was involved in both studies. A more objective test of the model would result from having trainers other than the author. More objective measures of the effectiveness of the model could also be used. For example, a checklist of motivational characteristics applied to preworkshop samples of materials developed and taught by the participants could be compared to postworkshop samples. And, it is essential that several replications of the study be conducted to test for consistent results. This type of action research can never be highly controlled, and the dynamics that can develop in any given group can have a strong influence on the outcomes. Given the initially positive responses to the model, more controlled studies of its critical attributes and areas of effectiveness appear to be warranted.

In general, those teachers who chose instructional improvement projects had made better progress and felt more positive.

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careful review of a draft of this paper.
Abstract. Learners often feel that instruction lacks personal relevance. Designing instructional materials that account for learners' interests may be one means of improving motivation in instruction. High school seniors (N=72) participated in an experimental study that investigated the motivational effects of incorporating their reported interests into instruction. Results showed that significantly more learners were willing to return to a task that used their interests (F=5.76, p<.02). Using interests was valuable for both high and low achievers. Interests are discussed.

Achieving optimum motivation of learners is a central, if largely unfilled, goal of the instructional development process. Since learners often find instruction lacking in personal relevance, the issue of how best to achieve learner motivation is a pressing one. Significant theoretical inquiries have explored motivational factors as they relate to instruction (e.g., Keller, 1983). However, prescriptions for motivating learners remain rare, and these prescriptions are seldom generally or routinely applicable.

The use of learner characteristics is a feature of the majority of models of instructional design (see Andrews & Goodson, 1980). Instruction that can meaningfully account for these characteristics is found to be more motivational. Yet of those learner characteristics actually used in instruction (e.g., age, achievement level, self-pacing), few have inherent, demonstrated value as motivators. The present study explores the possibility that a seldom-studied learner characteristic may be useful in addressing these motivational needs: learner interests.

Learner interests are often described as valuable tools for motivation in instruction (e.g., Briggs, 1977; McNeil, 1976; Powell, 1977). To date, though, interest use has been more passive than active; in other words, learners' interests are more often associated with, rather than actually incorporated into, instruction. Reading is perhaps the prime example of passive interest use.

Providing poor readers with high interest, low vocabulary material is often encouraged (e.g., James & Chang, 1983). Such efforts function largely as a matter of learner choice; that is, learners select reading materials that match their interests. Learners' improved desire to read has established the value of this technique as a motivator. Its procedural ease and clarity have also allowed it to become a matter of routine. Yet active interest use remains rare.

The active use of interests has been explored in a number of experiments (Anand & Ross, 1987; Ross, 1983; Ross, McCormick, & Krisak, 1986; Ross, McCormick, Krisak, & Anand, 1985). These studies showed some evidence of improved performance when interests were used in the example-base of instructional text. However, no systematic approach to the assessment of interests was undertaken. In some cases, interests were merely inferred. Perhaps most importantly, there was no measure of learner motivation. The present study was conducted to explore the possibility that an active use of systematically assessed interests may produce measurable motivational improvements.

Continuing motivation is a frequently used measure of learner motivation (e.g., Hughes, Sullivan, & Mosley, 1985; Story & Sullivan, 1986). The most common measure of continuing motivation involves learners' free choice of whether to return to a previous task. The "Zeigarnik effect" is a special type of continuing motivation. It is defined as a willingness to reengage an uncompleted, intrinsically motivating task (Green, 1963; Kruglanski, Friedman, & Zeevi, 1971).

Intrinsic motivation has been described as attributable to one's own behavior to one's own interests rather than to externally controlling circumstances (Luyten & Lens, 1981). Willingness to reengage an uncompleted task has been shown to be directly related to levels of intrinsic motivation (e.g., McGraw & Fiala, 1982). If use of learners' interests in instruction has value as a motivator, it is hypothesized that learners will choose to reengage an uncompleted, intrinsically motivating task that uses such interests more frequently than one that does not.

Interest use is primarily associated with low achievement (e.g., in reading). Yet similar age groups at both high and low achievement levels express similar interests (e.g., Zharacki, Clark, & Wolins, 1985). There is little evidence that actively using learners' interests in an instructional task would have differential effects for high and low achievers. Since grouping in instruction occurs most often on the basis of achievement, this study tests the hypothesis that interest use is valuable for both high and low achieving groups.

The purpose of the present study was to investigate the effect on motivation of incorporating learners' interests into an instructional task. Effects were studied across high achieving and low achieving learners.

Method

Subjects

Three classes of high school seniors from a middle class suburban high
school were chosen as subjects. This sample was divided into high and low achievers. Seventy-two (72) subjects participated in the final experiment, 36 high and 36 low achievers (8 low achievers were dropped at random from the sample to achieve equal numbers in each treatment group). None of the subjects had been exposed to instruction on syllogisms, the subject area of the experimental materials.

Procedures

High achievers (n=36) and low achievers (n=36) were identified by their classroom teachers. High achievers were defined as those currently having overall grade point averages of A or B. Low achievers were those having averages of C, D, or E. An interest inventory was given to all 72 subjects. No trends emerged for gender or achievement. Interest examples were incorporated into the interests version syllogism unit.

To establish the two syllogism units as equal in difficulty for high and low achievers, an additional 20 subjects (10 high and 10 low achievers) were chosen for a small-group preliminary tryout. Four groups were randomly formed. Four high and five low achievers were given the interests version of the syllogism unit. Five high and five low achievers were given the no interests unit. Average percent correct for the 12 question final quiz (no answers were provided) was approximately 50% for both versions of the unit and for both high and low achievers.

To ensure that the overall syllogism task was intrinsically motivating at a baseline level, subjects were offered the option of either "trying out a unit that teaches you how to solve special kinds of problems in logic" or individually pursuing their own work. All subjects chose the syllogism task. Subjects were blocked on the basis of achievement. Each block was then randomly assigned either the interests or no interests syllogism unit and asked to complete it.

Interest and Criterion Measures

Interest Inventory. An interest inventory based on the work of Sarbin (1964) was designed for this experiment. Sarbin described the human experience as an interaction of five "ecologies." These ecologies are critical facets of the environment within which the individual forms collections of highly valued interests. The ecologies are (a) Self-Maintenance (objects and activities), (b) Spatial (places), (c) Social (persons), (d) Normative (knowledge and skills), and (e) Transcendental (ideas and beliefs).

Five inventory questions were derived from four of the ecologies. Respondents were asked to list three items for each question and to make answers as specific as possible. No order of ranking was required. The five questions asked for lists of (a) three favorite possessions, (b) three things one likes to do best, (c) three places that one likes best, (d) three highly valued persons (not friends, family members or relatives), and (e) three things in which one has a valued knowledge or skill. To avoid controversy with high school subjects, a question concerning valued ideas and beliefs was not included.

Criterion Measure. The following question, which appeared at the end of each version of the syllogism unit, was used as the measure of continuing motivation: "You have just finished Part 1 of a unit on solving syllogisms. Would you be willing to do Part 11 sometime in the future? (Yes or No)."

Design and Data Analysis

The experiment used a 2 (interests, no interests) X 2 (high achievement, low achievement) factorial design. There was one dependent variable: willingness to return to task (Yes or No). Analysis of variance (ANOVA) was used for analysis of the dichotomous data. Analysis of variance has been shown to be robust for dichotomous data (Glass, Peckham, & Sanders, 1972).

Results

Table 1 shows the frequency of willingness to reengage the task by interests and achievement.

Table 1 shows that 24 of 36 subjects (67 percent) in the interests treatment and 15 of 36 (42 percent) in the no interests treatment reported a willingness to return to task. The analysis of variance revealed a significant difference favoring the interests over no interests approach, F(1,68)=5.76, p<.02.

Twenty-seven of the thirty-six (27 of 36) high achievers (75 percent) and 12 of the 36 low achievers (33 percent) chose to return to task. This difference was also significant, F(1,68)=16.00, p<.001.

The interaction of interests and achievement was not statistically significant.

Variance Accounted For

The interest factor accounted for 8 percent of the variance in the results, the achievement factor for 19 percent, and achievement by interest for 3 percent.

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Reported Interests

The most frequently reported interests of the 72 subjects, as indicated on the interest inventory, are summarized in Table 2. Also shown is the percentage of students reporting each item.

It can be seen that, across the 5 categories, sports-related and music-related topics were mentioned most frequently.

Discussion

This study investigated the use of learners' interests in instruction. Significantly more subjects in the interests than in the no interests groups were willing to return to task. Both high and low achievers chose to return more frequently to the interests than the no interests unit of instruction.

Results suggest that interests can be used to improve motivation in instruction. Learners displayed significant gains in continuing motivation when a representative selection of their interests was used in the example-based instructional task. This task was not only unfamiliar, but considered difficult (e.g., Taplin, 1971; Evans, 1972). Although the present study represents only one approach to the use of interests, findings indicate that interests can play an important role in helping instructional developers to motivate learners.

Significantly more high than low achievers were willing to return to task. Such return rates are characteristic of high and low achievers (e.g., Atkinson, 1964). Improving low achievers' desire to return to task remains an important objective. For example, given low achievers' need for high task structure (Cronbach & Snow, 1977), a more focused use of interests examples may prove beneficial. This could perhaps involve use of interests from a single subject area (e.g., cars). Further study of such techniques is needed.

A number of patterns emerged from interest inventory data. For example, music-related objects were the most prized possessions of study participants (60%). This remains a common finding (e.g., Rochberg-Halton, 1984). The vast majority of these music-related items were stereo, records, and tapes. Interestingly, stereo were more valued than the music played on them (47% to 21%).

Sports were major factors in the lifestyles and perceived personal qualities of subjects. Approximately 70% listed sports as not only an important activity, but as a valued area of personal ability. This reflects the extent to which sports retain preeminence in the daily activities and aspirations of this age group.

Over half the subjects (54%) listed a car as a favorite possession, a high incidence of car ownership among high school seniors. Surprisingly, places in California were preferred over the home (43% to 33%).

Results concerning valued persons (no friends or relatives could be listed) were unexpected. Ronald Reagan was the single person to emerge with even a modest consensus (17%). Among other current figures, only Tom Cruise found a significant number of adherents (7%).

Inventory results replicated a unique psychological phenomenon. More value is placed on physical objects than the uses for which they are intended (see Harrison & Sarre, 1971). For example, musical objects (stereo, records, etc.) were more valued than listening to music (60% to 34%). Owning a car was more valued than driving a car (54% to less than three percent). This may have implications for interest use. Learners may be more responsive to object-based than activity-based interests. This could be a useful basis for future research.

Collectively rather than individual interests were used in this study. Results suggest that individual learners can be motivated by interests that are representative of groups of learners. This approach is a decided advantage for the instructional developer. The interest inventory used in this study appears a useful, systematic means of collating data on collective interests. The specific interests listed in inventory responses also allow variety in the use of interest examples. For instance, specific cars reported by learners (e.g., TransAm, Corvette, etc.) can be brought into the instructional text without undue concern that they will lack general appeal.

The present data suggests potential benefits from additional research on interests. For example, exploring interests under a variety of ages, subject areas, and instructional media may offer some benefit. Computers, in particular, appear promising. They offer the means to inventory interests and immediately incorporate the findings into instruction. Such a procedure may provide a useful means of individualizing instruction.

This study indicates that actively incorporating learners' interests into an instructional task can help motivate learners to continue with that task. The increased desire to persist in a task has long-range implications for improvements in learning and performance. Present findings suggest that systemati-

Table 1

<table>
<thead>
<tr>
<th>Interests</th>
<th>No Interests</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI ACH</td>
<td>17/18 (94%)</td>
<td>10/18 (56%)</td>
</tr>
<tr>
<td>(n=36)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LO ACH</td>
<td>7/18 (39%)</td>
<td>5/18 (28%)</td>
</tr>
<tr>
<td>(n=36)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>24/36 (67%)</td>
<td>15/36 (42%)</td>
</tr>
</tbody>
</table>

1987, VOL. 10, NO. 3
Table 2
Summary of Results on Interest Inventory

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Favorite Possessions:</td>
<td></td>
</tr>
<tr>
<td>Music-Related</td>
<td>60%</td>
</tr>
<tr>
<td>Cars</td>
<td>54%</td>
</tr>
<tr>
<td>Clothes</td>
<td>33%</td>
</tr>
<tr>
<td>Pets</td>
<td>33%</td>
</tr>
<tr>
<td>2. Favorite Activities:</td>
<td></td>
</tr>
<tr>
<td>Sports</td>
<td>67%</td>
</tr>
<tr>
<td>Music-Related</td>
<td>34%</td>
</tr>
<tr>
<td>Being with People</td>
<td>33%</td>
</tr>
<tr>
<td>The Outdoors</td>
<td>26%</td>
</tr>
<tr>
<td>3. Favorite Places:</td>
<td></td>
</tr>
<tr>
<td>Places in California</td>
<td>43%</td>
</tr>
<tr>
<td>Places in the Home</td>
<td>33%</td>
</tr>
<tr>
<td>Friend's Home</td>
<td>11%</td>
</tr>
<tr>
<td>4. Favorite People:</td>
<td></td>
</tr>
<tr>
<td>Ronald Reagan</td>
<td>17%</td>
</tr>
<tr>
<td>John Wayne</td>
<td>7%</td>
</tr>
<tr>
<td>Tom Cruise</td>
<td>7%</td>
</tr>
<tr>
<td>Abraham Lincoln</td>
<td>7%</td>
</tr>
<tr>
<td>5. Valued Knowledge and/or Skills:</td>
<td></td>
</tr>
<tr>
<td>Sports-Related</td>
<td>70%</td>
</tr>
<tr>
<td>Music-Related</td>
<td>33%</td>
</tr>
<tr>
<td>Cars</td>
<td>13%</td>
</tr>
<tr>
<td>Outdoors-Related</td>
<td>11%</td>
</tr>
</tbody>
</table>

...cally identifying learner interests, and actively using them in instruction, may provide learners an added perception of relevance. Interests may have the potential to become increasingly useful tools in efforts to motivate learners.

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Conceptualizing Unfamiliar Content

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Abstract. In order to participate effectively in the instructional development process, an instructional designer must quickly develop a conceptualization of the content to be included in the instruction. The conceptualization is based on content-related information acquired from a variety of sources, such as the designer's prior knowledge, a subject-matter expert, or printed subject-matter materials. This article provides an overview of techniques an instructional designer can use to examine printed subject-matter materials when conceptualizing unfamiliar content.

Conceptualizing Versus Learning

Conceptualizing unfamiliar content is related to, but not necessarily the same as, learning unfamiliar content. Two points of distinction are relevant. First, learning takes place within one or more domains — cognitive, affective, and/or psychomotor. Conceptualizing, on the other hand, is solely a cognitive activity, regardless of the subject-matter domain. Second, during the conceptualization process, the designer becomes familiar with the content but not necessarily to the point of being able to apply the cognitive domain knowledge (e.g., classify various dance routines), perform the psychomotor domain skill (e.g., execute a dance routine), or manifest the affective domain attitude (e.g., frequently attend ballet recitals). In the taxonomy of the cognitive domain, conceptualization is at the comprehensive level but not necessarily at the application level (Bloom, 1956).

Regardless of the subject-matter domain, conceptualizing content is a cognitive activity. It is not surprising, therefore, that the conceptualization process is similar across the three domains. When conceptualizing cognitive domain content, the designer identifies the major topics in the subject matter, identifies selected subtopics, and determines the relationships among the topics. The outcome of this process is an abstract description of the content generalized from particular topics and relationships within the subject matter.

When dealing with psychomotor or affective domain content, similar processes occur. With psychomotor domain content, the designer identifies the major components of the psychomotor task (e.g., steps in a routine), identifies selective refinements within the components (e.g., subroutines within a step), and determines the relationships among the components (e.g., sequence, coordination). Here, the outcome is an abstract description of the psychomotor content generalized from particular routines and relationships within the subject matter. With affective domain content, the designer identifies the general attitudes/values to be internalized, identifies behaviors associated with the attitudes/values, and delineates the conditions under which the attitudes/values are appropriate. The outcome is an abstract description of the affective content generalized from the behaviors and conditions associated with the subject matter.

While the newly developed conceptualization encompasses the subject matter, it is unlikely that the conceptualization will include all the associated details. In fact, content detail can obscure the conceptualization in much the same way that visual detail can obscure the essential elements in a photograph, making figure-ground separation and attention focusing more difficult. Detail in the form of examples can help develop the conceptualization but need not become a part of the conceptualization. Early in the instructional development process, when the conceptualization is being formed, the abstract description is more important to the designer than the subject-matter details.

In summary, conceptualizing unfamiliar content is a cognitive activity resulting in an abstract description of the subject matter. The description encompasses the major components and relationships within the subject matter but does not include the myriad of details associated with the subject matter. In the
following section, specific techniques aiding the conceptualization process are examined. Following a brief description of subject matter expert interviewing techniques, attention will turn to how a designer can systematically extract subject-matter information from print materials to construct a conceptualization of the content.

**Techniques Aiding Conceptualization**

Conceptualization techniques help the designer collect information needed to conceptualize the subject matter. These techniques include interactions between the designer and experts, and between the designer and subject matter materials. Personal interactions are likely to center around the designer interviewing an expert; impersonal interactions are likely to center around the designer reading printed materials. While other interactions (e.g., touring facilities, attending demonstrations, operating equipment) are possible, these intergeneral information about the content. A common descriptive question is “What are the major topics you cover in your course?” Structural questions are more specific and are used to gather detailed information about a topic and to confirm the designer’s understanding of the content. Structural questions might be “What specific things are included in the first topic?” or “Is there only one way to complete this task?” Contrast questions are very specific and are used to discover the meaning of facts and concepts, and the relationship among them. A contrastive question might be “How is the first technique different from the second?” Bratton suggests that the questioning sequence varies depending on the information needs of the designer.

When reading subject matter materials, the designer is like a student with unfamiliar materials frequently not written with reading ease in mind. While it was argued earlier that the designer does not necessarily learn the content so that it can be applied, several similarities exist between a designer’s task to conceptualize the content from printed materials and a student’s task to comprehend information in textbooks. Both designer and student are unfamiliar with the material; both are expected to understand the material within a given amount of time; both have limited access to content experts. What techniques have been developed to enhance the interaction between readers and print materials? Interacting with Print Materials

From early in this century, reading educators have advocated the broadening of reading programs to include what they refer to as “content-area reading” (Moore, Readence, & Rickelman, 1983). As a field of study, content-area reading is concerned with improving students’ ability to derive meaning from text. While much content-area reading attention focuses on instructional strategies for classroom teachers, some content-area reading techniques are relevant for the designer confronted with print materials about unfamiliar content.

A fundamental premise of content-area reading is that “what a reader brings to a text determines in large measure what a reader takes from the text” (Herber, 1982, p. iv). More strongly put, “only if the new information can be organized or associated with the previously known will understanding, or comprehension, take place” (Allington & Strangle, 1981, p. 9). Thus, what a designer knows about the content before reading the materials will strongly influence his or her conceptualization of it.

Given the strong influence prior knowledge exerts on comprehending written information, designers are at a disadvantage if they attempt to read unfamiliar materials without the proper preparation. They are also at a disadvantage if they attempt to read the materials in the same manner as one would read a novel. And finally, they are at a disadvantage if, after reading the materials, steps are not taken to ensure that their conceptualizations formed while reading are accurate and complete. The content-area reading techniques described below and summarized in Table 1 are discussed within an instructional development context.

**Prereading Techniques**

Taylor (1981) argued that vision of the whole is necessary for the parts to make sense. Because a reader’s prior knowledge of a topic facilitates future comprehension, prereading techniques help the designer to organize and associate the new content within a broad, meaningful context.

With unfamiliar content, it is possible that the designer will have a very limited, and sometimes inaccurate understanding of the content. Before attempting to read materials about unfamiliar content,
the designer should assess the accuracy and scope of his or her prior knowledge. In addition to the questioning techniques described earlier, accuracy and scope can also be assessed by asking an expert to construct, with the designer’s assistance, a “graphic organizer” of the content (see Figure 1). Graphic organizers (Barron, 1969; Smith, 1981) are visual aids that define relationships among topics. Graphic organizers are analogous to “mind-mapping” somewhat crude and imprecise, but depicting the essence of the content.

Consider, for example, a graphic organizer for operating a computer printer. The expert might identify three broad topics: printer parts, printer set-up, and printer operation. Each broad topic might have several associated subtopics (e.g., tractor feed, print head, and DIP switches would be subtopics of printer parts). Furthermore, the topics and subtopics are related to one another. As shown in Figure 1, the graphic organizer indicates the main topics and subtopics and suggests their interrelationships. As the designer studies the graphic organizer and discusses it with an expert, misconceptions in the designer’s prior knowledge can be identified and corrected before reading printed materials. Also, the designer can develop a feeling for the breadth of the content area, a necessary precondition for meaningful reading. As a precautionary note, graphic organizers should be kept simple and general; too much detail can create confusion rather than clarification.

Examples can play an important role in the prereading process. The designer can ask the expert to show or describe a simple example of the content. If the example is meaningful to the designer and representative of the content, then the subsequent reading will be facilitated by this newly established prior knowledge. In situations where meaningful examples are not readily available, Feature Analysis charts may prove helpful.

Feature Analysis (Readence & Searfoss, 1981) is a technique based upon assumptions about how human beings organize knowledge. Smith (1975) stated that as human beings process new information (a) categories are established; (b) rules are formulated to place objects (words, ideas) into these categories; and (c) category interrelationships are established. Readence and Searfoss (1981) suggested that Feature Analysis can be used to refine and extend readers’ understanding. Data charts (Moore, Moore, Cunningham, & Cunningham, 1986), a modification of Feature Analysis, can be used for the same purpose. Creating the charts is a prereading activity (see Figure 2). Filling in the chart used in Feature Analysis is a during-reading or postreading activity.

When creating the Feature Analysis chart, the designer asks the expert what major topics are included within the content AND what topic features are considered important. Consider, for example, a course being developed to acquaint sales personnel with the computer printers offered by a company. The designer first asks the expert to identify the major products and then to identify the products’ features (e.g., variable print modes, alternate character sets, graphics output). This information is used to create the chart (printers x feat-

| Table 1 |
| Selected Content-area Reading Techniques |

<table>
<thead>
<tr>
<th>Prereading Techniques</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphic organizer constructed by an expert</td>
<td>Assesses scope and accuracy of designer’s prior knowledge and establishes subject-matter breadth</td>
</tr>
<tr>
<td>Simple, representative example described by expert</td>
<td>Establishes designer’s prior knowledge of content</td>
</tr>
<tr>
<td>Feature analysis matrix or data chart designed by an expert</td>
<td>Provides broad view of subject matter in terms of main topics and features</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>During-Reading Techniques</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey titles, subtitles, graphic aids, and selected paragraphs</td>
<td>Develops initial understanding of main ideas presented in materials</td>
</tr>
<tr>
<td>Covert headings to questions</td>
<td>Establishes designer’s prior knowledge of content</td>
</tr>
<tr>
<td>Identify organizational patterns within materials</td>
<td>Guides comprehension</td>
</tr>
<tr>
<td>Write in text, complete Feature Analysis or data chart Analysis or data chart matrix, make sketches, construct graphic organizer</td>
<td>Facilitates interaction between materials and reader</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Postreading Techniques</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present sketches, completed matrices, and graphic organizers to experts</td>
<td>Focuses conversation validating accuracy and scope of conceptualization</td>
</tr>
<tr>
<td>Make literal assertions and ask questions</td>
<td>Checks for literal-level comprehension</td>
</tr>
<tr>
<td>Paraphrase content and describe inferred relationships</td>
<td>Checks for interpretive-level comprehension</td>
</tr>
</tbody>
</table>

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During-Reading Techniques

Reading is an interaction between the thoughts and language of writers and readers (Readence, Bean, & Baldwin, 1981). Thus, reading printed material is, in a sense, interacting with an expert. The during-reading techniques described below help facilitate this interaction.

The first during-reading technique continues the above discussion of Feature Analysis. If the Feature Analysis approach is used, the designer examines the printed material and places a simple "✓" or "✗" in the Feature Analysis chart to indicate feature presence or absence. For example, if a particular printer has graphic-output capability, a "✓" is entered in the appropriate cell. The designer can also write notes in the chart cells. More detailed notes in the Feature Analysis chart will be more helpful with very complex and unfamiliar content. The during-reading techniques discussed below will help extract the information needed to complete the chart.

As pointed out earlier, when reading printed materials, the designer is studying the materials. One widely recommended study technique is "Survey-Question-Read-Recite-Review," or "SQ3R" (Robinson, 1946). Applied literally, SQ3R would be inappropriate for the designer since one of its purposes is to cause readers to spend more time on task (Readence, Bean, & Baldwin, 1981). However, some parts of the procedure, specifically "Survey-Question-Read," are relevant to the conceptualization process.

Sometimes considered a prereading technique, surveying involves examining materials on a global basis to identify the main ideas in chapters or book sections. The technique involves analyzing chapter title and subtitles, analyzing visual aids (e.g., charts, graphs), reading introductory paragraphs, and reading concluding paragraphs. When the surveying is complete, the designer has an initial understanding of the main and supporting ideas presented in the text. In some instances, especially with relatively simple content, this initial understanding may be sufficient to formulate the conceptualization. With complex content, however, more depth of understanding, and additional study techniques, may be required.

After the designer surveys the materials on a chapter-by-chapter basis, chapter titles and subtitles are converted to questions. For example, the heading "Changing Character Sets" might become "What are character sets available and how are they changed?" By converting headings to questions, the designer is establishing a content-related purpose for reading the materials, a critical component in the reading process.

After surveying the materials and formulating questions, the designer reads the materials. Since a comprehensive review of reading techniques is clearly beyond the scope of this article, the following discussion is limited to two techniques that appear particularly relevant to the instructional development process. The first technique involves identifying patterns within text; the second involves overtly interacting with text materials.

Writers sometimes attempt to communicate their thoughts to readers through organizational patterns in text. Knowledge and recognition of these patterns appears to be related to increased reading comprehension (Pearson & Camporelli, 1981; Readence, Bean, & Baldwin, 1981). The obvious implication is that, while reading material, the designer should attempt to identify organizational patterns within the text and use these patterns, when present, to guide comprehension. Consider, for example, a manual for a dot-matrix printer. Some sections of the manual might use a step-by-step organizational pattern (e.g., installing a ribbon); other sections might use a problem/solution pattern (e.g., troubleshooting printer problems). When present, organizational patterns can facilitate the initial understanding of the content presented in the manual.

As stated earlier, reading is an interaction between writer and reader. The best method of actively interacting with print materials is writing in the text (Readence, Bean, & Baldwin, 1981). Underlining main ideas, writing questions, and making comments in the margins are response modes readily available to the designer.

Written responses need not be limited to text margins. While reading, the designer can make sketches of content elements. The sketches not only aid the conceptualization process through active interaction with the material, they may also prove valuable when designing instructional materials. Graphic organizers can also be constructed while

![Figure 1. Graphic organizer for printer operation.](image-url)
reading, providing a visual depiction of perceived relationships among content elements. These overt responses are indicators of an emerging conceptualization. They play a critical role in the postreading techniques described below.

**Postreading Techniques**

After reading the subject matter material, the designer must validate the accuracy and scope of his or her conceptualization formed while reading. In conversation with an expert, the designer attempts to describe the newly formed conceptualization. Sketches, graphs, completed charts, and other overt responses made while reading the material can help focus the conversation. During this time, the designer should make sure that he or she understands the content on the appropriate levels of comprehension.

Reading researchers commonly refer to three levels of comprehension (Herber, 1979; Readence, Bean, & Baldwin, 1981). While the labels for the levels vary from researcher to researcher, the basic ideas appear to be congruent. For purposes of this discussion, the three levels will be referred to as literal, interpretive, and applied.

Literal-level comprehension involves determining what the author said, and identifying important information within the text. Literal-level comprehension is limited if the designer does not know the meaning of the vocabulary used in the materials, a common problem in technical areas. Literal comprehension is sometimes referred to as simply "reading the lines."

Interpretive-level comprehension involves determining what the author meant by what was said and perceiving the relationships which exist in the information. Interpretive-level comprehension is limited if the designer does not recognize the implied relationships among content elements. Interpretive comprehension is "reading between the lines."

Applied-level comprehension involves taking what is already known and applying it to what has just been learned. It also involves developing ideas which subsume the new and prior knowledge and extending both of them (Herber, 1978). Applied-level comprehension is directly related to prior knowledge and experience. Applied comprehension can be thought of as "reading beyond the lines."

Of the three levels of comprehension, only two are required for conceptualizing unfamiliar content — literal and interpretive. Both levels must be validated through interactions with an expert.

When validating comprehension on the literal-level, the designer makes assertions (e.g., "There are only five major product categories.") and/or asks questions (e.g., "Is the final step in the process to run a printer test?"). The assertions and questions are text-based; that is, they can be traced directly to parts of the materials read. Rather than an exhaustive listing of all content elements, validation on the literal-level should be a representative sampling of the main content elements presented in the text. Failure to validate comprehension on the literal-level risks including incorrect content or excluding critical content from the instruction.

When validating comprehension on the interpretive-level, the designer draws inferences from the content and presents the inferences to an expert for verification. Inferences can be presented by paraphrasing content and by stating relationships not directly presented in the text. Failure to validate comprehension on the interpretive-level risks the formation of an inaccurate or incomplete conceptualization.

Interpretive-level comprehension enables one to perceive the relationships which exist in information, conceptualize the ideas formulated by those relationships, and express those relationships in either written or oral form (Herber, 1978). Interpretive-level comprehension is the essence of content conceptualization. In other words, when a designer successfully engages in interpretive-level comprehension, the conceptualization process is complete, thus making applied-level comprehension unnecessary.

**Summary**

This paper provides an overview of how a designer can conceptualize unfamiliar content by reading subject-matter materials. Drawing from the content-area reading literature, prereading, during-reading, and postreading techniques are suggested for facilitating the conceptualization process. Prereading techniques help prepare the designer to organize and associate new content within a broad, meaningful context. During-reading techniques help facilitate the indirect interaction between the writer of subject-matter materials and the instructional designers. Postreading techniques are primarily concerned with validating the designers newly formed conceptualizations.

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<thead>
<tr>
<th>Variable</th>
<th>Character sets</th>
<th>Graphics output</th>
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<tbody>
<tr>
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<tr>
<td>Printer 2</td>
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<td>Printer 3</td>
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<td>Printer 4</td>
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*Figure 2. Features analysis (or data chart) matrix for operation of various printers*
conceptualization. When used in conjunction with subject-matter expert interviews, these information collecting and processing techniques should improve the conceptualization process.

References


Graduate Programs in Instructional Technology: Their Characteristics and Involvement in Public Education

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Abstract. Graduate programs in Instructional Technology (IT) were surveyed to determine (1) the similarities and differences among programs and (2) their involvement in teacher education and school systems. Findings show Instructional Technology to be an umbrella term for programs with six different curricular emphases and 66 different program titles. Equal numbers of graduates are placed as school library media specialists and designers and media specialists in business and industry. Very few become college professors.

The IT programs responding to the survey participate in the teacher education programs in their institutions primarily by acting as advisors in planning the curriculum and offering media and computing courses. Less than half have formal ties with local school systems.

Subsequent interaction among professors raised a number of issues. One was the "identity crisis" that seems to plague the field. Though often portrayed as a hardware/audiovisual/service enterprise, many professors dispute this characterization of the field and see themselves as software/systems/consulting specialists.

Another issue that emerged was the perceived declining influence of Instructional Technology in public education. Professor opinions were considerably divided here. Some held that the field should be actively providing assistance to the schools, particularly as their use of technology increases. Others maintained that opportunities for involvement in public education are few and the rewards minimal or nonexistent; these professors view the Instructional Technology field today as rightly and almost exclusively aligned with (nonschool) training. In between were professors only mildly interested in the matter.

These questions and concerns prompted the development of a survey of graduate programs in Instructional Technology. Although some of the information on the survey is available through AECT (Johnson, 1985) and in the Educational Media and Technology Yearbook (Logan, 1985), the survey was designed to analyze the similarities and differences among academic programs in an attempt to better understand the "identity crisis" issue. Second, the survey sought to determine what involvement the Instructional Technology academic program currently have in matters related to public education. The questions posed for the survey study are as follows:

1. How similar or different are graduate programs in Instructional Technology (IT)? Specifically:
   • What are the titles of graduate programs in IT?
   • What is the emphasis of the curriculum for each program?
   • How many faculty are associated with each program and what are their areas of specialization?
   • Where are IT graduates being placed?
   • In what ways are graduate programs in Instructional Technology involved in teacher education or the public schools? Specifically:
     • Do IT programs offer courses for teacher education majors? If so, what kinds of courses are offered?
     • Do IT faculty participate in planning the teacher education curriculum at their institutions?
     • Do IT programs have any formal ties with schools in their local areas or state?
     • If IT programs are organizationally linked to the teacher education programs in their institutions, are they more likely to participate in teacher education or school-based activities?

Conduct of the Survey

A two-part questionnaire was developed to be completed by the program leader of each graduate IT program. The first part asked the program leader to supply the following information: program title, placement of program within the institution, degrees offered by the program, primary emphases of the curriculum, placement data on graduates, and information related to the involvement of the program in teacher/public education. The second part asked the program leader to provide a list of faculty clearly identified with the IT program (excluding those assigned to other programs who have a minimal involvement in IT) and coding for their areas of specialization and the nature of their appointments.

Surveys were mailed to the program leaders of 210 programs listed in the Educational Media and Technology Yearbook (Logan, 1985) as masters programs in Instructional Technology. (All institutions offering doctoral programs in IT, listed separately in the Yearbook, are included in the listing of masters pro-
programs.) A cover letter asked for the cooperation of program leaders in establishing baseline data on which to chart future trends in the field (Part 1 of the questionnaire), and making possible a second survey to assess individual faculty activities (Part 2 of the questionnaire).

The questionnaire was mailed in April, 1986, and a follow-up letter was sent in May. By June, 1986, 142 programs (67.6%) had returned the survey; three of these institutions had dropped their IT programs.

Limitations

Two cautions must be mentioned. First, program leaders no doubt answered the items independent of total faculty participation. Therefore, the data reflect only that individual's perception of the IT program's activities and accomplishments. Second, in certain cases the data were collapsed into categories to facilitate analysis. This occasionally required subjective decisions on the part of the researchers, particularly where the terminology of the field is ambiguous, e.g. instructional or educational technology.

Results and Discussion

1. How similar or different are programs in Instructional Technology?

Titles of Academic Programs

Unlike the fields of Biology, Music Theory, Clinical Psychology, Educational Research and many others whose titles tend to be fairly consistent across institutions, program titles in IT display considerable diversity (see Table 1). (Where titles contained two elements, e.g. Media/Library Science, they were classified by the first named element.) Titles emphasizing instructional or educational technology were most frequently used (33.8%), followed by titles emphasizing media (25.8%) and instructional systems design (17.2%). Fewer programs have titles emphasizing library applications (9.4%) and computing (5.8%). Eight percent (7.9%) of the programs have other titles, most of these emphasizing communications. No title used the term audiovisual, apparently demonstrating an effort to discard an older, hardware image. Actually, the 1978 Educational Media and Technology Yearbook (Brown, 1978) noted a dramatic decrease in the use of the term audiovisual in academic program titles. The deletion process seems now to be complete.

Curriculum Areas of Emphasis

In questioning program leaders about their curricula it was first determined that whereas 97.1% had a master's program in IT, less than half offered a specialist degree (32.8%) or a doctoral degree (35.8%). Fewer still (18.2%) indicated that their programs offered a bachelor's degree in IT.

Program leaders were asked to check the primary and secondary emphases of their programs. Three persons did not respond. Of the remainder, all indicated a primary emphasis, but one fifth (22.2%) did not indicate a secondary emphasis. The most frequent primary emphasis selected was instructional systems design (39.6%) followed by school library media (28.1%), media (18.0%), instructional computing (10.8%), and communications (3.6%). (With only five programs checking communications as a primary emphasis, the category was eliminated from further analysis.)

Of the 31 (22.3%) programs checking only a primary emphasis, 14 (45.2%) were for media/library media, 7 (22.6%) were instructional systems design, 6 (19.4%) were instructional computing, and 4 (12.9%) were media. Of those reporting both primary and secondary emphases, instructional systems design (primary) and media (secondary) was the most frequent combination (14.4%). Instructional systems design (primary) and instructional computing (secondary) was next in frequency (12.2%). Other combinations included school library media/media (7.9%), media/school library media (6.5%), school library media/instructional systems design (5.1%), and instructional systems design/school library media (4.4%).

Is there a relationship between the selection of a program title and the reported primary area of emphasis in the curriculum? Program titles were collapsed into the six categories on Table 1 and analyzed by only the primary area of emphasis selected by the program leader. As can be seen in Table 2, programs with a primary emphasis in instructional systems design have program titles indicating either instructional/educational technology (45.5%) or instructional systems design (40.0%). Those with a primary emphasis in media use the titles instructional/educational technology (25.0%), media (37.5%), or some other title (20.8%). Those with a primary emphasis in library use titles highlighting instructional/educational technology (26.3%), media (42.1%) or library (26.3%). Finally, programs with a primary emphasis in instructional computing are titled either instructional/educational technology (60.0%) or computing (40.0%).

Instructional/educational technology is obviously the "catch-all" phrase for the field in that it is the only title to be selected by all categories of programs. It also appears that titles emphasizing instructional/educational technology, media, and school library media are used somewhat interchangeably. On the other hand, instructional systems design and instructional computing are more exclusive since they are rarely chosen by programs without corresponding primary emphases.

Since an indication of primary emphasis seems to more accurately reflect what programs are about, later analyses will make use of this variable rather than program titles.

Number and Specialization of Faculty

Program leaders were asked to list the IT faculty associated with their programs and to provide two codes. The first indicated the faculty member's area of specialization. Despite instructions to the contrary, many respondents supplied two or more codes for each faculty member. This may reflect either an understandable willingness to pigeonhole a colleague without his or her participation or it may be an indication that many IT faculty are considered specialists in more than one area.

The second code indicated the nature of each faculty member's appointment, either academic, administrative, service, or a combination of these. This coding was included because of the concern over the "service" image of the field. How many IT professors are on service appointments at their institutions?

The number of faculty in the Instructional Technology programs ranged from one to twenty-three, with the median being 3.8. Seventy-one percent (70.8%) of the programs have five or fewer faculty. On the average, two-thirds (63.7%) of the program faculty are male. One fourth (26.3%) of the programs have all male faculty; only a small number (6.8%) have all female
Table 1
Program Titles (n=139)

<table>
<thead>
<tr>
<th>Instructional or Educational Technology</th>
<th>33.5%</th>
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<tbody>
<tr>
<td>Instructional Technology (23)</td>
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<tr>
<td>Instructional Technology and Media Management</td>
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<td>Instructional Technology and Microcomputers</td>
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<td>Educational Communications and Technology (3)</td>
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<td>Educational Applications of Technology</td>
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<td>Curriculum and Educational Technology</td>
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<td>Interactive Educational Technology Technology for Educators</td>
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<table>
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<tr>
<th>Media</th>
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<td>Educational Media (12)</td>
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<tr>
<td>Educational Media and Technology (3)</td>
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<td>Instructional Media and Technology (2)</td>
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<td>Media Technology (2)</td>
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<td>Media Education</td>
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<td>Media Science/Instructional Design</td>
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<td>Media/Library Science</td>
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<td>Media Studies</td>
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<td>Information Media</td>
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<tr>
<td>Learning Resources/Commercial Media</td>
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<td>Instructional Resources in Education</td>
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<td>Educational Computing</td>
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<td>School Computer Studies</td>
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<td>Technological Systems</td>
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<tr>
<td>Management/Educational Computing</td>
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<tr>
<th>Instructional Systems Design (ISD)</th>
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<td>Instructional Systems (3)</td>
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<tr>
<td>Instructional Design, Development, and Evaluation</td>
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<td>Instructional Design and Human Resource Development</td>
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<tr>
<td>Instructional Science</td>
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<tr>
<td>Instructional and Training Technology</td>
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<td>Training and Development</td>
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<tr>
<td>Training and Learning Technology</td>
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<tr>
<td>Instructional Research and Development</td>
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<td>Learning and Instruction</td>
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<td>School Library Media (2)</td>
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<td>School and Public Librarianship</td>
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<td>Library Media</td>
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<tr>
<td>Library/Instructional Media</td>
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<tr>
<td>Library Science</td>
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<tr>
<td>Library Science/Media Education</td>
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<tr>
<td>Library Science and Communications Media</td>
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<tr>
<td>Library and Information Studies</td>
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<tr>
<td>Information and Library Studies</td>
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<table>
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<th>Other</th>
<th>7.9%</th>
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<tbody>
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<td>Communications</td>
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<tr>
<td>Communications Media (2)</td>
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<tr>
<td>Communications Arts</td>
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<tr>
<td>Communications and Information Systems</td>
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<td>Communications and Training Technology</td>
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<tr>
<td>Mass Communications</td>
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<tr>
<td>Information/Instructional Technology</td>
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<td>Information Services and Technology</td>
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<tr>
<td>Interactive Telecommunications</td>
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<tr>
<td>Young Education and School Personnel Services</td>
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Faculty. The most frequent area of specialization was media, where 78.2% had at least one member with this expertise. Seventy-two percent (72.2%) of the schools had at least one faculty member in instructional systems design, 66.2% had at least one in instructional computing, and 52.6% of the schools had at least one member specializing in school library media. Many faculty were listed as having multiple specialties.

The most common type of faculty appointment was an academic appointment with 91.2% of the schools having at least one such appointment. 56.4% had at least one academic/administrative appointment and 4.5% had at least one solely administrative appointment. Twenty-nine percent (28.7%) of the programs have at least one faculty member with an academic/service appointment and 6.8% have at least one service (only) appointment.

Placement of Graduates

Program leaders were asked to estimate the percentages of their graduate students (masters, specialist, and doctoral combined) placed in various types of employment during the years 1984-86. The results indicate that more graduates of IT programs are placed in school library media positions than in any other category, although an almost equal number are placed as instructional designers in business and industry. The next highest placement category was classroom teachers. Many fewer graduates were placed as media specialists in business or industry, college professors, librarians in non-school settings, or in other positions.

To facilitate analysis of these data, the job categories were collapsed into five: instructional designers and media specialists in business and industry, school library media specialists and librarians in nonschool settings, classroom teachers, college professors, and other. The "total" column on Table 3 shows that across all programs, about one third of the graduates (35.7%) took library jobs, one third (35.0%) took jobs in business or industry, 13.5% became classroom teachers, 7.2% became professors, and the remainder (8.5%) took some other job. Table 3 also shows that graduates of programs with a primary emphasis in instructional systems design are primarily placed in business and industry (57.0%). The graduates of media programs are equally as likely to go into business (35.0%) as to take library positions (35.3%). Three fourths (77.5%) of the graduates of programs with a primary emphasis in school library media took library jobs, while instructional computing graduates tended to become classroom teachers (47.2%) or go into business (25.0%).

Of special interest is the high placement of classroom teachers by instructional computing programs, corroborating a belief many have had that such programs have sprouted up in part to meet the needs and desires of in-service teachers. It is also evident that few graduates of any programs take positions as college professors. This, coupled with the fact that only 35.8% of the programs responding to the survey offer doctoral degrees may explain why it is becoming increasingly difficult to find candidates with traditional IT backgrounds for faculty positions. The long term consequences of a shortage of IT candidates warrants discussion among IT professionals.

Discussion

How similar or different are graduate IT programs? There are some common threads that bind the field together, but there is also considerable diversity in the titles and central focus of graduate IT programs. The table below highlights the differences in programs and provides a basis for comparison. The programs are grouped into five categories: instructional designers and media specialists, business and industry, school library media specialists and librarians in nonschool settings, classroom teachers, and college professors. The percentage of graduates placed in each category is also included. The table shows that the majority of graduates go into business and industry, with 35.7% taking library jobs, 35.0% going into business or industry, and 13.5% becoming classroom teachers. The remainder, 8.5%, took other jobs.

<table>
<thead>
<tr>
<th>Program Category</th>
<th>Graduates Placed</th>
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<tbody>
<tr>
<td>Instructional Designers and Media Specialists</td>
<td>35.7%</td>
</tr>
<tr>
<td>Business and Industry</td>
<td>35.0%</td>
</tr>
<tr>
<td>School Library Media Specialists and Librarians in Nonschool Settings</td>
<td>13.5%</td>
</tr>
<tr>
<td>Classroom Teachers</td>
<td>7.2%</td>
</tr>
<tr>
<td>College Professors</td>
<td>8.5%</td>
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programs. The diversity, of course, accounts for one of the appeals of the field: the wide marketability of IT graduates. But it also raises a few questions. Are there any constants across programs labeling themselves Instructional Technology (either directly or as an umbrella designation in books like the Educational Media and Technology Yearbook)? Should there be? Take, for example, previously cited data indicating that 27.8% of the IT programs do not have a faculty member specializing in instructional systems design. This figure may reflect the fact that some program leaders feel design to be so basic that no one needs to "specialize" in it. However, suppose there are programs that do not feel ISD to be relevant to their program goals? Should such a program use the title Instructional Technology? Admittedly, this line of thinking runs quickly into the politically charged issue of certification and competency testing (ASTD, 1983; Bratton, 1984). The data from this survey indicate that competency testing for "instructional technologists" in the broadest sense would be impossible. The specialized skills required for instructional designers and school media specialists would be different.

An interesting question follows. Is Instructional Technology as it now stands one field or a collection of fields? Historically, the merger of the library and audiovisual fields ushered in the concept of the school library/media specialist. These two areas seem to coexist easily within graduate programs, as indicated by an overlapping of the data for this survey on most measures. However, the amalgam of instructional systems design and school library media seems more strained. Some programs reported running two completely different tracks, one for designers and one for librarians. Most, however, specialize mainly in one area or the other. It would be interesting to know how similar or different the graduates of programs emphasizing these two areas are in terms of personal and professional ambitions, skills and other characteristics.

Between the plethora of program titles, variation in program emphases, and placement of graduates in widely varying settings — from service to consulting positions, from elementary schools to AT&T — it is not surprising that the public finds Instructional Technology difficult to understand. The "identity crisis" seems spawned from the nature of the field itself.

<table>
<thead>
<tr>
<th>Program Title</th>
<th>ISD</th>
<th>Media</th>
<th>Library</th>
<th>Computing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional/Educational Technology</td>
<td>45.5</td>
<td>25.0</td>
<td>26.3</td>
<td>60.0</td>
</tr>
<tr>
<td>Media</td>
<td>9.1</td>
<td>37.5</td>
<td>42.1</td>
<td>0.0</td>
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<td>ISD</td>
<td>40.0</td>
<td>4.2</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Library</td>
<td>0.0</td>
<td>12.5</td>
<td>26.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Computing</td>
<td>1.8</td>
<td>0.0</td>
<td>2.6</td>
<td>40.0</td>
</tr>
<tr>
<td>Other</td>
<td>3.6</td>
<td>20.8</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>% of programs reporting this primary emphasis:</td>
<td>39.6</td>
<td>18.0</td>
<td>28.1</td>
<td>10.8</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Job Type</th>
<th>ISD</th>
<th>Media</th>
<th>Library</th>
<th>Computing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library</td>
<td>13.4</td>
<td>35.5</td>
<td>77.5</td>
<td>3.9</td>
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<tr>
<td>Business</td>
<td>57.0</td>
<td>35.0</td>
<td>8.6</td>
<td>25.0</td>
</tr>
<tr>
<td>Teacher</td>
<td>10.2</td>
<td>9.4</td>
<td>8.6</td>
<td>47.2</td>
</tr>
<tr>
<td>Professor</td>
<td>9.0</td>
<td>10.6</td>
<td>1.8</td>
<td>10.0</td>
</tr>
<tr>
<td>Other</td>
<td>10.4</td>
<td>9.5</td>
<td>3.5</td>
<td>13.9</td>
</tr>
</tbody>
</table>
2. In what ways are graduate programs in Instructional Technology involved in teacher education or the public schools?

Location within Institutions

Eighty-three percent (82.8%) of the programs responding are in public institutions; 17.5% are in private institutions. Three fourths (78.8%) of the IT programs are located in the school or college of education within their institutions. Other institutions have their IT programs in the college of arts (5.1%), math and/or computers (5.6%) and media (7.9%).

Further breaking down the organization into specific departments or divisions reveals that 35% of the IT programs are in departments of curriculum and instruction, 19% are in departments of instructional technology or media, 5.1% are in library departments, and 2.2% are in computer departments.

Over half of the respondents (51.4%) report that their Instructional Technology programs are in the same department as the undergraduate teacher education programs at their institutions, 40.6% report that they are in different departments, and 8.0% report that their institution does not have an undergraduate teacher education program. The figures are very similar for graduate teacher education: 59.9% of the IT programs are in the same department, 33.5% are in different departments, 6.6% report having no graduate program.

To determine if placement within a school or college of education makes IT programs more or less likely to be involved in activities related to public education, programs were divided into those in the same or a different department as the teacher education program at their institutions (see Table 4). Because the results for undergraduate and graduate levels were similar, the data for these two categories were collapsed. Discussion of these results will be included at the end of the next three sections.

Courses offered for Teacher Education Majors

Program leaders were asked to list the courses their IT programs offered that were specifically intended for teacher education majors. It was assumed that core IT courses would be open to teacher education majors as electives, but the goal was to determine a more concrete level of involvement in the teacher edu-

<table>
<thead>
<tr>
<th>COURSE TYPE</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>115</td>
</tr>
<tr>
<td>Computing</td>
<td>91</td>
</tr>
<tr>
<td>Instructional Technology</td>
<td>22</td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
</tr>
<tr>
<td>Instructional design</td>
<td>12</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>255</td>
</tr>
</tbody>
</table>

Of the courses offered for teacher education majors, the mean percentage offered for undergraduates was 45.1%, for graduates 24.9%, and for both undergraduate and graduate 29.8%.

Forty-five percent (44.8%) of the courses offered by IT programs for teacher education majors are required, over half of them (52.5%) are offered as electives for teacher education majors, and 2.7% of the courses were listed as both required and elective. On the average, 95.3% of a programs' courses for teacher education majors were offered at least once a year.

Table 4 shows that IT programs in the same departments as teacher education programs at their institutions are slightly more likely to offer one or more courses than are those which are in a different department. The average number of courses offered is about the same.

<table>
<thead>
<tr>
<th></th>
<th>Offers 1+ courses</th>
<th>X courses offered</th>
<th>Participate in planning</th>
<th>Ties with schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>In same dept. as teacher education program</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>62.3%</td>
<td>1.95</td>
<td>85.0%</td>
<td>58.0%</td>
</tr>
<tr>
<td>No</td>
<td>70.1%</td>
<td>1.84</td>
<td>53.5%</td>
<td>40.1%</td>
</tr>
</tbody>
</table>

Participation in Teacher Education Planning

Sixty-nine percent (69.3%) of the program leaders report that their program faculty participate in some way in planning the undergraduate or graduate teacher education program at their institutions. When asked to describe the nature of the participation, the most fre-
quent answers reflected advisory roles: Serving on committees (35%), planning together (19%), advisory members (5.9%), and attending meetings (4.3%). Some respondents indicated more active participation: designing courses (8.1%) and teaching (6.5%). Most schools (86.9%) listed only one form of participation. Some, however, stated two entirely different types, so they were categorized as separate variables. Programs with media, school library media, and computing as their primary area of emphasis are more likely to participate in teacher education planning than those with ISD as the primary area of emphasis (see Table 5).

Proximity to the teacher education program in their institutions increases the likelihood that IT faculty will participate in teacher education planning, as can be seen in Table 4. Eighty-five percent (85.0%) of the programs in the same department had some involvement compared to only 58.0% of the programs in a different department.

### Table 5

<table>
<thead>
<tr>
<th>Primary Emphasis</th>
<th>Planning Teacher Education</th>
<th>Ties with Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISD</td>
<td>Yes 60  No 40</td>
<td>Yes 44  No 56</td>
</tr>
<tr>
<td>Media</td>
<td>Yes 80  No 20</td>
<td>Yes 56  No 44</td>
</tr>
<tr>
<td>Library</td>
<td>Yes 82  No 18</td>
<td>Yes 51  No 49</td>
</tr>
<tr>
<td>Computing</td>
<td>Yes 86  No 14</td>
<td>Yes 67  No 33</td>
</tr>
</tbody>
</table>

### Discussion

Has the role of IT programs in public education declined? This is a difficult question to answer for two reasons. First, the question rests on an assumption that the field played a vital role in public education at one time. Did it? The audio-visual movement was certainly closely aligned with the schools, yet the magnitude of its impact on the actual practice of public schooling is open to debate.

The second problem is that there are no data by which to compare the results of the present survey. Are we offering fewer courses? Do we have fewer tie with school systems? There is no way to know. The current data, though, indicate that the field does have some involvement in public education. Judging by the types of courses offered for preservice or inservice teachers (over half of which are elective), the role is primarily one of media/technology experts. As for designing teacher education programs, IT faculty participation appears to be more passive than active. In the written comments for this question, some program leaders said they are experiencing increasing requests for their faculty's expertise as teacher education programs acquire more sophisticated equipment. On the other hand, one respondent, when asked about involvement in teacher education planning responded "Ha! That will be the day. The only reason we are involved at all is because the state has mandated computer literacy. Next they'll be wanting to do that themselves!" So, participation in this area may be somewhat limited by interschool politics and traditions as well as by IT faculty interest.

One consistent finding is that programs emphasizing instructional systems design have the least involvement with schools and teacher education. They offer fewer courses, participate less in teacher education planning, and have fewer links with schools. Since earlier data showed these programs placing most of their graduates in nonschool settings, it seems this subset of the respondents has the least reason to be involved in matters related to public education.

It may be that the greatest impact the field is currently having on public education is through the placement of school library media specialists (85.7% of all graduates). Are school library media
specialists trained in IT programs different in any appreciable way from those trained in library schools? Are they trained as instructional technologists? Perhaps the field should take a fresh look at this avenue of influencing and guiding the public schools.

Future Research

This survey has provided some insight into the current status of U.S. graduate programs in Instructional Technology. The data show a diverse field in name, emphasis, placement of graduates, and participation in public education. A similar survey conducted in future years will be useful in charting trends in the development of the field. For instance, it will be interesting to know if the numbers of programs offering bachelor's degrees in Instructional Technology increases. Likewise, will the numbers of programs emphasizing instructional computing increase? Will the field have more or less participation in teacher education in the future? In addition, a survey of individual IT faculty to study their professional backgrounds and activities would also be valuable in attempting to discern who and what makes up the field of Instructional Technology.

References


Why would an instructional developer want to read a book like this? For several reasons:

1) Instructional developers are often called upon to generate questionnaires for front-end analysis and for formative evaluation, even though they may not have had any training in those skills.

2) The several scores of publications in the Sage series Quantitative Applications in The Social Sciences have, as a group, consistently demonstrated their usefulness as an introduction to a usually statistical topic, or as a convenient refresher.

3) There is probably no other single source that will provide as much useful information about developing survey questions for the same investment of either time or money.

In a mere 80 pages, Converse and Presser provide practical information under three main headings—Strategies of Experience and Research, The Experimental Evidence, and The Tools at Hand. Under the first heading, the need for simplicity and the diametrically-opposed attraction of complexity are discussed.

In explaining the need for simplicity in question construction, Converse and Presser suggest the use of common language, avoiding what my daughter, at age six, called “university talk” (poly-syllabics), and keeping the standard of grammar closer to spoken than to written language. Regarding question length, the authors state that despite general advice to keep questions short to aid in understandability, research shows that more information is provided by respondents when questions are longer. They discuss how to avoid certain common confusions in questions: double-barreled questions; double negatives; implicit negatives; use of words that could be unintentionally mispronounced by the interviewer, or mis-heard by the interviewee; overly long lists of alternatives; and dangling alternatives.

Simplicity of language alone is not enough, however, clarity and widespread understanding of concepts is also required. The concepts of variance, rate of change, and percentage and proportion are generally well understood by question-makers, and frequently find their ways into questions. The assumption that all respondents are equally facile with those concepts is not a safe one. With care, there is usually a way around employing such concepts in a question, as several examples attest.

The next section deals with manageability of tasks presented, to the respondent. With a few cogent examples, Converse and Presser demonstrate that the dividing line between fact and attitude is quite fuzzy, and sensitize us to the need to clarify our questions so that when we are seeking facts we don’t inadvertently tap into attitudes.

The problems of developing shared definitions is also explored (e.g., What is the meaning of the word “family”? Would any three people define it the same way?). The authors admit that providing a common frame of reference is not easy. Even stating the definition the investigator wants the respondent to use is probably not enough, because there may be a tendency for the respondent to revert to his or her own definition.

The words of advice on recalling the past may be especially germane to instructional developers, as they have frequent need to ask questions of that ilk. Good questions, Converse and Presser suggest, focus on the current, the specific, and the real. Memory questions tend to be difficult for most respondents. The recall of even so-called important events fades with time, even if they are highly personal. To enhance the validity of the reporting of recall of the past, several devices can be employed: bounded recall (establishing a baseline with an initial survey, then asking “since the last time we surveyed you”); narrowing the reference period (asking about yesterday rather about the last six months); averaging (asking about a single day, then finding out if that day was “Average”); using landmarks (e.g., did this happen since the explosion of the Challenger?); and providing cues, or entry points to the respondent’s schemata through a variety of associations.

Hypothetical questions are likely to be difficult for respondents. They require imaginative projection, and time to mull over the possibilities. However, they can be valuable to standardize a stimulus because actual experiences vary so widely, and a researcher does not know what set of experiences a respondent brings to a question.

The final point relating to the recall of the past is that common knowledge often isn’t. This is another reminder that the fewer assumptions we make about respondents’ knowledge, the more likely we are to get better data.

Three complexities that Converse and Presser call “interesting” are also briefly discussed: factorial surveys, in which portions of a question are varied systematically or randomly; ranking scales; and magnitude estimation scales. Instructional developers often use ranking scales, and hence should be aware that, in general, having a respondent try to rank more than four or five items is usually overwhelming. A better method, Converse and Presser suggest, is to have respondents choose the best three, then the best one from among them, and the worst three, then the worst from among them.

The section on The Experimental Evidence is probably the most useful and enlightening one in the book. While
presenting the research literature-based
generalizations that most instructional
developers will want to see. Converse and
Presser also offer references to the
literature that a more serious student of
question construction desires.

To defend the generalization that spe-
cific questions are better than general
ones, a number of studies are referred to.
In summary, specific questions mini-
imize the amount of variation due to dif-
ferent understandings; specificity aids
recall; and specific questions are not
susceptible to an order effect. General
questions still have a place, however,
when more global measures are of inter-
est, when time and/or space prohibit
asking for detail, and when comparing
general views to specific views.

Whether questions should be open-
ended or closed-ended is addressed
next. Closed-ended questions are more
specific. Building distinctions into the
answer categories can more accurately
tap differences among respondents than
letting people answer in their own
words. But open-ended questions are
preferred when knowledge about the
potential range of answers is lacking (i.e.,
not enough is known to create reason-
able categories), and when the topic of
the questions is sensitive or disapproved
of (e.g., sexual practices or alcohol use).

It is good practice, Converse and
Presser generalize, to offer a “no opin-
on” option. Forcing a snap decision
does little to establish the validity of the
data. By the same token, research shows
that people generally don’t manufacture
opinions instantly, either.

The next bit of advice goes against
much common practice (and even against advice from some other writers):
Omit the middle alternative and meas-
ure intensity, instead. Arguing that abid-
ing by the advice eliminates “fence-sit-
ting”, Converse and Presser suggest that
following a question without a middle
option, there should be a question deter-
mining how strongly the respondent
feels about the answer to the first ques-
tion. More specifically, they argue that
the typical Likert-type question with an-
chor points of strongly agree, agree, dis-
agree, and strongly disagree (note the
absence of a middle point) or the equally-
common polar question type with five or
seven points (only the extreme two of
which have labels) confound extremity, a
dimension of attitudinal position, with
intensity, how strongly a position is felt.

Forced-choice questions are more
likely to elicit a considered response than
are Agree–Disagree (A–D) questions.
A–D questions suffer from acquies-
cence response set, the tendency to agree
regardless of item content. Since it is
known that acquiescence is related to
education, with lower education being
associated with greater acquiescence,
there may be a confusing effect if A–
D questions are used.

Question order is the next consid-
eration. Research shows that the meaning
of almost any question can be altered by
the preceding question; as a general rule,
items affect one another when their con-
tent is clearly related. However, there is
also some evidence that no order effect
exists. Perhaps the only conclusion one
make is that experience suggests that
it best to ask general questions before
specific ones.

Wording effects are potentially very
important, but despite the considerable
amount of research effort already ex-
pended on this topic, there are precious
few generalizations to be had. Through
examples drawn from the research,
Converse and Presser sensitize the
reader to the problem, but are able to
offer only general guidelines to solu-
tions, such as creating split sample com-
parisons, using open follow-ups to
closed questions, using random probes,
and asking multiple questions on a topic.

The section The Tools at Hand is a
mixture of resources from which ques-
tions can be “borrowed” (a practice
Converse and Presser appear to rec-
ommend), and practical tips on a variety
of aspects of questionnaire construction
garnered from considerable experience
in the trade. The all-important phase of
pre-testing is addressed, not only from
the point of view of pre-testing a ques-
tionnaire, but of pre-testing individual
questions, as well. Instructional de-
velopers frequently use lack of time as an
excuse for not pre-testing their ques-
tionnaires beyond possibly having a col-
league proof-read them. Might they be
surprised to learn that, according to
Converse and Presser, a single pre-test of
a questionnaire is probably not enough
(two different ones are recommended)?
The suggested procedure of two cycles of
revision and polishing would be per-
fectly familiar to developers, however, if
it were couched in terms of developing
instructional materials.

If you are an instructional developer
who is looking for an entry point into
the literature on how to construct good sur-
vey questions, this book is a good place to
start. It has examples of both good and
poor questions illustrating most points
made by the authors. This advice is
based on both research and considerable
experience, and the authors make no
pretense of knowing all the answers;
when they don’t know, they tell you so.

If you are an instructional developer
who has some familiarity with the proc-
есс of constructing questionnaires, you
might find this book a useful and refresh-
ing review. You might be challenged to
refute some of the arguments presented
by Converse and Presser, and you will
probably find at least one or two things
that you do habitually in questionnaire
collection, that Converse and Presser
recommend against.

—Reviewed by Earl R. Misanchuk, Uni-
versity of Saskatchewan

The Art and Craft of Course Design, by

The title proclaims it: there is an alter-
native to systematic instructional de-
velopment! Of course, there have been
rumors for years that just possibly there
is an “art” component to instructional
technology as well as a “science” com-
ponent. But we have usually been able
to dismiss those rumors as being either
not theoretically sound, or not leading to
any practical follow up. Tony Earl, course
designer at the State University of Utre-
cht, The Netherlands, has provided us
with a book which begins to redress the
balance. It is possible to consider instruc-
tional design as an art, and this book
shows us what the implications of such a
paradigm might be. The results are a lean
110 page text which manages to cover
most of the bases of systematic instruc-
tional design, but is imbued with spirit,
excitement, and art. Here is a man who
knows his craft; and loves it.

Chapter One asks the almost prover-
bial pre-requisite question: What does
an instructional designer do? The author
answers with examples at three levels:
micro (course and lesson design) level;
meso (curriculum) level; and macro
(policy) level. A five step circular model
is presented which at once solves the
nagging linearity problems. In order, the
five steps (Earl calls them “activities”) are
(a) evaluation, (b) needs analysis, (c)
needs specification, (d) learning experi-
ence design; and installation. Finally,
Activity Four consists of an epic circle
with three sub-steps: thinking up a design,
working out a thought-up design, and
testing and revising a thought-up,
worked-out design. Throughout the chapter, Earl’s humanistic, aesthetic, and craft orientations shine through. Listen to him: “In this book the learning experience design step is seen to demand specialist know how and didactical cunning. You have to be a bit of a scientist, a bit of a magician, and a bit of a fox to think up, work out, and test and revise a design in an optimal way” (p. 15). It has probably been a long time since instructional designers have been characterized as a “bit of a fox.” At least, that is, with reference to their academic work.

The author suggests an acronym Emax Vmax Lmax E’max as a shorthand to rate the quality of a learning experience. The shorthand stands for: maximally effective; maximally valued; maximally liked; and maximally efficient. With two of four evaluative constructs (i.e., “valued” and “liked”) falling into what is often called the “affective domain”, the aesthetic focus of the author continues to dominate. Lines like “Keep a crazy ideas list. It will help you in many subtle ways.” Are not to be found in our more staid and formal systemic instructional design models!

Chapter One also introduces the author’s definition of, not learning, but “a learning experience”. Quoting from Tyler, we are told that “a learning experience refers to the interaction between the learner and the external conditions in the environment to which he can react. Learning takes place through the active behavior of the student; it is what he does that he learns, not what the teacher does.” (p. 16). Compare that with a more traditional definition of learning restated in Heinich, Molella and Russell (1985): “A general term for a relatively lasting change in performance caused directly by experience; also the process or processes whereby such change is brought about.” (p. 6). The Tyler definition used by Earl seems to provide rather more scope for an instructional designer. While focus on “behavior” is still paramount, the task of the designer seems to be implicitly to provide for (a) those “external conditions”, and (b) the interaction between the learner and the external conditions.

Chapter Two, titled “Thinking Up a Design” continues in the vein begun in Chapter 1. “Thinking up a design for a course or lesson is an intuitive, creative, and logical process” (p. 32). And this bit of wisdom: “Since it is a creative process it will not run smoothly from beginning to end” (p. 32).

The major point of this chapter is to introduce four decision making aids to assist in thinking up a design. These are:

1. “A set of criteria for a good design.” Earl suggests eight criteria from his own experience. For example, Criterion one states that “the design generates an active learning experience.” Criterion six suggests “the design makes critical use of media”, and so on.

2. “The Nth generation of the specified needs.” This decision point is especially intriguing. Couched in the author’s own particular jargon (which he relishes), the intent here is to examine the specified needs, not just one or twice, but in times. Your decision in making up a design is finally based on the latest, the nth, generation of those needs.

3. “An appropriate model.” The author suggests that an existing design will help you structure your own design.

4. “A response environment organizer, or REO.” Again this referent is critical, yet lies at the purely intuitive and artistic level. An REO is simply, the special bit of content that makes the course “click”. Other more prosaic jargons have called this an “anchoring idea”, or “advance organizer”. The concept is similar, except that Earl insists that his REO is “a very personal thing”, “a product of one’s own intuition, creativity, and logical thinking” (p. 46).

Chapter Three, “Working Out a Design”, deals in similar fashion with types of SR events and course sequencing.

Chapter Four, “Testing and Revising a Design”, discusses eight common mistakes made by designers. These are identified (and described) with such colorful phrases as “the missing imperative”, “the missing overview”, “the missing melody”, and so on. Most important, the author reminds us, “a design is something we experience. It touches the intellectual, emotional, spiritual, and physical in us.” (p. 83).

Chapter Five, “Installation and Evaluation”, concludes the process and suggests four critical evaluation questions.

1. Was there something you felt you needed in this learning experience and didn’t get?
2. Would you recommend this course/lesson to someone else? (To whom? Why? Why not?)
3. What is your sharpest memory of this learning experience?
4. How would you rate your learning experience as a whole in terms of its effectiveness, value to you, enjoyability and efficiency?

Again, it is significant that these four “critical evaluation questions” tend to focus on the “other” dimensions, that is the affective, the aesthetic, the value complex, and not the simple cognitive.

Finally, each chapter is punctuated with vivid case studies and a final section titled “some tips” which brings the art to a practical craft level. The entire book has a summary, and a short bibliography of some twenty items, seven of which are examples of instructional courses, mostly designed by the author. There is no index.

At a time when instructional design is being seen as positivist, systematic, and scientific The art and craft of course design provides a welcome alternative and supplement and is a valuable addition to the literature of instructional design and educational technology. There is an art dimension, and there is a craft dimension. This book makes those dimensions explicit.

Perhaps an appropriate conclusion to this review would be to use the author’s four critical evaluation questions on the text itself:
1. “Was there something you felt you needed in this learning experience and didn’t get?” No. The book is definitely characterized by what Susan Markle used to refer to as “learn”, but it all hangs together so well, that, while more could be added, it seems just about right.
2. “Would you recommend this book to someone else? To whom? Why?” Yes, this book is recommended to all instructional designers, especially those with an ISD, or ID training background. Why? To illustrate an alternative view to the well-worn systems models.
3. “How would you rate your learning experience as a whole in terms of its effectiveness, value to you, enjoyability, and efficiency?” The book gets top marks on all criteria.
4. “What is your sharpest memory of this learning experience?” Ah! the question seldom asked by instructional developers! To this reviewer, standing out above all others is the image of the instructional designer as scientist, magician, and fox. We know where to get training as a scientist...there are many options. But where do we go to learn to become a magician? or a fox? At least part of the answer is right here, in this book.

—Reviewed by Denis Hlynka, University of Saskatchewan

The best way to introduce Tony Earl's new book is with a quote from it:

"A design is something we experience. It touches the intellectual, emotional, spiritual and physical in us. A designer of instruction needs to be constantly aware of this in thinking up and working out a design and in interpreting the results obtained in development testing of a design." (p. 84)

This is the epiphenome of the book. After an era of instructional design emphasizing system, technology, science, and automation, Earl provides a small, paperback book that encourages an alternative. Using lively writing and rich examples, he prompts introspection about the excessively deductive, predictable and reverent nature of the instructional strategies we most frequently employ.

That's why I chose to read this particular book. I've been concerned that attention to system and science has rendered many of our instructional designs lifeless. Earl offers devices to jog more creative instructional patterns. He encourages consideration of "chains, necklaces, spirals, networks and hybrids," as varying methods for presenting instructional events. He also amused me with a musical rendering of instructional components, labelling them, "ching, chung, chong and chang". He is encouraging the quest for variety, for intuition and for careful attention to the instructional experience of the learner.

Tony Earl made me think back on instruction that worked, pressuring me to focus on a special bit of content or what he calls a "system of stimuli." His contention is that effective instruction works because the designer has captured and presented his or her material within a "response environment organizer." He makes his points with detailed and useful examples that illustrate the power of inductive strategies bound together by strong, meaningful ideational scaffolding.

I think that Earl's book is a workshop that he has converted into a text. While it benefits from workshop-oriented examples and questions built into the chapters, it also suffers from its presentational simplicity. It's a how-to-book that inadequately expresses why and when.

The author fails to place his work in context within the recent instructional design literature. While his inclinations are cognitive in nature, he references very little of the literature and no recent work. No Mager, even though he discusses goal analysis in detail. No Gagné and no Merrill, even though his book is about instructional strategies. There are fewer than 20 works cited in his bibliography, and only 4 have publication dates in this decade.

While I'm intrigued by his encouragement to blur distinctions between Analysis, Design, and Development, between the quest for needs, goals, and strategies, I am skeptical about practicality. How would it work, when you have a hundred or a dozen course developers? How would it work when the content is extremely technical or abstruse?

Instructional systems development is popular, not because it's right or even usefully prescriptive. It's popular because it is comforting. It provides direction and broad guidelines for the efforts of so many trainers, developers, designers, teachers and specialists, each working on different pieces of varied courses. An now, while it makes sense to me to attempt to incorporate more holistic and creative approaches within systematic course development, I regret that Earl's book failed to provide the compelling documentation and rationale I need to make it happen.

I like Earl's message. I think we need to hear it. But we need much more, in more detail and in light of current research and theory. The Art and Craft of Course Design is an idea whose time has come. However, we'll need more yet to make it a reality.

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