Using Gagné's Events of Instruction as a Guide for Producing Stimulus Material

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As a cognitive theorist, Robert Gagné is interested in the internal or mentalistic nature of the learning process. He has adopted and elaborated an information processing model that hypothesizes internal events take place in the learner's head during learning. These events include the processes of reception, perception, semantic encoding, storage, retrieval, response formulation, and performance and are related as shown in Figure 1.

Furthermore, Gagné has hypothesized that there are external events in the learner's environment, that can trigger or cue the internal events, and thus facilitate learning. The relationships that seem to exist between the internal processes of learning and the external events that elicit the internal processes have implications for instructional designers because they provide a conceptual base on which to select and sequence stimuli that constitute the instruction (Gagné, 1977). The purpose of this paper is to operationalize this theoretical foundation as a component in the instructional design process.

As has been said so many times, by so many authors, before we can begin to design instruction we should define the results we want it to produce. To this end we have the technology of behavioral objectives. In addition we have the technology of instructional analysis, or task analysis, the purpose of which is to describe the interrelationships among the enabling and terminal objectives of a unit of instruction. Briggs (1970), Gagné and Briggs (1974), and Wager (1976) have operationalized these processes congruent with Gagné's *Domains of Learning*. After the objectives have been described and the squence of instruction for teaching these objectives has been established, the designer can begin to plan the instructional stimuli as a set of external instructional events. These

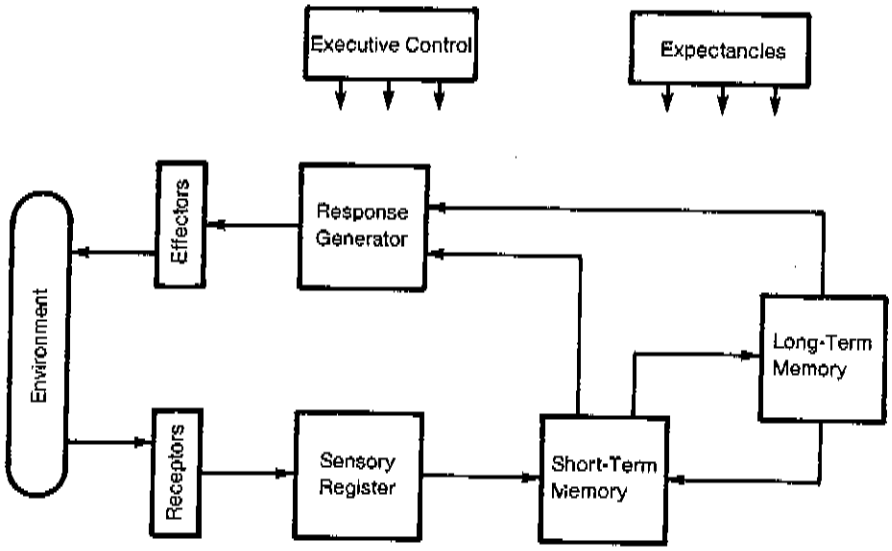

Figure 1. The internal events of learning. (From *Essentials of Learning for Instruction* by Robert Gagné, 1974, page 16. Copyright 1974 by Dryden Press, a division of Holt, Rinehart and Winston, Inc. Reprinted by permission of Holt, Rinehart and Winston.)

events will follow a logical order, as they relate to the internal events of learning, and the objective being taught during the period of instruction.

Gagné and Briggs (1974) list nine events of instruction. They are:

1. Gaining attention,
2. Informing the learner of the objective,
3. Stimulating recall of prerequisite learning,
4. Presenting the stimulus material,
5. Providing "learning guidance",
6. Eliciting the performance,
7. Providing feedback about performance correctness,
8. Assessing performance, and
9. Enhancing retention and transfer.

Further, Gagné and Briggs note that these events do not necessarily have to follow this exact order nor is it necessary that all events be provided to all learners, for all learning tasks. The order shown is a logical order with regard to the internal events of the information processing theory shown in Figure 1, and furthermore, the more events that are provided, the more complete instruction will be. The following examples will show how the events are used while designing instruction.

At the simplest level we might have instruction aimed at a single teaching objective. A typical example might be a lesson in a consumer economics course with the objective, "The student will demonstrate the calculation of the arithmetic average of a set of numbers." It is assumed that a task analysis has been performed and that the designer realizes that prerequisite entry skills of addition, subtraction, multiplication, and division are needed in the new task. (It is also assumed that the majority of learners possess these entry skills.) At this point, the designer can turn his attention to the materials, determining whether or not they possess the necessary stimuli to produce instruction that meets the objective and is functionally

complete with respect to the information process model. This is done on a media analysis worksheet. (See Figure 2.)

For example, Event 1, "eliciting attention and motivation," is accomplished by the classroom teacher convening the class and giving them the context into which the day's objective fits. This event could also have been accomplished by presenting the learner with a hypothetical problem that would call for application of the new skill for solution. Notice that in this example, a formal classroom learning environment was assumed; the process is as helpful in lesson planning for live instruction as it is in designing mediated instruction. The ingenuity of the teacher or instructional designer will be reflected in the interpretation of the events and the prescriptions for the stimulus materials. Each of the other events are listed on the left of the worksheet and the stimuli, media, and prescriptions are attended to for each event. The designer may omit an event if he feels it is not necessary to the task or for a particular audience.

It is often the case that the designer will attend to multiple objectives in a

MEDIA ANALYSIS WORKSHEET

CONSUMER ECONOMICS COURSE

The student will demonstrate the calculation of the arithmetic average of a given set of numbers.

UNIT # SPECIFIC OBJECTIVE NUMBER

INSTRUCTIONAL SEQUENCE NUMBER

Event	Stimuli	Media Alternatives	Tentative Media	Rationale	Prescription
1. Attn/ Motivation	written word spoken word	text live teacher	live teacher	Instruction conducted in the classroom, teacher available and expected.	Relate the need for being able to find averages as an important step in budgeting. Give an example of a variable expense that must be averaged, e.g., gasoline for the car.
2. Present Objective	same	same blackboard handouts, transparency	blackboard	Students can copy it down in their notes—reduces ambiguity that could result from an oral statement. Available.	Write the objective on the board.
3. Recall Prerequisite	same written symbol	same pretest	pretest	Written performance of the student can diagnose weaknesses in math.	Present a small but reliable set of multiplication and division problems. Detect problems of addition and subtraction from these problems. This test is to be analyzed after the rest of of the instruction has taken place, since the learner could still benefit from learning the order of operations relating to the objective.
4. Present Stimuli	same written symbol	blackboard transparency handouts	teacher blackboard	A problem can be developed from class input, gets class involved.	Teacher asks each class member to estimate how many cups of coffee they drank during the day. List the estimates on the board. (If coffee is not appropriate, use water).
5. Provide Guidance	concrete-visual image spoken word written word symbols (numbers)	blackboard teacher other students JP Aid (illus text)	teacher blackboard other students	This is probably a procedure familiar to a few of the students in the class. They can contribute here. Concrete visual image will aid encoding.	Ask if anyone knows the first step. Perform on board example. Second step, etc. Draw three steps on board label each from the bottom up 1) add quantities; 2) count the number of quantities; 3) divide sum by no.
6. Elicit Performance	written word spoken word	handout teacher pencil/ paper	teacher blackboard pencil/ paper	Teacher can give oral directions and written problem on the board. Each student can write a problem the teacher can later review.	The teacher tells the students to figure the average amount of coffee he or she drinks in a week (Sunday through Saturday).
7. Feedback	written word spoken word	teacher/ blackboard	same	Teacher provides a generic model. The accuracy of each student's answer in terms of procedure is evaluated by student.	Teacher solves the problem on the board putting up figures that are hers/ his and solves the problem using the three steps. Students exchange papers and check each others answers.

Figure 2. Sample media analysis worksheet.

single instructional presentation. In this case, it is necessary to think about how the events will be sequenced and integrated for all of the objectives. To do this a sequence worksheet similar to that shown in Figure 3 can be used.

This particular worksheet outlines a 55-minute period in which three objectives are to be attained by the learners (numbers 6, 7, and 8 listed on the left). The time across the top of the page describes the instructional period, and the boxes in the objectives/time matrix show the number of the event and its relationships to other events. In this case, for example, Event 1, "attention and motivation," is to be taken care of in the first 3 minutes of instruction. It is also the case that the stimuli presented here are to serve that event for all three objectives at the same time. The second set of stimuli are to attend to "presentation of the objective" (Event 2), and the third set of stimuli will serve two functions, Event 3 for objective 6 and Event 9 for Objective 3 (taught in a previous lesson).

Events 5, 6, and 7 are shown grouped together for Objective 6 since the student is asked to go through several iterations of the classify/feedback process in the learning guidance event. This is not true in Objectives 7 and 8 where learning guidance is scripted as an independent event. The sequence worksheet shows that in Event 8, Objectives 7 and 8 are conducted simultaneously, as is the case in Event 9 for all three objectives. The grouping of events for a particular objective is reflected in the prescription section of the media analysis worksheet. For example, the prescription for Objective 6, Events 5, 6, and 7 reads: "Present a list of resource types and a list of common resources. Ask participant to match resources and types and to indicate appropriate units of measurement. Provide answer key; have participant check accuracy and reconsider answers to be found in error." That is, this prescription has combined the elements of learning guidance, eliciting performance, and providing feedback.

The process of media analysis by events was first developed by Leslie Briggs in his well known *Handbook of Procedures for the Design of Instruction* (1970). The additional development of theory and technology relating to the events of instruction following that publication has been the stimulus for the elaboration of this process as described in this paper. In addition to its utility to the designer as a tool of media analysis and materials design, it has potential for those doing research in theory development, media use, and materials evaluation. As mentioned in the beginning of this paper, it is probably the case that some learners can benefit from less complete instruction, i.e., certain events may be omitted from the stimulus materials without seriously affecting the effectiveness of the instruction. Perhaps efficiency and motivation are related to the number of and types of events included in instruction. The events might also serve as a means to analyze potential media effectiveness based on the media's capability to provide the event. (For example, broadcast television has very limited capability for providing feedback. To the extent feedback is necessary its effectiveness will be decreased.) The events could provide a tool for the analysis of existing instruction and its functional completeness. At this point there is very little empirical data or research relating to the events of instruction and how they affect the design of instruction.

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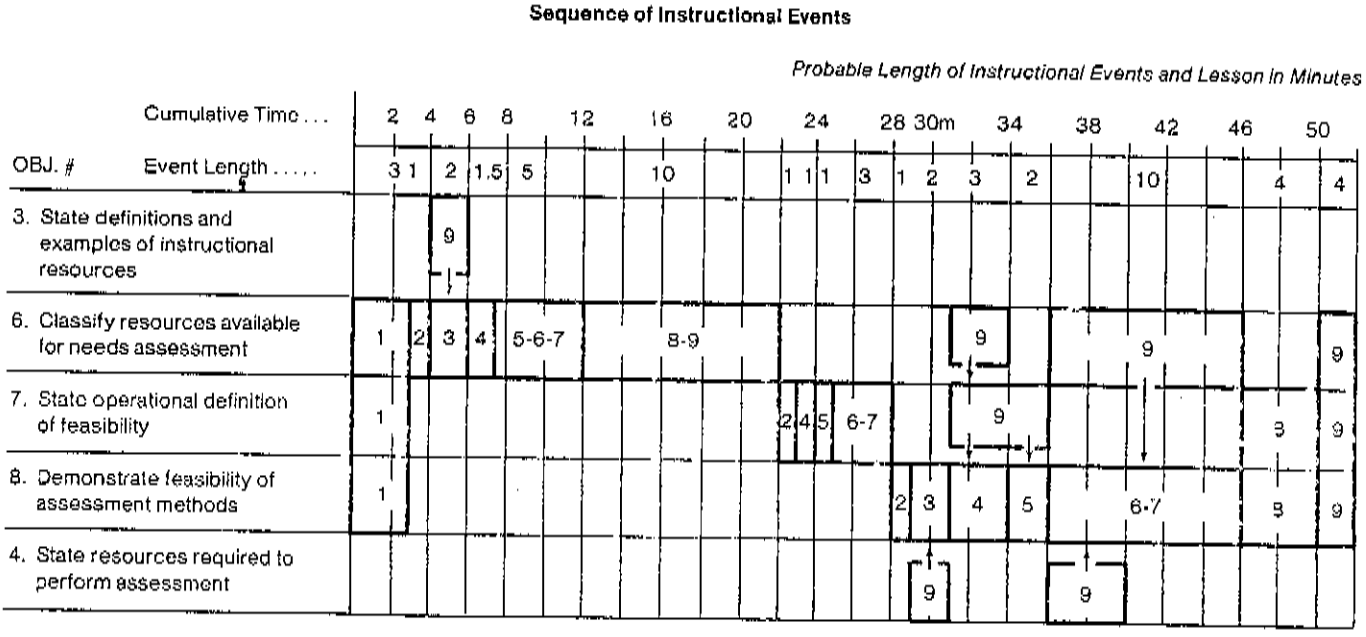

Figure 3. Sample sequence worksheet.