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Exploration is one of the most common forms of both communication and instruction and yet it is seldom planned or analyzed.

Explanation in instructional communication

by Sandra E. Moriarty

John Holt tells a little story (1967) about a fifth grade art class. The teacher held up a paper fan and asked how many students knew how to make one. Every child quickly made a little fan. Then she read from a set of instructions designed for fifth graders on how to make paper fans. She read slowly with proper emphasis. After hearing the instructions not one child could make a fan. Every parent who has tried to assemble a little red wagon on Christmas morning knows the debilitating effect of instructions like these.

Explanation is one of the most common forms of both communication and instruction and yet it is seldom planned or analyzed. Nettler (1970) has observed that "whatever we take for granted, we are least likely to explain." Chomsky (1970) also cites this familiarity problem: "We lose sight of the need for explanation when phenomena are too familiar or too obvious."

For more people working in their own areas of expertise, there are few unknowns and therefore little conscious recognition of a need for explanation. Knowing what needs to be explained is the hardest part of explaining. The problem is not just limited to areas of technical knowledge. Because of the ambiguity and multiple meanings built into our language, even common words, if they are central to message interpretation, may need explanation. Chomsky (1970) notes that "even the most familiar of phenomena require explanation."

One of the reasons explanation is given so little thought is because there is virtually no instruction in the art of explaining. There's very little information available in the literature of instruction or communication, two primary areas of practical explanation.

There is a tremendous body of literature, however, in the areas of history and philosophy of science, analytical philosophy, and cognitive psychology. Explanation, in those areas is a philosophical term describing the search for meaning using the scientific method. Nagel, a leading philosopher of science, describes (1961) scientific explanation as "formulating the conditions under which events occur, the statements of such determining conditions being the explanation of such happenings." To the

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scientific mind like Nagel's, an explanation is a statement of "repeatable patterns of dependence."

Explanation also is critical in teaching and communicating and this more practical dimension of explanation is the concern here. This paper will develop a model of the role of explanation in instructional communication. The underlying premise is that the level of explanation is a function of the complexity of knowledge being communicated.

Parameters of Explanation

The word "explanation" is used in a variety of ways. Jane Martin has developed an elaborate schema for describing the meaning of all possible variants of the word (1970). A simpler version of that type of analysis is used here beginning with the phrase "an explanation," which is used to mean **the response** to a question. (A more formal definition of explanation will be developed later.) An explanation is **the product** or result of an explanatory effort. "An explanation" is distinct from "explaining" as in "explaining something," which is **the act** of inquiry or the search for an explanation. "Explaining" is used in another sense to mean "explaining something to someone." This type of explaining involves a dialectic situation where the act of inquiry (explaining) is used to produce a response (an explanation) for some person.

Context. The explanatory situation is a form of instrumental communication where a particular type of a message, an explanation, is given **by** someone to someone. The explanation is the instrument, the tool, by which the desired effect (understanding) will be accomplished.

Instrumental does not necessarily mean that explanation is bound by an interpersonal communication situation. One can explain something to oneself just as one can search for an answer to one's own questions (Rescher 1970; Nettler, 1970). The lonely scientist working late at the lab is searching for an explanation just as is the kindergartener who is asking why the caterpillar developed wings and flew away.

Roles. There are two roles in explanation. The "explainer" is active and may either be packaging the explanation for dissemination to someone or may be searching for the answer to a private question. The "explainee" is passive and perceives and processes the information as would any receiver in a communication situation.

An individual searching for a private explanation shifts back and forth from search to reflection and alternates both roles. In interpersonal situations, the roles may also shift. One person, let's say a teacher, may provide a packaged explanation to a learner who is essentially passive in the situation. At the other extreme a teacher may encourage learners to assume the explainer role and search for their own answers. These self-discovered explanations are then reported back to the teacher who becomes the explainee.

The Objective. Explanation is a matter of heuristics or, as Rescher describes it, "rendering something clear to someone by putting it into a graspable setting" (1970). Explanation moves beyond learning and into knowing and particularly understanding. Most definitions of explanation, scientific as well as practical, are based on the process, act, or instrument involved in making something intelligible or understandable. The objective is always understanding (Eysenck, 1970; Meehan, 1968; Rescher, 1970; Taylor, 1970; Thyne, 1966; Von Wright, 1971; Williams, 1970).

Understanding is defined in most dictionaries as "to know" or "to comprehend" but there's another aspect of understanding that is found in definitions using the word **accept** as in "to accept a fact." Eysenck (1970) defines understanding as a cognitive state of acquiescence. The reason this condition is important is that it leads to another aspect of explanation and that is complicity. It's already been noted that explanation is instrumental in the sense that you often want to explain something to someone but the other someone can't be an intellectually passive on-looker. There must be a spirit of participation or involvement otherwise explanation becomes, like the Zen analogy, just one hand clapping. The one seeking to understand must truly seek. Flesch (1972) described this essential condition in one of his books on clear writing: "Nothing explains itself, there has to be a will and an eagerness to learn."

Definition of Explanation

Explanation can be defined as form of instrumental communication using dialogue and dialectics to generate inquiry and understanding. It is instrumental in the sense that the explainer wants to make something understandable to someone and the explainee must share a spirit of complicity, a willingness to share in the development of the explanation. Explanation seeks understanding by moving someone from the unknown to the known through the process of inquiry.

The Critical Questions

Any question can lead to an explanation but there are certain key questions that cue different types of responses representing different levels of complexity of knowledge. The basic explanatory cue seems to be the **why** question and many of the theorists define explanation as an answer to the question **why** (Nagle, 1961; Hempel, 1965; Eysenck, 1970).

Another critical question is **what**, although it is often seen as a cue for descriptive and definitional information on a lower level of knowledge than explanation. Von Wright distinguishes between **what** and **why** when he says that the results of interpretation are answers to the question "what is this?" Only when we ask "why is this?" he says, "are we in a narrower and stricter sense trying to explain" (1971). **What** questions are often seen as preliminary to **why** questions. Inman suggests that writers explain **what** the subject is before attempting to explain **why** it is (1967).

Another type of question is **how** and this elicits process information. Rescher (1970) identifies the **how** question as the essence of practical explanation, particularly as it is used in "how to" explanations which give procedures for performance. Eysenck (1970) disagrees with the limitation on the **how** question as a form of practical explanation. He sees it as basic to scientific explanation: "Natural science describes, so far as it can, **how**, or in accordance with what rules phenomena happen, but it is wholly incompetent to answer the question **why** they happen."

The final type of question, which appears rarely in scientific literature but more often in practical areas, is the **so what** question. This cues a higher order explanation calling for synthesis, interpretation and statements of significance. Inman (1967) summarizes the basic questions, as well as their internal relationships in the comment that "sooner or later the subject shifts from **what** to **why** to **so what**."

Levels

Inman's quote also introduces the concept of hierarchy. Throughout the writings of the scientific philosophers there are references to such relationships as "more basic than," "higher order" or "lower level" (Eysenck, 1970; Peters, 1970; Taylor, 1970; Von Wright, 1971). By analyzing these relationships a hierarchy of explanation emerges based on levels of knowledge complexity. Tourim (1970) calls this "mapping the areas of higher mental functions." For example, Von Wright (1971) observes that one can "ascend in the hierarchy or order of interpretive acts." Eysenck (1970) elaborates on the **what/why** relationship by saying "descriptive phases must precede causal analysis. We cannot seek higher order explanation while we are still unsure about lower order uses."

Level 1: What. The hierarchy that emerges from this analysis identifies the **what** question as a preliminary effort. It serves a basic information acquisition function: "what is this like?" It clarifies terms and details. The type of information given in response includes definitions, descriptions and examples. Definitions classify and categorize and permit comparison and contrast; descriptions develop a mental image, and examples clarify details and extend the description to familiar situations. Metaphors and analogies also are useful for exemplifying and describing.

Ineffective **what** explanations suffer from problems of completeness. The definition is buried or only half developed. The details may not be sufficient or they may be irrelevant. Because the source, who is familiar with the topic, fails to predict the unfamiliar, the right terms aren't defined and the situation is not described in terms of its critical features to the learner. It is the inability to spot the unknown that complicates the **what** explanation.

Level 2: How. The inquiry behind the **how** question, "how does this work," cues an analysis of process. A **how** response is a process description and can be seen as an elaborate form of a **what** explanation. Narrative techniques may be used with **how** questions because telling a story is a natural way to describe some processes. **How** explanations are cued by such phrases as "how to do," "here's how it works," and "a way to . . ." Demonstrations, step-by-step directions, recipes, hints and tips, all use **how** explanations.

To be effective, **how** explanations must consider the departure point, that is the audience's present state of knowledge and the route taken to arrive at understanding. Communicators need to relive the process they went through initially in learning how to do something or how something works and plot a path of critical questions: "What did I think at the beginning?" "What did and didn't I notice?" "How did I get around that point?" A process explanation must anticipate the step-by-step questions in the audience's mind and tell them at those critical points what to do next and which way to turn. An ineffective **how** explanation follows an unnatural route through the process, ignores the decision points, takes divergent paths or skips critical steps. A well-crafted "**how** explanation will also give perspective information at critical points, so there's some sense of "where we're heading."

Level 3: Why. The **why** question, the heart of explanation, elicits logical mental functioning and the responses typically focus on reasons and causes. Sample phrases that cue the **why** explanation are: "because," "in order that," "the answer is," "the causes are," "that's why,"

"the advantages are," and "here's proof." The structure behind a **why** explanation is a syllogism. A formal **why** explanation will state major and minor premises and the conclusion derived from them using either inductive or deductive reasoning.

There are two basic types of **why** questions and the distinctions between them preoccupy the writings of the scientific philosophers. "Causal" explanations explain why something has happened and "teleological" explanations predict why something will happen. Von Wright explains the difference: "Causal explanation points to the past: this happened because that had happened. Teleological explanations point to the future: this happens in order that that should occur" (1971). He further characterizes causal as explanation that is Galilean because of the focus on "interesting causes." Teleological explanations are Aristotelian because they focus on "interesting effects."

Ineffective **why** explanations usually fail for logical reasons—the syllogism is unclear so the audience can't "follow the gist" of the argument. In some cases the conclusion may not follow logically from the premise. **Why** explanations also may fail because the claim is too exaggerated and the proof given doesn't prove the point stated causing a believability problem.

Level 4: So What. The **so what** question calls for the highest complexity of knowledge. It analyzes significance, it interprets, it synthesizes. The underlying inquiry is: "What does this mean?" **So What** explanations use phrases like: "this means that," "the importance of," and "the significance of." Effective **so what** explanations may call for the "the big picture," in the sense that they amplify the meaning. This is the function of generalization. They also call for the "little picture" in the sense of simplifying so the bare bones of the patterns become apparent.

So what explanations may be ineffective because they get mired in small details. Another problem is built into the name of the category: "so what." If the analysis, the synthesis, is too abstract it may become inconsequential to the audience and this elicits a "so what" response indicating indifference. The danger with "the big picture" is that it may become intergalactic.

Hierarchy of Explanation

The chart below summarizes the levels of explanation. It also identifies the key strategies used for each type of explanation.

HIERARCHY OF EXPLANATION	
LEVEL IV: "SO WHAT"	
a. Identify Significance	
b. Synthesize: Amplify, Generalize and Simplify	
LEVEL III: "WHY"	
a. Identify Causes	
b. Predict	
LEVEL II: "HOW"	
a. Describe Procedure	
b. Demonstrate	
LEVEL I: "WHAT"	
a. Define: Classify and Provide Synonyms	
b. Discriminate: Compare and Contrast	
c. Describe: Details and Imagery	
d. Exemplify: Metaphors and Analogies	

An explanation can operate on any one level such as a "how to" explanation that is primarily a demonstration. Explanations can also jump around from level to level. An usual sequence for a well-crafted explanation would be to start with **what** by describing and defining, then move to either **how** or **why** where a process is described or reasons are given, and end with **so what** which interprets the significance. As new concepts and terms are introduced a set of embedded explanations is produced. A map of a complex explanation may resemble a series of small embedded loops within a primary series of loops.

In a book on composition, Snortum (1967) describes an explanatory attempt that illustrates the use of multiple strategies. His example, however, lacks the structure derived from the concept of a hierarchy based on knowledge complexity. He says:

An explanation shows what lies behind concrete impressions by taking them apart and giving you reasons for them, in a word explaining them. You might define the subject, distinguish it from other similar subjects, contrast it with a familiar counterpart, divide it into its components, and use an illustration to keep the explanation from getting too abstract. You might show a typical example and you may even use the techniques of narration and description. All techniques then are resources for explanation.

Message Analysis. To illustrate how explanation works, two short passages from composition textbooks are analyzed below. The first one is a Level I: **What** explanation. The phrases illustrating explanatory attempts are in bold face type.

(situation setting)	When you have to use a phrase or technical term that may be unfamiliar to your readers , it's your business to explain it. Do it simply, briefly, and effectively . Use words and ideas your readers are familiar with, but don't talk down to them. Here are two fine examples of how it's done:
(I: definition of technical)	
(I: description)	
(I: compare and contrast)	
(I: examples)	

A second passage uses multiple types of explanation and attempts to move beyond the **what** level and develop **why** and **so what** explanations. The word cues are marked on the passage in parentheses.

(situation setting)	Selecting a part to illustrate the whole, then, involves the writer making a deliberate choice (in order to make) his central point clear to the reader. He chooses a representative example (because it will) clarify the point, (because it is) a valid sample and (because it is) concrete and colorful. Thereby a good example will have a sense of immediacy in its appeal to and in its effect upon a reader.
(I: def. of "Selecting")	
(II: teleological)	
(III: teleological)	
(III: causal)	
(III: causal)	
(IV: synthesize)	

Instructional Communication

Explaining is very basic to teaching but it isn't synonymous. Thyne (1966) makes the point that "to teach is to promote learning; to explain is to promote understanding." He also points out that understanding does not equal learning and learning does not necessarily mean understanding. On one hand explanation is a tool of teaching; on the other hand it cues higher order mental activities than those required for many of the dimensions of learning.

The common ground, however, lies with analysis of the learner. The characteristics of explanation (instrumental situation, dialogue, dialectics, heuristics, and complicity) all demand skill in audience analysis—and so does teaching. The decisions that make an explanation effective are all audience based. Harwell (1960) describes the decisions to be made in developing an effective explanation: determine what they need to know, decide how elementary or how detailed, arrange the information in a logical order for them, and choose appropriate language. This analysis of the audience/learner's needs is where instruction and communication intersect in explanation.

As in other areas of education the process of finding an explanation is more instructive than receiving one already packaged by the explainer. The challenge, then, in instructional communication is to first sort out the known and recognize the unknown and establish the type and level of understanding desired. Then the explainer must encourage curiosity, elicit the questions, establish the dialogue and incite complicity. Rarely are our explanations that well planned; rarely are our explanations as well executed as they might be.

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