

The Heuristic Dimension of Instructional Development

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At the conclusion of a research project, the investigators face two questions: "What have we found?" and "What have we learned?" The answer to the first is determined by an examination of the data; the answer to the second, by a reflection upon their experiences. Contribution to knowledge from research can result from both systematic inquiry and heuristic observation.

The answers to these two questions can be stated with different kinds, as well as degrees, of confidence. From the standpoint of systematic inquiry, confidence is an abstraction—a level at which one may declare data to be statistically significant. From the standpoint of heuristic observation, confidence is a conviction that something is true, that it will work, that one can use it with assurance.

BACKGROUND

This paper reports the heuristic observations of members of the evaluation team and the principal investigator of a two-year study of instructional development in four major institutions of higher education across the country, *Instructional Systems Development: A Demonstration and Evaluation Project* (OE 3-16-025). In brief, the study was a project in which a hypothetical model (see Figure 1) for the systematic development of college-level courses was tried out at Syracuse University, Michigan State University, the University of Colorado, and San Francisco State College. This four-institution demonstration project was an extension of an earlier study, *A Procedural and Cost Analysis Study of Media in Instructional Systems Development* (OE 3-16-030), which sought a means for applying systems procedures to instructional development in higher education. The findings of this prior study offered hypothetical and

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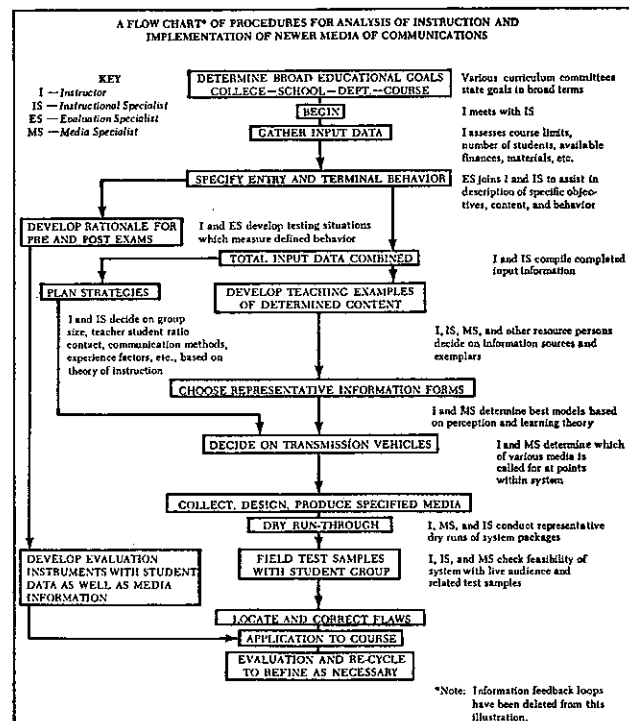


FIGURE 1

logical bases for instructional development steps, but did not provide much assurance that they were practical.

During the conduct of the project, transcriptions were made of conferences among the members of the development teams and the teaching faculty. This record preserved the questions, interactions, observations, and agreements of the media specialists, instruction specialists, and evaluation specialists as they related the steps of the hypothetical model to the task of developing courses of instruction with real faculty and students in actual university environments. The development teams did more than test and revise the model in terms of procedural steps and information flow. They learned how to use the model in order to get the desired results in terms of instructional effectiveness and efficiency. Along with the *what*, represented by a labeled step in the model, there emerged a heretofore uncharted *how*, being a collection of strategies, tactics, gambits, and ploys to make the model work.

These are the *heuristics* of instructional development. They are what has been learned by successive discovery—*action research* to guide future action. Heuristics are the mark of experience, not conflicting with formal preparation in theory and methodology, but somehow apart from it. Often intuitively felt, heuristics are sometimes articulated and passed in oral tradition, as rules of thumb, from one academic generation to another.

In various fields and manners, heuristics may appear as principles, apothegms, dogmas, or mottos. In one sense, a principle is a polished heuristic. The Prussian militarist Von Clausewitz reflected upon his experiences in war and formulated a matched set of concepts: "surprise," "concentration of force," and others still valid, despite technological change. Historian Charles Beard summed up what he learned in life with a series of apothegms, like "Whom the gods would destroy, they first make mad with power." Professional football coach Vince Lombardi spouts dogmas, such as "Winning isn't everything; it is the only thing." Young activists wear buttons with their guiding motto, "Don't trust anybody over thirty."

A distinction may be made between the rules of the game and a player's heuristics. The rules are stated; they are how the game is played: the heuristics are acquired; they are how the game is won. As Robert H. Davis points out, "Nobody plays chess following a model; he would get clobbered!" But in the period between the opening and closing formal moves, the player is guided by such heuristics as "Control the center of the board," or "Develop each piece to the maximum."

An articulated heuristic may seem like the poor cousin of the stated hypothesis of empirical research, but more likely it is its father. John M. Gordon calls a hypothesis a "past heuristic," for which research is most profitable to the extent that the heuristic is true.

Collecting heuristics is not academically respectable. They are not subject to proper experimental design, but they are daily put to the test. While admittedly obvious, they are useful because they are so often ignored. While admittedly overgeneralized, they are nevertheless generally true. What they lack in rigor, they make up in vigor. For example, no accredited research backed up Dale Carnegie's heuristic statements of the Thirties ("Remember that a man's name is to him the sweetest and most important sound in the English language"), but one has confidence that they can be genuinely useful in winning friends and influencing people.

Heuristics are usually stated strongly in a style that avoids the passivity and qualification endemic to scholarly writing. They address themselves to the reader or listener in the second person, thereby implying that *you* should *act* consistent with the guideline, i.e., "You can lead a (satiated) horse to water but you can't (usually) make him drink (much)."

In the case of instructional development, the heuristics set forth below act as unifying elements to tie together and make workable the discrete steps of the hypothetical model. The supporting examples are drawn from the experiences of the persons associated with the USOE project. The 18 heuristics are extensive in their coverage of practical aspects of the work of the media or instructional development specialist in higher education, but are not intended to be comprehensive or definitive. The reader is expected to assume the role of such a specialist, whose overall purpose is to help faculty members improve their instruction.

HEURISTIC #1

Always move toward determining the professor's objectives. The developmental model is explicit in the logical place to start: the statement of behavioral objectives. But when you sit down with a professor and try to get him to do this, he is likely either to go away and not return, or say outright, "I'll be damned if I spend my time writing behavioral objectives!" You need some techniques to get at this task indirectly. When a professor says that he wants to "whet his students' curiosity," you may reply, "All right, suppose you have a student whose curiosity is whetted. *What does he do?*" "What does an 'A' student do that a 'C' student doesn't?" The professor will often respond by describing student behavior. Or you can employ what the late Eugene Oxhandler called the "observation-verification" approach, i.e., "Let's see your exams. Let's observe what's going on in the classroom." Then deduce and articulate what the apparent objectives are, stating them in behavioral terms, and see if the professor agrees. These are both ways of moving towards the objectives without bringing the process to a halt if the professor will not initially get at this task himself.

HEURISTIC #2

The development of software is dearer than the acquisition of hardware. Hardware equipment, with lights and knobs and display tubes and keyboards, has a great fascination, and there is temptation to devote to it a disproportionate share of energy and money. Sometimes when asked about the progress of instructional technology at his institution, a media person may reply, "Well, we're beginning our installation of the gear, and—oh, yes—we're having a two-week workshop for the instructors to prepare the materials for the coming year!" Programed instruction people some years ago had a rule-of-thumb: thirty hours of development time to one hour of student time on the program. In the case of computer-assisted instruction, the figure has been raised to 400 hours of development time to one student hour at the console. And it is in software development and utilization that the employment of hardware succeeds or fails.

HEURISTIC #3

The development of software is a continuous process. In some areas of endeavor, you can "do" something and have done with it. Not in instructional development. The production of validated materials involves a series of successive approximations. And then when you are able to demonstrate that your materials can achieve your objectives, you are likely to move to objectives in a higher domain. This process is more than ordinary evaluation and revision; it involves a commitment to continuous refinement and improvement.

HEURISTIC #4

Involve the student in the developmental process. Often educators will attempt to evaluate instructional materials by saying, "I think . . ." Though the evaluator may be an accomplished and experienced teacher, this statement is still in the realm of speculation. The *student* is the prime source of information about the effectiveness of instructional materials in achieving their objectives. Often significant revisions of materials can be obtained by having a *single* student work

through them and discuss the experience with the developer. Avoid the temptation of having a professor go off by himself for a summer and prepare final versions of instructional materials without any students around.

HEURISTIC #5

The model for instructional systems development is universal in only a general way. At the start of the demonstration and evaluation project, it was thought that the 15-step developmental model could be tested and revised to produce a universal model. Instead, each of the four institutions produced its own variation.

It might be said that *people never adopt a process, they adapt it.* But there are some general similarities in all the instructional development models setting forth the systems approach to education. These models are all product oriented, designed to produce gains in student learning. They pinpoint and sequence interdependent functions. They have feedback loops to assure adequate performance; and they contain similar functional clusters.

The value of a model is to rationalize procedures. It reveals relevancy of otherwise discrete activities. Robert E. deKieffer points out that the model can be used as a road map so that whenever you deal with an instructor, you can tell where you are. Also, you can tell what steps *ideally* you should have gone through to arrive at that particular point so that you can "scoop back" and find out about prior decisions and other pertinent inputs before proceeding further.

HEURISTIC #6

Stress the human elements in an instructional system. People generally have a stereotype about systems and technology, based upon systems analysis and applications in industry and the military. A proper instructional system allows for the human use of human beings. Harold Lasswell defines technology as "an ensemble of practices by which available resources are used to achieve values." It is important to stress that your objective is the enhancement of *human* values as much as a favorable costs/benefits ratio. And there are distinctive roles and functions for humans in instructional systems.

At first glance, the instructional development model appears to demean the professor. It places greater emphasis on learner involvement. It requires inputs from other specialists and involves mediation of instruction. It extends his instruction and forces him to reveal his preteaching decisions. But on the other hand, the professor has more attention paid to him, for things happen when he makes a decision. He is credited with being an innovator. So it is well to stress the human elements in an instructional system, especially for the students and professors involved.

HEURISTIC #7

Proceed on the basis of agreements. When working with multiple-section, multiple-instructor courses, it is important to get agreements as far as possible on procedures, criteria, objectives, and grading instruments. There is a tendency to avoid tackling these issues directly, for agreement implies approval, and in committee situations *precise* agreement is impossible. Often it is sufficient to delineate the range (the maximum and

the minimum) of acceptability, which is in effect an agreement to disagree within specified limits. With a failure to specify such limits, the course will drift from week to week, compounding uncertainty and uncontrolled variables. For example, in a large freshman composition course, an assigned exercise in the logical support of a central thesis might be graded by an instructor who is primarily concerned with his students' ability to "think," and so rewards expression of "great ideas" regardless of evidence of logical support, while another instructor emphasizes rhetorical form or pattern, and so rewards inclusion of proper kinds of support of even trivial ideas. All instructors should understand how they will handle assignments of this nature, at least for this time around (assuming a recurring course), and should commit themselves to following through on these agreements.

HEURISTIC #8

Don't let the words get in the way. Like most fields, instructional development has its own jargon. The point to consider here is the effect of this jargon on members of the teaching faculty. An instructional development specialist using the term "information input overload," stemming from experiences in the computer field, may find that a humanities professor has turned him off. James Popham's popular wall motto, "Help Stamp Out Non-Behavioral Objectives," may please the office occupant but arouse negative responses in faculty members during initial contacts. It is better to compromise and use a more positive approach through the more neutral *specific objectives*, defining them in behavioral terms.

Not only word choice, but manner of speaking can interfere with getting the desired faculty responses. Faculty members are usually not disposed to accept dogmatic statements from persons outside their own fields. Many a faculty member sincerely believes that he can look at a class and by an "eye-ball indication" tell whether the students understand what he is talking about. To tell him flatly that this is a delusion is to cut yourself off from further, possibly productive, association.

HEURISTIC #9

Seek out the dirty jobs. Media specialists naturally would like to be called upon immediately to sit on the highest councils of departmental course planning, but if you wait for that kind of call you'll spend most of your time staring at the telephone. John E. Dietrich suggests that such time is better spent in finding out what kind of jobs departments are anxious to have done but do not want to do; then move in and help them out. Physical preparation of examinations is one area; scoring is another. Handling convention and conference support, preparing graduate study brochures, and providing artwork for research reports are others. Be superbly responsive and proficient. Such contact gives the media specialist and instruction specialist an opportunity to meet faculty and work *indirectly* towards the goal of instructional development. Don't try to sell an idea too hard to a faculty member. Your contact in routine work will provide an opportunity to structure the conditions so that the faculty member will begin seeding ideas for himself. Because he is familiar with you and trusts your operation, he will seek your cooperation and support in planting and maturing an instructional idea.

HEURISTIC #10

Learn the professor first. The students taking a course do this; so should the instructional development team. The faculty member is indispensable to instructional development in the university environment, and you should regard him as a human being, not just a functionary in the role of subject matter expert. There is often a vital distinction between his expressed needs and his real needs. One on-camera television teacher in the project made such exacting and exasperating demands on the assigned graphic artist that it became apparent that his need was more for media therapy than for supporting visual materials, and the relationship could be characterized as patient-nurse rather than professor-artist. Before engaging in a major development effort with a professor, find out whether or not he has the academic respect of his colleagues in his department and has a history of following through to completion projects enthusiastically begun. Often a trip to another university where some innovative program is operational will give you an opportunity to learn the professor's special interests, concerns, biases, prides, fears, and pleasures.

HEURISTIC #11

See that faculty members are rewarded for work in instructional development. The normal academic reward system is stacked against a professor who spends the required long hours and energy developing validated course instructional materials. However, most universities have a stated policy of taking good teaching into account in decisions for promotion, tenure, and salary increases. One reason publication generally dominates the selection for these rewards is that publication is visible, quantitative, and qualitative, in that referees pass judgment on the professor's research and writing prior to publication, and the whole academic world can acclaim or discredit it subsequently. Teaching, on the other hand, traditionally occurs in the sealed chambers of the self-contained classroom, and information about it transpires with uncertainty and distortion. The instructional developer is on solid ground when he establishes that the production of validated instructional materials is similarly visible, quantitative, and qualitative.

In addition, professors can find avenues open to publication in prestige journals for reports of the design and data from instructional development, if their approach is comparably rigorous to conventional research, and the writing avoids the pitfalls of the common "How I Taught Freshman Psychology on TV" type of article. Further, arrangement for commercial distribution of developed materials can provide financial rewards for both professor and institution.

HEURISTIC #12

Structure the conditions for survivability. Instructional development projects have a high mortality. What is begun with high expectation and energy often runs down after a year or two and passes out of existence. Ironically it takes about this long for publicity about an innovative project to circulate, and so by the time visitors arrive in numbers, many times all they can see are closets of stashed equipment. Attention must be given to building a staff that can continue the work and supply renewed ideas and energy when the original major professor turns his attention to other things. Often, pilot or ex-

perimental projects have a basis in special funding that is difficult to transfer to the regular budget. Institutional budgeting on a *program* basis, rather than the common "departmental pot" basis, can facilitate this transfer. Of course, if a new instructional development is evaluated for its balance of costs-and-benefits and if it obviously cannot feasibly be brought up to acceptable standards, it should be phased out. But the point to stress here is that this action should be a deliberate decision, not the result of dissipation or default.

HEURISTIC #13

Structure the conditions for transferability. Often it is not as hard to develop instructional materials in one university as it is to get them used in other universities. The N-I-H ("Not Invented Here") syndrome is very real. Institutions that will accept transfer credit for a student who has taken a course at another institution are loath to accept on their campus the instructional materials and teaching system that were the essence of that course. The feeling is that it is necessary to start from scratch and develop new printed materials, new tapes, kinescopes, instruction kits, and organization from local resources.

Ideally and eventually, collegiate instruction should be more cooperative, coordinated, compatible, efficient, and intercollegiate. What is immediately needed is a way of assembling the painstakingly developed supporting materials, objectives, teaching examples, and demonstrations in a "smorgasmedia" fashion so that a development team at another institution can examine, select, arrange, adapt, combine, and put the local label on a final course package.

But a word of caution. When the materials themselves or some facets of instructional development are being viewed as transferrable or up for adoption, they are often too readily or improperly transferred. As Philip W. Tiemann has observed, the popularity of an audio-tutorial laboratory method of instruction has led some educators to transfer the idea of individual learning stations and the more obvious physical characteristics without fully understanding the philosophical foundation for the audio-tutorial system. The trimmings or visible artifacts of the system—the open lab with carrels and audiotape recorders—are wrenched away from the ingredients of the system: its commitment to student learning based upon the characteristics of the individual learner and the systematic relationships between objectives, learning activities, and continuous evaluation. If the instructors have not integrated the new method into the course, if students do not see the relevance or value of their lab activities and small group sessions, and if the grades and marks in the course are based in the usual way on textbook passages, such "transfer" or "adoption" merely sets the stage for educational disaster.

Thus those who wish to transfer or adopt instructional packages must be reminded that it's not just a matter of bringing home a new baby. There is also the commitment to the process, nurture, and continuous development—as underscored in Heuristics #2, #3, etc. Moreover, those who generate good ideas for adoption need to present them for adoption in such manner as to assure good homes for their development.

HEURISTIC #14

Don't let subject matter interfere with an understanding of process. The instructional development specialist needs to have

techniques to get faculty to consider a new teaching device. For example, if you want to introduce an English instructor to the possibilities of programmed instruction, the apparently natural step would be to show him a program on grammar or punctuation. Don't do it! He will fight the first frame of the subject matter. Show him a program on contract law. Let him read some frames and make choices as to whether some capsule case contains all of the conditions for a valid contract. In this way he will learn how the process works without getting embroiled in content controversy. And show the law professor the program on punctuation.

Then, after the new process or device itself is understood, your faculty member has an informed basis for imagining and considering its various applications to his subject-matter specialty. Once he is favorably disposed in general toward its possible applications, he is ready to consider constructively specific illustrations in his own field. This is the time to introduce specialized examples—when he wants to build on them.

HEURISTIC #15

When you abstract reality you also reduce the learning experience. As you move the learning situation away from the real thing, you cannot assume that the students have learned the real thing. An aircraft simulator is not an aircraft; the available punishments for simulator error do not compare with those of actual flying, and so the nature of the experience is different. If music or public speaking students aim to perform before audiences, practice sessions before an instructor or classmates do not provide sufficient tests of accomplishment; somehow the instructional system must introduce the presence of an audience. Simulation may move the learner farther along than lectures and readings, but don't assume that you achieve more through simulation than is actually the case.

The point of this heuristic is not the insufficiency of simulation, but the necessity to bring the student from simulation to actuality as part of the structured learning activities. The heuristic holds also for mediated instruction. No one expects a student to master a foreign language entirely in a language laboratory. Samuel N. Postlethwait stresses that his purpose in audio-tutorial botany is not to bring the students to audiotapes or film loops, but to get the students to better deal directly with plants. Whenever the student encounters simulated or mediated instruction, he should be made to appreciate the reality that cannot be brought into the classroom.

HEURISTIC #16

Find the pattern or format that will balance benefits and liabilities. In a variation of the Marshall McLuhan observation about the old medium being the content of the new, there is a tendency to use instructional media to store and distribute old patterns of instruction. In an introductory course in business administration, you might invite a business leader to address a class and videotape his remarks for subsequent presentations. The result will almost invariably be the reading of a public relations speech. Instead, the TV interview format can be used to strip the guest of his PR armor and get him to focus directly on the issues that relate to the content of the course, providing opinion and examples to demonstrate the dynamics and values of the world of business. Then, after-

wards, the interview can be reviewed and an introduction inserted at the beginning to set the stage and prepare the student for the lesson. A summary can be added at the conclusion to review the salient points and lead into follow-up class discussion. This kind of pattern makes effective use of the capabilities of the medium in terms of the nature of the objectives and content of the course.

HEURISTIC #17

Faculty members are not generally moved to change their behavior by reading reports of instructional research. An instructional developer has on hand enough research reports so that if he were to stack them one on top of the other, he could diminutively replicate the Washington monument, with the crowning beacon being his own dissertation. But when a young researcher tells a tenured professor about an elegantly designed and rigorously controlled study that "failed to disprove the null hypotheses," he is likely to get the reply, "Son, you haven't told me a damn thing!" Findings of no significant difference produce no significant deference. Such reports may help to prop up a cooperative professor who has misgivings, or to counter certain negative attitudes among students and administrators. But the point to remember is that a professor or student or administrator will accept a change when it produces a perceived net gain from his own point of view and on his own terms. The task of the instructional developer is to find out what that might be and bring it about.

HEURISTIC #18

Nothing persuades like a visit, but watch out! Nothing deflates like a deluded visitor. The four-university project from which these heuristics emerged was cognizant of the advice of H. M. Brickell, "Nothing persuades like a visit." Surely it is of great benefit for a development team to let professors see an innovation and different human models in action and talk directly with respected disciplinary counterparts at another institution.

But sometimes publicity about a particular operation or activity raises expectations higher than can be supported by actuality. The seasoned campus visitor not only takes the guided tour of production facilities, but also talks with the instructors and observes students engaged in the reception and application activities of the instructional system. A multimedia classroom with student response stations may turn out to have only a demonstration program to utilize it. Computer-assisted instructional facilities may have only trivial games to play. Before taking a professor to see these, make sure that by their merit and not their publicity they will be persuasive.

And in the case of your own innovations in instructional development, recognize that you may be poorly prepared, staffed, and organized for visitors. Your main purpose was to improve instruction for your own faculty and their students. Don't dilute quality on this front with unjustified ineffective show-and-tell efforts for visiting firemen. Some development stories are too real, too complex, and too private to be seen; they are better told by media other than the visit. Moreover, well-run, demonstration-visitation projects do themselves call for their own instructional development program to be effective for the visiting audience.