EDUCATION AND IMPLEMENTATION IN MIS

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Center for Information Systems Research
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INTRODUCTION

The process of developing large-scale information systems is complex and too often marked by failure. Over the past decade, several techniques have emerged to improve it:

1) the Systems Development Life Cycle (SDLC): a methodology for project management that focusses on planning, rather than coding.

2) software productivity tools, including structured methods, walk-throughs and automated design and documentation aids.

3) implementation strategies that focus on managing the organizational change represented by new technologies and systems.

This last area is the theme of this paper. There is a growing body of conceptual and empirical (descriptive and prescriptive) research that provides the basis for implementation strategies that are as well-formalized as the SDLC (Keen 1979). The Implementation Cycle (IC) is, in effect, the behavioral equivalent of the SDLC. (See Kolb and Frohman, 1970, and Lewin and Schein, 1969, for models of the IC.) The IC emphasizes consulting skills and facilitation. It defines the role of the implementor as that of change agent.

This paper focusses on education as a vehicle for change. It describes one educational intervention explicitly intended to "unfreeze" personnel in a major bank; unfreeze them in order to prepare them for a large-scale systems implementation in which their commitment and participation was crucial to success. The intervention grew out of a detailed study of other efforts in the same organization to implement a common system (Keen, Bronsema and Zuboff, 1982). The study concluded, among other things, that the likelihood of success in an implementation effort increased substantially if there was a strong commitment to use
education to lead the implementation process rather than to use training to follow it. An additional study by one of the authors (Bronsema, 1981) concludes that education has the potential to be a major, formal component of the Implementation Cycle.

Education here does not mean training. Training focuses on building specific skills or transmitting specific knowledge. Education may include training, but it is much broader in scope. For example, education may have several behavioral objectives: 1) consciousness-raising and "unfreezing"; 2) providing a forum for open expression of concerns; 3) creating a common vocabulary and set of methods; 4) changing attitudes; 5) creating action; 6) building skills: technical, business, organizational, etc.; 7) transferring information. Generally, companies' education efforts do not seem to have clear behavioral objectives. The emphasis is on training, not education. In addition, companies do not generally use education to lead an implementation process.

This paper describes one particular education intervention, a workshop called "Preparing for IPS". The workshop was given in an organization we shall call "Megabank", in a country we shall call Hyperion. The context of the intervention (Megabank Hyperion), and the principles for design, delivery and impact of the workshop are described in the following sections of this paper. The concluding section of this paper outlines a general model for the use of education in the implementation process.
Integrated Processing System (IPS) is a real-time processing system that integrates all the major services and products of an international bank, Megabank. IPS is a strategic innovation in terms of the bank's technology, business activities, work flows and organization. IPS was intended to be highly generalized, but in practice substantial local modification was needed to adapt the system to local banking procedures, government regulations and market characteristics. IPS is being implemented in over sixty countries. The success of this common system has varied widely. In some countries, IPS was close to a disaster: behind schedule, disruptive and expensive. In others, implementation was fairly smooth (Keen, Bronsena and Zuboff, 1982).

Hyperion is a medium-size central branch in Megabank. (A central branch is generally a single country.) Hyperion is just beginning the IPS implementation. Responsibility for implementing IPS in Hyperion falls to operations, the "back office" of the Bank. (Hyperion's organization chart is show in Figure 1.) Operations handles all aspects of processing, including the computer components. Marketing, the "front office", has up to now mainly focussed on loans, but because the worldwide corporate banking market is rapidly changing, credit-based products (loans) are only marginally profitable and growth in revenues and earnings depends on asset-based and fee-based services, e.g., leases, balances, trade financing, etc. IPS is the technical base for Megabank's aggressive marketing strategy for Electronic Banking.
Figure 1: Hyperion's Organization Chart

Country Head (Lawrence)

- Operations (Hammer)
- Administration/Training (Berger)
- Marketing (Price)
- Marketing (Guthrie)
- Personnel
- Auditing
- Legal

Technology Committee
There is a distinct culture gap between marketing and operations personnel in Megabank Hyperion. Marketing is the elite; they know little about computers. Operations, which includes systems personnel, is psychologically and physically isolated from marketing in most branches. In spite of the isolation, Hyperion has made attempts to narrow the culture gap, and to involve others in the implementation of IPS.

Largely as a result of prior experience in implementing IPS, the senior systems coordinator in this division of Megabank committed significant resources for planning Hyperion's implementation. The start-up process of the implementation included training, selection of a user team and creation of a Technology Committee; Figure 2 outlines Hyperion's efforts.

Figure 2: Hyperion's Efforts

1) The Head of Operations attended a training program on IPS held in the divisional technology laboratory, Intech.

2) He selected three people from operations to be the "user team". They spent three months at Intech, attending training sessions and visiting other countries that had installed IPS.

3) The team scheduled regular weekly meetings with three to five senior managers in operations and systems. The meetings were held outside the Bank and lasted six to ten hours. Managers from marketing and auditing were invited but never attended.

4) As a result of the meetings, a Technology Committee was formed. This included senior managers from all functional areas. The Committee would review plans for IPS and formulate the development strategy. Members would also pass on information to their subordinates.

5) The weekly meetings were used for the user team and Head of Operations, Mr. Hammer, to write a five-year plan for implementing IPS.
   Year 1: planning; expand and develop the user team.
   Year 2-3: modify IPS software to meet local needs; implement IPS at the head office.
   Year 3-5: implement IPS in the local Hyperion branches.
However, the five-year plan had only one reference to "training of operations and marketing staff"; this was to be provided at the end of the second year.

Over the six months remaining in year one, several problems emerged. These included delays in delivery of needed hardware, the need for the user team to divert time and effort to other ongoing projects, and substantial discontent with the poor quality of IPS's documentation and design.

By the end of year one of the five-year plan, a one-week course, Introduction to Computers, had been developed by Intech, Megabank's centralized technology laboratory. Ten operations personnel from Hyperion attended. The course was then brought to Hyperion and taught by operations staff and professors from a local university. It was given eight times to groups of ten to twenty people (150 people in total), including twenty senior managers and forty-five middle managers.

The purpose of the course was to make people feel comfortable with computers and provide them with some technical vocabulary. It included one afternoon of hands-on use of a microcomputer and a brief discussion of IPS.

The course had most impact on operations personnel. Six months later one manager commented:

I'm a traditional operations person; I didn't know anything about computers and I didn't care. But after the course at the regional Training Center I changed; I knew operations was changing. If I wanted to keep moving I would have to know computers. I'm glad I switched over to the computer side.

The course did not have the same effect on all, however. Marketing personnel, for instance, found it informative, but not relevant. One participant from marketing said:

Sure the course was good and I learned something, but so what? I don't know why I was there and what it had to do with my job. We got technology training, but not training about IPS.
One of the instructors, a member of the user team, commented:

The content was good, the teachers were good, but the timing was wrong. I realize now that we were too fast and too early. It was given about a year before it was needed. We didn't talk enough about IPS, and no one knew why they were there. Most of them learned nothing, and those that did will soon forget it.

Little change occurred as a result of the course. Mr. Hammer continued to spend substantial time talking about the IPS plans, mainly to selected small groups. He asked marketing to appoint a representative to the user team; there was no response. Mr. Hammer put pressure on marketing, which finally assigned a junior manager. One marketing manager said:

I know we sent a guy to work on IPS, but I'll be damned if I knew what happened to him. He got a desk on the operations floor and I haven't seen or heard from him since.

However, one marketing manager expressed some interest in IPS.

I haven't had any experience with IPS to date. . . . If I don't know about it, I know that my people don't know anything about it. We need to know what we're getting for the Bank's investment. What are the steps, the implications, the millions of packages? Does IPS give us any advantage over the competition?

The culture gap between marketing and operations is commonplace across Megabank, particularly at middle and lower levels of the organization. The gap reflects differences in education, politics and attitude.

(An operations manager said,)
Marketing's concern is "service"; operations concern is "control". . . . we just have different ways of seeing the world. The final result is that operations thinks they're the boss. There's a conflict of power and control.

(A marketing manager said,)
I know virtually nothing about IPS. I keep hearing speeches from Hammer and the country head, but that's all I know.

I know the Bank will probably change because of IPS, but no matter what, marketing will always be the elite of the Bank.
IPS implies a major shift in how the Bank functions. The culture gap will have to close for the implementation to be successful. Some members of the organization are aware of the need to close the gap.

With automation, especially IPS, the separation between marketing and operations will almost disappear. We have to work together because those guys (marketing) are going to have to sell the new technology to their clients. You just wait, someday they will realize it, and they will be really angry. They will panic and complain about their lack of participation in the planning and design of the automated products. It's so frustrating.

Mr. Hammer was also aware of the need.

We have asked them (marketing) to participate, and they don't show up at the meetings... I hope it will change soon. We'll have to educate them. Marketing needs more courses on controls, and operations needs courses on service.

Another member of the organization blamed the Technology Committee for perpetuating the culture gap.

We have a Technology Committee. Every area of the Bank is represented. The problem is that there aren't communications between the Committee and their subordinates. I know it's impossible to have a meeting with everybody there, but the ones who are told don't talk to anyone else.

As we have seen, Hyperion's management had put substantial effort into planning for IPS. A user team was in place; Hammer had tried hard to bring people together and had set up a Technology Committee. Hyperion had a detailed implementation plan, and training had been provided to 150 managers and staff. Many of the mistakes made in earlier efforts to implement IPS in other countries had been avoided. Even so, there were some recognized problem areas. The need for "user involvement" was stressed by all, but marketing did not want to participate. The training program was viewed as a good one in terms of content and delivery, but had not significantly changed the culture gap. What should they, or could they, do next?
We (the authors of this paper) had done a number of case studies of IPS as part of an earlier research effort, and had worked as consultants to Megabank. Our work had included the development of several courses for senior management and assistance in strategic planning. Our research in Megabank had covered aspects of implementation, technology education, policy issues in managing information technology, and human resource needs in the Information Systems area. As external consultants we were asked by the Divisional Coordinator to develop a seminar that explicitly aimed at "technology mobilization" for IPS. Since Hyperion's need at this point was to change people's attitudes and actions, they needed an intervention aimed at that end. While training had been tried before, it had largely been ineffective. This time they would go outside the organization and ground the intervention in a clearly defined strategy. The rest of this paper describes the design, delivery and impact of the intervention, a workshop called "Preparing for IPS."
The main objectives of the IPS workshop were: 1) to close the culture gap (i.e., attitude change), and 2) to ensure participants understand what implementation involves and the need for actions on their part (i.e., action creation). The workshop was as much a research activity as a consulting project; it was based on general models of implementation, with case studies and structured interviews as integral parts of the design process. Our work (the design and delivery of the workshop) was based on eight general principles. We feel that the principles are of general value and validity as they are grounded in implementation research, and can serve as general recommendations for the design of future education interventions.

The eight general principles on which the design was based are:

1) education should lead to action.

2) it should include data from the participants' world as the basis for examples and discussions (i.e., case studies and interviews).

3) senior management should make a presentation early in the workshop: to demonstrate commitment; to explain the rationale and context of the system to be implemented.

4) the workshop should provide a forum for participants to:
   — express concerns
   — influence the implementation process
   — make their own plans and commitments
   — get answers to their questions, and get needed commitments from senior management.

5) the sequence of an implementation workshop should be:
   — hands-on experience
   — explanation of the goals of the implementation effort
   — clarification of plans, roles, impacts from the new system
   — discussion of the technical system
-- a case study that presents a fairly successful strategy for implementation
-- a methodology for planning the implementation
-- "green flags/red flags"; good and bad signs for implementation taken from interviews in the organization.
-- agenda for planning and organization action
-- feedback to/from senior management

6) the participants should not exceed fifteen in number, and must include people from all functional areas so that the issue of the culture gap is explicitly brought into the open.

7) the role of the teacher should be that of "advisor".

8) evaluation criteria should be related to the behavioral objectives of the intervention, and follow-up activities should be conducted.

Each of these eight principles will be discussed in detail.

Education as Action

Many of the participants did not view Hyperion's earlier training efforts as relevant to their jobs. The training effort involved information sharing, but did not lead to the "unfreezing" that has been identified as a first step in effective organizational change. The stages, unfreezing ----> moving ----> refreezing, in the Lewin-Schein (1969) model of the consulting process have been adopted by many MIS researchers as a valuable descriptive and prescriptive paradigm (Keen, 1977; Lucas and Plimpton, 1972). Information sharing is unlikely in itself to lead to unfreezing; that requires attitude change. In turn, attitude change may not help the "moving" stage; for this, methodologies for planning and explicit commitments are needed.

Figure 3 on the following page shows the outline of the curriculum for the IPS workshop, and the components that focussed on "unfreezing" and "moving." Many of these headings signal the transition between
Figure 3: Outline of Curriculum for IPS Workshop

<table>
<thead>
<tr>
<th>Curriculum</th>
<th>Focus</th>
</tr>
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<tbody>
<tr>
<td>Future of Banking</td>
<td></td>
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<td>IPS</td>
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<tr>
<td>Technology/IPS</td>
<td></td>
</tr>
<tr>
<td>Implications</td>
<td>&quot;Unfreezing&quot;</td>
</tr>
<tr>
<td>Quotations</td>
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<td>Case Study</td>
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<td>Red Flags/Green Flags</td>
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<td>Planning</td>
<td></td>
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<tr>
<td>With/Without Planning</td>
<td></td>
</tr>
<tr>
<td>Issues</td>
<td>&quot;Moving&quot;</td>
</tr>
<tr>
<td>Underlying Concepts</td>
<td></td>
</tr>
<tr>
<td>Tasks/Activities</td>
<td></td>
</tr>
<tr>
<td>Who's Involved</td>
<td></td>
</tr>
<tr>
<td>Project Organization</td>
<td></td>
</tr>
<tr>
<td>Worksheets</td>
<td></td>
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</tbody>
</table>
"unfreezing" and "moving," information sharing and attitude change strategies.

One key element of the workshop was designed to put management at risk — and to challenge them into action. It seemed to be unfair to ask participants to define their roles in the IPS implementation and to make commitments if senior management had not defined needed roles, commitments and resources. It was made clear to the Country Head and to Mr. Hammer that the vague goodwill concepts of "commitment" and "involvement" must be translated into action. The workshop asked for commitment and involvement from the participants; it also told them they had the right to expect the same from senior management.

The earlier case studies of IPS had focused on this issue. In countries where the culture gap was widest, operations often claimed that there was substantial user involvement, while marketing complained of its complete absence. Similarly, senior managers spoke of their commitment, but their subordinates saw none. The contradictions relate to ambiguities in the definitions of "user," "involvement" and "commitment." "User" is an abstraction, a distant figure, to whom one need feel no responsibility. "Involvement" is an invitation to a meeting, and "commitment" is a memo.

"User," "involvement" and "commitment"—words matter! A major concern in the design of the workshop was to define the behaviors that result from involvement and commitment. Methodologies and planning frameworks were provided that helped the participants translate attitude into actions. (See Figure 4 for excerpt from the workshop's planning framework.)

In addition, the word "user" was eliminated from the workshop material. Terms like "colleague" were substituted. A colleague is not an
Fundamentals of Planning

Need for a Plan

- investment
- risk
- potential

What is a Plan

- consensus
- comfort
- output

Plan Development Cycle

- project phases
- issues
- responsibility
- tasks
- work plans
- milestones
abstraction, but a real person towards whom one has clear responsibilities. (In a different setting one might substitute "client" for "user;" in this situation the responsibility is contractual.)

The actions towards which the workshop aimed obviously concerned involvement, commitment, bridging the culture gap and taking on active roles in implementation. The more general point is that education for implementation and technology mobilization must be based on operational goals. The key question is, "What actions do we want to occur as a result of the education intervention?" If that question cannot be answered, a "good" course, in terms of content and delivery, serves little purpose.

Data from Participants' World

Information technology is at the same time both concrete and abstract. The concrete components are the hardware and the program code; these can be presented explicitly and clearly in any course or seminar.

The abstract components which are so often critical in implementation are not so clear nor easy to present. They include:

1) general psychological, organizational and political issues;
2) the management process;
3) the systems-user culture gap;
4) "resistance to change;"
5) user involvement and management commitment.

These abstractions must be made concrete so that participants can move from principles to procedures, from ideas to action and from intentions to commitments.

In many ways, education for implementation is a form of action research. A key first step is to identify feedback to the organization regarding its perceptions, problems and needs. Hidden agendas need to be
brought out, and examples and discussions based on the participants' context, not some distant, general and semi-relevant case, need to occur.

The authors have developed a general approach to collecting such data and applied it in a number of settings. We spent three to eight days interviewing fifteen to thirty people at all levels of the organization. A structured interview format was used, and the focus was on:

1) the subjects' knowledge of and perception of the information system and the implementation process;

2) how their work is likely to be affected by it;

3) their expected and anticipated role in the implementation;

4) their views on how and where a course or seminar could help smooth implementation; and

5) their recommendations on what management should be doing to help in terms of providing commitments, resources, directives and mandates.

At the beginning of each interview the person is asked to describe the implementation of IPS and his/her involvement in it. In general, most people address the majority of the five points listed above without any additional questioning. If something is missed, however, their responses are used to format additional questions. Occasionally, other general questions are used to tap those points, e.g., "What problems (benefits, surprises) have you experienced with IPS system or implementation?" "What could management do to make this a better implementation?"

There are many benefits from the data. They invariably reveal consistent, well-articulated areas of concern that need to be discussed openly. Managers often have an incomplete or even inaccurate understanding of their own organization, especially of the lower levels. For example, they tend to assume subordinates have more understanding of the system and
its goals than they really do, or ascribe more commitment and involvement than really exists.

A major value of having concrete data from the organization is that the teacher can pull out hidden agendas without being put on the spot. For instance, rather than suggest there may be a lack of real commitment from the top or that "involvement" is too often pseudo-participation, it is far easier to point to an overhead transparency and say, "This is what your own people say about that." The transparency reads:

Operations has no idea of what we (marketing) need. We have become a slave to what operations thinks we should have; and I don't like it!

We had a meeting and senior management announced our user representative. I about died. That person wasn't competent or skilled to represent us, so why was he chosen? I was told, "He's the only person we have available."

(Note that anonymity is protected by providing only general indicators of from whom the quotations came. It is extremely important that the greatest caution be used in protecting the source of quotations. Anonymity is crucial, obviously, from an ethical perspective, as well as from the perspective of future research attempts in that organization. If the source of a quotation can be identified, the news will travel fast, and you will seldom get honest, open feedback from persons being interviewed.)

The interview data also provides a base for writing a case for use in the implementation seminar. Case studies are obviously useful components of any course on implementation. Too often, however, the case is a disaster study—a fiasco which is intended to drive home some cautionary tale about the need for involvement or planning. This has several disadvantages. It associates computer systems with failure and provides only negative guidelines: "Don't do the stupid things these people did!"

For the IPS implementation course the authors developed a case example
showing a fairly successful implementation strategy, weaving in quotations from the interviews and focussing on issues raised in them, such as:

1) the need for user involvement to be real and sustained;
2) the importance of liaison roles; and
3) the need for careful phasing, which may conflict with management's wish to speed things up and meet artificial deadlines.

The case was presented as a similar development effort to Hyperion's. It was a form of "faction"—factual fiction.

The use of a successful case rather than of a fiasco allowed the teacher to ask participants: "Where will your strategy differ from this one?" This is easier to answer than "What will your strategy be?"

Moreover, they identified with the situation and the people to the extent in several instances of claiming that this was Hyperion. The terminology, jobs, concerns expressed and potential problem areas in the case more or less matched Hyperion and IPS. It was a mechanism for connecting the classroom to the context. The discussions centered around doing and were expressed in terms of "we".

Quotations from the interviews were also used to create "green flags" and "red flags" for the planning process for IPS. (See Figure 5.) Much of implementation requires techniques for diagnosis and facilitation. There are few absolute rules; the process is situational. This makes it hard for participants in a course to see what they should do. As Figure 5 shows, one can more usefully identify situations, attitudes and opinions that indicate a given issue is being well resolved (green flags) or is likely to be a blockage to progress (red flags). By stressing that the quotations are from people in their own organization, the teacher again makes concrete
Figure 5: Green Flags/Red Flags

<table>
<thead>
<tr>
<th>GREEN FLAGS</th>
<th>TOPIC</th>
<th>RED FLAGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technologists know the system and business people know the market. We need each other; we teach each other.</td>
<td>Culture Gap</td>
<td>I'm a manager; only secretaries sit in front of a terminal.</td>
</tr>
<tr>
<td>I'm one of the biggest users of the system on the marketing side. I need the system.</td>
<td>Colleague Involvement</td>
<td>I'm a technical man; it's not my job to see that people use the system.</td>
</tr>
<tr>
<td>The technical and business people meet once a week to brainstorm and do creative problem-solving.</td>
<td>Teamwork</td>
<td>The team isn't strong here. How can there be user involvement when the team is a mess?</td>
</tr>
<tr>
<td>We created a user representative group of senior managers. It's working.</td>
<td>Liaisons</td>
<td>Senior management appointed our user rep. I about died, that person wasn't competent. But I was told that the person was the only one available.</td>
</tr>
<tr>
<td>The techies learned the business language and the business managers learned techie-talk. Now we can communicate.</td>
<td>Language</td>
<td>What do the buzz words mean? Bits, bytes, 24K, 64K—what does that mean?</td>
</tr>
<tr>
<td>If the person knows the benefits and communicates them, there will be no resistance.</td>
<td>Communication</td>
<td>Technologists and business managers—it's a dialogue of the deaf!</td>
</tr>
<tr>
<td>I (the CEO) am committed to making the system work. The buck stops here.</td>
<td>Commitment</td>
<td>The CEO doesn't understand the technology and gives us no support.</td>
</tr>
</tbody>
</table>
Figure 5: cont'd.

| Computers are a cultural change for us. It will take time, energy, patience and commitment. | Acculturation | In one day they changed from typewriters to terminals. There were big problems. |
| We have a technology plan. It has been reviewed by senior technical and business managers. | Planning | Our technology plan is loose and totally separate from the corporate plan. |
| Technology makes my job more fun. All the dirty work is done by the machines. Now I have more time to play with ideas. | Work Impact | With this system the work has expanded, but the number of people has remained the same. I could scream! |
| I now get the information that I need, and I get it right now! | Benefits | I don't understand why we put this system in. All I know is that I pay a lot of money for it! |
| Maintenance is a #1 priority! | Maintenance | Maintenance, patches and enhancements never get done. |
| What a wonderful change. We are no longer a paper factory! | Change | One guy checks the balances from the terminal with his hand calculator. |
| People, are the best resources we have. You can talk about a million systems, but there's only one Joe! | Human Resource | Automation will help us eliminate people. |
| We're developing manuals for technicians and users. We're also developing tutorials. It takes more time and money but we have to do it. | Manuals | I read the first ten pages of the system manual. It's like reading Chinese! |
We train at all levels. We start at the top and go all the way down the organization to teach them about the system.

From the point of view of planning I need to know what will happen after they know the system. How are they using it on their jobs?

Education/Training I (a user) had a lot to learn and there was no formal instruction.

Feedback How do we assess the value of the system—we don't!
what is too often abstract ("resistance to change") and sharpens the sense of immediacy and realism—and hence, the need for action.

Structured interviews have been the main methodology the authors have used throughout their implementation research. Much of the data used to create the case study came from previous interviews in Hyperion and other branches in Megabank. Implementation is a dynamic process; it includes cognitive and affective components. The stakes are often high; people see computers as affecting their sense of self, their jobs and skills, politics and organizational relationships. It is hard to elicit these perceptions and processes except by letting people express their views in their way. We view our research as a form of detective work and discovery. There are contradictory perceptions of "fact," subjective perceptions and historical factors—often unarticulated—that shape the context of the implementation effort. The data collected via the structured interviews is a form of text to be analyzed in terms of themes, motifs and key words in the same way as a literary text.

Frequently, the interviews reveal unexpected, key issues. In the IPS studies, for instance, a number of managers mentioned the need for a "referee". The occurrence of this somewhat surprising word revealed an imbalance between accountability and authority that left the systems staff badly in need of someone—a "referee"—to mediate between senior managers who had conflicting goals, priorities and commitments. Subsequent "probes"—structured interviews focussed on a few key areas—indicated that the issue of authority was a central problem with IPS (see Keen, Bronsema and Zuboff, 1982). Analyzing the ways managers and their subordinates talk about "commitment" revealed large gaps between the managers' perceptions of the term and that of their subordinates'. This was not at all apparent at
first and required the researcher to surface hidden issues by fettering out information and opinions, rather than surveying or making use of a questionnaire.

This paper focusses on education; the point to be made here is that both implementation research and implementation education benefit from being rooted in the data of people’s own words. The "texts" from the interviews were integral to the design of the IPS workshop and the case in particular, and the use of quotations from them gave a concreteness, immediacy and "relevance" to the educational curriculum and process.

Obviously it is more expensive to spend one to two weeks on interviews in order to design a workshop than to use "off-the-shelf" material. Whether or not it is effective to do so, in terms of cost-benefit trade-offs, depends entirely on the behavioral objectives for the education effort. If the goal is information-sharing, rather than action, off-the-shelf components may be fully adequate. We strongly conclude from our experience in Hyperion and elsewhere, that the investment in collecting data to root the content and process in the participants' reality is often essential to make education a mobilizing force for implementation.

**Senior Management Commitment**

The need for "top management commitment" is well-established in the MIS/MS implementation literature. With IPS, virtually every manager interviewed spoke about his or her commitment. The catch is: what is commitment? Is it an expression of support, willingness to allocate funds and staff, active leadership or statement of expectations? The IPS case studies clearly demonstrated that while many senior managers saw their
verbal statements as "commitment," their subordinates watched what they did, rather than what they said. Effective commitment involves a public investment of time, prestige and attention. It implies that the manager's position and success is at least to some extent linked to the success of the implementation effort. The manager provides authority and accepts accountability; subordinates who are given authority are also de facto held accountable.

It is clear from the IPS interviews that subordinates try to decipher management's real intentions. They ascribe motives and set their own agendas by deducing their bosses'. The employees in Megabank Hyperion were aware of the Country Head's general commitment to computer technology; they said:

Mr. Lawrence (Country Head) is committed to computer technology; he's really into that type of thing. He has a micro in his office and a micro at home. He spits out a lot of buzzwords—"Is the front-end loaded?" I have to find out what that means. If he knows it, I have to learn it!

Even though his people perceived his general commitment, Mr. Lawrence sent confusing signals regarding his commitment to particular projects, particularly IPS. Mr. Hammer, Head of Operations, explained:

Mr. Lawrence told us to drop our work on IPS for a little while and work on another project. He sets the priorities, so what choice do I have? I wish he'd make up his mind.

Lack of and/or inconsistent senior management commitment is a very real signal to others in the organization. This is relevant to education. The authors made it clear to Hyperion's senior managers that there was little point in designing an IPS workshop unless they demonstrated—not just stated—their commitment. Doing so required that the Country Head explain the wider goals and context of IPS, instead of leaving the staff to work out what they were. (Not surprisingly, frequently workers assume the
main intent is to reduce head count or beat the unions.) The Country Head needs to clarify the business aims that had led to IPS and outline the overall planning process, roles and phasing.

In addition, the Country Head must respond to the participants; a key feature of the workshop was the planning agenda (see next section) that in effect asked the participants to make commitments. It included the opportunity to indicate in writing what additional actions, resources or information were needed from senior management. Commitment is a two-way process. The workshop explicitly aimed at translating the vague idea of "user involvement" into action. It is unfair to ask subordinates to make commitments if these depend on managers doing the same. The senior managers' willingness to expose themselves to awkward questions, go on record and stake their prestige, and respond to their subordinates' statement of needs; all are valid tests of their own commitment.

In passing, it is worth noting that implementation research provides surprisingly little solid data about top management commitment, especially in relation to mechanisms for communicating it to the rest of the organization. The McKinsey study (1968) established commitment as a key factor for effective implementation. Since then this has been accepted as conventional wisdom. Our case studies suggest that "commitment" is a complex set of factors and that we need to pay attention to the perceptions of subordinates as well as top managers in this regard.

**Education as a Forum**

The paradigm of implementation as a process of social change is the theoretical base that has guided our research, as well as shaping the design of the IPS workshop. Key themes in this paradigm include:
1) the need to view "resistance" as a legitimate response from an organizational system that sees the cost of change as greater than the expected benefits, rather than smoothing over or suppressing it; the implementor should encourage and respond to the open expression of resistance; 2) change is self-motivated; there needs to be mutual understanding, operational goals and a joint contract between the bringers of change and those affected by it; and 3) the change needs to be institutionalized; too often it is in effect an organizational experiment that disturbs the status quo. For it to be permanent, a new equilibrium must be created. Key aspects of this "refreezing" process are training, making sure the new system has a "home" and a representative in the client organization, and creating any new roles, lines of communication and control mechanisms that may be needed.

In many ways, the IPS workshop is an embodiment of the social change paradigm. Almost every feature of the Lewin-Schein model can be restated in terms of education. A key conclusion we drew from our case studies was that implementation requires an educational forum as the base for information-sharing, attitude change (i.e., open expression of concerns and needs, and mutual understanding), action creation and skill building.

Just as the implementation literature assumes the importance of top management commitment without being very clear about mechanisms for building and communicating it, it often emphasizes the need for user involvement but fails to specify techniques for making it effective. It seems clear from empirical normative discussions of user involvement that education forums are an essential component of any strategy for involvement (Mumford, 1969; Lucas and Plimpton, 1972; Devlin, 1980; Caroll, 1981;
Involvement, commitment and communication require a forum.

Sequence

Obviously, the exact contents and sequence of sessions in a workshop will vary depending on the nature of the new system, the technology, the organization and the characteristics of the participants. That said, we feel there are some general rules about sequence. In particular, it seems important to begin with concrete experience. The IPS workshop began with a hands-on exercise in which computer games were used to create "funds" that were transferred to bank accounts using IPS-type technology. This had several purposes: ice-breaking, reducing fears of the machine, establishing the potential usefulness of IPS and, above all, making IPS concrete.

The next sessions described the business goals and context of IPS. Our case studies indicated that the complex economic, market, political and organizational analysis and planning that lie behind the decision to introduce an innovation of the scope of IPS are well understood by senior management and many of the technical staff; they are not understood by "users." The IPS workshop began with a review of trends in banking, competitive strategies and the business goals that led to IPS. It moved on to describe the likely impacts of IPS on people and jobs. Only then did the workshop describe the technology behind IPS. Obviously, if implementation is seen as primarily technical in nature, this sequence is unnecessary. If it is viewed as a process of organizational change, the logical order is from the context to the technical vehicle.
Kolb and Frohman (1970) introduced a model of learning that focusses on four modes: concrete experience, abstract conceptualization, reflective observation and active experimentation. In retrospect, the IPS workshop is consistent with Kolb. The hands-on exercise (concrete experience) was followed by lectures which highlighted concepts, definitions and technical issues. The case study and "green flags/red flags" provided the participants with data from their own organization. The "flags" (see Figure 5) were instructive in themselves, providing early warning signals and a basis for diagnosis. Words are powerful; quotations are concrete. It seems clear that they led the participants to work hard to relate the teacher's material to their own situation and to take positions (reflective observation in Kolb's model).

These positions were shaped, extended, modified, explained and used in the final and longest segment of the workshop, the planning agenda. (See Figure 4 for planning agenda.) This presented a methodology for planning and a detailed framework and checklist for action (Kolb's active experimentation). These sessions moved towards specific definitions of roles and specific commitments. Most of the participants had never been involved in a major computer project; they were ready to be "involved" but needed a vocabulary and set of methods to do so. We observed in our case studies a frequent passivity among staff in user departments; they had no idea of what they could or should do. A main need in implementation education seems to be to make action possible. The workshop thus focussed on roles: the teacher helped participants define who does what, not just what is to be done. (See Figure 6 for "Who Does What" Matrix.) In addition to clarifying roles (through the use of the matrix), the participants initiated role-playing and there was substantial active experimentation.
Figure 6: Matrix -- Who Does What

<table>
<thead>
<tr>
<th>Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Project phases</td>
</tr>
<tr>
<td>Commitment</td>
</tr>
<tr>
<td>Planning</td>
</tr>
<tr>
<td>Preparation</td>
</tr>
<tr>
<td>Proj C &amp; Adm</td>
</tr>
<tr>
<td>Installation</td>
</tr>
<tr>
<td>Testing</td>
</tr>
<tr>
<td>Development</td>
</tr>
<tr>
<td>Testing</td>
</tr>
<tr>
<td>Implementation</td>
</tr>
<tr>
<td>Operation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Management</th>
<th>Users Internal</th>
<th>Users Customers</th>
<th>Systems Development</th>
<th>Systems Operation</th>
<th>External Support</th>
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</tbody>
</table>

S = supplies authority and resources  
R = responsible/sign-off  
A = active participant  
P = passive participant/informed  
NP = non participatory role
The case study used in the workshop stimulated some interesting reactions. One participant, John, noted the similarity between the actions of the Country Head in the case and the actions of Mr. Lawrence. John was adamant, "The Country Head (in the case) was wrong!" At that point the teacher assigned people to character roles. John played the Country Head and had to defend his decision to other characters, and did a good job.

As stated earlier, the contents, pace and sequence of a workshop depends on many situational factors, but it needs to have a structure that moves attendees forward via concrete experience, concepts, reflection and experimentation. Education is a dynamic process, and the IPS workshop was in itself an implementation effort, beginning with unfreezing and ending with moving (see Figure 3).

**Group Size and Composition**

Since it was indeed an implementation effort, the workshop had to address the culture gap. It is obviously easier to build consensus within a homogeneous group: there is substantial risk inherent in seeking out heterogeneity. In Hyperion, marketing and operations personnel had never, below the senior management level, taken a course together. One participant stated that "the workshop was the first time marketing and operations had been in the same room together." At times there was substantial conflict among culture groups, i.e., workshop participants from different functional areas. This was intended: the culture gap became a culture clash in the workshop. The red/green flags and the case study seemed to help people both face up to the gap, clash, and then try to
integrate the cultures. The process was necessary; a workshop participant explained:

You talked what you hurt. It was good that people talked; it was perfect. We seldom get a chance to talk, let alone talk to people from different areas. People had to talk, to get it out, or it would have been a mistake.

The culture gap between marketing and operations in Hyperion is probably no larger than in many companies. Lack of mutual understanding between "users" and systems personnel is extremely common in most organizations. For example, office technology brings the terminal to almost every job function and level; there is certain to be problems in implementation because of gaps in attitude, understanding and mutual respect. If nothing else, education—skillfully designed and handled by an effective teacher—forces the culture clash that precedes culture integration.

There can be no clash if there is a homogeneous group; and there can be no accompanying dialogue if the group is too large. We have found that groups of ten to fifteen participants is optimal. That size group is large enough to represent a diversity of opinions, and yet small enough to provide the opportunity for all participants to contribute.

Teacher

The six preceding principles for designing implementation education were derived from general implementation research, case studies and interviews. In many ways, they merely apply the principles of implementation to an education venture. This involves facilitation and process consultation (Schein, 1969; Beckhard, 1974). The seventh principle, the role of the teacher, is complex. We define it as that of an advisor, combining and moving between the roles of teaching, research and
consulting. Teaching is trust: the presentation of general principles and methods, and classroom management. Research is knowledge: presenting data from this and other settings, and providing theory and frameworks. Consulting is action: giving advice and expertise. (Figure 7 diagrams the roles of the teacher.)

Figure 8: Roles of the Teacher

The Advisor needs a range of skills. We argue that implementation education will be ineffective or incomplete if any of the triad is missing:

1) Teacher-Researcher (Consultant role missing): the workshop will be too abstract.

2) Teacher-Consultant (Research role missing): there may be a credibility gap—the teacher is seen as "selling" something.

3) Researcher-Consultant (Teacher role missing): classroom skills are vital; there is a need for formal transfer of information, and teaching of methodologies and concepts.
The supply of qualified Advisors will be a major constraint on effective implementation education, just as the shortage of qualified process consultants, liaison staff and change agents hinders implementation itself.

Evaluation/Follow-up

We feel that most evaluations of corporate education programs tend to focus only on "happiness quotients"; i.e., students are asked to rate the quality of the teacher and their own satisfaction with the course. Hyperion's Training Center staff distributed a teacher evaluation questionnaire to workshop participants; the teacher received an average rating of 8.8 on a nine point scale, ranked on nine variables. So what? That information does not tell us if the behavioral objectives were met, if the curriculum should be modified, or if the course should be offered to others. Extremely high ratings may mean the teacher impressed the class, made people feel comfortable and introduced no discordance or conflict; however, the high ratings may have little or nothing to do with learning or impact. Education, like other forms of change, involves stress. In assessing the impact of the IPS workshop we were more interested in the actions it stimulated and the nature of the impact than in satisfaction measures.

Hyperion spends a lot of money on training, but lacks systematic evaluation tools.

(The Head of Operations said:)
There are some standardized evaluation forms used by the Training Center; I guess they do something with them. I haven't designed anything yet. I don't have a way of getting structured feedback when people go back to the workplace. I wish I did.
The issue of evaluation is linked to that of behavioral objectives. It is almost meaningless to evaluate a program for which clear operational goals were not defined before implementation. The earlier courses on computers held in Hyperion did not have such explicit goals and did not lead to much action. The Training Center's use of simple teacher rating measures indicates a lack of specific behavioral objectives.

After the IPS workshop, we interviewed all the participants in order to assess the immediate impact of the workshop in relation to the stated objectives. There may have been some bias in their responses, although the candor with which they expressed their views and the rapport built up through earlier interviews in Hyperion made this seem unlikely.

Objective 1: close the culture gap. The workshop was a jolt to many. It did seem to have facilitated a culture integration through a culture clash. It was seen as manipulative by some; education is manipulative, however "participative" its intent. The following comments are fairly typical:

(A participant from marketing said:) One night after the workshop several of us were walking to our cars. I heard myself say, "If IPS is bad, then I'm living in a crazy world! We have a lot of smart senior people in Megabank, and they made the decision to go with IPS. One thousand smart people can't be wrong!" I found myself saying this—and I believed it! I didn't feel this way when I went into the workshop. I wasn't prepared for this, for the IPS culture to get inside me.

(Another participant said:) I have attended 80 to 90 courses at the Bank, and I've only been to one other course like this. It was pure brainwashing. After I realized it I felt manipulated. I think there was a group paranoia for awhile; everyone started to think there was a microphone in the room. We were really in that workshop to reach the conclusion that we have to be involved in IPS, and there's no way around it. Don't get me wrong, the course was very good, but it was brainwashing!
Another participant said:
I'll think about the workshop for a long time—for five years, the life of the project plan. I will think about the course constantly for the next three months. I'm obsessed with it—that's the kind of impact it had on me!

People in marketing spoke of a new feeling of commitment to IPS after the workshop. They said:

The course really made us think, and now we really feel committed to IPS. We have to have coordination and teamwork. Some countries have had problems, but if we can do a professional, motivated and integrated job, then we might be able to be the first country to get out of IPS what you're supposed to.

I finally understood the real purpose of the course when we broke into groups to make our plans and to assign tasks and responsibilities. I now understand the extent of our commitment. When we discussed it we found we were really active, not passive. We realized the amount of participation that we have to have to make IPS a success.

Before this workshop I was told that I would be a part of IPS. After the workshop I feel a part of it.

This workshop is called "Preparing for IPS". You should change the name to "Committing to IPS"!

There are obviously some complex ethical issues involved here. The quotations above indicate that education can have a major affective as well as cognitive impact; this is the central thesis of our study. It could still be that the long-term costs of IPS will outweigh its benefits and that the workshop's "brainwashing" leads to commitment to the wrong cause. Only if education has no real impact does the ethical issue disappear. Herein lies the paradox: with education, it is possible to create commitment to the implementation of a "poor" computer system; while, without education the chances that the system will be implemented properly are considerably less—therefore, it becomes a self-fulfilling prophecy, i.e., the system will be "poor."
Objective 2: create action. Since the main goal for the workshop was to influence action, its success mainly depends on follow-on activities directly initiated as a result. Recommended actions by participants included: 1) sharing information and experience with colleagues—

I'll set up a seminar on IPS for all my branch heads. We'll teach it together and we'll start next month. We'll start to pass the information down.

2) pushing the workshop down to more junior and up to senior levels—

They should give this workshop to the levels below us. It really needs to be pushed down, all the way down to the tellers and cashiers.

Senior management has to take the workshop because now we know ten times more about IPS than the Technology Committee does!

and 3) meeting with senior management—

We need to talk with senior management. We would like some immediate answers to our questions. They will have to be patient with us—especially the Country Head; he tends to be somewhat autocratic. Even if he hears crazy or stupid questions, he has to be patient and answer them.

Over the next month, several actions were initiated. A number of the participants met with the Country Head. The meeting was to prove fruitful, both as another forum for operations and marketing to share information and ideas, and as a vehicle for new commitment for further education.

The Country Head had received the feedback from the workshop, both written and verbal. He was somewhat distressed by his staff's lack of understanding of IPS. . . .

I can't believe that they asked these questions. We've told them about IPS over and over, and everyone of them got a copy of the strategic plan. My people have a problem! Before I got here there was a tradition of participative decision-making. That was the old culture. It isn't my style; I'm more autocratic. It's frustrating to have to go over all these issues. . . . again!
... but sacrificed his self-confessed autocratic style to hold a two-hour meeting with them. In fact he saw it as a positive opportunity. He told the group:

We've talked about all of this (IPS) before, but we'll do it again. Don't worry; we want to reemphasize points to make sure everyone understands—so please ask your questions. IPS is still a concept, and until it's a reality it will be difficult to understand.

At one point in the meeting operations questioned marketing about their lack of participation in IPS. Marketing explained their new commitment:

We had a person there part-time and it didn't work. So now we're giving one person full-time, and we'll give two if necessary. We're committed to IPS.

In fact, we want more responsibility, and to have a bigger say in the IPS project.

Another topic of discussion at the meeting was education. The Country Head stated his commitment to further education:

We need more education. We need to push the workshop down in the organization. I want every single person in Hyperion to go through a modified version of the workshop. I want it given to account officers, tellers, cashiers... everyone.

He then followed up his stated commitment with action. He assigned the heads of Training and Operations to be responsible for IPS training. Mr. Berger (Training) said:

We have no training plan yet. We were waiting for the technical people to tell us what we should give to whom. Our training Center in Hyperion is only a year old; it's still evolving.

They really want lots of technology training now. It will be challenging. They want to teach hundreds of people in the Bank. I don't have the staff or the resources to do that. And what about the Bank's customers? They will eventually need training, too.
Mr. Hammer (Operations) also assigned one of his operations staff to deal with the issue of technology training. The person he assigned felt uncomfortable in her new role.

He (Hammer) threw it to me. Now I have to deal with the issue of training programs, and I'm at a loss. People who give training are never specialists in training. I don't know anything about education; I have a hard enough time keeping up with the technology.

In addition to my new responsibility for training, I'm also responsible for the functional specifications of IPS. I don't have time to do that and learn how to educate people, too.

The problem is how to educate. . . with terminals, with conferences. . . with what?

These latter remarks are a little disturbing. The workshop was also a force for unfreezing: it broke open the status quo and stimulated an awareness at all levels of the need for a wider, deeper education effort. The workshop also led to a significant increase in the resources committed to and the priority placed on education as part of the IPS implementation in Hyperion. However, without a plan for education strategies and methodologies, increased resources are unlikely to yield results. The long-term impacts of the workshop, and of the increased resources allocated for education can only be guessed at. The future will largely depend on Hyperion's ability to determine "how" to educate.
CONCLUSION: MODEL OF EDUCATION FOR IMPLEMENTATION

The eight principles described in this paper may be valuable for the design and delivery of a single education intervention to address issues inherent in the implementation of a computer technology. However, the issue raised by one of Hyperion's operations staff, "how to educate," is an important one. Regardless of the successes of one intervention, without the development of a comprehensive education strategy, the workshop simply may have been "lots of sound and fury signifying nothing."

As stated in the beginning of this paper, we believe that education is one way to address the Implementation Cycle (IC). The Hyperion experience points to the need for development of an education process to address the IC. Therefore, in this section of the paper we will propose a model of education for implementation; we call our model "Strategic Computing Education" (SCE). SCE is a comprehensive plan to teach people in an organization how to get ready for and adapt to computer technology. We believe that education, more specifically SCE, can be an integral component of an organization's strategic plan for implementation of information systems. The following discussion will briefly describe the SCE process.

SCE Process

The operative word in our model is "strategic"; therefore, a traditional corporate strategy paradigm has been only slightly modified to accommodate the SCE process. (See Figure 8 for a diagram of the SCE process.) There are six steps in the SCE process.

1) Identify the SCE implementation mission; i.e., what are the behavioral objectives or changes sought?
Figure 8: SCE Process

SCE Mission

- External Environment
  - Scanning
- "Information Company"
  - Scanning

Education Intervention

- Strategy
  - Develop Plans
    - Cost-Benefit Analysis
      - Feedback Controls
2) **Scan the internal and external environments** so that information can be fed into the process. (The internal environment in this study is the "Information Company" within the organization—that part of the internal organization that is or will be involved with computer technology.) Information obtained from this environment will provide a reading on people's general knowledge base, their expectations, their attitudes and potential pockets of resistance concerning existing and/or planned computer technology.

3) **Design education strategies** based on this information. There are at least four possible strategies: information sharing, attitude change, action creation and skill building. Any one or combination of these strategies may be chosen to match the information or problems diagnosed in the previous scan of the environment.

4) **Develop plans** to achieve those strategies; i.e., what to do, when, to whom? The SCE process may involve a mix of interventions (formal courses, seminars, workshops, user liaison roles, etc.) with clear behavioral objectives and targeted communities. An example of an SCE matrix (planned interventions and target communities) is presented in Figure 9.

5) **Perform a cost-benefit analysis.** Since education is not the only vehicle to address the implementation process, it is useful at this stage to conduct a cost-benefit analysis to determine if the planned effort is worth the expected outcome. We view education as one candidate for inclusion in project management/development tools; examples of other candidates are: formal project management and control techniques, software productivity aids and prototypes. The case for education must be made in relative, not absolute terms. Three questions must be answered: what
Figure 9: Example of SCE Matrix

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Communities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing Technology (policy issues, key strategic choices, resource needs, and opportunities)</td>
<td>X</td>
</tr>
<tr>
<td>Introducing Technology (basics, demonstrations, presentations by senior management/technology managers)</td>
<td>X X</td>
</tr>
<tr>
<td>Building Systems (vocabulary, methods for participation, user/technical staff/management roles and responsibility)</td>
<td>X X</td>
</tr>
<tr>
<td>Implementing Systems (managing organizational change, technology mobilization, forum for open expression)</td>
<td>X X X</td>
</tr>
<tr>
<td>New Computing Environment (Consciousness-raising, refocussing development staff, maintaining broad exposure)</td>
<td>X</td>
</tr>
<tr>
<td>Management Technology Update (Joint action in key strategic and technical areas)</td>
<td>X X</td>
</tr>
<tr>
<td>X for Non X-ers (e.g., Marketing for non-Marketers) (Knowledge of business, exposure to what users do and care about, building consulting skills)</td>
<td>X</td>
</tr>
</tbody>
</table>
impact can education have; are these impacts not obtainable through other investments; is education worth the cost?

6) **Build feedback controls** into the process to assure that education interventions are relevant and effective.

Although the workshop, "Preparing for IPS", was only one intervention, it serves as a microcosm of the SCE process. Figure 10 illustrates the analogy between the SCE process and one single intervention (the workshop).

<table>
<thead>
<tr>
<th>SCE Process</th>
<th>Workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission</td>
<td>close culture gap; obtain involvement</td>
</tr>
<tr>
<td>Scanning</td>
<td>pre-workshop interviews</td>
</tr>
<tr>
<td>Strategy</td>
<td>attitude change and action creation</td>
</tr>
<tr>
<td>Plans</td>
<td>workshop curriculum</td>
</tr>
<tr>
<td>Cost-Benefit Analysis</td>
<td>not completed; but immediate results were positive</td>
</tr>
<tr>
<td>Feedback</td>
<td>post-workshop interviews</td>
</tr>
</tbody>
</table>

**Figure 10: SCE/Workshop Analogy**

The workshop is an SCE intervention, and someday may be a component of an entire SCE process. We feel that in order for the workshop to have any long-term impact, it must be a part of a more comprehensive SCE plan.

The beginning of this paper focussed on a single education intervention, and on the eight principles in the design of that intervention. This section of the paper has described our initial conceptualization of an SCE process. We hope that both (the eight
principles and the model) will be food for thought for practitioners attempting to include education in an implementation process.

This paper is one of our first attempts at sailing in largely uncharted. Our experience indicates that we have set a good course, and we are in the process of further developing our ideas on SCE, and committing those ideas to paper. Only time and other explorers will verify our efforts. In conclusion, we offer the academic's "bottom line", SCE is in need of further research.

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