The issue of discipline

There is one very marked characteristic of teaching and learning at Delf College, the theoretical importance of which we failed to appreciate when we began; the whole enterprise proceeds on a voluntary basis. This means not only that we compete for the children's time with other after school activities, but that when the children are disruptive, we can exert very little leverage through negative sanctions.

This fact of our research life was brought home to us very early in the enterprise. Once they got over their initial shyness of adults with unknown powers, the children did not follow our directions docily. There was a good deal of disruptive behavior: hitting, throwing small objects, running around, dancing on tables, except at those times when the children accepted the pedagogical tasks which we had arranged. These behavior problems were by no means peculiar to the children's behavior when they were at Delf College. Their various histories of failure had produced quite a variety of strategies for keeping reading and other education-related activities out of the contexts they inhabit. However, we faced new problems in this regard because there was no principal to send the children to, and no policeman to call in if the children failed to cooperate.

Casual visitors to Delf College, and several of the participant researchers had a common reaction to disruptive behavior: Get the kids to behave and then they can learn to read. We have come to adopt a position toward this common sense maxim that places it on a par with the idea of a teacher-proof curriculum; while it may make life easier in the institutional settings where reading is taught, it is not an appropriate goal for designing curriculum/teaching activities. The "control them, then teach them" approach has failed these particular children for a long time; in fact one of the many ways to describe the Delf College students is to say that they are students for whom that strategy is demonstrably inadequate. If it had worked, they would be succeeding in regular classrooms.

Another problem with attempting direct control was our limited authority. We could not compel the children to participate. So, instead of confronting disruptive behavior directly, Delf College teachers engage in a process of constant subversion of the children's disruptions, resorting to direct control only when physical damage is threatened. All other instances of bad, but not damaging behavior, were dealt with by a single principle: do not respond directly to bad behavior. Behave indirectly.[12]

We have adopted the notion of *appropriation* to describe the strategy of dealing with disruptive behavior. To say that a child is disruptive is to say that the goals organizing the child's behavior and the goals organizing the teacher's behavior are not the same. Instead of seeking to change the child's goals directly, as a means of bringing the child and adult tasks into line, appropriation builds from aspects of the child's goal-directed actions that can be fit in the activities associated with the teacher's actions. In effect, the teacher tries to coordinate with a part of the child's (disruptive) behavior in order to *appropriate* that bit for her own purposes.

So, for example, one teacher faced a problem with disruption in the form of a game in which sheets of paper (sometimes the sheet being written on) were wadded up and thrown across the table. This activity was appropriated by setting up a new activity; stockpiling paper wads for a paper fight after the reading lesson. In another case a teacher faced a problem from children doing a task parallel to reading, such as drawing a picture. Picture drawing was then incorporated in reading, with a rule attached; failure to be on task when a question is asked results in removal of the drawing task (Note that by this procedure, the child must hold herself responsible for the reading).

There are many difficulties associated with this approach to discipline, but given the constraints on our research setting, we are motivated to discuss its virtues. One virtue is the theoretical expectation that if we can be successful in subverting the children into our version of interesting activities, then their learning will be especially effective. In so far as they accept our goals, and we accept theirs, we are in a far stronger position to accelerate their reading, because control is exerted through activity, not through external constraint imposed by teacher or institutional authority. In so far as they do not accept our goals we are compelled to engage in an activity that might be thought of as psycho-educational therapy, simply to gain enough access to the child's system of understandings to make useful educational interaction possible. Delf College can be considered a combination of standard and nonstandard instruction, organized so as to assist the child to marshal all the mental resources s/he can bring to the task of reading.

FROM COMPUTER TIME TO THE FIFTH DIMENSION

The second major arena of curriculum activity at Delf College centered on learning from microcomputers. At the start, our computer time facility consisted of three Apple II microcomputers, two computer aides, a part-time staff person, a small amount of software, and some of the goals and constraints essential for the proper plan to emerge. At the end of June, the Delf College Fifth Dimension housed a quite different computer facility embodying a far better motivated system of psycho-educational activities based heavily on microcomputers. This section presents a description of the development of the facility.

Computer time: Start-up

We planned to make the Apple II's principal components of a system in which we could accomplish two goals: (1) we could observe children engaging in a mixture of socio-cognitive activities for which we had interesting analyses; (2) we could engage in some training experiments that were well-motivated. The motivation had two sources. First, we knew that the video-game context is motivational for children; they might work to be in an environment which included computers. Second, Riel's (1982) research on a similar population of children motivated an argument that practice on some games transfers in predictable ways to classroom performance.

[12]There were occasions when physical damage was threatened severely. In only one case did we lose a child because of discipline problems; a child who threatened great physical harm to one of the staff and himself which we could not control. In a few cases we escorted children home.

The game tasks developed as programs for the Apple II by related LCHC research projects were primarily focused on arithmetic skills and concepts. In order to provide ourselves with some pre/post comparisons testing for transfer effects, we held these games out of our entering set of computer activities while we conducted extensive pretests (Petitto, 1982).

We were in a far less sure position when it came to computer-based games that involve reading. From a variety of sources we obtained educationally-oriented computer software that implicates reading. None of these programs had been worked with extensively by researchers; they were designed primarily for classroom use and normal readers. We started to adjust one program with permission of the publisher. We also had several interesting possibilities being developed by our LCHC colleagues involving writing (James Levin), reading (Peg Griffin), and short-term memory (Andrea Petitto). Software development takes time; assembling hardware to run these programs to their best advantage does too. When Delf College opened, the computer half of our curriculum was in a state of scholarly disarray.

There were two solutions for our problem of what to do during computer time and how to increase the literacy part of computer time activities. First, we investigated commercially available software and found several programs available for Apples that appeared to meet our needs. These programs provided interesting practice for children on tasks that seemed related to analyses of perceptual and cognitive development. And there were programs that required game players to be involved with processing a considerable amount of written text. The games originally considered were Hodge Podge, Odell Lake, Lemonade, Match Game and Mad Libs. Along with two of Riel's games, this gave us seven games for use in computer time; we felt this was not an interesting and extensive enough mix.

Other commercial games which staff members had found interesting and knew children had enjoyed were added, even though we had no theoretical claims about their usefulness in our research/training endeavor. Some of these games were almost direct copies of the games available in the video arcades that many of the children enjoyed. We were worried about arcade games on three grounds: (1) we could not avoid feeling the effect of the developing societal disapproval of video arcades, particularly when a local teacher visited and expressed disapproval of the frivolous proceedings; (2) we disliked the social mores of the arcade parlor that the games appeared to bring with them to Delf College: intense competition and sex-role differentiation; (3) we were worried that beginning with flashy arcade games would reduce our chances of successfully introducing the education/research games that we were busy developing and pretesting.

We decided to test this last concern: designating some games as flashy and some as not flashy, we split the children into two groups so that about half of them were to be able to play anything they wanted and the other half were allowed to use only the non-flashy games. After a month we gave up on this attempt: the practical problems of adults, unfamiliar with the hardware and the children, overwhelmed this mini-project. We also considered various systems of controlled access. But in the end we rejected all the straightforward control systems we considered. We were taking away too much and providing too little in return. Short of staff and facing a renewal progress report, we decided to bide for time and to make the best of it.

Phase One

In essence the computer time at Delf College grew topsy-like. The children's preferences and social relations were powerful forces determining who would use which program on which Apple. Sex differences and expertise differences were easy to note as the children worked during computer time. Our staff expanded: as our assessment component finished its first round, more adult interaction in the computer area was available. The original computer aide for each day was joined by two other staff members so that managing the equipment and supplies, and the children, and taking notes on the proceedings became less problematic. Soon, the children had more than two dozen games available to choose among. We added the printer and graphics tablet accessories to the basic Apple setups. With this variety and with our increased ability to note the children's activities, we were able to worry about how they were spending their time and whether their activities were sabotaging our goals.

Our observations and reflections returned mixed verdicts about this first phase of computer time at Delf College. On the one hand, interesting interaction patterns were being established. Children who worked very hard to avoid teaching interactions during the reading group time were willing to engage in them during computer time. One common pattern was for the teacher to insert herself into a group of children playing a very flashy game of Space Eggs or Snoogle (like Pac Man), to offer praise and encouragement, to name strategies that had been used, and to point out occasions when they might be or could have been used successfully. The children responded to this approach. They began calling for the teacher when she was out of range and busy. While we were having difficulty engaging the children in some learning tasks that we could relate closely to their learning abilities and disabilities, we were succeeding in participating in their learning on the arcade style games. Here the children showed perseverance, attentiveness, and a great deal of progress from trial to trial and from day to day.

Other patterns involved the children acting as teachers of their peers or adults. There was more than enough that a lot of people, including the adults, didn't know (See the section on spontaneous apprentices). The children asked each other to explain how to get a game started, to describe the procedures for playing a game, and to model and coach novices so they could learn advanced strategies. We were amazed to find that interactions that we would have characterized as good teaching and learning were said by the children to be instances of cheating or copying. Of course the beneficiary of the teaching/cheating never made the charge, but child observers did. We began to wonder what analyses of learning the children implicitly held -- teaching/learning strategies we thought of (modeling, verbal directions, hints, leading questions, metacognitive reminders) were treated as cheating, not teaching. Whatever their analysis of "fair" learning, it appeared to us to be one that would be very hard to learn with.

On the other hand, as we appraised computer time at Delf College, it was apparent that the full range of activities was not being exploited. Unless the adults were very good at controlling the group of children using the facility, the bigger children, the more practiced children, and the male children monopolized the facility and used the arcade-type games rather than the ones in which we were most interested. The computer time environment would not "organize itself" into a mix of activities that we could view as healthy. The most attractive games tended to remain attractive, even after a lot of use -- familiarity seemed not to breed contempt. The arcade-type games are cleverly constructed so that a novice views one goal that it is plausible to reach with some practice, and just as s/he reaches it, another goal comes into view that calls for a different kind of expertise and some more practice (see Malone, 1981; Newman & Petitto, 1982, for further discussion). There is always, it seems, an interesting *whole task* for the child to perform.

In a game called Space Eggs, for instance, the beginner sees: (1) a player gets points by shooting an egg and then shooting the creature that is hatched; (2) the player must avoid being attacked by the hatched creatures; (3) the player gets three different sized ships each with different gun characteristics, a new one provided when the old one is destroyed; (4) the points are carried on from ship to ship and a high score for the game is displayed in addition to the current player's current score. But, there are other characteristics to the game that emerge as one gets expert enough. If the player succeeds in hatching and shooting all the creatures (for 15 points each), the screen fills with new eggs that release different creatures when shot and that are worth more points. Each kind of egg and creature has a unique pattern that the player can react to in order to protect himself and clear the board to find out about a new kind of creature. A further characteristic of the game remained a mystery for quite some time: the player's ship has an opportunity to dock and get extra fire power if the player amasses a certain number of points on a certain ship on a certain creature.

Children who were expert at this game kept discovering new properties. The day finally came, however, when one child achieved to the degree that the computer had no further response to: all that happens is that the most complex pattern repeats itself. The child's response was simple: he stopped playing the game. During future days at computer time, he chose other games, going back to Space Eggs only rarely.

We learned a great deal from observing such sequences of discovery and interaction on arcade games. Quite apart from the pyrotechnic dynamic devices in such games, it appears crucial that upon entering the game there are obvious and achievable goals even for a novice, such as "shoot the eggs and get as many points as possible." *Not until (but always as soon as)* a certain level of skill has been reached do new and interesting goals present themselves. Once a new feature of the game is presented and becomes a goal of the child's activity, the reward structure of the previous stages is reorganized, so that in cases where the game permits, the child may bypass former goals (get as many points as possible per level) in the service of new goals that are higher in the game's goal hierarchy. This notion fits neatly with Leont'ev's writing on activity and goal formation. The games appear to be models of zones of proximal development.

It was clear, however, that all the while that the arcade games were organizing admirable functional systems, they were also promoting a less admirable organization of computer time at Delf College. An essential organizational issue is the distribution of scarce resources -- in this case, the Apple microcomputers. The adults wanted some equitable distribution of computer access among the children and some variety among the programs used, with a bias toward the more carefully designed cognitive training games. The arcade games required massive amounts of practice -- hence, a hegemony on the Apples for these games. Further, the more expert players have the best chance of breaking through to another goal, providing the group with a redefinition of the game -- hence, a hegemony for the experts on the Apples. Turn-taking was basically in the service of competition among the experts; novices aspiring to master the game were content to cluster as an admiring audience picking up a turn at transition times when they were lucky. Children who were not motivated stayed away, were ridiculed away, were tricked away or, on occasions had an adult enter the struggle and wrest the resource, at least one Apple, away from the distribution system organized by the arcade games.

Phase two

We found that when adults were effective at countering the organizational power of arcade games, children could enjoy the commercial educational games and the games constructed at LCHC for research purposes. For example, Odell Lake is a game which uses an ecological chain and provides practice in seeing transitive relations among the items in an array. This game has some of the properties of Space Eggs; there are new goals to be discovered and practice can make better players. But the amount of text involved and the relatively less exciting payoff for the beginner's efforts make it the kind of game for which an adult helper comes in handy. An adult who introduces charts and writes down what is being discovered can keep the child in the game context long enough for the child to become accomplished and continue on his own. We had the same experience with several other games intended to have educational benefits; with adult mediation, they can be successful. Some of the children who professed dislike for microcomputers during computer time enjoyed these activities with the adults.

An obvious and, by March, plausible solution to computer time at Delf College was to increase the number of Apples and to increase the adult mediation. We added another Apple set-up and we added UCSD undergraduates for more adult help. When this happened, more educational activities started occurring during computer time. The undergraduates, furthermore, increased computer time outside of Delf College because they worked with the children on Apples at home or at the university on days that the children did not attend Delf College. The undergraduates learned ways to get the children to use the Apples for the more educational games.

Our solution at this point was to change control over the resources by expanding them a bit and by calling in more capability for interactive, on-line adult control. Typically, there would be a cluster of children around two Apples organized by arcade games and a cluster of adults and children around two other Apples organized by adults and the research/educational games. We were not satisfied with this Maginot Line. We had some theoretically motivated and potentially interesting new software to introduce that we didn't want to "compromise" by identifying it strongly with the "adult side." A change was needed, but we wanted to be very systematic about the way we introduced that change.

The Fifth Dimension

Several considerations guided our choice of a new computer-based curriculum. Central was our desire to change the mix of computer activities. At the same time, we wanted to retain the good features of the interactions that resulted from the arcade games, especially the redistribution of expertise that gave children the opportunity to be experts *vis à vis* us and their peers, and the many opportunities for discussion of cognitive skills and strategic planning. Further, we wanted to avoid a situation in which the adults controlled access to the games by inventing a control system that the children experienced as intrinsic to the computer.

Here we were adopting Schelling's (1960) strategy of interaction; you can gain power in an interaction by giving it away. This was directly opposite our move in phase II, where we multiplied our power. By placing the decision-making power in the computer, we could move out of the role of control and nearer to the role of facilitators. We could work with the children helping them to succeed at their goals.

But we needed more than a computer controlled, restricted access arrangement to continue to motivate the children. We created a fictional world, "The Fifth Dimension," for the children to explore. The Fifth Dimension is composed of a conglomerate of popular music themes, which are coordinated and ruled over by a wizard who is never seen, but who issues orders by tape recorder in a deep and mysterious bass voice. We built a physical model of this world in the form of a 3' by 6' maze with 21 rooms in it, most with multiple doors, but only three with access from or to the outside. Like commercial computer games, the Fifth Dimension has a set of embedded goals where success at some nominal level is both demanded and generally accessible. It also has a series of higher order goals that allow the children to succeed while striving higher. Like Dungeons and Dragons, and other currently fashionable role playing adventure games, the Fifth Dimension has a chance component to it, along with various escape clauses that permit the children some added measure of control over their fate. The Wizard gives children and adults somewhat equal control by providing each with typewritten copies of the rules and procedures, including a procedure to ask for clarification of unusual situations.

After a great deal of shuffling about, we selected a beginning set of 22 computer games and 4 non-computer activities that children would be required to deal with when they entered the rooms in the Fifth Dimension. (Some rooms included a choice of activities.) Of the computer games, we classified 7 as arcade games and the remainder as education or research-relevant.

The Fifth Dimension proved a big success. By and large, the children adapted quickly to the change in computer time. They were taken to a local store to purchase small metal unicorns or beasts or knights on horseback to represent them in the game. They also came to the university to help decorate the Fifth Dimension maze with bright designs inside and out. They knew that their metal token could mark their progress through the rooms.

When the children entered the classroom on the day that the Fifth Dimension arrived, they found that they could not log onto the computer until they had entered into the game, and they met up with the goal of helping their tokens to escape the Fifth Dimension by one of the possible exits. If successful, their characters were "transformed," and the children could return to the store to purchase new characters to re-enter the maze. Within a week or so all of the children were spending their computer time in the Fifth Dimension. The first student to achieve the goal of transforming a character was a girl who had, until this time, refused to deal with computers at all.

According to the wizard, a child whose repeatedly transformed character manages to visit all the rooms in the Fifth Dimension also gets a special testimonial t-shirt. No child has yet achieved this goal, but some are close.

Although some of the children grumbled about restricted access to arcade games, this grumbling did not carry the day. Instead, the children began to find a great variety of games interesting. In some cases, when the rules gave a choice for a child to enter a room that s/he knew included an arcade game or another room that provided a more education-like game, the child chose to forego the opportunity to play the arcade game in order to achieve goals appropriate to the Fifth Dimension, like getting to an exit.

Several factors seemed to be involved in the success of the Fifth Dimension environment as a setting for the computer games. Every activity in the Fifth Dimension has three pre-set levels of achievement which controlled movement to a new room and the award of tokens instrumental to some freedom in choosing rooms. For each activity, levels always included at least one that was easily achievable and one that was very hard. Consequently, from the perspective of the game-world, arcade games and educational games did not differ much in difficulty; all had goals that were very hard and very easy, and all demanded skill to gain freedom of movement.

It was also important that in the Fifth Dimension the children tended to work alone, although we had a provision for joint ventures into a new room. From various comments made by the children as they made their choices in games in the Fifth Dimension we began to realize how the previous social arrangements had formed a part of the attractiveness of the arcade games. Those waiting to play the next round formed an audience and with it competitive comparisons. In the Fifth Dimension students were all busy "surviving" in addition to monitoring the success of others. As a consequence, the competitive spirit diminished and the arcade games lost relative attractiveness. The children's acceptance of the goals of the Fifth Dimension reordered the reinforcing value of the alternative activities.

A very important factor in the Fifth Dimension, felt strongly by adults, was the mediation of control by the Wizard's rules. At times, we sabotaged our own efforts in thought or in deed. We chafed against a system that provided a particularly wonderful reward for a game that was "fun anyhow" and that provided a miserly reward for a game we particularly wanted a child to play and worried that he might reject. We managed to prevent ourselves from tampering with the Wizard's levels and consequences. However, we were more likely to slip and take control back from the Wizard when a *child* chafed under the constraints. It was always a mistake and it never worked; when we had the sense to relinquish on-line control and consult the Wizard's rules with the upset child, we would always find an acceptable escape clause that kept the child in the context.

Our rewards for following the rules were high. We saw children whose temper tantrums had succeeded in getting them out of educational activities come back under the control of the Fifth Dimension so quickly that errant tears dropped on the keyboard while the microcomputers were booting up a new estimation arithmetic game or an interactive text writing program; the children were too busy to wipe the tears away. We had the pleasure of collaborating with children on hard tasks whose achievements *they* had accepted as a goal and who no longer viewed us as someone to wheedle or bully into making the hard work go away.

By the close of school, the new computer curriculum was in full swing. Every child had explored many games, and many had put in hours of practice on educational games, including several of the specially designed LCHC games. From the standpoint of research, and with the Wizard's collaboration, the flexible framework of the Fifth Dimension can continue to evolve with the developing skills of the students. We are currently revising this educational/gaming environment in preparation for a more refined assessment of its usefulness.

Some Issues Concerning Fact and Theory

Earlier in this essay we described the strategy whereby we could coordinate to construct an interdisciplinary research project on learning disabled children. True to our original strategy we have described our experiences pretty much in terms of the entering strands of research. Underlying this strategy were a set of research goals that we believed could be profitably pursued if we made common cause. *Theoretically*, this common cause was to create an environment in which our disparate techniques and languages could speak to each other. Could we move from creating an interdisciplinary project to creating an inter-discipline?

Remembering that the rewards for such an enterprise will certainly be found in the doing if they are to be found anywhere, we have spent a good deal of time seeking ways to extend the parts of our data base for which we can give principled accounts. As we note elsewhere, we are guided in this effort by Alexander Luria's attempts to create a "romantic science," in which general laws derived from laboratory research would have to confront the "living facts" that they were supposed to explain. The system that Luria created, part "experimental," part "clinical", was designed to produce data adequate to the phenomena being analyzed. In current parlance, it was insufficient to settle for a nice share of the variance; what was needed was an approach adequate to the real decision making requirements of the individual. His books on a person with a remarkable memory and another with a severe brain injury illustrate his enterprise. Recognizing the difficulties of forsaking the controlled circumstances of the laboratory, he characterizes his ideal as follows:

> Truly scientific observation avoids such dangers. Scientific observation is not merely pure description of separate facts. Its main goal is to view an event from as many perspectives as possible. The eye of science does not probe "a thing," an event isolated from other things or events. Its real object is to see and understand the way a thing or event relates to other things and events. (Luria, 1978, p. 177)

The difficulty of Luria's advice is that we have no agreed-upon set of criteria for adequate description of many events that our experience suggests are linked in theoretically important ways. In so far as we are serious about getting the events that characterize our individual strands to relate to each other, we need to find "inter-methods" to go along with our inter-discipline.

In the following two sections we describe two events that struck us as significantly related to our overall theoretical concerns, but for which we had neither prearranged methods of analysis nor any video taped record that we could use to check with. Instead, the data are our records and field notes, interpreted using the framework we have been describing here. It is our hope that in their present state they will prove useful as hints about the living facts of learning among learning disabled children.

NOTHING SUCCEEDS LIKE SUCCESS

Its an old adage. Nothing succeeds like success. In the following remarks we describe the process that the adage summarizes using an example from the cognitive training strand of our research. Our task, as part of our efforts to assess the contribution of metacognitive processing to problems among learning disabled (LD) children, was to administer a memory testing and training procedure. The testing aspect consisted in finding out how many of 16 color photographs a child could recall. The training aspect consisted of showing the children a videotape on which a girl about their age demonstrated seven different ways of remembering pictures just like they were being asked to remember.

We included this work because recent psychological research and theory has placed special emphasis on the teaching of thinking skills to school children somewhat separate from the usual curricular goals of teaching reading and arithmetic. The idea that schools should teach children to think, not just fill them with facts, is the background assumption that underlies these efforts. So, one reason to teach children strategies for remembering is that they are academically useful so the children can use them in varied academic tasks. Our orienting question in this regard was: will the skills that we teach them in this training task transfer to the classroom? (There were plenty of grounds for scepticism, but some evidence for hope too.) A second reason was quite specific to the population of children we were working with; we suspected strongly that the kind of learning handicapped child labeled "specific learning disabled" would *not* be disabled when it came to strategic planning abilities. That would help to specify better what we meant by the "specific" part of the phrase