Chapter 2

Feedback in Education: On Whom and for What

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ABSTRACT: *If education systems are to be effective it is necessary to define the important outcomes they are to produce. Once the outcomes are defined then it is necessary to describe what educators should do that will produce the student outcomes. Neither students nor educators are likely to improve their performance if they do not receive feedback about it. In order to provide feedback it is necessary to measure what students and educators are doing. This chapter reviews what is known about effective feedback, distinguishes between feedback and reinforcement, and provides an outline for how education can begin to reform to be more efficient and effective.*

> *"A culture that is not willing to accept scientific advances in the understanding of human behavior, together with the technology that emerges from these advances, will eventually be replaced by a culture that is."*
> *B. F. Skinner*
> *The Shame of American Education*

A memory that has stuck with me from my undergraduate education involves an experiment I assisted a psychology professor conduct on the effects of feedback on learning. The experiment was very simple. Subjects were asked to turn a knob 180 degrees. Although I was able to see the precise number of degrees they turned the knob, the subjects themselves did not know how far they turned the knob as their hands were shielded from their view.

The results of the experiment were consistent and predictable: Without any knowledge of the results, the subjects were unable to improve. When given feedback (knowledge of results), they all improved.

Between undergraduate and graduate school, I served in the U.S. Army in Korea as an artillery officer. I was taught how to adjust artillery rounds to hit designated targets at distances of up to 7 miles. The process was fairly simple. We were instructed to use binoculars as a feedback device. If the first round landed above the target, we were taught to adjust the second round so that it fell below the target. When the target was bracketed, the distances were halved until the target was hit. Using this feedback procedure, we became proficient in directing the gun crews to hit the target with a minimum number of rounds. As in my psychology experiment, feedback made our adjustments efficient and effective.

In graduate school, while training to be a clinical psychologist, I discovered that traditional psychotherapy treatment provided little feedback for either the patient or the therapist. The closest thing to feedback was the verbal report of the patient. Patients reported that they "felt better," "about the same," or "worse." Although some patients professed good results, many seemed to make little progress and others abandoned treatment after only a few therapy sessions.

Interestingly, lack of progress was always blamed on the patient. They were "resistive," "uncooperative," "neurotic," or "crazy." While it didn't seem right to blame the patient for being a patient, I was to learn later that this approach was also common in other fields such as education, where poor results are blamed on the student, the parent, the government, or the community. Assigning blame to the person seeking assistance was very unsatisfying to me, and I began to wonder if I had made a bad career move. I was sure there was a better way. Fortunately, during my final year of graduate training, I was introduced to behavioral treatment methods.

My first job as a Ph.D. was at the newly opened Georgia Mental Health Institute, a facility designed to train professionals for the new mental health hospitals that were being built around the state. The treatment programs were conducted under the auspices of the department of psychiatry of Emory University Hospital. Although the Institute was designed to train all mental health disciplines, psychiatrists had the legal responsibility for treatment and all treatment was conducted under their supervision. Because the department of psychiatry was psychoanalytically oriented, treatment was protracted and only a small number of patients could be treated.

Within a few months of the Institute's opening, the directors began to receive heavy pressure from the Department of Mental Health to treat more patients. This meant that primary treatment responsibilities had to be given to other disciplines. Although the social workers, chaplains, and, to a certain extent, vocational rehabilitation counselors had some patient treatment responsibility, the clinical psychologists, also holding the title "Doctor," quickly assumed a full load of patients with little oversight from the unit psychiatrists. Because I was eager to use behavioral treatment methods, I volunteered to treat any patient whom the unit psychiatrist or psychiatric residents did not want or with

whom the psychoanalytically oriented treatment had not been effective.

My early patients were those diagnosed as chronic schizophrenics or chronic depressives, or who had long-term incapacitating phobias. Since behavioral treatment relies on data to evaluate its effectiveness and for determining when reinforcement is earned, all of my patients were on an individualized point and token system. Patients earned points and tokens for behavior demonstrated during their therapy sessions with me and from the nursing staff for behavior on the residential unit during the rest of the day. This method of treatment allowed a patient to monitor his or her progress continually, and allowed the therapist and other staff to know the patient's progress, or lack of it, at any point in time. All patients on token plans made rapid progress compared to those not on such plans.

Because phobics are difficult to treat with psychoanalytic treatment and since I had volunteered to treat them, typically they were assigned to me on admission to our unit. The treatment method I used, developed by Dr. Joseph Wolpe, is called *systematic desensitization*. Phobic behavior is treated as learned maladaptive behavior rather than the result of some sexual or oedipal trauma.

Measurement is easy because phobic behavior is easy to see. For patients who had agoraphobia—the fear of outdoors or open spaces—I simply took them to the front door and asked them to see how far they could go down the walkway before having to come back into the building. I then counted the steps or measured the number of feet traversed. Often the baseline for individual patients was zero. Most were unable to even crack the door without expressing considerable anxiety. However, given that baseline, when the patient was able to stand in the open doorway, I was able to provide positive reinforcement for that achievement. This was repeated with every step in the desensitization protocol, and usually within a matter of days most patients were able to walk around the campus unescorted. With feedback and reinforcement paired this way, patients who had been in treatment for periods ranging from 15 to 25 years were discharged in as few as 90 days. (I maintained contact with several of these patients for many years and they remained symptom free.) Following this initial success, we were given more patients to treat. The psychology staff and interns were soon treating most of the patients assigned to the unit and with good results.

The clinical director took notice, and when he was promoted to superintendent of a new 500-bed regional hospital in the Atlanta area, he asked me to join him as head of psychology, education, and training.

At Georgia Regional Hospital I was allowed to create a computerized system-wide token economy in which all 500 patients had individualized treatment plans that were reviewed at least weekly. Every patient had a point card and knew what he or she had to do to earn points and the number of points needed to pay for merchandise, trips home, and other reinforcing events and activities. While this may not sound like leading-edge treatment today,

it was revolutionary in the 1960s. The results were revolutionary also. Rehospitalization was reduced from approximately 75% to 11% in the first year, and the average length of stay in the hospital was reduced from months and years to weeks.

GOING TO SCHOOL

In 1969, Jim Grenade, a vocational rehabilitation counselor, and I wrote a grant entitled "Innovative Grant for the Behavior Disorders." Truancy was a national concern at that time and this grant was designed as an experiment to see if we could create a method to keep truant students in school. Most of the participants in this project had been arrested one or more times for committing crimes serious enough for them to be sent to the Fulton County Juvenile Detention Center.

Juveniles assigned to this project were released from the detention center as long as they remained in school. Grenade was the homeroom and study hall teacher. When not in his class, students attended regular classes. In that era of social promotion, it was common for our students to be functionally illiterate even in the 10th grade. The 28 students in the program were, on average, 3 to 4 years behind their academic grade level.

Following the model used at Georgia Regional Hospital, we developed a point system in which each student was assigned behavioral and academic pinpoints performance criteria for earning privileges and tangible reinforcers (tickets to sports events were the most popular). Grenade was a master in dealing with these kids. He was tough in that he was not deterred by the many excuses or threats the students made when they failed to earn the points required to keep them out of the detention center for the weekend. He was focused on creating successful students, and success was assessed by academic measures and student referrals to the program. Even the toughest, most recalcitrant students came to respect and trust Grenade because he was probably the only person in their lives who followed through on promises.

In addition to the points Grenade awarded, classroom teachers gave points for various academic behaviors in their classes. Since we needed a way to measure progress, all students were sent to a local tutoring center, where they also earned points. We chose a company called Learning Foundations to tutor our students in basic studies because its remedial tutoring centers in Atlanta were the only ones to use teaching machines. Data from the machines allowed us to give the students a report card every day. The result was that over 90% of the students remained in school, improving several academic years during one school year. The changes in social and academic success were so dramatic that the director of Learning Foundations asked if it was possible to develop a

similar program for its centers. Of course I said that it was, and the centers saw good results with a non-delinquent population.[1]

An executive vice president with Tarkenton Ventures, the parent company of Learning Foundations, approached me with a problem after seeing how the behavior of the students changed with the use of the point system. One of his companies was involved in a government program administered by the National Alliance of Businessmen called JOBs 70s. The program targeted the hard-core unemployed.

To encourage companies to hire participants from this group of unemployed people, the government paid for recruitment, training, child care, medical care, and job training. The problem the executive vice president presented was that while his company was able to find, recruit, and train chronically unemployed people, when they were assigned jobs in a textile factory, supervisors fired them in a matter of days or weeks. He asked me simply, "Do you think you could teach the supervisors to *keep* them?" Of course I said yes, and that was the beginning of what was to become Aubrey Daniels International (ADI). Ninety-day turnover (terminations) was reduced by half in 90 days. As a result, our business exploded and we subsequently worked with all the major U.S. textile companies.

For the past 34 years, ADI has used behavioral methods to improve business performance by upgrading management skills and management systems in virtually every kind of business in over 30 countries. Even though our work has been primarily in the private sector, we are increasingly being asked to work with non-profit organizations.

WHY DO SCHOOLS EXIST?

Before addressing the issue of feedback in education, a more basic question needs to be answered: Why do schools exist? Although this may seem an unnecessary question, if it had actually been addressed on a practical level, many of the current problems in education would not exist. I suggest that it must be answered in order to fix schools. Once that question is answered, the answers to other questions will come easily.

The most apparent answer is, to educate students. But what is an educated student? How do we tell an educated student from an uneducated one? Once we define the word "educated," we will know how to measure the effectiveness of a school and a teacher. The measure is simply the number of students who are

[1] During this time I also helped a prevocational training center for mildly retarded students and a vocational rehabilitation center at Cherry Hospital in North Carolina develop similar programs, all with good success.

educated according to a pinpointed (highly specific) definition.

The problem starts with the fact that educators cannot agree on what the outcome of education is, or should be. Is it knowledge or skill, or both? If both, what is the balance? Is knowledge more important than skill, and, if so, how much more important? While I will not address these issues in this paper, I submit that until attempts are made to define and measure the elements that constitute a good education, nothing will change.

We can measure teacher effectiveness, but the typical measures used have all too often resulted in more punishment than positive reinforcement. That is why after centuries we still cannot agree on what an education should be. If measures are well constructed, teachers can be motivated to meet or exceed them. If they are not constructed properly or administered well, educators will naturally resist them to the detriment of the educational system and ultimately to the detriment of students.

Here's the rub: If you don't have data, you don't know what you are doing. We need data, but on whom and for what. More importantly, how will the data be used?

For a moment, let's assume that the mission of a school is to create successful students. The classroom teacher's role is to create successful students in the subject matter of the class. If teacher accountability is to create successful students, what is the accountability of other staff? It is actually simple. Every staff member's charge is to help teachers be successful. The only reason any education staff exists at the school, county, state, or federal level is to help teachers educate children more effectively. Right away you can see that accountability in these jobs should be primarily for *valuable* behaviors that have a direct link or connection to increased student learning. Look at the following figures.

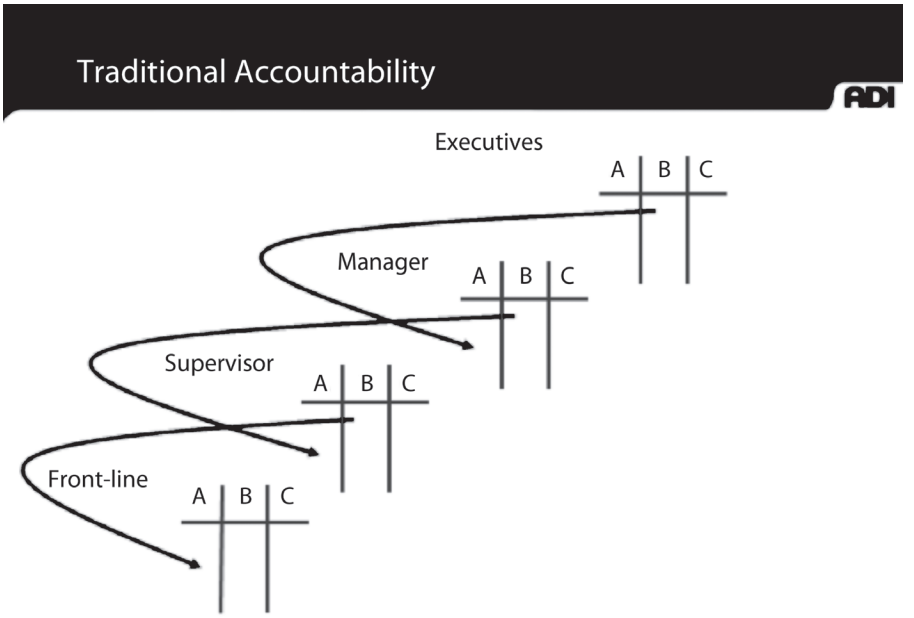

Figure 1. Traditional accountability.

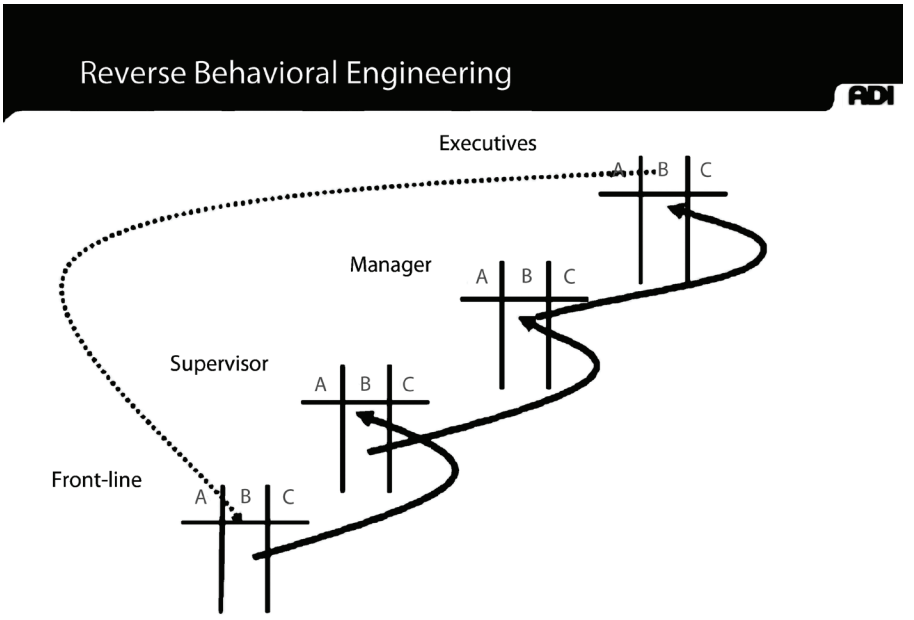

Figure 2. Reverse behavioral engineering.

Figure 1 is a traditional accountability chart. When you start at the top and cascade down, everyone has a different job. When improvements are needed, the jobholders above the front-line employee level (teachers, in this case) usually ask for more money and more staff, typically resulting in more meetings and more paperwork.

Rather than start at the top, the reverse behavioral engineering accountability chart in Figure 2 starts with the front-line employee (teacher) and asks, "What does a teacher need to do to help students learn?" That question is repeated at each level and for all administrative and support personnel—in other words, "What does a department head do to help teachers teach more effectively?" "What does the principal do to help a department head create more successful teachers?" In this model, no one can be successful if students don't learn.

However, even if the children learn, some employees in the chain may not be successful if they cannot demonstrate behavior that helped the level below to be successful. If a department head cannot show behavior that was beneficial to a teacher's effectiveness, then that person was not effective and the teacher was successful in spite of the department head.

This model of accountability flushes out redundancy, ineffectiveness, and incompetence. Once you know what the job requirement is, then the issue of feedback can be more focused on valuable behavior and outcomes at every level of school staff. As you will see, feedback is needed at every level but will be different at every level.

WHAT IS FEEDBACK?

If someone walks up to you and asks, "May I give you some feedback?" I advise that you excuse yourself and leave quickly because, in the popular vernacular, the term "feedback" is code for "May I criticize you?" That kind of information is rarely helpful and falls in the category of what a friend of mine refers to as "more unsolicited advice." The function of feedback should be to provide information that will promote success—in this case, increase teacher effectiveness and improve student learning. Therefore, I will confine my remarks to what I call performance feedback.

In any context where the goal is to help someone improve a skill or social behavior, performance feedback is information about performance that will allow, for example, a student to change, or improve. Allowing the recipient to change is an important part of this definition of feedback, because much information that is presented as feedback does *not* help a person improve.

For feedback to be performance feedback, it must be information that allows the performer to adjust his or her behavior toward more effective or efficient performance. For example, most people would say that seeing the flight of a

golf ball is feedback for a golfer. It is certainly immediate information about how the club hit the ball. Watching a ball careen out of bounds with a vicious curve (slice) motivates every golfer to make changes to correct the flight path of the ball. However, I know of some golfers who have been playing for 50 years and still cannot hit the ball straight. For average players, seeing the flight of the ball is not information that will allow them to improve. They don't usually consider the angle of the clubface when it hits the ball. Furthermore, if they do, they typically don't know what to change about their stance, grip, position of legs and arms, and so on—all factors that affect the angle of the clubface when it comes in contact with the ball.

Just as information about the flight of the ball doesn't help the average golfer to improve, a failing grade doesn't tell a student how not to fail the next test. Therefore, in those instances, the flight of the ball and a failing grade do not fit the definition of performance feedback. However, the flight of the ball is performance feedback for a professional golfer who, on seeing a slice, knows what caused it and is able to change the offending behavior on the next swing. Likewise, being able to recognize and convey what a student must do to improve is the role of a professional teacher.

For many students, getting an answer wrong does not necessarily help them improve, since they may not know what specific thing they did that caused the answer to be wrong. Therefore, performance feedback is limited to a particular kind of information. When a teacher says, "That is wrong—try it again," the student may either repeat the mistake or engage in highly variable behavior far from the behavior that will result in improvement. It would be more helpful to say something like, "Try this next time," followed by relevant and helpful instruction.

The point is that performance feedback is more than a score, and effective feedback for one student may not be effective for another. For expert mechanics, hearing a noise in an engine is performance feedback as they will know exactly what to fix. For expert musicians, hearing the sound produced by the musical instrument is performance feedback because they will know precisely how to correct their performance. Teachers should then always strive to know the specific form of feedback that will help each student.

PUT IT ON A GRAPH

In over 30 years of helping companies improve performance, ADI has taught managers and supervisors to "put it on a graph." Let's assume you are presenting data that meet the definition of performance feedback. A graphic display of performance that allows performers to see where they are relative to where they started and where they are going is often highly effective in helping them

improve. Such data have been associated with tremendous improvement in situations where poor performance has existed for years and where managers thought individuals or groups could not, or would not, change. However, this is not the whole story.

If you want to improve some aspect of your own performance, start by tracking it graphically. If you want to lose weight, weigh yourself every day and record the result on a graph. If you want to stop smoking, graph the number of cigarettes you smoke daily. If you want to exercise more, graph the number of minutes you exercise or the number of repetitions of specific exercises. Chances are high that you will lose a couple of pounds, smoke fewer cigarettes, and exercise some more. However, the changes will be small and temporary. You may lose 1 or 2 pounds, smoke one or two fewer cigarettes, and exercise a couple of times more than normal before you return to your former weight, addiction, or exercise routine.

I learned this early in my business consulting when visiting facilities where the supervisors had previously made significant improvement in quality or production only to find that the improvement graph had not been updated for several weeks. When I asked why, the response was, "The graph quit working." All they had done was to graphically track the performance, and although it resulted in some quick improvement, the upswing rarely lasted.

NECESSARY BUT NOT SUFFICIENT

Improvement in performance is practically impossible without some knowledge of the results of behavior. You can't learn to talk, walk, write your name, or ride a bicycle without some form of feedback from the environment about your behavior. The famous Helen Keller, a blind and deaf child, learned to communicate but only because she had a teacher who found a way to create effective feedback for her verbal behavior. (It is interesting that Helen Keller is well known, but almost no one knows the name of her teacher—Annie Sullivan—the real heroine in Helen's achievements.) Another problem with performance feedback is that it does not change behavior. I have frequently heard it said about some undesirable behavior, "I have given him feedback on that many times and nothing changes." In fact, the person may know what to do but doesn't do it. Why?

Although feedback is often paired with consequences, the feedback does not change performance—*the consequences do*. This fact is poorly understood in education. Situations in which the measure is the number of wrong answers not only fails to motivate, but often does the opposite. As simpleminded as it may seem, feedback on the number of correct answers (although the reciprocal can be inferred from the number of wrong answers) is more motivating. The

number of correct answers focuses students on what they accomplished rather than what they failed to do correctly.

I have said many times that the best job you will ever have is one where you know at the end of the day how well you did. Most students don't have that job; most teachers don't have that job. However, teachers can create that job for students and for themselves. What if every student went home every day knowing what he or she accomplished that day? How motivating would that be? Shouldn't every teacher know what he or she wants every student to learn each day? How motivating would it be for a teacher to go home knowing that every student learned everything that the teacher targeted to teach that day?

While this seems impractical to most teachers, it is a reality at Morningside Academy in Seattle, Washington. Founded by Dr. Kent Johnson in 1980, Morningside gives all parents a written, money-back guarantee that a student who is behind grade level will gain at least two academic years per year of instruction in his or her worst subject. In over 30 years of operation, Morningside has refunded less than 1% of tuition. All of Morningside's teaching materials and teaching methods have been thoroughly researched in order to make sure that they increase student learning.

A typical class hour at Morningside consists of 10 minutes of instruction, 40 minutes of practice on the instruction received, and a 10-minute break. A distinguishing feature of Morningside, in addition to assigning no homework, is that every student receives a report card every day! This sounds reasonable when you consider that the teacher should know what he or she needs to accomplish each day.

A cartoon in one of my books depicts a caveman standing in front of a progress status graph scratched on the cave wall. The caveman says to his friend, "It's just something the kids scratched out, but for some reason I feel good when I look at it." Changes in the data that make a person feel good are almost always associated with improvement. The trick is to create conditions in which seeing the graph makes the person who has improved feel good about the improvement. Creating those conditions requires knowledge of consequences. Although feedback is necessary for improvement, consequences change behavior.

CONSEQUENCES

Of the four behavioral consequences—positive reinforcement, negative reinforcement, punishment, and penalty—only two are of concern in improving the performance of students: positive and negative reinforcement. Positive reinforcement is clearly the most powerful interpersonal tool known, but at the same time it is the most misunderstood and misused.

Negative reinforcement, by far the most frequent consequence in schools and businesses, occurs when a person increases a behavior in order to escape or avoid some form of punishment. With negative reinforcement, people improve because they "have to." If students are told that they cannot go to recess until their work is completed, it is likely that the teacher will see an increase in behavior, because the students want to enjoy a full recess period. While resulting in improvement, the negative reinforcement will elicit only enough behavior to enable the students to go to recess. If all that a student ever does is what the teacher assigns and no more, then neither the teacher nor the parents have made the subject positively reinforcing. Unfortunately, a large part of education is accomplished through negative reinforcement. While negative reinforcement gets a minimum of improvement, it never captures the discretionary effort that characterizes love of learning. The only way to do that is with positive reinforcement.

Figure 3. Behavioral consequences and their effect.

POSITIVE REINFORCEMENT

Surprising to many teachers, positive reinforcement is not a pat on the back, telling the student he or she is smart, saying "good job," or giving the student a sticker or gold star. While all of these examples *may* be positive reinforcers to a given child in a given situation, they could also be punishers. The impact on the behavior is the proof. If the behavior increases, it is a positive reinforcer; if the behavior decreases, it is a punisher. Students let the teacher know what their reinforcers are, not by what they say, but by the way they respond behaviorally. It is quite possible that a student will tell a teacher that he or she likes something, but when the teacher tries it, the student's performance doesn't improve.

One thing teachers can count on is that nothing is positively reinforcing to all students and that everything is reinforcing to some students. There is no substitute for finding the unique reinforcers for each and every student. While the process can be time consuming in the short run, it will be efficient in the long run after the elimination of many false starts. Finding a student's positive reinforcers may require trial and error. Although teachers can make mistakes in what they choose as reinforcers, if the worst error they make in teaching is to try something as a positive reinforcer that turns out not to be one, they will have made the best mistake possible. The worst mistake is to try something as a punisher, such as negative attention, only to discover that it is a positive reinforcer to the recipient.

Finding an effective positive reinforcer is only the beginning of effective teaching. Reinforcers that are immediate are more effective than delayed reinforcers. Reinforcers lose a significant part of their value within minutes of the occurrence of the behavior. Not only do they lose their value, but when they are delivered later they may fall on a behavior that is not productive and thus may increase the unwanted or unproductive behavior. While some people have a difficult time believing this, there would be no superstitious behavior if it were not so. People develop superstitious behavior when there is a coincidental pairing of a reinforcer with some unrelated behavior.

Of course, I realize that teachers cannot see or be in a position to reinforce every occurrence of a behavior. That is why students must be taught the proper way to reinforce peers. People who are positively reinforced will reinforce others more often. In addition, those who are reinforced for some improvement or accomplishment can reinforce themselves in similar situations. A student who receives a teacher's praise for a creative production is likely to look to the teacher when completing another production. When the teacher is not present, the student knows that the teacher would like the present creation because of what happened before. You cannot be proud of yourself until someone has been proud of you. Students who have been praised for some accomplishment will tell other students as well as their parents and grandparents about the

accomplishment. This multiplies the reinforcement associated with the behavior. Although part of this reinforcement is delayed, it has some effect on subsequent behavior as parents, or others, are likely to ask the students how they did it or to show them what they did. All of this provides reinforcement for the demonstrated behavior.

One of the biggest problems with reinforcement in schools is that it is delivered non-contingently. Simply stated, often the positive reinforcer is not earned. In other words, there is no real accomplishment. My grandson played T-ball when he was 6. He knew little about baseball and spent more time in the outfield looking for four-leaf clovers or animals in the clouds than looking at the batter. When the season ended, everyone received a trophy. On the way home he asked his mother, "Mama, why did I get a trophy?" His mother had to think quickly and replied, "Well, Elijah, you were at every practice."

The practice of giving rewards when they are not earned is a bad practice. It not only creates a mentality of entitlement, but it also robs children and adults of the joy of accomplishment. Teachers cannot give students self-esteem; the students must earn it. However, teachers can create the conditions in which every student can earn rewards. Even the smallest improvement is an accomplishment. Teachers who make improvement a reinforcer will benefit their students for a lifetime.

People have told me over the years, "I reinforced her but she didn't change." My response is, "One positive reinforcer will not change your life." B. F. Skinner estimated that it requires 50,000 contingencies to teach basic math. He was wrong because with modern technology we are now able to track contingencies involved in learning much more accurately than in Skinner's day. By a "contingency," I mean an opportunity to do something right or wrong and where a correct response provides an opportunity for positive reinforcement. At Morningside Academy a child may receive 50,000 contingencies a month and may do over 100 math facts per minute.

Some teachers do not understand the value of rapid responding. They think it is nothing but repetition, and that went out of instruction many years ago. Repetition without reinforcement is resisted for good reason—it's boring! Yet, repetition with reinforcement is exciting and energizing. I suggest that the lack of repetition paired with reinforcement is one of the reasons academic achievement is so dismal in our schools today. Repetition with positive reinforcement is also the reason that computer games are so much more attractive to students and adults than traditional instruction. When playing video games, players often receive as many as 200 reinforcers per minute. In how many classes do students receive as many as 200 reinforcers a minute? This is the reason that it may take 12 years to become fluent in subjects that could be taught in a matter of several weeks using modern technology. Maximizing the learning opportunities requires many reinforcers by teachers, the material, peers, and parents. It is the teacher's responsibility to manage reinforcers.

Although performance feedback and positive reinforcement are necessary at every level of the educational system, the frequency and form of both vary from job to job.

WHAT I WOULD DO

If I took on the job of making schools more effective, I would do the following: I would first examine every job using the following criterion: "How does this job help students learn?" When a clear link cannot be *demonstrated*, either the job should be eliminated or the position used to create a job for someone who will help the teacher teach more effectively. I am convinced that more than half of all administrative and support jobs could be eliminated or reassigned.

Then I would train all school personnel in the science of behavior. Since teaching is about changing behavior, all teachers should be fluent in applying the science of behavior in the classroom. Teachers need to know more than the basics of the science; they need to know the science in depth, as every child presents a unique opportunity to apply it. However, to create a culture in which everyone participates in student learning, directly or indirectly, I believe it is important that everyone understand how to make sure that only productive behavior is reinforced.

Next I would hire coaches and assign them to all schools to help teachers teach more effectively. The coaches would spend most of their time in the classroom. Their accountability would be to create successful teachers. They would pinpoint behavior that each teacher needed to do, track it, and reinforce it appropriately. A coach would be assigned several teachers, the number of teachers per coach determined by how far the teachers are from performing at desired levels. Coaches would probably be assistant principals.

Then I would develop a bonus plan in which all teachers who are successful would receive financial remuneration commensurate with their level of success. Success would be defined by the rate of improvement and the number of students who improved.

Finally, I would hire Dr. Kent Johnson to install the Generative Instruction Model used so successfully at Morningside Academy.

Many years ago, Dr. Fred Keller, the pioneering behavioral educator, said, "If the student didn't learn, the teacher didn't teach." You can't blame students for not learning, because they are *students* after all. They don't know what it is that they are to be taught.

The movie *Stand and Deliver* chronicled Jaime Escalante's efforts to teach calculus at Garfield High School, an inner city school in East Los Angeles. When he started teaching, he found that students were worse than poor in math skills. Knowing that businesses needed employees who had knowledge of math,

he set out to teach it. This type of story is usually found only in the movies, but Escalante's success along with that of his students was a real-life triumph under the most difficult circumstances. His problem was not the students—he won them over quickly—but the administration and other teachers. His success with students apparently caused such problems with the other teachers that he finally left the school. He was criticized for coming in early, staying late, and teaching too many students per class.

Escalante started at Garfield in 1974 and by 1978, with Ben Jiménez, a fellow teacher he recruited, taught calculus to five students, two of whom passed the Advanced Placement (AP) Calculus test. In 1982, Escalante came into the national spotlight when 18 of his students passed the AP exam. In 1983, 33 students took the exam and 30 passed. By 1987, 73 students passed the AP Calculus AB exam and another 12 passed the more challenging BC version of the test. By 1991, when Escalante left the school, 570 students took AP Calculus tests. This inner city school at one time had more students pass the tests than any other school in California (Mathews, 1989).

While this example is certainly noteworthy, almost all schools have some exemplary teachers. It is unfortunate, but if not for the positive reinforcement they receive from students and parents, they, like Escalante, might leave the system—and many have. I have had a number of teachers tell me that they love to teach but hate where they have to do it. They are not referring to the geographical location of their jobs or the physical conditions, although many times those two aspects leave much to be desired. They speak of the negative atmosphere created by ineffective administrators, time-consuming paperwork, an abundance of conflicting regulations, useless meetings, irrelevant in-service training, and, of course, some uncooperative parents and students. Yet, few jobs in our society are capable of generating more positive reinforcement than teaching. Seeing a student's response to learning a simple fact, his or her curiosity about class material, and the joy in an accomplishment can overcome many of the negatives in "the system." If not for that, education would be in an even bigger mess.

COACHING TEACHERS

More than two decades ago, Bennett (1987) demonstrated that coaching in the classroom was up to 19 times more effective than the usual ways of training teachers. Therefore, a classroom coach for teachers is a cost-effective addition to the faculty. This person should be in the classroom long enough to sample teacher performance and give real-time feedback to teachers on behavior, methods, organization, and planning. The coach would not be an evaluator but instead employed for the sole purpose of increasing teacher effectiveness. Some teachers

require more coaching than others, but over time a school will need fewer classroom coaches. Coaches can then be assigned to work with students who require more individual attention. A primary outcome of classroom coaching is more positive reinforcement for the teacher. Initially, the reinforcement comes from the coach, but if successful this approach will result in increased reinforcement from parents, students, administrators, and other teachers.

In my opinion, these coaches should be behavior analysts and adept at working with teachers as well as special needs students. A coach should work primarily with classroom teachers, and secondarily with individual students.

Every job in the system, from the superintendent to the school custodian, should first be examined from the vantage point of how the job facilitates learning in the classroom. If a connection between a job and student learning is determined, then the tasks involved in the job should be examined to see if they are relevant to student learning. I estimate that a reduction in staff positions of as much as 70% is possible while increasing the rate of student learning. Paperwork, rules, and regulations should similarly be analyzed to see whether they advance learning. If a direct link between a requirement and learning cannot be demonstrated, trash the requirement. I realize that some federal paperwork and requirements could not initially be eliminated, although if they really add no value they should be targeted for eventual elimination. This would be part of the superintendent's responsibility. In education as in business, many systems, processes, and management behaviors waste time and money. Eliminating them will save valuable resources as well as free employees to spend more time and effort on the task of student learning.

Pay for performance has been an issue in schools for many years. Numerous systems have pay for education (the teacher's education, that is) but not pay for student performance. The assumption is that more highly educated teachers will produce better student performance. Consequently, obtaining an advanced degree results in a higher pay grade whether the teacher demonstrates increased effectiveness in the classroom or not. This has long been done in schools, and it is obviously not working. The assumption that higher pay for a higher education constitutes pay for performance is simply wrong. Resistance to pay for performance comes from attempts to use merit pay as an incentive. These systems as used in education are just as flawed as most performance pay plans in business.

In a true pay for performance system, bonuses are triggered by student performance. However, pay for performance should be based on individual student improvement, not average or grade-level performance, because doing otherwise encourages subterfuge and possibly grade alterations as occurred in the recent Atlanta Public Schools scandal. Some goal would be set, and a teacher would begin to earn a bonus only after hitting that goal. The maximum bonus would be paid only if all students met their learning goals. Teachers with a greater number of students would have an opportunity to earn a larger bonus.

The bottom line is that teachers are employed to transfer knowledge and skill to students. Those who excel at it are clearly more valuable to schools than those who don't, and pay should be based on their effectiveness. New Jersey's Governor Christie recently asserted that science teachers should earn more than physical education teachers. His point was that some teachers are more valuable than others. While Christie is focused on the value of subject matter—that science is, in his opinion, more valuable than physical education—I think the focus should be on the value created by a teacher regardless of subject matter. The fact is that some teachers succeed even with minimal resources and support and under the most adverse physical and social circumstances.

In an interview on *60 Minutes*, Michelle Rhee, one-time chancellor of Washington, D.C., public schools, observed during a school visit that most of the classes had very few students in them. When she asked where the students were, she was told that it was Friday and, in addition, it was raining! However, in one class she visited, all the desks were occupied and students were even sitting on the radiators in the back of the room. Later that morning she observed several of the students she remembered from this class leaving school early. When she asked why they were leaving, they said that the only class they found interesting was the class of the teacher she had observed. They came in early for that class and then left for the day.

Let's return to the movie *Stand and Deliver*. The success of Escalante's teaching methods seems to have been lost on today's educators, although he was teaching until the 1990s. Ironically, his phenomenal success in teaching inner city students calculus was his undoing. His success created too much pressure on other, less successful teachers who used every traditional excuse for not being effective teachers: too many students, too little money, lack of parental involvement, and so forth to explain their poor results. He demonstrated that none of that mattered. Although he had many barriers to overcome, they did not prohibit his success.

Escalante did not have the advantage of computers, and his methods involved much repetition. To help students develop fluency in calculus, he also taught during the summer. Think of inner city students volunteering to come to summer school to learn calculus! By 1991 he left, as did his colleague Jiménez, citing faculty politics and petty jealousies. Today the very successful program he started is practically non-existent. I think most people would agree that Escalante should have earned the maximum salary and bonuses allowed by the system whether he was teaching math or basket weaving, because he was a great teacher proven to be so by the measure of his students' success.

Peter Drucker, the influential management consultant, said, "If you can't measure your job, stop doing it and see what changes. The things that change are the measure. If nothing changes, eliminate the job." While I am sure that such a procedure will encounter much resistance in education, it may well identify many excesses.

SUMMARY

Looking at the problems in education, you will likely discover that schools are no better at managing teachers than teachers are at managing students. The current methods of accountability are misguided and ineffective. Evaluating schools on overall learning is resisted at every turn. Teachers and administrators think that because of differences in schools—inner city, suburban, rural—it is not fair to evaluate schools or teachers on whether they meet one-size-fits-all academic standards. I agree. The measure currently used is average improvement by class or school. The problem is that no school is average and no student is average.

The "average" student may be 60% female, 10% Asian, 15% Hispanic, and 15% Black. Who meets those criteria? No one! Parents send children to school to be taught. Whether the average improvement in a class met or exceeded some standard is irrelevant to parents whose child failed. Teachers should be evaluated on the number of students who improved, not some average in which several students scored very high, skewing the class score but leaving behind many students who made no improvement or some minimal increase.

Just because behavior is measured doesn't mean it will be changed. Effective feedback only provides the opportunity to deliver consequences in an effective manner for the right behavior at the right time with the right frequency. Truly effective schools will have plenty of charts showing progress at the student, class, and school levels. Performance feedback is a necessary part of academic success but is in no way sufficient. With a scientific understanding of the proper functions of feedback and consequences, schools can make much progress. Without that understanding, they will make little progress.

REFERENCES

Bennett, B. (1987). The effectiveness of staff development training practices: A meta-analysis. *Dissertation Abstracts International*, *48*(7), 1739.

Mathews, J. (1989) *Escalante: The best teacher in America*. New York:Henry Hold and Co.

Skinner, B. F. (1984). The shame of American education. *American Psychologist, 39*(9), 947.