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ABSTRACT

To help determine how the introduction of alternate assessment can be structured to maximize its acceptance and long-term adoption by teachers, a case study was conducted of the introduction of alternate assessment in a suburban middle school in the spring of 1991. Three seventh-grade life science teachers, three eighth-grade physical science teachers, two science supervisors, and one assistant superintendent were interviewed in the course of this study. Interviews were conducted as the middle school science teachers were revising end-of-year activities for their students and including alternative assessment in this revision. Hands-on testing was developed for both grades. On the whole, the teachers were pleased with their initial efforts at alternative assessment. Two factors encouraging sustained adoption of the new approach were dissatisfaction with the status quo and a belief that alternative assessment would help student learning. Concerns about the practical aspects of alternate assessment and resistance to change were two factors likely to tip the balance against alternate assessment. A common theme was the teachers' satisfaction with the fact that they had been given the power to design and conduct the assessment themselves. Four figures present some of the assessment questions and some aspects of test design. There is a 12-item list of references. (SLD)

SCIENCE TEACHERS' PERSPECTIVES

ON ALTERNATE ASSESSMENT

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In the past few years, twenty six national organizations have issued reports on the state of American education (Hurd, 1989). Science education plays a large role in these reports since science and technology form an essential part of our economic base. The American Association for the Advancement of Science and the National Science Teachers Association have proposed standards for science education. Current definitions of science literacy (Champagne et al,1989) go beyond factual knowledge to include abilities such as investigative skills, group collaboration, problem solving and higher order thinking.

Conventional standardized tests are effective at evaluating factual knowledge. Since other aspects of scientific literacy are not well measured by these instruments, an effort is being made to introduce alternate means of measuring student progress in the sciences. At the national level, the 1994 Science Examination of the National Assessments of Educational Progress [NAEP-Science] and the Third International Mathematics and Science Study [TIMSS] will contain alternate modes of questioning (Champagne & Newell, In press). At the state levels, California, Connecticut, Michigan, New York, and others are developing and implementing tests that radically modify methods of assessing student achievement in science.

In the face of such a major shift in testing emphasis, it is

important to understand what happens when this innovation is used in classrooms. Whether this is a long-term change in American education or another flash-in-the-pan academic fad depends in large part on teacher acceptance of alternate assessment. This exploratory study examines the introduction of alternate assessment in the seventh and eighth grade science classes in a suburban school in New York State. Its purpose is to identify patterns in the innovation process to be considered by those who intend to initiate alternate assessment.

QUESTION

The fundamental question underlying this study is, How can the introduction of alternate assessment be structured to maximize its acceptance and long term adoption by teachers? Two subsidiary questions are used to focus the study. 1. What factors enhance the probability that alternate assessment will be sustained beyond the initial experimentation stage? 2. What factors act to discourage long-term adoption of alternate assessment?

SUSTAINING INNOVATION

Much has been written about effective ways to introduce and sustain innovation in schools. In a review of the literature on staff development, Sparks and Loucks-Horsley assert:

> Study after study confirms the necessity of [a] schools with norms that support collegiality and experimentation; [b] district and building administrators who work with the staff to clarify goals and expectations and actively commit to and support teachers' efforts to change their practice; [c] efforts that strongly focus on changes in curricular, instructional- and classroom- management practices with improved student learning as the goal; and [d] adequate appropriate staff development experiences with follow-up assistance that continues long enough for new behavior to be incorporated into ongoing practice (Sparks & Loucks-Horsley, 1990, p.247).

Johnson and Johnson discuss innovation in schools from a social psychology approach. Teachers who are asked to introduce a new practice in their classrooms must:

> * Understand conceptually what the new practice is.
> * Translate the concept into a set of operational procedures that are appropriate for their own classrooms.
> * Use the new procedure often enough to get past initial awkwardness and to attain a routine level of expertise. (Johnson & Johnson, 1988 p.9:8).

They point out that learning a new classroom procedure is different from learning new facts because there is a greater need for feedback about performance, implementation efforts must be modified until they are effective and some failure is an inevitable part of gaining expertise. Success comes when failure is followed by practice, feedback and reflection.

Not every teacher is willing to accept innovation. Johnson, Johnson and Holubec have devised a commitment chart as a practical heuristic to understand people's reaction to change:

C = [XYZ] A
C = Commitment to use new practice
X = Level of dissatisfaction with status quo
Y = Belief that innovation will increase student learning
Z = Practicality of change
A = Cost of change (Johnson, Johnson & Holubec, 1988 p.2:18)

In other words, XYZ must outweigh A before an individual is willing to accept the new practice. If anyone is not dissatisfied with the current practice, is not convinced that the new practice will have a desired effect on students or is not convinced of the feasibility of the innovation, then that person will believe the cost of changing is too high and will resist the innovation.

Leadership is seen by many researchers as one way to tip the balance in favor of accepting change (Miles & Louis, 1990); (Seif, 1990); (Strong et al, 1990). Simpson advocates a participative/collaborative style of leadership which includes persuasion, team building, seeking input from others and sharing recognition (Simpson, 1990). Johnston et. al. reflect on ten years of innovation in the Pittsburgh schools and conclude that sustained support from the school district was significant in many ways:

> There is one additional lesson that will hardly seem surprising to anyone who has been involved in school improvement activities. Change takes time. The amount of time needed can tax even the most generous funders and the most sophisticated boards of education (Johnston et al, 1990 p.48).

In summary, innovation has been sustained in schools where there is an atmosphere of collegiality and innovation, staff

support, and a general willingness to spend time and money on the new practice and accept temporary failures.

SAMPLE AND SITE INFORMATION

This is a case study of the introduction of alternate assessment in a suburban middle school in the spring of 1991. Through looking at the experiences of early adopters, it is possible to see patterns that reflect those seen in the literature on other innovations and to draw tentative conclusions about effective ways to initiate alternate assessment.

Three seventh grade life sciences teachers, three eighth grade physical sciences teachers, two science supervisors[1] and one assistant superintendent were interviewed in the course of the study[2] This study focuses on the experiences of the six teachers. Early in the Spring 1991 semester, the middle school science teachers were asked to revise the end-of-year activities for their students and were encouraged to include alternate assessment in this revision. One of the seventh grade teachers had attended a three day workshop with Grant Wiggins to learn the essentials of this approach, so she provided conceptual information to the others. One of the eighth grade teachers has long been an advocate of hands-on teaching and testing. She

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[1] Supervisor Mr. Sweet left the school at the end of the 1991 academic year, but remained in the area. Mr. Nash began supervising 9/91. Since both were involved in the alternate assessment, both were interviewed.

[2] Pseudonyms have been used for all quotations.

became the ringleader for the project.

Tests given consisted of three parts: multiple choice, short essay and performance tests. Although this study focuses on the performance aspects of this assessment, it should be remembered that conventional approaches were also used.

As a performance test, the seventh graders were given a cooperative group exercise lasting one half-hour. The question had to do with determining the effects of acid rain. The teachers prepared a set of three cups with sprouted radish seeds for each group. Two of the cups had acid added to the soil. Students were to take data on the size of the seedlings, make a graph and draw conclusions about the effects of the acid. [See Figure 1 for questions].

The hands-on test for the eighth graders was more complex. One hundred and twenty stations were set up in the gym - twelve rows with ten questions each. Students worked on a problem at a desk for five minutes and then rotated backwards down the row. Even this was not enough to accommodate all students, so another set of stations was set up in a classroom to handle forty more students. [See Figures 2 & 3].

On the whole, the six teachers were pleased with their initial efforts at alternate assessment. A few batteries burned out and the radishes had not been growing long enough to show much difference according to soil type; beyond such minor glitches, the experiment was deemed a success. At the wrap-up meeting, there was great enthusiasm for continuing and refining

the process in the following year.

METHODS

Grounded theory (Strauss & Corbin, 1990) was the major method used in this exploratory study. This is an emergent design whose goal is hypothesis generating. Iterative cycles of interviews were conducted over a period of two academic years to follow the introduction of the new approach and its effects on teaching in the subsequent academic year. As hypotheses emerged, the researcher discussed them with the subjects and used their input to refine ideas. The pattern of work was as follows:

* Attend planning meeting in early June with all the teachers, audiotape the meeting and transcribe tape.
* Assist and observe on the day of administration of the alternate assessment.
* Attend, audiotape and transcribe summing-up meetings held separately by seventh and eighth grade teachers.
* Develop interim memo suggesting emergent hypotheses and circulate to all involved.
* In the fall, interview two science supervisors and the assistant superintendent about emerging ideas to get their perspectives.
* Interview each teacher individually to inquire how alternate assessment in previous year has affected this year's teaching.
* Circulate draft of final report to all for comments.

The software package Textbase Alpha was used to code and sort data. Multiple readings were used to code for topics, domains and patterns. Anomalies were marked, as were interesting quotations.

A conceptually clustered matrix (Miles & Huberman, 1984) was constructed as a means of organizing the data and looking for patterns. On such a matrix, three kinds of entries are made. A label captures in a single word each informants' characteristic

response. An explanation elaborates on the label where necessary. A quotation captures the essence of a person's thought and adds richness to the picture. After constructing the matrix, the researcher can get an overview of a large amount of data. Patterns and directions of movement emerge. By reading rows, one can get a picture of an individual's responses to several issues. By reading columns, it is possible to do cross-case analyses [See Figure 4].

RESULTS

The question which shapes this study is: How can the introduction of alternate assessment be structured to maximize its teacher acceptance and long-term adoption? Two focusing questions are: What factors enhance the likelihood that alternate assessment will be sustained beyond the early experimentation phase? and What factors act to discourage the adoption of alternate assessment?

To examine the results, Johnson & Johnson's Commitment Chart (see above) will be used as an organizing heuristic. Commitment to use a new practice results when the level of dissatisfaction with the status quo, the belief that the new practice will lead toward a desired end-state and the practicality of the new practice outweigh the perceived costs of the change.

A. FACTORS ENCOURAGING SUSTAINED ADOPTION

1. DISSATISFACTION WITH THE STATUS QUO

Teachers in this sample expressed dissatisfaction with conventional means of testing in two ways. Several spoke of their frustration when students memorize material only for the duration of the testing period. Others implied their dissatisfaction by speaking of their vision of how things ought to be:[3]

> We have to be careful too because we don't want to be teaching to the test all year. We have to be fluid enough. For instance, that's one of the problems with the regents. We teach to the test all year because it's such a crucial measurement tool. I don't really think we should do that. We should say that, okay, we're going to have 50 of the material that we teach is something we can access from and the other 50 is just something we adapt the learning to the child at that moment as it comes, depending on the level of the kid. [Ms. Brown, 12/10/91]

> If I'm going to fill their heads with a lot of memorized facts, how much are they going to remember? We can get into all kinds of details on simple machines and all that stuff - a lot of that stuff I don't even remember. My goal is to give them the concepts, ideas and to keep going over that so that maybe that will stick. The detail - give them the opportunity to look that up in references.[Ms. Cook, 11/25/91]

> I believe that the process and the skill development and the thinking - that's what's important. The actual content I don't think is anywhere near as important for middle school. For high school that's something different. But, for middle school, I really don't believe in content to a certain extent. I used to be so worried that I was going to leave out something. Then I began to realize, they aren't going to remember half of what I teach them anyway. [Ms. French, 11/12/91]

> You can only give them recall tests and assault their self esteem so often before they just kind of give up and don't

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[3] Quotations have been minimally edited for readability.

> even want to try. So I think some of these kids will be pleasantly surprised when they get their tests back and feel good about themselves. [Ms. Quilt, 11/20/91]

The teacher who had the most doubts about alternate assessment was the one who appeared least dissatisfied with conventional testing:

> I think that's the bottom line. Whenever they are assessed as far as their knowledge, as far as what they can do. The bottom line is basic knowledge and being able to apply it. Some of the problems, you did have to apply some knowledge, but I think you have to be careful because I think a lot of the questions were very open ended and there wasn't much direction and I think there's a lot of direction in science. When working on something you have to have direction and have to be focused. So I just hope that people don't try to make it 100% alternative type of situation. [Mr. Patton, 6/18/71]

2. BELIEF THAT ALTERNATE ASSESSMENT WILL HELP STUDENT LEARNING

Alternate assessment provides a great deal of intrinsic satisfaction to teachers who see students respond positively:

> I'm gearing my tests so that they're not memorizing. They have to show me they can understand it. Because, I can't tell you how many times I've taken tests that I didn't understand. I just memorized and would plunk things down. Now I understand it, but back then, it was just memorize and get it over with. [Ms. Brown, 12/10/91]

> But I would say, for the majority of the kids, it's good. They need to be trained, this is new for them, They need to learn how to do this. They need to learn what their responsibilities are as part of the group. [Ms. French, 11/12/91]

> Still, we can't forget that there's got to be some joy and some - it's got to be a fluid thing, learning. I think one of our big jobs in the middle school it to get kids excited about learning. If we turn them off now, that's too bad. [Ms. Brown, 12/10/91]

> When we went over the test, they were very interested and they asked questions and they wanted to know why they got

> certain things wrong. When they walked out after the lab practical, they said it was fun. Some of them really thought it was fun. [Ms. Quilt, 11/20/91]

When asked during an interview what recommendations they would have for schools considering adopting this mode of teaching, several teachers mentioned the benefits of hearing other teachers' enthusiasm:

> I think when you get into a program you need to teach your staff, to give your staff a chance to go out to schools where it's being used, where you can see how successful it is, where you can hear all the teachers' excitement and just feel it. Then you will buy into it because you're a teacher, because you care about kids. [Ms. Brown, 12/10/91]

B. FACTORS THAT DISCOURAGE SUSTAINED ADOPTION

1. CONCERNS ABOUT THE PRACTICAL ASPECTS OF ALTERNATE ASSESSMENT

Although the six teachers in this study were enthusiastic about the success of their first attempts, they also had serious doubts about the practicality of regular use of alternate assessment. These concerns focused on three issues: time for preparation, administration and scoring; space to set up the assessment; and resistance from some students. Of these, time was the predominant concern. Four out of the six teachers spontaneously mentioned it:

> I wish we had more time though. Ms. Quilt and I have always worked together closely. For us to actually find time to sit down together and a team and work on something together is impossible unless we do it outside school. There's no time during the course of the day... We grab each other in the morning before school...It's only because we're good friends that we do this. If I were teaching in a department that on a social level I was not necessarily friendly with these people, it wouldn't happen. It absolutely wouldn't happen the way the system is now. We are isolated,

absolutely isolated. [Ms. French, 11/12/91]

> It's so hectic in terms of teaching five classes, monitoring a study hall, meeting with guidance, parent conferences etc....You can't just stop and say, okay, now I'm going to take time to figure this out, So it's a matter of changing your way of thinking so that you kind of foresee where you can try something...I've tried a couple of these things... and I didn't like the way - it just didn't seem to work right. You have to make some modifications and try again. [Ms. Quilt, 11/20/91]

> The toughest part is for us to get together to meet and plan it... That's probably the biggest problem. Even in doing this exam, there's no time really given to us. I was under the impression that superintendents were compensated to have - we'd be given a half day to do this. We weren't. Or maybe we would work in one free period. I thought we would get the whole day or something like that. [Ms. Cook, 11/25/91]

Planning the assessment is only one aspect. Getting out all the equipment for the hands-on activity and setting it up and then putting it away again took uncounted hours. A look at the list in Figure 2 of the equipment needed makes this clear. Janitors, school staff and the researcher all lent a hand in order to get everything set up in time. Without this extra help, the assessment would have been impossible. After the exam, scoring took time:

> The correcting took over eighteen hours. Some of it was done while the students were being entertained by the other teachers at a field day at the town park and the rest of it was, as usual, at home, at night... It was a lot to do, but the experience was worth it. [Ms. Quilt, 11/20/91]

Space is also an issue. In this school, there is an exam week in which classes are suspended. Students only come for the hours in which their own tests are scheduled. This means that there are empty rooms that the alternate assessment can spread into. The gymnasium and extra classrooms were used to

accommodate this need. It is much more difficult to find space for ongoing assessments throughout the year:

> I have so many kids in this classroom. All of the desks are filled. I have such limited space. I tried the first test to do lab stations. It was a fiasco, completely! There was no room...It was hazardous... I was crushed. [Ms. Price, 11/20/91]

Although the new format appears to work well with the majority of students, there is resistance from some:

> The problem is that there are so many kids who simply don't remember things from day to day, and who can't follow instructions, and who don't have the basic skills that it's real hard to be very much concerned about these high falutin' kinds of testing when all they really need is to get their basic skills down pat. [Mr. Patton, 11/21/91]

> You still run into the difficulty of the student who is unmotivated, or who is learning disabled or who for whatever reason chooses not to be an active participant. ...You're constantly working toward helping those kids adjust to this kind of testing too. That takes a lot of individual time and work. [Mrs. French 11/12/91]

On the other hand, the new format helped some of the poorer students for whom reading and writing are difficult. The interactive format allowed them to show what they knew:

> I was afraid that all my enriched kids would get 100 and everybody else would fail... But I had kids in the classes that were not enriched that... a couple got hundreds and there was a nice spread... It could be real nice for them to realize, hey, you weren't in the enriched class but you did better than some of the kids who were and you took the same test. [Mrs. Quilt, 11/20/91]

2. RESISTANCE TO CHANGE

Johnson and Johnson's model claims that when dissatisfaction with the old, perceived benefits and perceived practicality of the new do not outweigh the costs of change, resistance will be encountered. As can be seen by the teachers' quotations, the

balance of these factors is currently tenuous. The costs of the change are high, especially in terms of teachers' time and energy.

Ironically, the thing which seems to be most likely to tip the balance against alternate assessment is pressure in favor of alternate assessment by administrators. Support is desired, pressure is not:

> In this district, they've been doing that for years - shoving things down throats. Teachers look at it as one more thing and that's going to cause resistance, especially when a good program, a good tool, comes along like authentic assessment. Teachers are going to be resistant to it. [Mrs. Brown, 12/10/91]

C. SUMMARY OF RESULTS

In this school, the teachers were highly motivated to experiment with alternate assessment. They felt empowered to work together create their own assessments. After the assessment, they were pleased to see that their students had learned with understanding. Experience with the first year of alternate assessment encouraged all of them to try new things in the following academic year.

Mr. Patton, who was most dubious about the benefits of alternate assessment expressed his concerns in a way that was positive and that could be heard by the other teachers. They took his objections into account and devised a test which had a stronger academic content. Having had his major fears allayed, Mr. Patton participated willingly in the new assessment. In the following academic year, he tried other experimental formats on a

smaller scale. By taking his legitimate concerns seriously, the others made him into an ally rather than a resistor.

A common theme was the teachers' sense of satisfaction that they had been given the power to design and conduct the assessment themselves:

> It actually didn't come from administration. It came from teachers and it came through our School Improvement Team...The administrators set up some guidelines for some criteria that they would like to see, which included some form of alternate assessment, which we agreed was not a bad idea. We really should be moving in that direction. [Mrs. Quilt, 11/20/91]

If anything stands in the way of this optimistic account, it is the serious problems raised by the practicality of alternate assessment. In one way or another, the teachers raised issues about lack of space and lack of time for planning, administering and scoring. The excitement of a new program carried them past these worries for the first year. But these are exactly the sorts of problems that cause innovations to be scuttled as the years go by.

DISCUSSION

Alternate assessment carries about equal measures of promise and problems. Administrators and teachers wishing to institute these new techniques will do well to proceed thoughtfully. Much wisdom can be gleaned from the literature on school innovation in general. Experiences in this school duplicate the recommendations for effective innovation mentioned by Loucks-Horsley (1990). There is a strong atmosphere of collegiality and

innovation. The administration has established goals for the new practice and provided some support while the teachers created their own design for implementing the goals. Focus of the innovation has been on student learning. Success at creating a good learning environment has been the most effective motivator for all the teachers. Loucks-Horsley's final recommendation is for follow up that continues long enough for the practice to become a part of the school culture. Whether this will happen remains to be seen.

It is clear that change takes time - two kinds of time. During the school year, time must be made available for planning and conducting alternate assessments. On a more global level, it should be understood that it will take three or four years of experimentation before the new approach has been fine-tuned to be truly effective. For example, in the first year, much effort was put into design issues and almost no effort was put into developing systems for scoring the results. The supervisor said, "That's all right. Elaborate scoring rubrics can be done next year. It doesn't all have to be done at once." [Mr. Sweet, 6/11/91]

It is a commonplace in psychology that before people can take a risk, they must be assured that the costs of failure are not too high. The teachers in this study did some interesting things to create the necessary sense of security. The assessment was counted as a unit test rather than as a final exam. That way, if there was something seriously wrong with the assessment

itself, the students would not be overly penalized for a poor score. Both teams devised a common core of questions. Then each teacher added a few questions that were specific to material that they had emphasized. The tailor-made test allowed for teacher individuality. [Field notes, 6/11/91]

The hands-on assessment taken by the eighth graders had ten questions but only eight were scored. The lowest two were dropped. Some equipment failed in use and some batteries wore out. Scores for those stations could be discarded. In the seventh grade, cooperative groups worked together on the exercise. They were allowed to ask their teachers process questions during the test. This assured the students and the teachers that there would be no failures caused by lack of understanding what was expected of them. These design decisions by the teachers did a great deal to allay anxieties about this new way of evaluating learning. [Field notes, 6/11/91]

An atmosphere supporting experimentation is essential to successful adoption of innovations. In this district, what worked well in the middle school would be almost impossible in the high school. Middle school teachers have more freedom. Pressures from college entrance exams and state mandated tests create serious constraints on the high school curriculum.

When one is caught up in the excitement of innovation, it takes se f-discipline to face the negative side of that innovation. Yet if it is to succeed in the long run, such a critique is essential. Practicality is the Achilles' heel of

alternate assessment. "Trying to fix the airplane while it's in the air" is a good metaphor for the problems. Introducing effective new assessment modes will take large quantities of the two commodities which are scarcest in schools: time and money for staff support. Exhortation and mandates will not make alternate assessment spring full-blown into American schools. Teachers who are committed to better learning outcomes for their students are intrigued by the potential of these new techniques. But judging from the experiences of these six teachers, resolving practical issues is the key to long term implementation of alternate assessment.

CONCLUSION

One must be wary of generalizing from six cases. In this situation, however, the conclusions ratify common sense and point to issues that should be considered when attempting to implement alternate assessment. To improve the chances for long term adoption of the new practice, one should focus on issues of practicality and on helping teachers see the benefits of alternate assessment to student learning. Teachers need opportunities to understand conceptually what is meant by alternate assessment. They need to see other teachers use it and to have an opportunity to try it themselves. Experimentation involves the potential for some failures. Consequences for not getting it right the first time should be minimal.

Alternate assessment should not be seen as a panacea. None of the teachers in the study would advocate doing away completely

with multiple choice and essay questions. They point out that different students have different strengths. Testing modes appropriate for one kind of content are inappropriate for another. Alternate assessment is seen as an additional tool in the teachers' repertoire.

The assistant superintendent who oversaw this project sums up factors affecting adoption:

> One factor is the amount of resources that a district can put into it along with the amount of commitment that some people will make to it. It takes more effort, at least initially it takes more effort. It takes a certain amount of risk taking and support on the part of the district, teachers' colleagues, the administration , to go ahead and try something different. Depending on how much we can support, particularly with time and training, I think that will really be very important to how many teachers take it on, how much they will do of it. [Mr. Miller, 1/11/92]

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7TH GRADE FINAL ASSESSMENT PART III NAME_____

I. Begin this part of the exam by reading carefully the following paragraph

ISSUE: ACID RAIN

Many scientists blame acid rain for the destruction of pine forests and lakes in the eastern United States. Studies also link acid rain to the corrosion of buildings and statues and to possible harmful effects on human health. These scientists believe that industry and automobile emissions are responsible for the acid rain problem. They fear that the environmental damage may soon be irreversible. To control acid rain, they claim, strict regulations must be imposed, especially on industrial emissions.

Opponents of regulation argue that the causes of acid rain are not yet understood. They point to the studies showing that natural processes, not acid rain, are to blame for the damage. Other studies have concluded that motor vehicle emissions are the major source of acid rain. Thus, the group argues, industrial controls will not cure the problem. Instead, controls will reduce the industries' efficiency and waste the public's money

II. To investigate the effects of acid rain on plant growth a scientist carried out the follwing experiment.

Radish seeds were planted at the same time, under the same environmental conditions except for the conditions described below:

Plant A was planted in soil mixture X, given 6 hours of light, and 50ml of pure H_2O per day.
Plant B was planted in soil mixture X, given 6 hours of light, and 50ml of a .25% solution of water and sulfuric acid per day.
Plant C was planted in soil mixture X, given 6 hours of light, and 50 ml of a .50% solution of water and sulfuric acid per day.

All the plants have been growing for 10 days.

III. Choose <u>three</u> characteristics to compare about each plant and make <u>three</u> observations using these characteristics.

IV. Create an organized data table showing the length of each plant's stem.

V. Create a bar graph comparing the stem growth of each plant.

VI. Answer each question: 1. Name the <u>control</u>. 2. Name the <u>variable</u>. 3. Name the <u>experimental group</u>. 4. Describe the 5 steps of the experimental method as it relates to <u>this</u> experiment.

BONUS QUESTION: Write a short essay - Should we regulate industries to control acid rain? Why or why not?

FIGURE 1: SEVENTH GRADE QUESTIONS

Final Assessment: Process

SECTION: _____

1. Which of two objects is denser? Show your work in calculating the density for both objects. Include units in your work.

2. Use the pH paper to determine the pH of the substances provided. Indicate which of the substances are acids, which are bases, and which are neutral. Construct and record your results in a data table, which should include the substance, its pH and whether it is an acid, base or neutral.

3. Compare how each block slides down each of the 4 surfaces. Which surface causes the most friction and which surface causes the least friction. Explain how you arrived at these answers.

4. Which of the 3 magnets is the strongest? Use any of the materials provided to solve this problem. Describe how you were able to solve the problem.

5. Count the number of swings for 20 seconds for each pendulum. Construct and record the results in a data table. Explain your results. What are two factors that will affect the swing rate? What are at least 3 factors that could cause errors in your experimental results?

6. How does increasing the angle of an inclined plane affect the force needed to pull an object up the plane? Include a data table with the angles and forces.

7. How does the focal length affect the magnifying power of a lens? Record your results in a data table along with your explanation.

8. Which ball bounces higher? Explain why and justify your answer.

9. Examine the objects. Think of a problem you could solve using the materials provided. Write your problem, hypothesis, and procedure for your problem. If you have time, do the experiment and record your results and conclusion.

10. Watch the video. Record your observations of Flasks A and B. With your knowledge of chemistry explain why there might be differences between Flasks A and B.

FIGURE 2: EIGHTH GRADE QUESTIONS

EQUIPMENT LIST FOR EIGHTH GRADE HANDS-ON ASSESSMENT

Sixteen of each of the following:

Balance
Graduated cylinder
Calculator
Small metal weight
Red plastic block
250 ml beaker
150 ml water
Eyedropper
Paper towels
Ph scale
Ph paper
Bottles containing:
- Acid (vinegar)
- Base (milk of magnesia)
- Water

Discard pan
Friction block with 4 surfaces
Small block
2 electric leads
100 ml beaker
Copper wire
Zinc metal
Bicarbonate of soda
2 kinds of toothpaste
4 kinds of dish detergent
Electric box
4 batteries
Video showing chemical change experiment
Video player
Bar magnet
Horse shoe magnet
Plastic ruler
Force measurer
Paper clips
Stand + 2 pendulums (4" and 12" of string)
Stop watch
Inclined plane
Protractor
1/2 Kg weight
Dish soap
Molasses
Tinfoil covered cardboard
Tissues
Light ray box
Ruler
2 Convex lenses - different focal length
White base
Tennis ball
Wooden ball
Golf ball
Assorted wind-up toys
Microscope
Seltzer
Test tube rack
4 test tubes
3 eyedroppers
Cranberry juice
2 petri dishes
Voltmeter

FIGURE 3: EIGHTH GRADE EQUIPMENT LIST

7TH GRADE	INITIAL ATTITUDE TOWARD A.A	LEVEL OF DISSATISFACTION WITH CONVENTIONAL TESTING	BELIEF IN POSITIVE EFFECTS OF A.A.	PERCEPTION OF PRACTICALITY OF A.A.	PERCEPTION OF COSTS OF CHANGE
Ms. Guilt	Attended Workshop Very Positive Ringleader "It teaches them what they've got to do throughout the year."	Medium "You can only give them recall tests so often and assault their self esteem before they give up."	High "They are data gathering and collecting and organizing...They are shown at each step a good example. That's what A.A. is."	Concerned "It's nice to do all these new things, but if you're not given any time to learn it, or plan it, it becomes more difficult."	Concerned "It's like trying to fix the airplane while you're flying it."
Ms. Brown	Positive, sees 2 sides Follower "The thing I liked about it was actually watching the kids work together."	Medium "We don't want to be teaching to the test all year...50% should be adapted to the learning of the child at that moment."	Medium "We really had, for the first time as a department, to work together to create a product."	Concerned "If you don't give planning time to your staff, then you're shoving it down their throats and they feel resentful"	Dubious "I don't understand A.A. I don't understand why every few years they come along and say nope, you're doing it wrong. Change it."
Ms. French	Positive Follower "I know if I did it more, my teaching would be better. I just haven't been able to find the time."	Medium Did not discuss dissatisfaction.	Medium "I'm doing more practical...more hands on...more cooperative testing than before."	Concerned "It's going to take a long time to make the transition...The kids need to learn how to do this." "I don't get any support."	Dubious "The difficulty of the student who chooses not to be an active participant...help those kids adjust to this kind of testing...takes time and effort."

Figure 4: Conceptually Clustered Matrix

8TH GRADE	INITIAL ATTITUDE TOWARD A.A.	LEVEL OF DISSATISFACTION WITH CONVENTIONAL TESTING	BELIEF IN POSITIVE EFFECTS OF A.A.	PERCEPTION OF PRACTICALITY OF A.A.	PERCEPTION OF COSTS OF CHANGE
Ms. Cook	<u>Very Positive</u> Ringleader "You can always be creative. Always trying something new."	<u>High</u> "If I fill their heads with facts, how much are they going to remember?"	<u>High</u> "I guess my whole orientation to testing and viewing things is beginning to change."	<u>Convinced</u> In class A.A. works well. <u>Concerned</u> "Coordination of whole grade A.A. is difficult. Kids are on top of each other. Numbers and equipment are a real problem."	<u>Concerned</u> "You need to give teachers real time to plan it. By the end of the day you're exhausted. I was under the impression we'd be given 1/2 day."
Mr. Patton	<u>Dubious</u> Uses doubts effectively to keep others focused on academic outcomes. "Bottom line is, they do have to be accountable for knowledge."	<u>Medium to Low</u> "I wouldn't want to forfeit the conventional half of the test."	<u>Low But Changing</u> Another teacher says: "I've seen this person turn 180°, a real change, a policy change from my perspective."	<u>Changing</u> "I noticed it took the pressure off. Maybe it will change their attitude a little bit."	<u>Very Dubious</u> "This is just the newest fad. It isn't going to last because it doesn't work real well in schools. I'm not sure the ends justify the means."
Ms. Price	<u>Positive</u> Eager Follower "I make my kids explain it to me as if I were 5. If they can do that, they understand it."	<u>High</u> "We don't want them sitting there like the olden days where we just stood there and talked like a big professor."	<u>High</u> "This year I want to focus on making sense of hands on tasks. I want them to understand what they are doing and why they are doing it."	<u>Worried</u> "I tried the first test...it was a fiasco. There was no room. It was hazardous. This room is so small."	<u>Less Concerned</u> "I'm sure this year I'll have a lot better input as far as better ways of putting the test together. I'm going to be a lot more confident."

Figure 4: Conceptually Clustered Matrix