UW-Madison
National Institute for
Science Education

NISE Talk
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Let's start by showing you this. This is a transparency I came along 25 years ago and until I went to the NSF I would always start each of my talks with this. When I got to the NSF I had to be on better behavior so I stopped doing that.

What I'd like to do is really call attention to two essential components of reform. Very essential components of reform and those components are integrity and responsibility. I warn you that I'm going to come back to this repeatedly today and those of you who know me know that I feel strongly about each of these components. I'm speaking about the integrity of the individual who is participating in a reform movement, a responsibility that the individual has. I'm also talking about the integrity of the community where the reform movement is taking place. I'm talking about the responsibility of the community so it's both an individual responsibility and a collective responsibility. Both the integrity of the individual and the integrity of all the people included in the reform process as well as the academic integrity of the offerings as well as the responsibility that we in academe have been entrusted with by society to see to it that the students that we get at the very end of their education and during their education actually benefit from their interactions with us. So this is going to be somewhat of a personal tour and I'd like to emphasis the fact that I'm going to speak about some innovations that I have participated in my course in the past 25 years or so, but let me on the outset state that I fully subscribe to the statement that most if not all what passes nowadays in the past 25 years as being innovative is nothing but tinkering, is tinkering at the edges. But across the time period such as the one I've been involved with here at Madison and a couple of years before that at the University of Illinois. I'd like to share with you some of these perspectives. But I want to come back to these two points and I would like you to remember that they are interwoven in everything that I'm going to be saying. So to put things in a better focus and a better context let me just remind everyone what I consider to be the purpose of education. Why do we have UW-Madison, why do we have institutions of higher education? Why do we have K-12

schools and so on? So this is to me is the purpose of education, to enable individuals to fulfill their human potential. Not to guarantee that they will do it, but to enable them to do that. Of course I'm going to share these with you in the form of headlines and we can elaborate on them, discuss them and even disagree with them as we go along. What's the purpose of research? We do research, we pride ourselves on being in a research institution. We don't even describe ourselves as an educational institution. We say we're a research university. What's the purpose of research? Again in headlines, it's to advance knowledge. But to what ends? That's part of the discussion we want to go through. What's the purpose of technology? We live in a very advanced technological age, what's the purpose of that? To advance the human condition. We have a college of engineering, we have all kinds of advances in agriculture, we have advances in instructional technology. What are the purposes? To me the purposes are to advance the human conditions. So what I'd like to again focus on and try to have us be looking as the overriding theme, that is to what we would like to do is basically achieve what is referred to as science literacy. If we can come to an understanding of what's meant by science literacy, if we can come to some agreement as to what the components of literacy in science are as distinguished from scientific literacy. All the science majors become scientific literate, all the physics majors, all the science majors, become scientifically literate and literacy in science is distinguished from scientific literacy in the sense of appreciation, in the sense of understanding that the other members of our society have. So we want to achieve science literacy by moving from understanding to appreciation to eventually to fulfillment.

Let's look for a moment at the conditions of undergraduate education in science and mathematics. This is my characterization of it. The curriculum is stale or lacking. I know we have a big megabuck project aimed at improving the curriculum but I want us to think about these improvements, so called improvements that are underway in terms of their integrity and in terms of their responsibility that they carry, not only to the funding

agencies, not only to the citizens of the State of Wisconsin in our case, but to taxpayers of Wisconsin but to citizens of Wisconsin, students themselves. There are widespread needs of the faculty, in fact the faculty is such an ?????? group its very hard to identify and clearly state what these needs are. There are large _____ among career students and the noncareer students, those are the literate in science students are for the most part neglected. Most of the disciplinary departments, the vast majority of them, care very much so about the so called pipeline. People who want to come through courses and become professionals like themselves. We need to pay special attention to the rest of the population and we're not very good at doing that. We have very few _____ students, instrumentation in science and mathematics at the undergraduate level is really needed much more so so that we can have courses in science and not courses about science. We also lack comprehensive effort. Again despite all the big megabucks projects that are underway now. So again I just want to be sure everybody knows as they say on the street, where are we coming from and you're going to know where I'm headed I hope by the end of this discussion.

I'd like again to bring this point home. I'd like to borrow from something that _____ said recently. A failure of science, not the failure, a failure of science to produce benefits for the poor by science here I would like to _____ to mean science and technology. Again to fit it with what I had said before. The failure of science to produce benefits for the poor in recent decades is due to two factors working in combination. The pure scientist has become more detached from the mundane needs of humanity, that's humanity, not rumanity, right? And the applied scientists have become more attached to immediate possibility. What's the bottom line? Everybody checks the stock market even on the 10th anniversary of the big crash. Everybody's concerned with the bottom line. I think there's something to be said what Mr. Dixon is trying to share with us. In a different publication again this year, he goes on to say what he believes science is. One of the things

that I strongly object to is for a speaker to put up a transparency and then proceed to read it as I've done so I'm not going to read it. I'd like to reflect on that and I will speak softly as you read it and ponder what Dixon is saying so that we can ask ourselves what is it that we are attempting to do in this reform. Is it that we are so well endowed to do that? Financially endowed. And one of the questions that I'd like to raise is are we sufficiently intellectually endowed to tackle the questions that must be addressed in reform. Well, I submit that in the process of education that we go through here at this university and other institutions of higher education, other institutions of K through 12 levels that we have and this is not an overstatement on my part. We have lost sight of what it is that we are attempting to accomplish. There is very much engaged in the process of doing it, we're damn good at the process of getting funded, getting the students registered, processing the grades and so on but we have lost sight and I say we have lost sight somewhat advisedly mainly because if we have lost sight that implies that we had it in the first place. We have lost sight of what education is all about and what the purposes of courses are all about and so I'd like to submit to you that in our institutions of higher education, we have clearly, clearly lost sight of helping individuals fulfill their human potential by leaving out a very important component of what we do. Namely making sure that the students that we have learn the difference between right and wrong. I might say what does this have to do with teaching chemistry, what does this have to do with reform in science, mathematics and technology? It has everything to do with this. And this is a problem that is not peculiar to our institutions of higher education. This is a problem that is characteristic of society at large but we are custodians of what? Of knowledge? The advanced knowledge, right? Are we the custodians of virtue or is that a bad word that we should not even use in this setting? You know the difference between right and wrong is a line. It's a thin line, it's about 1/2 centimeter wide. Nowadays it's about 5 centimeters wide. Anything goes. And I speak with a great deal of pain about this. And a great deal of concern about our responsibility as faculty, responsibility of administrators, responsibility as individuals in

our society who have been entrusted by society to deal with those issues. So let me discuss for a few moments, what it is that faculty do. We set expectations. Not only for ourselves but for the students. We state accomplishment levels. We do this rather well in most cases. What we do is we monitor progress of the students and sometimes we reward achievement. All of these awards are carefully selected so that they reflect what it is that we are attempting to do and what we're concerned with I submit should be that a desirable outcome. Look, at UW-Madison--to focus on that for a moment. We get every good students, that's the characteristic of this university. It's one of 3 or 4 important characteristics that distinguishes from other universities. We get good students, we have good faculty, we have good facilities and we get reasonable support from the State, despite the fact that if you look at the data that comes out of the administration you see that fraction is going down. But the State of Wisconsin, for the population really has no business supporting an institution like ours. I mean business in the dollar sense. But they have entrusted us for a long time, it will be 150 years next year in doing the kinds of things that we do. So what I submit is that our responsibility is to and the best we can do really is to be concerned about the value added to the students that we get rather than our AP students or barely admitted to the university. And that's something we should keep in mind so that's the desirable outcome. What are the characteristics and attributes of those individuals who get a bachelor degree from UW-Madison. And how do they differ from other _____ as a bachelor's degree. What are these characteristics and attributes? We should examine they. We should look at them. We should, as I said already, be engaged in setting expectations, we develop strategies for achieving those expectations, we look at the attributes of the students, as I already alluded to, we try to be involved in the achievements of the students and we should look at the consequences of what we do. Not only the consequences for the students who do well in the course, but for the consequences for the other students that don't do well in the course. For the bottom half of the student population, what are the consequences? We are engaged in encouragement, we expect

encouragement and we see that in a variety of ways but the most visible way is the financial _____ that we get. And we're all disappointed in that and that is bound to be reflected in what we do in our classroom and outside the classroom. Of course we look at rewards and so many other factors that are involved in what we engage in. So I just want to be looking carefully at these types of activities that we are engaged in. So let me now switch to focus on the course that I have been involved with for a number of years. All my years except the time when I was in Washington I taught the first semester course--Chemistry l03. This is from this semester's syllabus. The syllabus is 14 pages long. It's not just a syllabus, it is really a guide that reflects alot of these points that I've been trying to talk to you about. In fact my first lecture is devoted to 40 out of the 50 minutes on it. To talk about the syllabus, to talk about the expectations. Those of you who are interested in looking at the details of what I have, I didn't bring copies because you can all download them if you want to. Here's the internet address. You can look at all kinds of different things that are related to course and other kinds of things that I do in my course. I had a slip of the tongue and said we because Rod Schreiner and I do everything together. He's the one who is responsible for what you see on the web and a variety of other things that he and I have collaborated on for the past 26 years. Ever since he came here in graduate school. So that's the web address. scifun.chem.wisc.edu So I will show you a couple of things about this. I'm not going to go through all of this in detail, but just to impress upon you the fact that I do state the expectations as clearly as possible to the students and I hold them responsible for stating their own expectations too. And one of the words that I emphasize with them is the word, connection. I discuss the importance of making connections. Not only mental connections among the various chemical principles and phenomena that we discuss, but the connections among people and the connections among the wealth of talent that we have on this campus here. The richness of the opportunities that are available. So I just bring that "c" word into the discussion for us to look at. I state to them very clearly what the expectations are and what are some of the activities that we

have in place for them to look at. So one of the things that I do is call their attention to a variety of academic offerings at the University. Here's just a brief look at my course day by day outline. And I'd like to just take a minute to talk about something that is clearly indicated here. This is the lecture topics, this is the weekly laboratory experiment. I'd like to call your attention to the special activity to be announced here in the special activities to be announced here. Our labs for the most part are cookbook labs. We don't do experiments, we do exercises. And the link between what goes on in the lab and what goes on in the lecture is getting weaker and weaker. In fact the lab has become kind of a separate course from the lecture and coordination is something over the past 25 years between the lecture and the lab has not been as strong as it used to be or it should be. Well, I have decided in consultation with the lab director that the special activities during those two weeks would be to have the students come to lab and instead of coming for 2 hours come for one hour but they don't do an experiment. Instead a guest speaker from the University comes to talk and discuss with them anything that the speaker chooses as long as they promise that they be excited about what they're doing and they share the expertise that they have with the students. I try to pitch it not only at the level of the first year freshmen, that's what most of the students are in my class, but they pitch it a little higher in order to encourage them to go beyond what it is we're doing in this course. And you know what. I have 16 lab sections, they meet two sections at a time. So I needed eight speakers for the first set of sessions just a few weeks ago. And the first eight people I contacted said yes and they came. I asked the students to write a one to two page essay about their experience was with the speaker. I asked the speaker to give me feedback. Everything so far has been very encouraging. I know this is all antidotal. I'll show you some quantitative data in a moment about other things but this is something new and the students who come from small settings or bigger settings are really interested in knowing things _____ lab, SpacePlace, research that takes place in the biochemistry department, and so on. We are doing this next week again and I haven't settled on the final roster for

the speakers but everybody is looking forward to it. The essays they turn in they know don't count for a grade. I promised them that I would read them. I am very impressed on the strong writing skills that some of the students have. I'm also depressed about some of the students who can't express themselves very well. So we have the typical, _____ distribution. So, anyway, this is a brief look at this. I'd like to share with you a couple of other things that we do in the course. By the way, I'd like everybody to take one copy of this, but don't scrutinize it now, just keep a copy and we'll talk about it a little later. There's something on the back side of it as well. OK. So what I'd like to also point out that this is what I state to the student. They say what do I have to do to get a B? Standard question. This is what you have to do. And you're not competing against each other, you're competing against the course. And so I grade on an absolute scale, not on a curve. Well I can grade on a curve, this is the curve. This is the curve. And your task is to coordinate with each other and to study together, so having told them what the expectations are, I point out to them what the learning aids are and then I ask them to put themselves into what I call cooperative learning groups. Don't look at this now. It's kind of interesting but I just want to make sure that you do get it. Cooperative learning groups. I ask the students to sign up in groups of five and form a cooperative learning group. And they have about two weeks to form this cooperative learning group and they have to tell me what the groups are. So I'd like to pass this around and you can get an idea about what I ask the students to do and how they end up working together in preparing for exams and doing homework. Sometimes I urge them to sit close to each other in the lecture so we can do problems in the lecture itself. Depending on the size of the lecture that becomes a task that's not easily accomplished. I point out to them that we're going to do things called the Chemical of the Week, I tell them that I will give them exam study questions and I point out to them what they're trying to do here at this campus. Something called the Learning Community. We're trying to shrink the university and so a professor in math and myself have students registered in specific lab sections in chemistry and in the math. Next year we're going to

try and do it with physics as well. So that the students study together beyond the cooperative learning group this year that we have asked them to sign up for. And this is all voluntary by the way, nothing is really mandatory as such. So I also point out to them that there are other activities that they might participate in. Bull Sessions. Ever since I taught at U of I during the Kent State tragedies and even before during the Viet Nam war tragedies the students asked if they could speak to an instructor. I was a heck of alot closer in age to them than I am now, but I maintained this since I've come to Madison. And I have students who are no longer in my class that come to these Bull Sessions. They find out when they are and come. It's very informal, we get together and just talk about anything they want to talk about. I provide refreshments--cookies and soft drinks and very very useful mechanism for feedback. I ask them to keep in touch, e-mail, give them helpful study hints, all this is for their perusal and their use. In 1972 Allen Kelly who was an econ professor and I have been working with something called Chem TIPS and none other than Frank Baker who sits over there, has been very helpful to me over the years and sharing ideas and technology that he has developed for using TIPS. He doesn't call it Chem TIPS, he just calls it TIPS. TIPS is an anagram for Teaching Information Processing System. It is an approach like this. The idea is to get feedback from the students to the instructors and back to the students in a timely fashion and so what I'd like to show you now are some examples of the Chem TIPS questions that we ask and when we do this is the last 8-10 minutes of the Monday lecture. The lecture is 50 minutes long--give the students questions that we are expected to answer in the lecture itself and they are in multiple choice format. This is from yesterday's Chem TIPS survey. For the most part it is nonmathematical. What they do is they answer their responses on an optical scanning sheet. Somebody runs it over to this building, whatever, what floor is it on, I forgive what floor it's on and its processed and within a couple of hours and the information is available on the chemistry computer and every student in the class, even the ones who missed the class get an individual set of assignments based on the performance that they've done or the lack of

performance that they're done on such survey. This is something that is very very effective in terms of getting feedback, not only to the students because they get the student reports. The survey typically has 10 questions. These are the other 10 questions. Those for the most part are qualitative questions by virtue of the nature of the material itself. What we get then is the instructor gets a report, each TA gets a report for each section and we have diagnostic information to the students, to the instructors in a variety of forms. Here is the result from yesterday's survey. 292 students turned their sheets in, the score was 73. The questions are grouped in clusters depending on the topic or subtopic that is being discussed and this gives an idea how the students did on the different questions. Each TA as I said, gets a copy of this in much more detail about every student, about the answers that the students have selected, sometimes in a mathematical question, they say Oh Dr. Shakhashiri I made a mistake, I made a math error by dividing instead of multiplying and you and I know that's not a math error, it's a conceptual error. So the message is generated to the students based on their responses takes that into account from the guidance that we provide them. So we get an item analysis table like this and it is very clear to me as it is to anyone who looks at this, by the way the entries in parenthesis are percentages, it is very clear to me that problem #4 and problem #8 and 9 and 10 need special attention. You might say, they didn't get to finishing 9 and 10 but I know they left 2 minutes before the bell rang so it's being there that makes a big difference in terms of getting this data. These of some of the types of things that we've been trying to do and then the messages are generated, 18 students got 100 yesterday and they get a table of responses and those that didn't show up--70 students. 70 that are on the roster but did not turn in a survey. I don't know whether they were there and didn't turn it in or they were absent. I know there weren't 70 people absent, that I know. OK some of them have figured out that the way to get all the messages, all the _____ and enrichment messages is not to turn the survy in. Well I try to admonish them not to do that because you notice one of the option that I had on the questions after #5 was. What? I don't know. Just be honest with yourself and with me

because this is useful diagnostic information. So after the second exam which is next week, the people who are not participating in this survey, we're just going to exsponge them from the roster. Because it costs a penny or 2 to do this and if they're not using it, then.....

Other side of tape

questions 4, 5 & 8. This is what the printout shows them. You should learn the ....., this talks about these things. This is nothing new to them. But it's a way of focusing their attention on the kinds of things that they thought they knew but for some reason they got 2 or 3 right so they kept this message. And this goes on like that. So what I'd like to do now is show you some information about how the students feel about this Chem TIPS and if I can find my right transparencies here, I will do that because I do ask them for information about it and .....see if anyone has any questions as I go through this very rapidly.

Chem TIPS Questionnaire. Spring Semester 1995. This is rather interesting. I'd like to spend a minute on this. How often does your TA discuss the Chem TIPS questions in quiz section? 252 responses. 46% said always. TAs are supposed to do them all the time and they do them all the time according to the TAs. 38% frequently, 12% said rarely and 4% said never but you can see the sum of the first two is pretty good. Do you prepare for the Chem TIPS survey? Rarely they say, right? Do you prepare for the quiz that is given by the TA? Yes they prepare. The perception is that this counts for a grade so they have to prepare for it. Chem TIPS doesn't count for a grade. But I know from the survey of the results that the performance on the Chem TIPS and the performances on the quizzes that the TAs give are not too different from each other. How many surveys have you taken this semester? At that time 10 were given. As you see, there is very good participation in those activities. Do you try to suggest _____ that you receive on the Chem TIPS?

Always, frequently, rarely, somewhat. Sorry this doesn't have all the percentages, the numbers here. 83 out of 252 say rarely. OK, Do you find the suggested assignments helpful? 51 out of 252 say always, frequently 133, rarely drops to 34, that's something that consistently shows up on these questions over 20 years. Do you feel the Chem TIPS helps you learn the course material better? Better than what? Right...we need to talk to the writing lab people. Much better, somewhat better, doesn't help. Has Chem TIPS changed any of your study methods for this course? A. Increased frequency of doing the covered course material. B. Changed my method of preparation of exams C. both A & B. 48 out of 252 say its ineffective but the rest of them are affected by it. How many Chem TIPS questions do you guess at per survey? 2 to 3. 80 out of 252 guess at more than 3. In the future the results of Chem TIPS should count as part of the grade. Definitely not. Do you think the Chem TIPS program should be continued in the future. Definitely yes. This is consistent year in and year out. This is very interesting to me. Do you discuss Chem TIPS surveys with other students from other lecture sections? Not some other quiz section, other lecture sections. 90 out of 252 said they do. So that's also progress.

I want to tell you about something else I do in my course and is part of my course syllabus which I showed you before. At the end of my syllabus I ask my students to fill out a sheet that looks like this and to turn it in with a picture so when they come to see me or even if they don't come to see me, I glance through this and look through the faces and try to make a connection between the face and I brought a sample but I didn't bring the whole set, if you want to glance at this. The thing I want to call to your attention is this last entry down here. Tell me a couple of interesting things about yourself. As you look through this, you might want to look what they consider to be interesting and how they share that this me.

I want to point this out. University Counseling Center. I urge them to be aware that we have services on campus to help with study skills, are helpful in test anxiety, dealing with

test anxiety, call their attention to the writing lab, call their attention to the GUTS tutorial program. How many remember Harry when he started the GUTS program here in the late 1970s? Nobody remembers Harry. He used to come and talk to me alot about how he should construct this. Alcohol and drug abuse. What does that have to do with the chemistry syllabus? It has everything to do with the chemistry syllabus. It has to do with the responsibility and the integrity components we talked about before and my first Chemical of the Week on day one. You know what it is? Ethanol. Later on in the bull session I asked them afterwards. Do you think I overdo this business of talking about alcohol and drugs? Do you know what they say to me, back to as recently as last week when I had the bull session is that nobody else talks about it on campus here. Thank you for bringing it out. If you go to my web page you can click on alcohol and drug abuse and you get referred to all kinds of other sources of information. Not only counselling but factual information about alcohol and drug abuse. National Chemistry Week, that's coming up in a couple of weeks, so this being a lecture about chemistry, I told you I'm trying to do alot of different things here. I'd like each one of you to take one of those. Remember getting one of those from MG&E? This is part of my Chemical of the Week which is methane. This is micro_____ substance. It says scratch and sniff. It's interesting not only to talk about the technology by which this is made. Don't scratch them and sniff them now because the whole room will have a foul smell. This is an additive that the gas company puts in gas so that we can detect a gas leak. Methane itself is odorless and it's colorless and so part of what they learn in chemistry course is what the additive is and what the name is, and so on so you can scratch and sniff that later on.

I'd like to show you a couple of examples of the Chemical of the Week. Here's the one from last week. Gases that emit light. The handout that we give them in class doesn't have the color on it but if you go to the web you'll get it in color and it's alot more effective in color because you can see the position of the line, the initial line and so on then it is on a

piece of paper. Another Chemical of the Week that we had recently is to add to their joy and to their skill development of making connections. We talk about the chemistry of autumn colors, the beautiful engaging very vivid changes that take place and so we talk about the chemistry of it. I showed this to a biology colleague the other day and he said this is not the chemistry of autumn colors, the biology of autumn colors. Well, it's the science of autumn colors that we're talking about and the web page has all these very attractive photographs but the actual handout itself doesn't so I call your attention to the fact that they should go look at the web page.

What I'd like to do now is share with you a couple of pieces of information about the student's perception of what I do. At least as indicated by the course questionnaires that they fill out. What do they say about differently. This is a standard course questionnaire that we have in the department and this is from the fall semester of 1996. Questions 1--The lecturer is very well prepared. Its a 1-5 scale with 5 strongly agree, 1 strongly disagree. Lecturer is very well prepared 4.6. Lecturer is well organized 4. Lecturer makes the course interesting 4.6. Seems willing to answer questions 4.3. Speaks clearly 4.6. Lecturer writes ledgibly. Most of the time I do. I'm surprised at that because sometimes I don't think I write as ledgibly as I'd like to but their perception is that I do. Makes effective use of visual aids. 4.7. Sufficiently available outside of class. 3.7. Well, you know there's another question missing there. Right? How often have you tried to get to the professor. But anyway that's a standard set of questions that we use. Lecturer is an effective teacher 4.4. Exams reflect material covered in course. 4.6 You can see the rest. Sufficient time is allowed. Type of questions are appropriate for the course material. Exams are more of a test of understanding than memory. All of these numbers are pretty encouraging and its indicators. Its not an evaluation. I object to using the word evaluation in this content. The back side of the questionnaire has room for them to write comments and we look at those comments very carefully. I look at them very carefully. But I'd also

like to show you a set of special questions that I ask them in the same connection. I'd like to get feedback what their perceptions are. So the textbook, is it suitable for this course. You notice the numbers drop down a little. You have to take that into account as you look at these data. The workbook, this is a workbook that Rod and I put together way back in 1977 and have revised it several times. They like that. The option of retaking the exam should be continued. I'll talk to you about that in a second because I have post exam options that I'd like to discuss with you. The lab book is suitable for this course. Number drops down--that bothers me. Chem TIPS should be continued. Same as I said before. Lecture demonstrations were interesting. Yes, they're interesting but did you learn anything from them? You know. That's the next question. They increased my knowledge of chemistry. Not as high but its still above 4. That's pretty good. The Chemical of the Week increased my knowledge of chemicals, their properties and use as well. Not as much but still higher than the neutral point. The Chemical of the Week should be continued. They're about the same. This semester I visited the web site? Most of them said never. That's because I started encouraging them to do it. It's interesting isn't it? You set the expectations, you tell the students it's important to do it and they'll do it. This time I hadn't told them to do it. Later on, in subsequent semesters, you _____ and Rodney knows how many _____ we get. Anybody can get that information. The lab experiments increased my understanding of the course. That's terribly low as far as I'm concerned compared to the other numbers. It's just the neutral point. 3 is the neutral point. Cooperative learning groups should be continued. Now I have a good understanding of what Shakhashiri means by his emphasis on connections. That's not bad. It's not as high as I'd like it to be but that's OK. Informal group meetings should be continued. How many have you attended? So that tells you something about the reliability of that number and I plan on taking Chemistry 104 next semester. They already signed up for it so that's there. OK. Where are we going with all this? I want to discuss for a moment the post exam options because this is really something that's important. This is out of the syllabus.

This is what I do with Chemistry 104. I expect you to get at least a C in my course. That's the acceptable level of accomplishment that I described earlier. If on the first exam or the second exam you see the grade below 75, then you have the option of retaking this exam. Special exam will not last 75 minutes, it only lasts 50 minutes, 100 points and this is not a late exam, it's not a make-up exam. This is a retake for those who didn't do too well on the first test. What's well--a grade of 75 or higher. No matter what you get on the retake, the maximum I will enter for you is 75. But psycological effect on those who score 64 on the Monday exam come back and do well, 85 or a 90. Even if I enter a 75 for them, its very very _____. Many of those students take advantage of the retake the first time. That's part of the convenience building factor. So this is only available it says here for the first of the three scheduled exams. From one semester to another I vary. Why do I vary? Because the TAs are so overworked, I have to _____ to grade the exams Monday night _____. I seek their advice. I get alot of input from the TAs. Sometimes they offer only once, sometimes they offer twice?????????

Special group projects. That's what we do for the bottom half of the student body. What about the top half of the student body? Well, you have an option. You can partake in special group activities. Only if you scored higher than 75. And the incentive is that you improve your grade. That's the incentive. You have to choose a topic and you have to choose the group. You have to have 5 people, not 4, not 6, 5 people and you sign a statement after I approve your topic. You give me 2 topics you want to work on. I choose one of them. I usually give them their first choice but I reserve the right to choose a topic because sometimes they choose something I don't know enough about and I don't have time to find out about for that semester. That hasn't happened and that's what I tell them. Topics must be specific and related to chemistry and I want you to write me a report that's got to be 10-15 pages long. 10-25 pages long is the length of this report. At the end of the semester I will sit down with them as a group and will give you a group grade. Everybody

in the group gets the same grade. And if your group grade at the end of the semester is higher than your own individual grade, I'll give you a point. If it's lower, nothing--if it's the same--nothing. OK. Let me see how well you can guess. Every semester, I should tell you, I have very high participation even from students who don't need to improve their grade. What do you think is the largest number of groups that I have had? I have 350 students. The average on the exam is usually 75-80 so probably half the students are eligible. What do you think? 5 groups--10 groups--20 groups. How about 35 groups. One semester I had 35 groups. Now you imagine there are 35 reports, sitting with the students for 45 minutes to discuss their reports, scheduling the groups which is very difficult to accomplish but it is very very worthwhile. One of these days when I can get some help from the University I'd like to videotape those sessions and have somebody critique them. Just for documentation purposes. Alot of these things I have done I have not been able to successfully document.

Now I told you sometimes I have the students sit together in the class and they answer questions--this is a summer course I taught about 3 years ago. They're suppose to do these questions. There are questions 1,2,3,4,5 and they go all the way down to number 9. This is an example to show what the format is like. And they should mark the time they should start and the time they should finish. One of the things I'm trying to teach them in this course is time _____. You know some of these questions are not worth more than 2 minutes or 3 minutes and so there is a sample in that same group. There are the names of the students, they started at 9:54, they answer these questions, they're suppose to talk to each other about it, work it out together and it took them until 10:04 to answer those questions and you can see they worked them out. Many many different opportunities for them to do different types of activities in the class and outside the class.

So what I'd like to do is come back full circle to what I was saying before. I'd like you now to look at this handout but I'd like you to look at the back of it. The back of it has some suggested reading. And you might say that two or three of these maybe even 4 or more of these authors are conservative. Morton Anderson you certainly agree is conservative. Wouldn't you? Out of the Hoover Institute. Worked very hard and effectively in the Reagen administration. His wife was a member of National Science Board. That's a different story that I'd be happy to tell you about sometime. The last two books, I really recommend them to anyone who's interested in reform. If we don't know what it is we're doing, and if we continue to tolerate and allow people to come through our institutions without learning the difference between right and wrong we are making a mistake. And if that's a reservative view point, OK, you can label it as such if you want. And as you read these books and contemplate some of the comments that I have shared with you, I'd like to remind you about the plaque that hangs outside Bascom Hall. So you can actually do the _____ not only in terms of what I said but also in terms of what these other people said. Even if you don't agree with everything that I said or that they say in these publications, it is very very important I think as part of our responsibility as learned individuals, as members of a learned community to know what others are saying. And why are they saying it? So we can even know what it is we are disagreeing with. Instead of just letting everything go. I can site for you as I'm sure you can site for me, specific incidents that have occurred on campus in the past 12 months where the response of the campus has been much less than desirable for dealing with those issues. We lost administrators because of a violation of some university policy and you know what I'm talking about. The policy of reporting to your supervisor if you have a sexual activity with someone who works for you. We lost those individuals because they violated that policy, not because they did something wrong. Bigger than violating that policy. When an administrator gives his or her word to you and you find out that he or she is not able to keep it, what does that say about collective responsibility? What does that say

about our integrity as a community of scholars, as a community of educators, as a community of researchers? What does that say? I don't want to put this on university people, that's one specific example. What I'm faulting here so you don't misunderstand me, is not the policy itself, I think the policy is OK, but beneath it, these people are asked to leave because they didn't report it, not because they did it. I just want everybody to understand what I'm saying to you. Just like you'll understand my next example which comes out not from the university but from our community. On the 5th of September, the Madison school teachers called in sick. You know they weren't sick, the students know they weren't sick, the school board knows they weren't sick, everybody knows they weren't sick. They were sick alright. Just like the rest of us in the community are sick for tolerating that behavior. What does that teach anybody who listens to the announcement that the teachers are sick on the 5th of September. What do the youngsters and the parents of the youngsters learn? (Audience: They took the only action that was available to them.) I'm not attacking the teachers. Don't get me wrong. Listen to what I'm saying. I'm saying all of us tolerate that. Of course they were doing something because they didn't want to do something illegal. Right? They didn't want to go on strike. What does that say about the community standards? We talk about science standards, and math standards. I submit to you in closing that this whole discussion about science standards and math standards never will work until we get ourselves committed to community standards which will include dealing with difficult issues like that. I am on the side of the teachers--that's not my point. My point is that we have to maintain our integrity, we have to have people learn to define what integrity is. So my last transparency is this one. I'd like to thank you for your attention and look forward to hearing from you in person or by e-mail. I'd like each one of you to have a souvenir in addition to the scratch and sniff prize. Just pass this around. Take only one. I thank NISE for affording me this opportunity to go out on a tour that goes beyond the normal discussion that take place in NISE settings but I respectively submit some of these points, even though they're underlying what NISE is trying to do, try

to come to them because they reflect very strongly on us as individuals and as a community. Again thanks for listening.