Classroom Management for Successful Student Inquiry

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Classroom management is an important concern of every teacher. Experience, however, indicates that this is especially true when a teacher is using inquiry-based activities (Jacobowitz 1997; Lawson 1995). Students focus on observations and cooperative group interactions (Lawson 1994; 1988). The teacher becomes a participant in the exploration rather than the focus of student attention. He or she moves from one group of students to another and must provide helpful suggestions or probing questions (Lawson, Abraham, and Renner 1989).

To some this approach may appear to lead to a loss of order. In reality, however, good inquiry-based activities, when properly introduced, increase student interest and motivation, and that greatly reduces classroom control problems. Rather than a purveyor of information, the teacher is now a fellow investigator into interesting questions and phenomena (Lawson, Abraham, and Renner 1989). Student motivation shifts from an extrinsic desire for a good grade, which only some students view as possible or even desirable, to an intrinsic one of satisfying a curiosity about nature (Lawson 2000).

Even so, in implementing the National Science Education Standards, we have found that many teachers encounter classroom management problems in inquiry teaching. In this article we will briefly describe some of these problems and suggest some ways to avoid them or reduce their severity. It is extremely important that a teacher develop techniques that allow the effective implementation of inquiry-based activities.

Identifying Classroom Management Problems

During a recent semester, we asked a group of middle school teachers to generate a list of common classroom management problems they experienced while implementing inquiry lessons. They then ranked each problem in terms of its severity (not a problem, slight problem, moderate problem, serious problem, or very serious problem). We show these classroom management concerns and their average ranking in severity in appendix A. We then asked the teachers to consider each in turn and suggest ways to overcome them.

Solving the Problems

Virtually every experienced teacher when first introduced to the learning cycle agrees with its emphasis on creative and critical thinking but has one question: Will I be able to do it with my students? The answer is an emphatic yes! The learning cycle consists of exploratory activities guided by the scientific method in three instructional phases: exploration, term introduction, and concept application (Lawson 1988; Lawson, Abraham, and Renner 1989). This process allows for meaningful questioning, discovery, and understanding of newly constructed concepts. However, to implement inquiry in the classroom, some solutions to classroom management problems are needed. The following tips have proven successful for elementary and middle school teachers.

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Time and Energy

Some teachers argue that too much time and energy are involved in teaching hands-on lessons. This is especially true for teachers who usually rely on text-based programs and prepared materials that make day-to-day preparation relatively easy. Initially, preparation required for inquiry activities is more time consuming. However, just as with other teaching styles, once the development has been accomplished, time commitments to the program will decrease significantly each year.

In the case of inquiry labs, energy is required to prepare lab materials, but no more than is required for traditional activities. Inquiry-based lessons may actually require less effort to teach because students soon become motivated and involved in the process, requiring less supervision. In many cases all that is needed is an occasional suggestion of ways to begin. Educators have the opportunity then to model the use of mental energy that problem solving and creative thinking require as a norm.

Classroom Constraints

Surveys have revealed that 40 percent of all science classes are taught in classrooms that were not designed for laboratory use, although only 25 percent of the teachers in those rooms felt the room was inadequate for that purpose (Hurd et al. 1980). This seemed to be a problem for those considering the learning cycle approach, which requires students to apply their newly acquired knowledge to practical assignments. However, poorly equipped rooms do not seem to be as limiting as some teachers argue. Besides, inquiry does not happen because of furniture, it happens because teachers' and students' minds are at work!

Reading Levels and Language Skills

Teachers often feel that inquiry places greater demands on students' verbal and reading skills. Empirical research has shown that middle school students are concrete operational or empirical-inductive thinkers. Therefore reading about scientific inquiry, which is guided by reflective or hypothetical-deductive reasoning, can be difficult for young learners.

Expository, fact-laden textbooks place no such demands on student thinking. In fact, they only place demands on memorization ability. But challenging students' thinking is far better than taxing their ability to memorize. Thinking skills can be improved and are of general use, whereas rote recall of isolated facts has little value.

Therefore, the book should be a supplement to class activities rather than the ultimate source of all that is right or wrong. The readings should be assigned after the inquiry lessons on topics being investigated—not before. In this way reading assignments serve to reinforce and enlarge the already introduced terms. The focus of student attention is the scientific thinking.

Student Immaturity

Sometimes teachers argue that inquiry cannot be used because their students are too immature and waste too much time. If students are wasting time, that is a problem of classroom management, not the inquiry method. If investigations are at an appropriate level, then interest should be high and participation widespread. This requires that teachers become familiar with lessons ahead of time and modify activities to meet individual student levels. Students have the option to waste a learning opportunity with any method, not just with the inquiry method.

Leonard (1989) provides many good suggestions for teacher techniques that will maintain participation. Using his extended discretion approach, students begin with fairly structured inquiries that require little autonomy. Gradually, the structure is decreased and student autonomy increased. Inquiry does mean more noise and activity, but the argument that elementary or middle school students are too immature to inquire cannot be accepted. Classroom experience has shown that elementary school students are fully able to participate in inquiry lessons that are properly designed and carried out.

Safety Concerns

Sometimes teachers argue that inquiry cannot be used because of safety concerns. This objection appears valid, but teachers must also keep in mind that inquiry lessons can be taught without the traditional hazards associated with science activities. It requires creativity on the part of the teacher to find alternative materials. Much inquiry can be achieved with materials just outside the classroom, whether purchased at local stores or brought from students' homes. A world of living things is available to all teachers, and bags of seeds from the grocery store work just as well as those from supply companies—and at a fraction of the cost!

Safe implementation of these activities depends solely on the teacher and is the responsibility of the local school, district, or institution. Inquiry activities are designed to be conducted safely in the classroom under the supervision of properly trained and responsible teachers. We suggest that teachers consult safety manuals or textbooks for more specific relevant information. It is best to get legal advice from your school or school district concerning these issues.

Thinking Skills Required

Usually, concern about students' thinking skills arises not because inquiry is so difficult, but because in most cases students have not been allowed previously...
to think for themselves and to make mistakes. The inquiry approach does not allow a student to be inactive, as in the traditional expository approach. Being an active participant creates an unfamiliar situation for some, and they may lack the requisite skills at first.

An excellent strategy to use when students are struggling to come up with hypotheses is to stop the class discussion and ask them to convene a discussion among the students sitting at each lab table to generate some hypotheses. In fact, this strategy of asking students to brainstorm in small cooperative groups works well in many other situations as well. Be prepared to call for such discussions whenever students need more time to think. Teachers should not give up inquiry just because expository schooling typically constitutes most of the students’ past experience. Going along with traditional practices does not create a better educational atmosphere.

Sequencing

Another objection teachers expressed is that adopted textbooks or curricula lock them into a specific schedule that they cannot modify. Teachers were concerned that the inflexibility of some programs did not allow them to alter the order of activities when the situation warranted.

The disadvantage of a chapter-by-chapter presentation of scientific facts is that students are given the impression that the material presented in each chapter in no way relates to others. The study of science becomes an exercise in memorization. What possible purpose can this serve? Teachers and districts should develop their own sound curricula that are independent of any text.

Teachers should isolate the theories that provide an accurate and adequate understanding of the discipline. Then, using an inquiry framework, find activities that help develop those theories.

Once this process is complete, resources (not necessarily a textbook) should be selected that best meet the goals of the curriculum. These are used for reference rather than as the center of classroom instruction. Research and experience have shown that this process produces a better curriculum.

Support

Many teachers fear that administrators will not understand what is going on. A teacher may reason, “When using inquiry, I’m not sure how each unit will turn out. My principal will think I’m doing a poor job.” Granted, failures tend to be blamed on the method of instruction, and unsympathetic administrators often seem to agree. The teacher’s duty is to instruct the administration in the proper use of inquiry in the classroom and to acquaint administrators with the data that show inquiry to be a superior approach to teaching.

Leaving the security of the norm thus takes some courage. Yet can our society continue to let teachers risk losing students by boring them day after day with traditional, expository teaching? Can teachers continue to trade good thinking and problem-solving skills for memorization of unnecessary facts? The modest personal risk is less than that to society if our schools fail to provide students with an education in thinking.

Materials Management

To solve the problem of managing materials, make sure to announce a clean-up policy at the start of the semester and stick with it. For example, you may decide to allow students to work up until a set time in the lab period and then require them all to participate in clean-up, with one or two students assigned specific tasks such as erasing the boards. Then, do not excuse anyone until the lab is cleaned to your satisfaction. Problems arise largely due to lack of a clean-up policy or inconsistent enforcement.

Conclusion

We have summarized our suggestions in appendix B. By using them, teachers new to inquiry can deal with the inevitable problems that arise. Clearly there is much to keep in mind as one attempts to successfully guide student inquiries. Developing the needed teaching skills takes practice and commitment. But once they have been acquired, the inquiry classroom becomes a very exciting and rewarding place that provides students with knowledge that they can use far beyond the confines of that classroom.

Research and experience indicate that the inquiry classroom presents the teacher with unique challenges that often require them to modify activities to meet individual student needs. Hands-on inquiry activities have proven to effectively assist students in understanding content and acquiring process skills. Classrooms are more successful when teachers are able to differentiate instruction. The correct use of inquiry-based activities allows such differentiation. The classroom management strategies described here will allow you to engage in successful student inquiry without undermining your students’ research efforts. We encourage you to give them a try!

APPENDIX A

Classroom Management Concerns of Middle School Teachers Using Inquiry Lessons

Time and energy (Serious to moderate problem)

- Difficulty monitoring 6-8 different groups
- Class period time constraints
- Not enough time to set up between classes or periods
- Teachers not willing to go beyond the text
Classroom constraints (Serious to moderate problem)

- Too many students
- Too little space
- Too many interruptions
- Inquiity is too noisy
- Physical set up of room, tables, and chairs does not promote interaction

Reading levels and language skills (moderate to slight problem)

- Language barriers
- Students with limited writing proficiency have difficulty with lab reports

Student immaturity (moderate problem)

- Many have short attention spans
- Students do not stay in groups
- Lack of cooperative learning skills
- Students do not follow directions

Safety concerns (slight problem)

- Overall safety with materials
- Students do not always follow safety rules
- Students who play, not investigate
- Restrictions on chemicals or animals in the classroom

Thinking skills required (moderate to slight problem)

- Students with diverse learning levels
- Students lack data collection skills

Sequencing (moderate problem)

- Tardy or absent students
- Groups finish at different times
- Text use is required

Support (serious problem)

- Not enough supervisors or adults for groups
- No parent support
- Administrators are not familiar with hands-on learning
- Curriculum emphasizes reading and math, but not science
- No financial support

Materials management (serious problem)

- Materials get broken, lost, and stolen
- Materials not in kit supplied with textbook resources

APPENDIX B

Teacher-Generated Solutions to Classroom Management Problems

Time and energy

- Teachers should become familiar with lesson ahead of time
- Prepare all equipment in advance
- Plan ahead for clean-up/set-up and enlist student helpers

Classroom constraints

- Rearrange desks
- Use a set-up conducive to monitoring (horseshoe or u-shape)
- Split the class and alternate stages of inquiry
- Explore team teaching

Reading levels and language skills

- Plan groups to include a mix of levels, late students, and language skills
- Use peer tutors
- Use ESL resources for vocabulary and worksheets

Student immaturity

- Teach cooperative learning skills first
- Give feedback throughout
- Monitor groups and provide feedback on roles
- Use predetermined signals for noise reduction
- Try team building activities or sensitivity training
- Begin with structured inquiries and gradually decrease structure

Safety concerns

- Anticipate problems
- Teach safety first
- Enforce rules and consequences
- Have students develop their own directions based on objectives of the lesson

Thinking skills required

- Model data collection procedures
- Use thinking skills pretests
- Modify activities to meet individual student levels
- Try mixed ability groups

Sequencing

- Allow students time to explore freely
- Work with tardy or absent students after school
- Assign peer tutors for tardy or absent students after school

Support

- Talk to administrators about needs in order to do inquiry
- Provide overview of needs in teacher/administrative inservices
- Point out that it is required for science assessment
- Bring parents in through letters home or science day activities

Material management

- Plan ahead for clean-up and set-up
- Enlist student helpers
- Use simple inventory control, like labeling items in kits
- Keep materials in a tub or box so students know where to return them
- Emphasize the importance of the material manager role
Key words: classroom management, inquiry teaching, class activities, student participation

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