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A Comparative Study of Student Perceptions and Teacher Perceptions of Classroom Practices in Advanced Ninth-Grade Biology

Evelyn C. Hart
University of North Florida

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by

Evelyn C. Hart

to

Drs. E. Schirer and M. Betkouski

Department of Education

University of North Florida

Jacksonville, Florida 32216

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A Comperative Study of Student Perceptions and Teacher Perceptions of Classroom Practices in Advanced Ninth-Grade Biology

The high standards of the curriculum for Advanced Ninth-Grade Biology as set forth by the school board mandate that the students enrolled in these classes must be of superior caliber. Therefore, the curriculum and the students determine to a large extent the teaching strategies used by the teachers assigned to teach these courses. Based on these requirements, one may assume that most, if not all, of the teachers assigned to teach these courses are well versed, educationally prepared and capable of handling the curriculum materials and classroom management. As suggested by informal student assignments of teachers, most of these teachers have good rapport with the students and strive diligently to meet their needs.

Because of the requirements placed on the students and teachers in these classes, one can readily preceive that the lessons are well-planned and that the students basically know the direction in which they are headed. Usually a set of objectives for the course has been displayed and discussed, and the students have been informed of their responsibilities in meeting these objectives successfully.

Even though plans are carefully made and followed as closely as possible, it is suspected that the teacher's perception of what is actually taking place in the classroom may be altogether different from that of the students. One may stop a student--any student--in the hallway, in the lunch room, on the bus, anywhere, and ask him what is going on in a particular class. Very often that student's response will differ from the response of the teacher who taught that particular class.

In a science classroom, especially on with the more advanced students, it is not unusual for one to observe a conglomeration of different, but meaningful, activities taking place simultaneously; invariably the same or a similar objective is being met by all of these activities. The tone of the class, often determined by bulletin boards, models, charts, and specimens, has been set by the teacher in accordance with the objectives to be mastered by the students, and allowances have been made for individual needs. One could ask, however, what is taking place in that class beyond the obvious completion of various activities and tasks. The question, then, becomes one of determining why there are such variations in student achievement levels when many learning activities are offered with the intent of meeting students' varied learning styles.

As a partial response, one could say that teachers, for whatever educational, philosophical, practical, or religious reasons, may have preconceived ideals about what the abilities of early adolescents should be. However, many times these ideas are erroneous. Many studies have been conducted in which the results show that what students should be able to do, as conceived by the teacher, is not, in actuality, what the student is capable of doing as determined by classroom participation, informal surveys and standardized tests.

There are several possible reasons for such misconceptions. For example, during student teaching when the regular classroom teacher has "prepared" the class to receive an intern for a few weeks, and through limited observations of other teachers' classes by these interns, prospective teachers may find themselves assuming that homogeneously grouped students can function and learn approximately the same content materials and process skills at the same rate using the same or similar methods. However, it must be remembered that these students are grouped as a result of test scores which are subject to error and are many times misplaced in either a higher or lower ability group. Moreover, there is still variation in ability even within the most homogeneous group of individuals.

Teachers in many parts of the country have been advocating smaller class sizes for years because they are led to believe that students can learn better in smaller classes. However, recent research indicates that the greatest advantage of smaller class size is the opportunity for teachers to be more creative and innovative. Research does not support that more learning occurs in smaller classes.

Many teachers also have the mistaken conception that because students score high on standarized tests, they automatically have the ability to participate, and will participate, in class discussions and activities at a much higher rate than students who score lower on these tests. They feel that the converse is true for those who score lower. Moreover, because of "advanced" students' higher reading and comprehension abilities, teachers sometimes assume that their use and treatment of textbook and other reference and supplementary materials is superior to that of lower scoring students; therefore, these students are directed into independent studies where they are left alone to accomplish tasks that may be too difficult and require thought processes that are beyond the scope of their true abilities.

Many studies have been conducted to ascertain the abilities of students at different ages and grades. The results of many of these studies reveal that a number of variables influence the way students respond in different situations. For example, a student's enthusiasm for a particular topic in a class may lead a teacher to believe that he is capable of far greater achievement in the entire course than he is demonstrating. On the other hand, if a good student is in a class where he is bored, unmotivated, and irritated, he may not impress the teacher favorably and thus may fail that course. The teacher may not, therefore, assess accurately the ability of a student if he considers observable behavior alone.

Teachers can formulate misconceptions about their students' abilities if they fail to account for developmental factors which may be operating. Many teachers visualize early adolescents as young adults capable of making reasonably responsible decisions. This is seldom the case, for at the age of fourteen or fifteen, these young people may still enjoy many of their childhood pranks and activities. They still depend on adults to make most of their important decisions. Some, though not very many of them, have not developed an acceptable degree of self-discipline to handle themselves effectively in our rapidly changing society. While a large number of these adolescents have gained the physical stature of early adulthood, they are still somewhat awkward in their movements and manipulative skills. This adds to their difficulty in performing many of the tasks, requiring a degree of dexterity, which are being thrust upon them by their adult conterparts. In addition, their capacity for reasoning, abstract thinking, and decision making is at such a level that they need to be guided soundly by adults with stabilized judgement into the proper channels of thought processes and non-verbal reasoning.

In light of the various misconceptions described above, it appears that there may be a discrepancy between what a student is able to do and teach expectations. Because of these possible discrepancies, inappropriate classroom practices may be used. For example, subject matter may be presented in a manner that does not foster comprehension. Students may be afraid to expose themselves to the ridicule of peers by admitting a lack of comprehension; thus students may also create a barrier between themselves, their peers or teachers which could lead discipline problems.

It would appear that examination of student and teacher perceptions of classroom practices might provide information useful in explaining the descrepancies among what teachers think they are doing and what the students see them doing, the achievement and attainment levels of the student, and the application of process oriented science and traditional textbook science. Therefore, the purpose of this project was to determine if a discrepancy exist between student and teacher perceptions of classroom practices in Duval County junior high schools. Specifically, this project attempted to answer the question: Do the perceptions of Advanced Ninth-Grade Biology students in Duval County parallel those of their teachers with respect to the strategies being used, the treatment of text and related materials, the laboratory assignments and the follow-up to them, and the level and kind of overall student and teacher participation in the classroom?

This study involved the administration of a questionnaire, the "Biology Classroom Activity Checklist" (Kochendorfer, 1967), to ten volunteer ninth-grade biology teachers and at least one of their biology classes. It was the intent of this study to administer the questionnaire in order to collect data to ascertain whether students and teachers perceptions of what is going on in the classroom are similar, and to what degree they are similar.

Definitions of Terms

1. Concrete operations: According to Piaget, the period in the child's mental development from preschool through upper elementary grades (about junior high school) in which analysis of situations and events is based largely upon present perceivable elements.

2. Formal operations: According to Piaget, the final stage in mental development of the child in which he is able to use symbols and deal with abstractions.

3. Perception: In its most limited sense, awareness of external objects, conditions, relationships, etc., as a result of sensory stimulation.

4. Classroom technique: The particular method of execution chosen by the teacher to transmit to students in the classroom the knowledge of some skill, theory, or idea.

5. Informal evaluation: Appraisal of an individual's status or growth by means other than standardized instruments.

6. Basic skill: A skill that is fundamental to the mastery of a school subject.

Review of Related Literature

Teaching Methodology

A review of the literature disclosed no recent studies relating to student and teacher perceptions of classroom practices on the junior high school level. However, there were many exhaustive and conclusive studies regarding student attitudes, abilities, achievement, and behavior (Parker, 1977; Atwood, 1978; Berger, 1978; Hess, 1978). Teacher attitudes, practices and perceptions of different aspects of students and schooling were also found in many of the studies reviewed (Parach, 1965; Orgren, 1977; Roger, 1967; Tyler, 1966).

There is presently a great deal of controversy among educators concerning the abilities of early adolescents. For instance, Chiappetta (1975) reported on several studies at the National Association for Research in Science Teaching Convention which indicated "that normal adolescents are unlikely to reach the level of formal thinking until their late teens or early twenties if they reach it at all" (p. 1). From studies such as this came the generalization that "the majority of adolescents and adults function at the concrete operational level and not at the formal operational level when having to deal with abstract science materials" (p. 1). Therefore, if this is indeed the case, then the methods employed to teach science to ninth-grade students would need to be adjusted accordingly.

Weiss (1978) reported that lectures and discussions are the predominant techniques used in science, mathematics, and social studies classes. Discussions occur "just about daily" (p. 17) in half or more of these classes. Approximately two-thirds of the classes in each subject have lectures once a week or more, with many of these classes having lectures "just about daily" (p.17). Science and social studies classes are generally more likely than mathematics classes to use alternative activities such as library work, student projects, field trips and guest speakers.

Berger (1978) stated that teachers should introduce a lesson using concrete laboratory examples and then move to formal thinking, rather than introduce the formal laws and verify them with laboratory work. "Hands-on" problem-solving science sessions can show students that when they believe they can control situations, they can predict what will happen. This has great portent for the future.

The Association for Supervision and Curriculum Development (ASCD) News Exchange (1978) reported on a study designed to determine the status of science, mathematics, and social studies in the aftermath of two decaeds of improvement efforts at local, state and national levels. One study related that students spend their time processing the contents of the textbooks in some way by filling out worksheets, writing answers to questions at the end of the chapter, or taking part in teacher-led recitations. This indicates that more emphasis is placed on rote memory than on the process used. In contrast, studies tend to substantiate the belief that students retain more when they are actively involved in the learning process.

Class Size

While investigating the relationship between class size and student achievement, Hess (1978) reported that studies concerning class size fall into three basic groups: those relating class size to academic achievement, those relating class size to institutional factors, and those relating class size to financial conditions. Most of the research has focused on achievement and has revealed little relationship between class size and academic success. Research has also been conducted on institutional factors. While reductions in class size spur innovations in teaching methods, it is not clear whether the relationship is direct, nor has it been shown that the innovative techniques themselves lead to any real results in terms of student achievemtnt. Financial considerations reveal only that larger classes are less expensive to operate.

Student Responsibilities

Parker (1977) believed that junior high school students should be responsible for their own basic skills and that, from the time a student is promoted to seventh grade, he should be confronted with the minimum competencies in which he must perform proficiently to be eligible to advance to the next higher grade. Parker stated that students should be trained to recognize acceptable and unacceptable

Performances in basic skill areas, and to discover their errors and discuss their error patterns with the teacher.

Berger (1978) concluded that, with limited training, science teachers can move toward allowing students to make more of the classroom decisions. When this happens, he found students made better predictions and were able to solve problems better, and that teachers became better listeners. Teachers who move in this direction would, therefore, experience a change classroom situation in which students could develop more consistent thought, that is what is often called scientific literacy.

Student Preferences for Learning

In a study of science process attainment, Atwood (1978) concluded that a strong preference for application is both advantageous and desired by students in ninth-grade science. He noted that student preference for memory or questioning is neither an advantage nor a disadvantage in terms of learning. This means that rather than conventional textbook science, ninth grade students prefer to become involved. They prefer to learn by doing, as well as by applying knowledge gained.

Classroom Practice

In an attempt to identify and determine favorable classroom practices in high school biology, Kochendorfer (1967) formulated a list of teaching practices that were judged to contribute positively to the attainment of inquiry objectives. Since a need for a method of observation of realities in the classroom existed, and a trend in science toward inquiry rather than conventional science was evident, Kochendorfer used a checklist to determine the amount of inquiry and the degree to which teaching methods paralleled the stated objectives. He found that a comparison of the profiles of individual teachers - based on student assessment - revealed specific differences in classroom practices among individual teachers and groups of teachers.

Summary

There are many underlying factors which contribute to the overall perception of observable classroom practices. The view one takes of these factors, however, is determined largely by his point of reference. For the teachers, that point of reference may have as its basis their philosophical ideas and/or ideals. The student, on the other hand, may take a realistic view of a situation and judge it at face value. Thus, having conflicting reference points may be the deciding factor which caused the perceptions of teachers and students to differ at times with regard to classroom practices.

Hypothesis

A comparison of the perceptions of ninth grade biology students and their teachers was conducted to test the following null hypotheses:

1. There is no significant difference in the perceptions of teachers and their students on the role of the teacher in the classroom, student participation in the classroom, the use of textbook and related materials, the way tests are designed and used, laboratory preparations, types of laboratory activities, nor laboratory follow-up activities.

2. There is no significant difference in the perceptions of teachers and their students on the type of activities that take place in the laboratory portion of a biology class and the type of activities which occur in the classroom portion of a biology class.

SAMPLE QUESTION

Checklist

Answer Sheet

1. My teacher often takes class attendance. 1. A D

If the statement describes what occurs in your classroom, blacken the space containing the letter A (AGREE) on answer sheet; if it does not, blacken in the space containing the letter D (DISAGREE).

REMEMBER:

1. The purpose of the checklist is to determine how well you know what is going on in your classroom.
2. Make no marks in this booklet.
3. All statements should be answered on the answer sheet by blackening in the space under the chosen response in pencil or ink.
4. Please do not write your name on this booklet or answer sheet.

SECTION A

1. Much of our class time is spent listening to our teacher tell us about biology.
2. My teacher doesn't like to admit his mistakes.
3. If there is a discussion among students, the teacher usually tells us who is right.
4. My teacher often repeats almost exactly what the textbook says.
5. My teacher often asks us to explain the meaning of certain things in the text.
6. My teacher shows us that biology has almost all of the answers to questions about living things.
7. My teacher asks questions that cause us to think about things that we have learned in other chapters.
8. My teacher often asks questions that cause us to think about the evidence that is behind statements that are made in the textbook.

SECTION B

9. My job is to copy down and memorize what the teacher tells us.

10. We students are often allowed time in class to talk among ourselves about ideas in biology.

11. Much of our class time is spent in answering orally or in writing questions that are written in the textbook or on study guides.

12. Classroom demonstrations are usually done by students rather than by the teacher.

13. We seldom or never discuss the problems faced by scientists in the discovery of a scientific principle.

14. If I don't agree with what my teacher says, he wants me to say so.

15. Most of the questions that we ask in class are to clear up what the teacher or text has told us.

16. We often talk about the kind of evidence that is behind a scientist's conclusion.

SECTION C

17. When reading the text, we are expected to learn most of the details that are stated here.

18. We frequently are required to write out definitions to word lists.

19. When reading the textbook, we are always expected to look for the main problems and for the evidence that supports them.

20. Our teacher has tried to teach us how to ask questions of the text.

21. The textbook and the teacher's notes are about the only sources of biological knowledge that are discussed in class.

22. We sometimes read the original writings of scientists.

23. We are seldom or never required to outline sections of the textbook.

SECTION D

24. Our tests include many questions based on things that we have learned in the laboratory.

25. Our tests often ask us to write out definitions of terms.

26. Our tests often ask us to figure out answers to new problems.

27. Our tests often ask us to relate things that we have learned at different times.

28. Our tests often give us new data and ask us to draw conclusions from these data.

29. Our tests often ask us to put labels on drawings.

SECTION E

30. My teacher usually tells us step-by-step what we are to do in the laboratory.

31. We spend some time before every laboratory in determining the purpose of the experiment.

32. We often cannot finish our experiments because it takes so long to gather equipment and prepare solutions.

33. The laboratory meets on a regularly scheduled basis (such as every Friday).

34. We often use the laboratory to investigate a problem that comes up in class.

35. The laboratory usually comes before we talk about the specific topic in class.

36. Often our laboratory work is not related to the topic that we are studying in class.

37. We usually know the answer to a laboratory problem that we are investigating before we begin the experiment.

SECTION F

38. Many of the experiments that are in the laboratory manual are done by the teacher or other students while the class watches.

39. The data that I collect are often different from data that are collected by the other students.

40. Our teacher is often busy grading papers or doing some other personal work while we are working in the laboratory.

41. During an experiment we record our data at the time we make our observations.

42. We are sometimes asked to design our own experiment to answer a question that puzzles us.

43. We often ask the teacher if we are doing the right thing in our experiments.

44. The teacher answers most of our questions about the laboratory work by asking us questions.

45. We spend less than one-fourth of our time in biology doing laboratory work.

46. We never have the chance to try our own ways of doing the laboratory work.

SECTION G

47. We talk about what we have observed in the laboratory within a day or two after every session.

48. After every laboratory session, we compare the data that we have collected with the data of other individuals or groups.

49. Our teacher often grades our data books for neatness.

50. We are required to copy the purpose, materials, and procedure used in our experiments from the laboratory manual.

51. We are allowed to go beyond the regular laboratory exercise and do some experimenting on our own.

52. We have a chance to analyze the conclusions that we have drawn in the laboratory.

53. The class is able to explain all unusual data that are collected in the laboratory.

Procedure. This study included ten teachers and their three hundred twenty ninth grade students from ten public junior high schools throughout Jacksonville - a moderate sized metropolitan city in northeast Florida. The students were enrolled in Advanced Ninth-Grade Biology and were selected for that course on the basis of test scores received in English and Mathematics classes, and their science teachers' recommendations.

Advanced Ninth-Grade Biology was instituted into the science curriculum for the first time in the 1978-79 school year. As for all advanced courses, it covers the same topics, but in more depth than the standard course in Biology, and includes some topics beyond those in the standard course. In addition, more emphasis is placed on application of knowledge than on recall.

As stated in the introduction of this paper, the teachers of these students were certified in the subject area, experienced in the field, and capable of handling the curriculum materials and classroom management. Therefore, it was assumed that they were among the best qualified to handle the demands placed upon them by the objectives of the course.

There were two favorable conditions for this study: the positive attitude of ten volunteer teachers of Advanced Ninth-Grade Biology -- there are thirteen in the county -- and a cross-section sample of students from different sections of the county.

The same instrument, the Biology Classroom Activity Checklist (BCAC), developed by Kochendorfer, was used to assess the perceptions of the teachers and students to determine to what degree they agreed with each other regarding what was going on in their biology classes.

Horst (1949) developed a reliability measure based upon comparison of the variances. The reliability coefficient obtained with this formula was .96. Using this procedure, there were several indications of the validity of the BCAB. A correlation of .84 among the judgmental evaluations of several observers indicated the content validity of these items.

Because the reliability, validity and usability of this instrument has previously been established (Kochendorfer 1967), it was chosen as a method of obtaining data on seven different groups of classroom practices as follows:

Section A - Role of the Teacher in the Classroom

Section B - Student Classroom Participation

Section C - Use of Textbook and Reference Materials

Section D - Design and Use of Tests

Section E - Laboratory Preparation

Section F - Type of Laboratory Activities

Section G - Laboratory Follow-up Activities

The answer sheets for the questionnaire were scored by sections, indicating the correct number of responses as compared to a key which has a highest possible score of 53. The more closely the answers paralleled with the key, the more inquiry oriented the classroom and laboratory were preceived to be by teachers and students.

Section A through D dealt with the classroom, while sections E through G dealt with the laboratory. These were designated as P1 and P2 respectively in the statistical analysis data.

The mean, standard deviation and variance were computed for each of the following variables: A, B, C, D, E, F, G, P1, P2, Total and Group. Correlation coefficients were also computed on both the teacher and student groups to assess the possibility of consistency in perceptions of classroom and laboratory practices.

Table 1

Comparison of Mean

Variable	Mean (GRP-1)*	Mean (GRP-2)*
A - Role of the Teacher in the Classroom	5.60	4.46
B - Student Classroom Participation	5.10	3.87
C - Use of Textbook and Reference Materials	4.60	3.47
D - Design and Use of Tests	4.00	3.06
E - Laboratory Preparation	5.00	4.40
F - Type of Laboratory Activities	5.60	4.73
G - Laboratory Follow-up Activities	4.80	3.95
P1 - Sections A - D	19.30	14.87
P2 - Sections E - G	15.40	13.09
TOT - P1 and P2	30.70	27.97

*Group 1 - N=10
*Group 2 - N=320

Table 2

Analysis of Variance

Variable	PR>F	Standard Deviation-GRP-1	Standard Deviation-GRP-2
A	.0025	1.349	1.155
B	.0049	0.994	1.359
C	.0109	0.843	1.380
D	.0386	1.699	1.391
E	.1043	1.154	1.140
F	.0345	1.505	1.262
G	.0369	1.475	1.242
P1	.0001	3.497	3.163
P2	.0031	3.405	2.375
TOT	.0001	5.578	4.561

Results and Conclusions

The tests of significance used on the seven classroom and laboratory practices characteristic variables were the F-test, the analysis of variance and the correlation coefficients. The results of each of the variables A through E were compared for student and teacher groups and for P1 (classroom practices) and P2 (laboratory practices). Table 1 shows the means of the variables for teachers (GRP-1) and the students (GRP-2) which indicates the statistical significance of the differences of perceptions for each of the variables.

It is apparent from observation of the standard deviations in Table 2 that testing (D) is the area that has the most disagreement as to perception for both the students and teachers. The two areas where teachers appear to agree most among themselves are student classroom participation (B) and the use of textbook and reference materials (C). These same areas, B and C are also the least agreed upon among students, and show very significant different views between students and teachers.

While both the classroom activities sections A - D (P1) and the laboratory activities sections E - G (P2) show significant differences in perceptions of what is happening in the classroom as preceived by teachers and students, the P2 group shows a much closer view point between teachers and students than P1.

The PR > F-values were computed according to standard statistical tables and techniques, and the significance of the F-value was determined by the use of a table for the unit normal curve. From these results, the most significant difference in perception of what is happening in the classroom is apparent in the role of the teacher (A). The only non-significant different perception is in laboratory preparation (E). The role of the teacher and laboratory preparation, coincidently, happen to be the two areas that students agree the most among themselves.

Based upon the results of this study, the only null hypothesis set forth which can be rejected is the perception of laboratory preparations. Not only do students precieve the role of the teacher differently, there is significant disagreement among the teachers themselves, eventhough they are using the same objectives. Students appear to agree that they have less participation in the classroom than the teachers preceive them as having. There is greatest disagreement between teachers and students on the use of textbook and reference materials. The most concurrance in perceptions between teachers and students was in the design and use of tests.

It seems reasonable to assume that there was no significant difference in perceptions between teachers and students on laboratory preparations because of the physical activities involved. However, the types of laboratory activities and the laboratory follow-up activities were preceived differently by teachers and students.

Suggestions for Further Research

Because of many limiting factors, this study was confined to a minute segment of the overall manifestations exhibited in practices which occur in a particular classroom. Results on correlation coefficients were analyzed, but not included in this study. There was not comparison of responses of students by particular teachers. Great interest may be generated in the results of responses in one section of the city as opposed to another section.

The numbers of individuals included in the two groups in this study may be a highly significant factor in determing the results obtained, therefore a high degree of bias may be incooperated. It is hoped that further study in this area may reveal more continuity in agreements of the perceptions of teachers and students of classroom practices in Advanced Ninth-Grade Biology.

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