

A Science Class in a California School

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A combination physical science class with students from grades 9-11 was observed in a multi-ethnic school for a period of three weeks. The investigator observed and audiotaped seven class periods, each of 59 minutes duration, interviewed three science teachers, and collected documents such as seating charts, student grade reports, work sheets, question papers, etc. There are two major themes that can be inferred fairly accurately from the study. (1) Classroom processes can be conceived to have three distinct phases - - the opening phase, the instructional phase, and the closing phase. (2) Teacher's philosophy and personality are translated into teacher's behavior and transpired in classroom management.

The Holy Angels High School is located in San Pedro, California. San Pedro is a rapidly growing area and the school is in its third year of existence. The school looks like a typical suburban high school. The glass windows of the front red brick building have a lot of posters on it. One yellow poster cautioned every visitor: "Kinds Zone" enter with care and love. There are several other posters regarding 'Cinco de Mayo' (a Mexican festival) celebrations.

The school is a 9-11 multi-ethnic high school offering college preparatory, general education, and vocational courses. The total enrolment in the school is approximately 1500. The student body consists of approximately 53% White, 24% Hispanic and 16% Black students, and the remaining 7% is Asian and students of other origin.

Throughout the school, there is a great concern for discipline and order. As students move from one class to another, campus supervisors are on duty in the corridors to ensure orderly movement. A total of nine staff members - - two vice-principals, one dean, and six campus supervisors, provide for the disciplinary function. Disciplinarians move around with walkie-talkie/radio and count loudly: ten, nine, eight.... go. Before counting 'one' the student should

get to the class. One of them was following a group of three girls asking: "Where are you supposed to be?" Students walking in the campus after the bell, were holding up the "yellow card" (the card showing permission) establishing their legitimacy to move around. Disciplinary staff is asking for the "yellow card" from students who are still at the lockers where they keep their personal belongings such as books, back-packs, shoes, and sports items.

One police vehicle is invariably at the 'bus loading zone,' the no parking area, during the third period. A female police officer is meeting with four students. The disciplinary staff who was keeping those students in the lunch area, for the officer to come, was listening to the conversation and was nodding his head. The two soft-drink vending machines near the lunch area are without any customers. As students pass between classes, many of them are searching for something in their lockers. The clattering sounds of the locker doors indicate the beginning of the next period. The metal lockers reinforce the institutional feeling of the school campus (Lipsitz, 1991, p. 109).

At the time of the study, the staff of the Holy Angels included sixty-eight regular education teachers, one principal, two vice-principals, one dean, three counsellors, one librarian, six campus supervisors, and other non-teaching, administrative, custodial, and cafeteria staff. Each of the regular education teachers served a maximum of 165 students per day. Most of the regular education teachers are working in a area of their specialization. In an interview with Mr. Charles, the science teacher, asserted: "Physical science only that is the only thing that I can teach."

Mr. Charles is a physical science teacher with four years of teaching experience. He has a chemical engineering background with fifteen years of experience in that field. He is a religious man who attends Bible study classes to which he refers to occasionally during his instruction. For example, he mentioned about one of his ailing friends, a cancer patient, who attends the same prayer group, while he was discussing radiation therapy in the class. On another occasion, during group work, he explained to Mary, a student, the different backgrounds of authors of the four Gospels. Mary was reading the Gospel according to St. Matthew while the teacher was lecturing.

Mr. Charles demonstrated a strong sense of ethics. He discussed with the class how his daughter, Nancy, fell off from bed (suspected child abuse) while she was with the baby sitter on the previous day. His daughter had bruises on

both cheeks, which resembled four finger prints, and two bumps on the forehead. Antony, a student in the class, suggested: "Mr. Charles, you can quit you job (a big laughter) by taking the case to the court." Mr. Charles responded quickly: "Making money out of my daughter's bruises and cuts! I am not for that."

Mr. Charles is teaching a combination physical science class with students from grades 9, 10 and 11. The students in the class are not college bound. The teacher remarked: "This science class is a graduation requirement." This indicated that the students are not there because they wanted to take the course (Jackson, 1990, p.9)

The chairs in the classroom were arranged in seven rows and five columns. There are tables on the three sides, close to the wall, with air and gas taps and electrical outlets intended for the laboratory work. There are storage cabinets fixed to the wall above the tables. At the back of the class there are four new consignments of teaching-learning kits from M/s. Learning Technologies Incorporated. During an informal conversation, Mr. Charles remarked: "The administrators do not know much about the science learning kits and I have no problem in getting whatever I wanted to get."

The teacher's desk (lecture cum demonstration table) is an organized mess of several requisites – a 350 ml conical flask fitted with a one-holed cork and a delivery tube; two plastic trays, one labeled "work sheets" and the other labeled "current events." There are two sinks at either end of the table with air and gas outlets.

On the first day as I entered the classroom, I felt that the class had been prepared by the teacher to receive the new "observer." In the subsequent days I became one among the students. Two students Jesse and Joe were sitting on the table. Jesse was on the back table, and Joe was on the side table. When I asked about the seating arrangement Mr. Charles explained his outlook

"Jesse sits in the back on the table instead of in his seat. I still don't hassle him. You know, I figured if he is sitting back there and paying attention, which he is, I will let him sit on the table, ah uh they don't give me any grief for the most part, and they are listening, they are paying attention and whether they are not sitting in their seats with their hands folded, you know, that doesn't make any difference to me."

Each of the seven lessons that I observed seems to have three phases (Mehan, 1979, pp. 73-75). The phases are: (1) The opening phase, (2) the instructional phase, and (3) the closing phase. The opening phase usually started with announcement:

"Any one interested in attending a water-polo camp in summer, (Eric-Ooo that sounds fun) good luck () for information – one of the best camps in the nation ... If you believe, you qualify for a perfect attendance, pick up your form from the attendance office and turn it to Miss. Anderson, May 6th. ... Applications () uh for summer residential programme at U.C. Riverside are here, students interested in participating see Mrs. Moreno/Mrs. Schumacher at Students accepted to attend will be notified by June 3rd, all those students selected will stay at the U.C.R. campus.

The opening phase is very time consuming and is a waste of time (ranging from five to seven minutes) Mr. Charles suggested:

"If I could, ideally, I would like to have uh, you know, two or three hour blocks, but not everyday. You know may be Monday, Tuesday, Thursday have three hours each day, something they; wouldn't spend () because we lose so much time counting the students, getting the stuff out, and it a sort takes a while getting into the frame of mind of working and once we can get them in the frame of mind, we can let them work and keep working productively for a period of time and then do the clean up () ah uh, you know, this I think would make the teaching more efficient time-wise. And I think it also keeps it from being so sporadic, I mean a little spot here, and a little spot there sort of thing. They get it bite-size pieces and actually think about () and accomplish something in that time."

The instructional phase is teacher dominated and a question (which should more like a statement) rose by the teacher serves as a preface to the subsequent explanation:

"How many of you have heard of the archaeologists will dig something out? () and they will say use () Carbon dating and so many () so old, () yeah, that's () its, that's what they are doing.

They are measuring radioactivity.”

Teacher and student questions are rare in the classroom instruction. If there is a question at all, the question is not sustained for a possible response. There is no wait time as the question serves only as a lead to the explanation to follow. Another category of question (three to four in a class period of 59 minutes) that dominated instruction is that which requested responses from ‘sharp’ students: “What do we need to convert A.C to D.C.? What do we need Joe? Jesse, what should happen to gravity?”

Most of the students in the class are ‘emotionally flat’ as Goddard (1984) has observed. Mr. Charles is aware of students’ disengagement and uses a point system to ensure attention. During the lesson, Mr. Charles often takes his grade book and walks around the class to note down students’ names. “Let me get names of the people who are sleeping here, (Mr. Charles counts in low voice) one, two, three, four () O.K. all those six. Ah, yeah, Seirah, are you not getting to sleep at home?”

On another occasion, Mr. Charles noticed that some students are putting their heads down and not paying attention, and he took his grade-book to note their names. “There are a bunch of people losing their points.” There are specific days on which Mr. Charles checks whether students are bringing books to the class. This is also a part of the point system.

During class, Lori, a student, waited so long to be called on, with her hands up. The teacher was discussing about the “solar power system” with Michael and Eric. She tried four times to get teacher’s attention and finally asked for a clarification: “What does ‘retrofit’ mean?” This is because of the fact that the teacher usually expects questions from the ‘sharp’ students. During and after the instruction phase, four to five students seem to have more access to the teacher. Eric usually works at the teacher’s desk after the lab. Joe invariably meets the teacher after the class to say: “Goodbye, see you tomorrow.”

Characteristics of the closing phase are different, depending on the nature of the activity in which the class is engaged - - watching a film, doing lab experiments, group work, etc. But, there is one thing common to the closing phase, that is, students’ signaling the teacher to quit instruction. The process of student signaling is characterized by lack of attention, students moving their chairs and whispering, girls taking out their make-up kit, turning in their work-sheets, and students getting their back-packs. Mr. Charles’ response to these

behaviours was as follow:

“We got (..) What (looks in the watch, since the wall clock in the classroom is not working) ten minutes? We got out here at fifty – nine, I have got about () thirteen minutes. Why don’t you, why don’t we go ahead and finish this lab today. We got plenty of time. Make sure that it is nice and neat. Yeh, you got lots of time. Finish it up; it will be fresh in your mind. Make sure, your names are on there.” (Teacher is looking for coils, galvanometer, and magnets) Eric, I got three of them. Teacher: You got three of them? How many coils? Eric: Four. Teacher: “O.K., and three galvanometers, Uh. As you finish, you can drop the work-sheets in the tray. One last thing, don’t forget . . .” (inaudible, students are moving to the door)

Between the student signaling and the bell (end of the period), there is an average of seven to ten minutes. This is the time for the ‘sharp’ students to interact with the teacher. They move to teacher’s desk to do experiments, to ask questions, or to help teacher to organize the lab equipments. In an interview, Mr. Charles described the ‘sharp’ students as follows.

“. . . so, sharp student is () a student that can stay with me while I am talking, like on the transformer thing today, like you pointed out, you know, Jesse asked some questions that told me he understood what was going on. And Joe does too, Joe doesn’t have the uh, he frequently won’t speak up, he had a () he took Biology or Chemistry, one of, I think Chemistry and dropped out of it, he wasn’t doing well. So he is got a kind of wounded his self image right now, so if you ask him, he will say, he is not a good student in science . . . and Eric seems to have a genuine desire to try to figure things out. Eric is, () is not the sharpest student, I mean, I have a number of other students that can figure things out faster and easier than Eric can. But they don’t have that natural curiosity.”

The characterization of ‘sharp’ students by both the science department chair, Mr. Jim, and another science teacher, Mrs. Lucy are comparable to that of Mr. Charles. They describe ‘sharp’ students as more motivated, getting beyond the concept, demanding, wanting more explanation; investigate on their own,

etc. But the grade reports show that all the three students described as 'sharp' students by Mr. Charles were scoring below 80%.

The generalisations drawn from this study are valid to the extent that they are based on seven hours of classroom observation, three teacher interviews, and an analysis of a few records, and hence should be treated cautiously.

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A Look into the Concept of Correlation

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Correlation is the relationship between two variables. The variables involved in correlation cannot be called dependant or independent variables. Coefficient of correlation gives an idea about the direction of relationship and the strength of relationship. Correlation coefficient can range from +1 to -1. In order to find out the correlation coefficient the variables involved should satisfy the conditions of normal distribution and homoscedasticity . Restriction of range of variance of the variables, non-linearity of relationship and heterogeneous sub-samples will affect the correlation.

The concept of correlation was first conceived by Sir Francis Galton. Galton was a 19th century scientist who was fascinated with genetics and heredity. He was particularly interested in the study of inheritance of the Sweet Pea plant. Karl Pearson was very fascinated by Galton's work and attempted to write a biography about him. Pearson looked into Galton's studies about relation of weight of daughter seeds from type of mother seeds and developed a formula for product moment correlation and this is how the concept of correlation evolved (Stanton, 2001).

Correlation

Correlation is simply the relation between two variables. For example, correlation between the number of times one combs the hair and the length of hair can be found. This will tell how one variable varies with another variable but does not infer the cause. Correlation does not imply causation. Thus, this does not indicate causality or in other words this will not tell the length of hair is caused by the number of times one combs it. This will only indicate how change in a variable is associated with another variable. The variables involved in correlation cannot be called dependant or independant variables. In order to