An Analysis of Physics courses at ****

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There are a number of factors that affect classroom instruction, management, an interactions. Observations were conducted in **** physics courses with the hope of identifying such factors. Initially, these classes were chosen with the intent of discovering differences in the use of curriculum, teaching strategies, and classroom management techniques implemented in classes consisting of students with varying cognitive development. However, by choosing to limit observations to physics courses many factors that generally affect learning was ruled out. Students at **** are required to take physics their junior year. Thus, the majority of students observed were on the same cognitive level. What is more, the physics faculty at **** consists solely of males. This ruled out another factor—gender—that can result in differences in a classroom that affect learning. Being that courses were observed toward the end of the school year, teachers had pretty much already set their boundaries regarding behavior. There were very few instances where teachers chose to administer reinforcement or punishment in relation to behavior. There was, however, a noteworthy difference in the years of teaching experience among the instructors observed. Two of the instructors observed, Mr. * and Mr. ***., had four and one-half years and over twenty years of experience, respectively. This resulted in some variation in the instructional methods and curriculum used in the courses. However, there seemed to be more variation due to the cognitive abilities of the students in the classroom, not based on the age or grade level of the students, but ability in the subject. This paper will compare and contrast the teaching strategies, curriculum, resources, classroom management strategies, and motivation used by a novice teacher and those used by an expert teacher. Moreover, the use of these tools

for learning will also be compared and contrasted with students with different cognitive abilities.

The comparison concerning cognitive ability will be made between Advanced Placement (AP), Honors (HR), and College Preparatory (CP) courses. The physics AP course is taught at a higher level than most high school physics courses and is designed to be as challenging as introductory college level physics courses. After successful completion of the course students are encouraged to take an AP exam, which may result in the student receiving college credit. The HR physics course is classified as more challenging than a CP course and is for students who are self-motivated. The CP physics course is considered the regular high school level physics course.

To begin with, Mr. *.'s classes will be analyzed. Again, Mr. *. has four and one half years of experience. Thus, he will be considered a novice teacher. Mr. *. teaches both CP and HR courses. Mr. *. holds in high regard the integration of technology and education. The effective use of technology is said to enhance instruction (Slavin, 293). Thus, he uses a Power Point presentation (PPP) in delivering his lectures. The PPPs are visually stimulating and would seem to be very beneficial to visual learners. He supports and enhances the information contained in the PPPs through demonstrations and verbal illustrations and/or explanations. This method of instruction would seem to benefit the auditory learner as well (Slavin, 125). Although Mr. *. gives PPPs to students enrolled in both the HR and the CP courses, the intent of the PPP differs depending on the course level. For example, Mr. *. states that he generally gives the PPPs to his HR class before a laboratory activity as an introduction on how to learn. However, he generally gives PPPs to CP students after a laboratory activity as a review.

In accord with his emphasis on technology, Mr. *. assigns students to complete laboratory activities by means of computer simulations to ensure familiarity with and proper, safe use of equipment in both courses. Then, students are given hands-on laboratory assignments, which should be very appealing to the kinesthetic/tactile learners. Students in the CP class are given laboratory assignments with step-by-step instructions and diagrams to show how to use and put equipment together. Students in the HR class, on the other hand, are given basic instruction as to how to complete their lab. They have to determine on their own the best method of completing the lab. For example, in the lab comparing series and parallel circuits, students in the HR class are asked to identify what determines the brightness of the light bulbs. They must choose their own method of discovery. This allowance for discovery learning is in accord with the constructivist method of instruction (Slavin, 245). However, students in the CP class are told how to set up the circuit for each step. Then, they are asked to determine what caused the change in brightness. This system can be classified as guided discovery learning (Slavin, 248). Students are directly given the information they need to make an educated guess on the brightness in the system. However, students must still come up with the correct answer from their own observations.

When it comes to assigning homework the HR class is randomly checked. This system, the variable ratio schedule, serves as an effective reinforcer for students to complete all of their homework assignments (Slavin, 149). However, the students in the CP class have their homework checked everyday for completion. They received a variable ratio schedule too though. He randomly grades their homework for accuracy, although he always checks, records, and gives points for their completing it. Both classes

are given praise as a positive reinforcement (Slavin, 140). Mr. * makes comments such as, “Nice job.”

Mr. ***. is the physics instructor with over twenty years of experience. The biggest difference to be noted in his style and Mr. *.’s style is the use of technology. Mr. * uses a lot of technology in the classroom PPPs, computer simulations, overheads connected to his computer, and other computer related technological devices. However, Mr. ***. was observed to use only PPPs in addition to overheads (not attached to a computer) and laboratory equipment. This, however, may not be primarily due to their experience in the classroom. Mr. ***. teaches mostly AP physics courses, which are student-centered (Slavin, 243-7). Thus, many opportunities for Mr. ***. to use technology do not present themselves. Mr. ***. does give PPPs to his HR class. However, there were no PPPs given to his AP classes.

It is assumed that the students in the AP physics class have an interest in physics /engineering and strong abilities in mathematics and science because they enrolled in such a challenging course. The students in the AP class seemed to be highly motivated. According to Mr. ***., their homework is never checked. The solutions are posed on the wall and they check their homework on their own. However, he says that their homework is always done and this was the case in the classes observed. It seems that AP students are self-motivated or engaging in self-regulated learning (Slavin, 324). The HR students, however, have their homework graded each day.

During labs, AP students used circuit boards complete with capacitors as well as resistors. The students begin their work right away and stay on task throughout the period. The instructor only looks over their shoulder as they complete their assignment,

he does not offer assistance at all. Students approach the instructor with questions. However, he responds to their questions with more questions. He is using the inquiry method of teaching, which is common in college physics courses. In accord with constructivist views, the inquiry method facilitates the development and strengthening of critical thinking and problem solving skills (Slavin, 264-269). During the HR laboratories, the instructor walks around to make sure that students are on task and their labs are going smoothly. He gives direct answers as responses to their questions.

In conclusion, only one major difference was noted in the instructional methods of the novice teacher and the expert teacher. Mr. *., the novice teacher, made more use of modern technology than Mr. ***. Nonetheless, this difference—and other differences noted in the classroom—seemed to be the result of the cognitive abilities of the students in the courses. There seemed to be more variation in the instructional methods used for the courses taught—AP, HR, or CP physics—than by the instructor teaching. This shows an effective use of between-class ability grouping. Students are grouped according to their ability and provided with what they need at their level. However, research does not support this method because it is said to hurt students in lower track classes. Although acknowledgement is given to the fact that it may be necessary at the secondary level (Slavin, 283).

Works Cited

Slavin, R. E. (2002). *Educational psychology: theory and practice* Allyn & Bacon.