

Classroom Management and School Science Labs: A Review of Literature on Classroom Management Strategies

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Abstract: Effective learning refers to the extent to which educational institutions are effective in achieving their educational objectives. Effective teaching/learning cannot simply happen in a classroom where teachers fail to manage classrooms effectively. Therefore, classroom management happens in a positive classroom environment where positive teacher-student rapport is established. As for science laboratory, learning in the labs has been long considered as a crucial part of science education. Effective management strategies not only in the classrooms, but also in science labs support and enhance effective teaching and learning. Classroom management in science labs is a standout amongst the most central roles played by teachers because it determines the achievements of students. Effective science teachers are the ones who understand the peculiarities of students' behavior in science labs and use preventive and reactive classroom management strategies to prevent or react to problem behavior of students. Emphasizing the knowledge and the practice of classroom management strategies, this study will illuminate effective techniques for management in the classrooms and consider this from the perspective of teacher effectiveness, particularly in science labs, and consequently suggest some implications for practice.

Keywords: Effective Teaching/Learning, Classroom Management, Science Labs, Reactive Strategies, Preventive Strategies

1. Introduction

Effective learning refers to the extent to which educational institutions are effective in achieving their educational objectives. Studies have indicated that effective teachers play a pivotal role in tailoring effective education (Hattie, 2009). However, effective teaching and learning cannot simply happen in inadequately managed educational settings (Korpershoek et al., 2014; Jones & Jones, 2012). It happens in a positive classroom environment where positive teacher-student rapport is supported. Thus, Everton and Weinstein (2006) refer to classroom management as “the actions teachers take to create an environment that supports and facilitates both academic and social-emotional learning” (p. 4-5).

As for a science lab, it is generally defined as the environment in which students create activities based on the doing-living approach and gain concrete experiences (Ozmen & Yigit, 2006). Learning in the labs has been long considered as a crucial part of science education. Tobin (1990) stated that “laboratory activities appeal as a means of admitting students to learn with understanding and, at the same time, engage in a process of constructing knowledge by doing science” (p. 405). Therefore, labs constitute an

essential and unique role in science teaching, and science teachers have insisted that scholars can gain enormous advantages in learning that accumulate through laboratory exercises. Nevertheless, helping students accomplish wanted learning results is an extremely intricate process. Tobin (1990) suggested that meaningful learning is conceivable in the laboratory if the pupils are offered chances to manipulate equipment, and textiles in an environment suited for them to build their insights of phenomena and related scientific concepts. On the other hand, for the most teachers, how to effectively manage their classrooms has become the most challenging concern. Therefore, unpracticed educators regularly do not have sufficient energy to create effective systems and subsequently suffer from teacher burnout in their professions (Bernshausen & Cunningham, 2001). Consequently, effective management strategies not only in the schoolrooms, but also in science labs, underpin and enhance productivity in teaching and scholarship. Classroom management in science labs is one of the most central roles played by teachers because it determines the achievements of students. Effective science teachers are the ones who understand and apply specific classroom management strategies in science labs.

Classroom management strategies emphasize on preventing misbehavior rather than reacting to it (Lewis & Sugai, 1999). Preventive strategies are the strategies where teachers negotiate classroom rules with the students rather than impose the rules on them; on the other hand, reactive strategies make use of punishment which unlikely yields positive student behavior. However, most teachers use the less effective reactive classroom management strategies instead of using more effective - preventive classroom management strategies (Rydell & Henricsson, 2004; Woodcock & Reupert, 2012). This is due to the lack of teacher trainings and their awareness of powerful classroom management strategies. Therefore, effective teachers need to learn a great deal of classroom management strategies and teacher professional development programs should provide the necessary “toolbox” which can help teachers obtain and apply the most appropriate strategies when necessary. Which strategies should (at whatever rate) be a bit of this alleged tool kit in current instructional settings is as yet unclear. The explanation behind this is the books that are utilized in educator preparation programs (e.g. Jones & Jones, 2012) by and large allude to studies that were used decades back or implemented narrative evidence instead of observational evidence. Regardless, everyday practice in instruction is evolving quickly. Since more innovation and technology are discovering their ways to our labs, it is increasingly important to apply up-to-date approaches to make the science activities engaging and the learning more meaningful for the students. Moreover, new technology in science labs places high demands on teachers’ classroom management skills of the safety regulations, rules, and procedures to improve the effectiveness of the lab tasks.

Effective teaching research additionally demonstrates that an adequate degree of classroom discipline is necessary to produce an environment positive for student learning as students’ misbehavior diverts the learning procedure and annihilates the effectiveness of even the most warily structured lessons (Barton, Coley & Wenglinisky, 1998). The issue is that most science teachers are not aware of the effective classroom management strategies in science labs as a way of improving students’ performances and they lack the understanding of what techniques can work effectively in science laboratories. This study is an attempt to fill this gap in the literature. This paper provides an overview of the literature on classroom management strategies and examines the findings of the empirical research and recommends effective practices and key principles of classroom management that provide and maintain an effective learning environment in science labs.

2. Classroom Management

Every teacher has a fundamental obligation to ensure that there is sufficient beauty in every student. A teacher ought to love the students, but at the same time firmly stand against exceptional behavior that does not meet the requirements (Wellington & Ireson, 2017).

The main goal in classroom management is creating an environment for students' academic, emotional and moral development; it is not simply maintaining order in the classroom. Classroom management is an essential teaching skill and teachers should diminish students' problem behaviors and create learning environments that support students' intellectual and emotional development (Henley, 2010). Henley (2010) believes that students should be encouraged to become self-controlled learners which will consequently enable teachers to have more time to spend on academic instruction in the classroom and less time dealing with misbehavior. This will eventually lead to more effective teaching and greater academic growth of the students. Similarly, McDonald (2013) describes classroom management as "teacher actions and instructional techniques to create a learning environment that facilitates and supports active engagement in both academic and social and emotional learning" (p. 20). Since nowadays students are a lot more diverse than in the past, it is mandatory for teachers to demonstrate care and skills to understand students' needs and interests and be able to help them in their intellectual, social and emotional growth.

Classroom management, which is an indispensable part of effective teaching involves three mechanisms; increasing the instruction time, designing activities to increase students' engagement for academic success and using proactive classroom management strategies to regulate students' behavior (Sugai & Horner, 2002). Thus, teachers provide the students with the prospect to learn and the classroom management provides the settings for learning.

Effective classroom management is necessary for effective learning. Evertson and Weinstein (2006) assert five actions for teachers to achieve effective classroom management. First, teachers should provide a platform where the positive and caring relationship is supported by and among the learners. Second, teachers should provide and support equal opportunity for the students to grasp the learning. Third, teachers should involve students in the learning process by establishing various methods, procedures, and rules. Fourth, teachers should encourage and support students to become self-regulated learners and take responsibility for their own learning. Lastly, teachers should be able to help students with behavior problems as counselors. Thus, the actions taken by teachers are not only concerned with providing students with a supporting environment for academic success but also social, emotional and behavioral developments. Furthermore, cooperation among the students is encouraged in an effectively managed classroom (Doyle & Carter, 1984).

2.1 Effective Classroom Management Strategies

Classroom management strategies are tools used by teachers to create a learning environment where students build a cooperative relationship between themselves and teachers and effectively engage in learning. However, it is necessary to make the distinction between various types of classroom management strategies used to prevent problem behavior or respond to problem behavior (Lane,

Menzies, Bruhn, & Crnabori, 2011). To prevent undesired behavior, preventive strategies such as rules and procedures are considered, and on the other hand, to respond to problem behavior reactive strategies such as verbal warnings and punishments are used. According to Marzano et al. (2003) preventive strategies are more effective than reactive strategies; however, reactive strategies are also necessary to decrease the undesired or disruptive behavior when preventive strategies fail.

Both preventive and reactive strategies can be implemented for the whole class population or for individual students in a science lab. Clear written rules, procedures, and group detention are examples of preventive-reactive strategies for the entire classroom population, whereas, moving seats, detentions, replacing the students' places and sending students out of the room, in cases of disruptive behavior are examples of preventive-reactive strategies for individual students.

Marzano et al. (2003), after reviewing 101 studies on classroom management, found four components of effective classroom management. Firstly, rules and procedures are essential elements which articulate the expected behavior. The second component is disciplinary interventions which refer to responding to disruptive behavior, including punishing negative behavior. The third component is the teacher-student relationship which includes teacher techniques to establish the right level of authority and cooperation to improve the teacher-student rapport, for example, listening to students when they have to say something and showing personal interest in students' personal lives. Lastly, mental set which entails two aspects; with-it-ness and emotional objectivity. With-it-ness refers to identifying the potential problems and responding to these problems immediately, while, emotional objectivity refers to teachers' emotional state, for example; not getting angry or sad while dealing with problem behavior. Furthermore, Marzano et al. (2003) points out the vital role of teaching students the strategies to regulate their own behavior rather than guiding their behavior directly. Therefore, it is necessary for teachers to teach and encourage learners to become more responsible to monitor and control their own behavior.

Hatti (2009) states that the latest researches have urged educators to utilize more empirical and scientific-based practices in their classroom activities. These empirical-based strategies have been classified into five groups; a) articulating the classroom routines and physical arrangements of the classrooms, b) reinforcing the positive behavior set by classroom rules, modeling them as teachers, c) having students actively involved in learning eventually this will lead to diminishing possible misbehavior, d) recognizing and encouraging students towards positive behavior, and e) utilizing a scope of systems to react to misbehavior from simple techniques to prompt and divert the behavior (Egeberg, McConney & Price, 2016). However, making a decision about what is and what isn't powerful classroom management is an unpredictable issue, even the techniques claimed to be very effective might turn out to lack scientific foundations. There was, notwithstanding, rising sign that fruitful methodologies were dependent upon key contributing elements and convictions. Therefore, teachers need to develop themselves in a broad range of evidence-based classroom management strategies; thus, pre-service teachers should be provided with teacher training programs which will help them gain and apply particular strategies when necessary. Now we will direct our discussion about classroom management strategies to science labs in order to find out peculiarities specific only to the labs.

2.2 Classroom Management in Science Laboratories

Science laboratories have long been playing a pivotal role in science education. They provide unique learning and teaching experiences and science teachers claim the rich benefits of lab activities increase students' engagements and subsequent achievements in science lessons. In order to make the correct interpretation and presentation of the nature of science, science labs are considered to be an integral part of secondary school science education. Learning in labs not only helps students develop the concepts of a particular discipline, but also other cognitive skills such as creative thinking, critical thinking, and problem-solving skills. In addition to cognitive skills, lab activities also develop students' attitude and interest towards the discipline, practical skills, and their social and emotional skills. In this manner, science lab exercises are progressively portrayed by student-centered approaches to learning (as opposed to teacher-centered), with a large emphasis on students' metacognitive skills (e.g. self-regulated learning strategies; Dignath, Büttner & Langfeldt, 2008) and cooperative learning (Wubbels, Den Brok, Veldman & Van Tartwijk, 2006). However, in a poorly managed science lab, the aforementioned benefits of science lab activities might not be observed.

A good science lab ought to have flexible spaces. Along these lines, science labs incline towards being multi-purpose. Different subjects like Physics, Chemistry, and Biology require different skills of teaching, materials and facilities, therefore, a laboratory that can support all three is significant (Wellington & Ireson, 2017). Using non-fixed lab equipment allows the lab to be altered to suit the subject being taught. More so, a good laboratory needs to have open communication lines, facilitate practical learning, contain comprehensive storage units, and centralized safety features. The laboratory also has to be made of standardized material as opposed to wooden desks that can easily catch fire.

Generally, any lab is usually equipped with dangerous chemicals and other tools that may lead to fatal accidents. As a precautionary measure, labs are equipped with safety rules as they act as measures against such accidents. As a matter of first importance, students are expected to behave and conduct themselves in a manner that is responsible at all times (Roy, 2014). This includes strictly abiding by all written and verbal instructions to the latter. Secondly, students should only perform experiments under the supervision of a professional or a teacher. Other safety measures in the lab include working on a clean bench and dumping all chemical waste as required.

The main aim that should be considered in the arrangement of science labs is the inevitability of change in the curriculum. Science labs should then be arranged in a manner that facilitates flexibility which will be beneficial in terms of avoiding future inconveniences and cost in reconfiguring the space. Alternatively, science lab arrangements have to consider the class size as it forms a variable for determining the number of workstations and the amount of space needed. A science lab also needs current technology for learning purposes and also to be used as a safety measure. Automatic sprinklers in case of fire and ease of access to safety tools are paramount.

Discipline in the science lab usually begins with the issue of disrespecting set rules and guidelines. A student may neglect to follow some, if not all, rules associated with the lab. For instance, eating or drinking is a vice when done in the labs, however, a student may decide to indulge in the same (Roy, 2014). On the other hand, discipline issues arising in science labs can entail vandalism of equipment.

Students may knowingly or accidentally vandalize lab equipment during experiments. Other cases entail running within the lab and dangerous unmonitored experiments.

The best way to limit and manage disruptive behavior by students in science labs includes coming up with norms that provide consequences for the behavior. Similarly, a teacher may use the syllabus to come up with academic and behavioral expectations from the students. Usually, the nature of any disruptive behavior is dependent on the comfort level of the faculty. It is essential to provide a list of disruptive behaviors and the corresponding consequence.

Science labs are a significant tool in teaching and learning as they provide a great impact on students in mastering what is verbally taught in class (Wellington & Ireson, 2017). Science labs are utilized effectively when students can perform practical studies on their own, which they may relate to their respective learning. The lab setting should allow a centralized area which a teacher may use for demonstration purposes. Along these lines, there are various strategies that should be adhered to, facilitating effective classroom management in a science laboratory. An instructor should develop a set of unique teaching style that will enable clear and concise interaction with the students. The initial strategy for the classroom management of a science lab entails classroom attitude. An instructor is mandated with the task of setting the tone of the classroom.

Secondly, there is a laboratory overview which deals with an organized step by step guide of the concepts to be learned in the lab and an overview of the lab procedures that will be used by the students to achieve the set learning objectives. The laboratory overview is expected to bridge the gap between classroom work and laboratory activities. Moreover, an instructor should perform a laboratory demonstration of key equipment operations and various techniques for handling different laboratory tools and chemicals. These factors collaborate to form effective classroom management strategies for the science laboratory. To maintain these strategies, the final factor deals with laboratory instructions where clear rules are set both for the students and for the instructor. These will see to it that the laboratory is used as expected and its effectiveness is adhered to.

On the other hand, we ought not to consider students as inactive players rather dynamic players who can serve for the advancement of viable classroom management. They can likewise help us conceptualize and create classroom management strategies. One study, conducted by Woolfolk and Weinstein (2006) to find out the perceptions of students for a good teacher, revealed three aspects; a) good teachers develop caring rapport with students, b) maintain the control in the classroom without being very restricted and aggressive, and c) make learning joyful. With the encompassing goal to see better what teachers do to make and maintain a positive learning environment from the point of view of the students, Egeberg and McConney (2018) conducted a research study with 360 students. Several vital aspects emerged in this study; one of them was the care and respect and being heard by the teachers which were teacher positive behavior eventually brought about positive behavior by the students. Another finding was teachers' ability to maintain the order but at the same time to encourage students to do well in behavioral and academic terms. The last one was for the strategies that teachers used to involve students in the learning process which was captivating students' attention, articulating the objectives clearly and providing reinforcement and feedback to ensure learning. At the point when students are given the

chance to share their own viewpoints about classroom management, they might offer inspiring suggestions into what they wish and need of what establishes effective classroom management.

3. Conclusion and Recommendation

Teachers are considered to be the most powerful players in the classroom environment and they are the key components affecting students' academic achievements and behavior (Sanders, Wright, & Horn, 1997). Teachers play three pivotal functions in the educational process; decision making about the instructional strategies, tailoring and designing the curriculum to ensure student learning and utilizing effective classroom management strategies (Marzano, Marzano, & Pickering, 2003). It is important to mention that all of these factors are important; however, classroom management serves as the basis for instructional strategies and for a good curriculum design to be effectively implemented. That is; effective learning can only happen when these three factors are present, none of these factors alone can ensure effective learning. Thus, effectively managed labs allow teachers to spend more time teaching and less time on dealing with student behavior. If the management system becomes inconsistent, this will make students engage in more inappropriate behavior draining teacher's energy (Egeberg, McConney, & Price, 2016).

The main purpose of this study was to find out and analyze the peculiarities and the most effective classroom management strategies in science labs. Classroom management is tied in with making the correct conditions for compelling learning, realizing whatever strategy you utilize, whatever your class resembles and whoever your students are, there are numerous systems, helping the students to defeat every one of the obstructions that he/she faces. Effective classroom management assumes an imperative part in effective teaching techniques and encourages instructors to effectively profit their students.

In reviewing the research on classroom management, it has become evident that effective classroom management is not only about specifying the regulations, rules, and consequences, but it is also about understanding students' diversity, needs, interests, and motivation behind their behavior. Therefore, teacher professional development programs play a pivotal role to help science teachers become more competent in theoretical and empirical knowledge about the effective classroom management skills and strategies in their daily work in science labs. In addition, the strategies that have been presented in this paper are relatively easy to implement, however, what makes these strategies work depends on teachers' consistency using them. However, as Sucuoğlu, Bayrakli, Karasu, and Demir, (2017) suggest that contents of classroom management courses should be revised, and more opportunities should be given to teachers to transfer their knowledge into practice and they should be given feedback about their teaching practices which all eventually lead to using strategies in accordance with the developmental level of students, instead implementing the same strategies to everyone. The literature likewise uncovered three center topics: addressing students' needs through establishing positive rapport among educators and students, classroom control through encouraging students' responsibility, and adequately captivating students in learning (Egeberg & McConney, 2018).

After scrupulous analysis of the classroom management literature, we recommend some effective preventive and reactive classroom management strategies that will help science teachers have a positive and supportive learning environment and prevent disruptive student behavior:

Preventive strategies;

- Reinforce positive behavior.
- Provide consistent lesson structure and routines for labs
- Use effective rules and procedures and their consequences
- Have effective lesson plans
- Establish your expectations from the students
- Involve parents
- Be fair

Reactive strategies;

- Remain in control
- Don't take it personal
- Use appropriate body language
- Involve students in the solution
- Focus on positive behavior
- Listen and empathize
- Talk privately
- Use planned ignoring

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