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Teacher's Questioning Effects on Students Communication in Classroom Performance

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Abstract
Classroom questioning has been more of a puzzle regarding its role in learning output among school students. Research studies point to its significance in affecting students' performance and achievement. The purpose of this study is to investigate how students perceive teachers' questions in the classroom and relate them to their academic participation. The study also inquires question-types that are more or less favorably received and their consequences. The study is conducted in three schools (Grade V to VIII), and a sample of 50 students was purposively selected and interviewed through semi-structured interviews. A qualitative method is used to analyze the data; where the primary data is supported by secondary information and previous scholarly arguments.

The discussion reveals that questioning in the classroom is positively associated. The study recommends that training sessions and workshops should be organized for teachers along with induction of practical courses on how to use effective questions in the classroom. Furthermore, developmental questions can be used by developmental managers in the workplace as they encourage their employees to think for themselves when taking care of customers and increasing productivity.
Keywords: Teachers, classroom, questioning, high-order question, low-order question, wait time.

1. Background of The Study

The long and venerable history of the practice of classroom questioning is an educational strategy often traced back to Socrates (Black, 2001). Socratic Method of using the question-answer method to challenge widespread assumptions, to expose contradictions and to strive for novelty in knowledge and wisdom is a powerful teaching approach (Mujtaba, 2014; Cnop & Grandsard, 1998). To this end, its long history and demonstrated effectiveness has been of interest to researchers and practitioners due to its widespread use in contemporary teaching techniques (Cobb, Boufi, McClain, and Whitenack, 1997; Croom & Stair, 2005). The existing literature rates questioning next only to lecturing in popularity as a teaching method and notes that teachers spend thirty-five to fifty percent of their instructional time while conducting questioning sessions in classroom (DePree, 1998; Alton-Lee, 2003). To understand question theoretically, it refers to any sentence which has an interrogative form or function; while in a classroom setting, teacher questions are defined as instructional indications or stimuli that convey to students the content elements to be learned and directions for what and how of doing things (Denzin & Lincoln, 2000; Evans, 2000).

In a learning environment, a duty of classroom teacher is to promote thoughts and inspire inquiry among students that is effectively done through proper questioning (Gall et al, 1978; Brualdi, 1998). In this

context, Croom and Staire (2005) note that appropriate questioning is positively associated with development of critical thinking faculty in students along with reinforcing their understanding. It also improves feedback sessions and enlivens classroom discussion (Bonne & Pritchard, 2007). Besides, questions are of significant value for eliciting students' reflection and challenging their deeper understanding and engagement in the classroom (Golkar, 2003). According to Good and Brophy (2003), classroom questions are best used as diagnostic tools to help indicate students' academic progress or to assess their critical thinking (see also Cazden, 2001; Chin, 2006). Likewise, Vogler (2005) is of the view that questions can monitor comprehension, help make connections to prior learning and can stimulate cognitive growth. Teachers must be aware that it is possible to transfer factual knowledge and conceptual understanding through the process of asking questions that can best be achieved through carefully crafted questions framed within the context of the learning content (Danielson, 1996; Hamm and Perry, 2002). On the other hand, unskilled questions mostly yield in short answers and are rated as low-level that merely check students' existing knowledge (Henningsen and Stein, 1997).

The act of asking questions has the potential to facilitate or influence the learning process, it may also have the capacity to turn a child's learning off if not handled tactfully (Caram & Davis, 2005). As said earlier, in order for effective teaching to take place in the classroom, a teacher should be able to pose and ask good questions that foster teacher-student interaction (Capel, Leask and Turner, 1996). It also inclines students to listen carefully to and analyse critically what the teacher says about the learning material (Jahnning, 2004). The importance of apt classroom questions cannot be underestimated; and according to Kawanaka and Stigler (1999), a teacher's questions drive students to discuss problems and derive concepts and procedures, thereby functioning as guide to use them to solve problems (Danielson, 1996; Johnson & Onwuegbuzie, 2004).

Asking good questions have been debated for many years owing to its significance to foster better learning (Guan Eng Ho, 2005; Tan, 2007). In this regard, Ornstein and Lasley (2000) and Bonne and Pritchard (2007) hold the view that good questioning is both a methodology and an art; therefore, if used well, it can make a significant contribution to improve teaching and learning as well as student's self-image.

To take a step further, Kulm and Capraro (2004) opine that researching the issue can have a long lasting effect on improving teaching-learning environment that need to be incorporated in training programs particularly for pre-service teachers. From students' perspective, it gives students the opportunity to evaluate their progress in terms of their achievements and demand of the learning situation (Fisher, 1995). Likewise, Durham (1997) indicates that teachers also view questioning as a basic way to stimulate students' thoughts and to guide their knowledge. Teachers also need to heed the motivating power of questions (Capel et al, 1996). This is particularly true of oral question-answer sessions (McNamara, 1994) that encourage learners to express themselves more openly (Petty (1993; Vogler, 2005; Danielson, 1996; Latham, 1997; Groenke & Paulus, 2007). More critically, it needs to be noted that flexible neutrality of teacher assumes primary importance to render the exercise positively meaningful (Chin, 2006), and to mould it into a device extending and controlling communication in the classroom (Yang, 2006).

Thus, it is revealed that teachers' questioning and learners' performance are relational that can be direct or inverse depending upon the ability of teachers' knowledge about good questioning. However, research seems to confirm that physical atmosphere of learning environment particularly classroom and social infrastructure do contribute to affect the learning outcome of students Mujtaba, 2014. In light of the existing literature, the current study focuses only on exploring the value of questioning in the context of the target population and its influence on performance and academic achievements of the students.

2. The Argument

It is widely agreed that the goal of all teachers should be the success of their students. This study investigates into the amount of different questioning of teachers and students in the classroom and their effects on students learning and students academic achievement. Among the many facets that contribute to classroom also include, particularly in general science education, the types of instruction, questions and the amount of wait-time (Dantonio & Beisenherz, 2003). The teacher, then, becomes a key figure to control and to run the classroom as a lecturer or facilitator in teacher-student interaction (Hattie, 2002). Middle school teachers who contextualize learning allow students with opportunity to discuss, argue and make new discoveries with their peers lead to long term academic development (Lappan & Ferrini-Munday, 1993). As a means to this end, posing of effective questions encourage students to think on a higher level and respond in multiple ways (Kerry, 2002). Questions also monitor comprehension, help make connections to prior learning and stimulate cognitive growth (Vogler, 2005). They also serve as diagnostic tools to help indicate students' academic progress and to assess students' critical thinking (Mason, 2000; Croom and Stair, 2005).

In the context of this study, three main types of questions are addressed including high-order, low-order and follow-up. Black (2001) defines *high-order* questions as those requiring mental manipulation of learnt

information followed by logically reasoned answers. On the other hand, *low-order* questions require students to recall material, either from their memory or a teacher's presentation, verbatim or in their own words (McHill & Dunkin, 2002). In addition, *follow-up* questions are those in which a teacher includes previous answer given by a student into ensuing questions (Nystrand & Gamoran, 1988). Another tool for guiding communication in the classroom is the use of wait time- pause between the end of a teacher's question and the beginning of a student's response (Rowe, 1974). Stahl (1994) reports average teacher's pause or wait time to be between 0.7 and 1.4 seconds. Pausing in communication is more common today due to technology and such interactions take place through many means, including social media (Cavico, Mujtaba, Muffler, and Samuel, 2013), but it does not always lead to learning or critical thinking. Verbal communication of different ideas in the classroom is more facilitated when a proper balance of high-order to low-order questions with a minimum of three seconds wait time is observed by teachers (Muijs & Reynolds, 2005). Verbal expression allows teachers to better understand a student's mastery of conceptual knowledge and benefits student's learning (Nunan & Lamb, 1996). In this connection, Jones and Gerig (1994) state that classroom discussion provides students with information needed to be academically successful along with providing them cognitive strategies they need to derive meaning from new information.

An important contributing factor in teaching is teacher-student interaction (Vogler, 2004) that is mostly in the form of question types (Walsh & Sattes, 2005). Mason (2000) argues that style and nature of questions encountered by students strongly influence the sense that they make of the subject matter. to add to this, Rogers (1972) points out that high-level questions prepare students for current and future situations in life by helping them to face puzzles and novel ideas. However, the teacher's style and methodology determines and dominates the usefulness of the process (Hughes, 1971). Teamwork and small group activities have been found more motivating for students (Cnop and Grandsard, 1998).

This study is significant in the target area in the face of poor performance of students in middle schools. A mere look at the schools over the years reveals discouraging trend. The passing percentage of students in 2006 was 23%; 22.8% in 2007; and 21.8% in 2008 showing a decreasing trend over the three-year period. Such poor display of success ratio, in the context of this study, is associated with questioning, its status, role and its bearing on commitment level of students in classroom. As such, the objectives of this study are to:

- highlight teachers' questioning and their influence on communication and learning in middle school students
- study verbal questioning behavior of teachers and its bearing on the learning environment of middle school students
- analyze question types employed by teachers along with the amount of wait time they allow for response and their use of follow-up questions

3. Methodology and theoretical base

Appreciation of effects of teachers' classroom questioning on students' academic performance demands multi-dimensional perspective and analysis to obtain relevant results. Individual tests, nature and types of questioning, duration of questions, group discussion, examination, grading, interviews, and even focused group discussion are relevant to the study. In addition, secondary information and a conception of the origin of questioning effects are also taken into consideration. Analytic unification of such diverse forms of data shall lead us to evolve a comprehensive policy for improving teaching standards in schools.

During the study, empirical data was taken from an unpublished doctoral dissertation as a means to make the data more authentic and reliable. It related to two schools located in the target area of this study including Government High School Ramora (Coded as GHS-I) and Government High School Chakdara (Coded as GHS-II).

The data pertained to physical infrastructure, communication, tests, class participation of the students, teachers' interaction, recreational facilities, and environment of the schools. However, as this study is based upon teachers' questioning effects, the same schools were selected through convenience sampling. This study is conducted in three schools (Grade V to VIII) of Chakdara city of Malakand Division, Khyber Pakhtunkhwa Pakistan.

The data collection procedure was completed in about 90 days with intervals applying different variables to judge multiple factors affecting the performance of students. Analysis included several types of questions chosen, the amount of wait time allowed within the specified duration, and frequency of follow-up questions. Responses were recorded with the help of Performa specifically designed to meet requirements of the study. The data collection instrument has four major components including the type of questions, time wait or wait time, follow-up questions, and comments in the final stage. In order to understand the nature and structure of the participants' questioning, quantitative results are obtained and qualitatively analyzed. Data samples chosen

for qualitative analysis were teachers' instructional structure and behavior during questioning continuously compared with similarities in techniques identified and unifying commonalities were used as meta-categories (Denzin & Lincoln, 2000). A pure descriptively qualitative discussion supported by secondary arguments to understand the problems of the students and to explore their hidden potentialities and capabilities for their personality development is presented for policy consideration.

The study has been framed in theoretical meta-analytic stance and corpus of researchers who worked on quality education measured through different inputs such as building, class size, quality of physical facilities, student-teacher relation, test scores, obtained grades, class participation, as well as social and moral development of students. They include Hanushek, (1999), Hoxby, (2000), Johnson, (2000), Krueger and Whitmore, (2000). Similarly, the study is also guided by McGuffey (1982) and Earthman and Lemasters (1998) studies where they link academic achievements with physical and infrastructural facilities. Besides, recourse is also made to Coopers' (2001) argument of associating level of comfort with physical environment to students' academic achievements and other outcomes including teacher motivation, school leadership, and students' time spent on learning. Furthermore, Barker and Gump's (1964) view of school as an "ecological environment" that changes the behavior of individual students reinforce the significance of the study.

The researchers have followed Students Participation Model which is providing a learning model based upon participation practice in general science classroom. The model is defined by student participation and learning to speak and acts by participating in the classroom discussion and to help in solving of new and unfamiliar problems as supported by Evans (2000) as well as Croom and Staire (2005). The contributors in the model are expected to propose and defend ideas and conjectures and to respond thoughtfully to the various arguments of their peers (Martino & Maher, 1993), while Cobb *et al.,* (1997) support this notion by setting that students actively construct their understating as they participate in classroom social process (Myhill, 2006). The model further focuses on instructional approach; used to facilitate communication in the classroom. Instructional approaches include verbal communication through discourse or written communication through the use of pictures or words (Ostegard, 1997; Nicol, 1999; Reinhart, 2000). Specifically, verbal communication can be found in instruction that asks high-order and follow-up questions and allows students appropriate wait time to respond (Tobin, 1986). Therefore, verbal communication is being used as the focus of this research.

Questioning is one approach commonly associated with student's verbal communication and it has been stated that teachers spend thirty-five to fifty percent of their instructional time asking students questions (Black, 2001). Moyer and Milewicz (2002) explicate questioning as the most frequently used instructional tool in the classroom to develop students in academia. Brown and Edmonson (Cohen, 1995) listed some of the purposes in asking questions as follows: to arouse interest and curiosity concerning a topic, to focus attention on a particular issue or concept, to develop an active approach to learning, to stimulate pupils to ask question themselves and others, to diagnose specific difficulties inhibiting pupil learning, to express a genuine interest in the ideas and feelings of the pupils, to provide an opportunity for pupils to assimilate and reflect upon information. All these suggest that there are variety of purposes and reasons for asking questions in the classrooms by teachers.

4. Results and discussions

The data collected during the course of the study relating to questioning techniques and their contribution to learners' overall communicative and academic performance were thoroughly analyzed and discussed in light of secondary sources available to the researchers. The findings are explicit to the extent that effective use of the techniques are positively related to classroom communication and is reflected in the improved academic performance of students.

5.1 - The Teacher's Role

Findings of the study demonstrate that the teacher's role is to help students in developing understanding of concepts and to build their personalities. This is in accordance with Reinhart's (2000) explanation of a good facilitator of communication as one who is able to get students to explain things in an easily understandable manner. The explication of the data also reveals that students learn to think and evaluate in presence of an expert facilitator (Golkar, 2003). Three components for facilitating communication, as the analysis indicates, are asking, listening, and responding. Although, agreement over significance of one over the other is not straightforward, there is consensus over their indispensability for facilitating communication. The role of teacher emerges to be of utmost significance in initiating discussion through the selection of appropriate questions, allowing students to be heard and on the hunt to the possibility of further discussion. It is noted that the questions asked should be oriented towards discussion and communication of different ideas that are directly associated with the in-depth knowledge of the subject. These questions should provide opportunities for students to reinvent ideas through exploration and refining of previous ideas (Martino & Maher, 1999). It is noted that a teacher must strike balance

between the process of discussion and focus on content. Engagement in the process of discussion includes how the teacher and student interact: who talks to whom, when and in what ways. The content of discussion refers to the substance of ideas raised and the depth and complexity of these ideas in terms of different concepts in the context of discussion (Sherin, 2002). Similarly, Vogler (2005) opines that teachers must understand that questioning is a skill, and like all other skills it must be practiced before it can be mastered to its best potential. The discussion further specifies that effective communication requires teachers to be good listeners where they must focus on the responses to decide the immediate course of the classroom situation. In this regard, Wasserman (1994) also emphasizes the condition of full and conscious effort to tune into the 'how and what' of the student's ideas. Too often teachers are observed to be inclined towards listening what they want or expect rather than listening to students' thinking and reasoning.

The discussion further elaborates that the next factor in teacher's response to student; as a responder, teachers must listen and comprehend a student's ideas or comments and weigh the various options so an appropriate response is given (Nicol, 1999). In addition, responding goes hand-in-hand with listening, it is much easier to respond if one listens to the student's thinking. In this regard, to support the primary information with philosophical argument, Tobin (1986) gives several alternatives that teachers face when deciding how to respond to a student. Those alternatives include whether to paraphrase the student's answer, provide an explanation, ask another question, move on to a new topic, allow the student to continue to speak, or to call on another student to respond (Tobin, 1986). Of course, one way a teacher can respond to a student's thinking is by using follow-up questions. Using follow-up questions within a given task demonstrates the teacher's attention towards the learner's thinking. Teachers often use these questions to gain further insight to or clarification of ideas communicated by other students. This strategy communicates to the student; the answer is still open for discussion (Moyer & Milewicz, 2002).

5.2 - Style of Instruction

The data analysis demonstrates the style of instruction within the classroom. There are two main styles of instruction within the classroom: small group or students-centered instruction, and whole-group or teacher-centered instruction. Cnop and Grandsard (1998) explicate a small group instruction as a method where students would cooperatively form in groups to work out the detail of a given problem, construct new examples of the problem, and formulate a hypothesis about the problem so as to find a solution. The teacher becomes the facilitator among the different groups and offers suggestions, gives encouragement, and corrects misunderstandings. In this connection Cnop and Grandsard (1998) found an increase in motivation among their students when they worked in small groups or learned by communicating with other peers in the classroom. Similarly, DePree (1998) conducted a study of students who worked collaboratively, and found that confidence increased and students stated that learning in groups was easier because other students within the group helped them to understand the problem at hand. The primary information explicate that this type of instruction is beneficial to communication within the classroom because students have some input into and control over the communication.

The analyzed information disclosed that second style of instruction is whole group or teacher-centered instruction. Evans (2000) defines this type of instruction as one where the teacher takes on the role of being the sole provider of information through lectures, leaving students to reflect and take notes. Further, the amount of teacher-student discussion is limited, thus causing the second style of instruction to be labeled as whole group or teacher-centered instruction. Myhill (2006) elucidates this type of instruction as recitation, or the process by which the teacher initiates and dominates communication and students are passive and expected to recall what they have learned or report other people's thinking. Whole class settings have also been found to provide limited opportunities for talk that would allow students to evaluate their own thoughts and learning experiences.

5.3 - Question Typology

The collected information reveals that another component is the types of questions that teachers pose to their students that play an important role in interaction between the teachers and students in the classroom. In this milieu Nicol (1999) explained that teachers posing certain types of questions do not lead to positive learning outcomes. The sample information portrays that tension was related to posing questions that examined what students were thinking versus posing questions to get students to provide factual information or questions to assess their knowledge. In order to know when to pose different types of questions one must know how a certain type of question is defined so it can be effectively used in instruction. Likewise, one must also know the type of response different types of questions will elicit so that instruction will be successful for students to understand concepts. The discussion further elaborates that the three major hierarchical question types teachers can pose to be discussed are high-order, low-order and follow-up.

5.4 - High order-Questions

Golkar (2003) demonstrates that high order questions are those questions that the teacher is not predisposed to expect a specific answer and promote analysis, synthesis, and evaluation of information (Wimer, Ridenour, Thomas and Place, 2001). The field information predominantly explores various levels of student's cognitive learning is known as Bloom's Taxonomgy. Benjamin Bloom created a six-level taxonomy for intellectual behavior. In addition, Bloom, Englaehart, Frust, Hill, and Krathwohl (1956) identified four levels use high-order questions to engage the students in communication. The analysis exposes that at the application level, students are asked to apply facts, principles or generalizations that are known to solve a problem. Croom and Stair (2005) identified, apply, choose, demonstrate, or illustrate as possible verbs found in the questions asked at the application level. The analysis level asks students to identify and comprehend element within a process, communication, or series of events, possible verb found in analysis questions can include analyze, appraise, calculate, or compare. Synthesis questions ask students to engage in creative thinking. When a teacher asks a synthesis question, he/she might be found using verbs such as arrange, compose, create or design. Evaluation, or the highest questioning level, asks students to determine how a concept or idea is consistent with standards or values. This level of question might include verbs such as appraise, assess, choose, or argue. Only about twenty percent of a teacher's questions are usually high-order (Black, 2001). In this regard, Rickards (1974) found that the use of high-order questions stimulate cognitive processing behaviors, which influence the recall of both relevant and incidental material. Similarly, Nystrand and Gamoran (1988) state that these types of questions signal to students the teacher's interest in what they think, not just what they know and can report about what others have said. Likewise, Ostergard (1997) concluded that teachers who were able to use high-order question learned how to promote significant student communication in the classroom. Furthermore, Golkar (2003) found that high-order questions lead to more elaborate and extended forms of conversation, as well as engage students in meaningful interaction. Overall, high-order questions allow teachers to encourage their students to be more creative and analytical in their thinking.

5.5 - Low-Order Questions

The collected information with strong support of secondary data explicate that other types of questions commonly used is the low-order question. Golkar (2003) expresses that Low-order questions are those questions where the teacher attempts to predict the student's answers before asking the question and have pre-determined answers. Low-order questions are procedural or knowledge based questions that address information. The secondary information express two levels of Bloom's taxonomy which are knowledge and comprehension (Bloom *et al*., 1956); these two levels ask a student to recall information. In this regard, Croom and Stair (2005) note possible verbs in knowledge level questions as arrange, define, label or list. When students are asked to put information in another form, then they are at the comprehension level of Bloom's taxonomy. A typical student response to a low-order question generally requires a straight answer from memory rather than a more complex answer (Wimer *et al*., 2001; Gall *et al*., 1978). In this regard a study among general science classrooms in Germany, Japan, and the United States, Kawanka and Stigler (1999) found that the emphasis in U.S. classrooms is still asking students to communicate already known procedure and principles rather than individual ideas and thinking process. Similarly, Yip (2004) reiterates that low-order questions are used primarily in science classrooms to assess the knowledge level of students. Hamm and Perry (2002) state that low-order questions send the implicit message that General science is a discipline in which the teacher always knows the answers and creative solutions are not valued. In general, most classroom discussions involve more than fifty percent of low-order questions (Black, 2001). This notion is supported by Myhill and Dunkin's (2002) study, which found that teachers ask low-order questions sixty-four percent of the time during instruction. There are several common forms or types of low-order questions; obtaining an answer from the student, and moving on to the next question without any probing into the student's thinking (Moyer & Milewicz, 2002).

5.6 - Follow-Up Questions

The collected information express that the final area of study regarding types of questions is that of follow-up questions. In this regard, Nystrand and Gamoran (1988) state that follow-up questions are those in which a teacher incorporates a previous student answer into a subsequent question. These questions are often found to use pronouns and as guiding questions. These questions guide students to discuss problems and derive various concepts and procedures, or they guide students to use certain concepts and procedures to solve problems (Kawanaka & Stigler, 1999). Follow-up questions can go both ways: students can inquire about the teacher's remarks or the teachers can inquire about the student's remarks and only follow-up questions were examined from the teacher's perspective. In this regard, Sahin and Kulm (2006) have found follow-up questions to provide students with a hint or suggestion about the next step towards the solution, as will as a sequence of ideas to lead

students towards independent thinking. These types of questions are often used to guide students to use certain concepts and procedures rather than guiding them to discuss the problems and comprehend various concepts. Follow-up questions can be very beneficial to communication within the classroom. First, when teachers are exercising the use of follow-up questions during instruction, they must pick up on what students have said and then weigh the possibilities for discussion so that it can be weaved into the exchange of communication within the classroom (Nystrand & Gamoran, 1999). Second, these questions function to chain together teacher questions and student responses, making the communication within the classroom much more coherent.

5.7 - Wait Time

The qualitative discussion elaborate that last component considered is the teacher's use of wait time when asking questions. In this connection Rowe (1974) explicate the wait time to be the time between when the teacher stops speaking and the student responds or the teacher speaks again. On average, students are only allowed one second of wait time to start an answer (Rowe, 1974). Similarly, Rowe (1974) noted differences in interaction between the teacher and students when wait time increased to three seconds or more. Several benefits for both the student and teacher were found when a minimum of three seconds of wait time was allowed. Benefits for the student included longer and more correct responses, fewer "I don't know" responses, more volunteers, appropriate responses by more students, and scores on achievement tests tended to increase (Rowe, 1974; Stahl, 1994). Teacher benefits found were more flexibility and variety in their questioning strategies, and the quantity of questions was replaced with high quality of questions (Rowe, 1974; Stahl, 1994). In addition, Rowe (1978) also found more coherence in discussion between students and teachers, as well as improved motivation, which led to improved discipline in the classroom. Rowe (1978) added to previous research by stating that a minimum of three seconds wait time restructured the learning by shifting students to an evaluation of their thoughts and the thoughts of others in the classroom. The discussion further elaborates that another aspect that affect wait time is the rate at which a teacher presents information, as it should match the cognitive processing abilities of students (Tobin, 1986). Thus, teachers should supply sufficient time for students to think about the question and engage in communication. In general science classroom, Tobin (1986) found that when extended wait time were given, there was an increase in application questions and decrease of questions seeking basic comprehension. Likewise, the student was given more opportunities to apply the instructional objectives and verbally participate in communication. In addition, the analysis express that silence during the wait time give teachers time to think and develop higher quality communication that influence their thinking and responses to students.

Creating a learning environment in which all students are given opportunities to participate in ways that not only enhance their learning but also the learning of others in the classroom can be related to the wait time allowed by the teacher. Wilen (2004) notes that students at all levels can be frustrated when teachers do not give them sufficient time to think. Allowing a few seconds of wait time can also increase the probability of a more thoughtful and supported response. Wilen (2004) notes wait times of three to five seconds can increase the quantity and quality of student responses.

5. Discussion And Recommendations

Communication in the classroom involves the interaction between teachers and students. The study has focused on verbal communication through the tool of questioning and good questioning could start with the student or the teacher. This research has focused on the teacher's initiation of questions. The teacher plays multiple roles as a facilitator of communication, which includes asker, listener, and responder. In addition, the teacher must focus on the actual types of question asked and the amount of wait time given for students to respond.

Teachers must provide an instructional environment for learning, and they must decide which types of questions to ask so that good communication of different creative ideas will occur. They follow the asking of different questions with listening to students' responses. Teachers must listen to each student's response in order to determine if further explanation is needed from the students. Upon listening to students' ideas, the teacher then must respond to each student's ideas in a manner that further encourages communication of their thoughts or edifies the communication of thoughts already given. Students must feel that the classroom is a safe place where all responses are valued, whether it is in a whole group setting or small group setting.

Students can be asked high-order or low-order questions, but research indicates that high-order questions are better for communication in the classroom. High-order questions cause students to analyze, synthesize or evaluate the material presented, thus creating better communication of fruitful ideas. Sometimes the initial question does not provide enough information for the teacher to determine conceptual understanding on the part of the students. Thus, a follow-up question is needed to elicit further explanation and communication of ideas from the student. A balance between high-order and low-order questions with the possibility of follow-up questions will create a positive environment for the communication of creative and inventive ideas in the

classroom.

After a question is posed to students, an allowance of significant wait time is necessary to provide beneficial results of communication within the classroom. Teachers must give their students a minimum of three seconds wait time to think about the question being asked so that they can formulate a thorough response. When three seconds of wait time is allowed students will be best able to communicate in a manner which allows for well thought out responses.

Overall, this study focused on the role of the teacher in eliciting communication in the general science classroom. Most often the learning process begins with the teacher, but it does not have to end with the teacher. Although the teacher plays a significant role in this process, it would be interesting to explore how the students actually respond to the teacher's lead. Do their responses relate to the questions being asked? Do the teacher's questions cause students to formulate their own questions and thus create a more two-way communication? If students asked questions of their own, are they high-order or low-order in nature? The first recommendation of this study would be further research that focuses on learning from the student's perspective.

Furthermore, teachers' training is pivotal to implement small group instruction within the classroom to improve the results. The most positive results from this study were found when students were placed in small group setting; if teachers knew how to plan lessons structured around activities that encourage their students to work together, then would they be more likely to implement this kind of settings in the classroom? Are teachers afraid that the amount of content learned would be inhibited if students were asked to discover the concepts with their peers? Does resistance to small group instruction stem from lack of knowledge in how to implement it, or fear of not being in total control of the learning of their students?

Finding ways to not only foster deeper understating but also critical thinking skills is a necessity in the world of education. Effective communication is a good way to attain these goals for each student. This study hopes to have provided a method to educators which will encourage them to get their students talking about various concepts. Through the use of high-order questions, a minimum of three seconds wait, ad an instructional setting that encourages interaction in the classroom, the goal of effective communication or learning can be met in every classroom. High order questions relate to application, evaluation, synthesis, or analysis in nature, and thus require students more time to formulate their responses.

Previous studies looking at high-order questions and wait time have found differing results with regards to the three second minimum. Rowe (1974) studied elementary through college level science classrooms and found a mean wait time of one second. Swift (1983) found teachers who had been trained in asking high-order questions still fell just below the three second minimum goal of wait time. Heningsen and Stein (1996) encourage teachers to allow an appropriate amount of time for discussion. Edwin (1999) conducted a study among 70 teachers' interns who underwent a sixteen week practicum with a focus on asking high-order questions and allowing sufficient wait time. At the conclusion of the study, the interns were found to ask high-order questions with an average wait time of 3.6 seconds. However, in Tobin's (1986) study of middle school language arts classrooms high-order questions yielded a mean of 4.5 seconds. Tobin's findings support the finding in this study that high-order questions require a greater amount of wait time.

6. Summary

In this study, the authors hope to provide teachers with an effective method to extract communication of conceptual understanding from their students. Through the use of proper questions and sufficient wait time the researchers expect better learning outcomes to occur. In a nutshell, the main purpose of this study was to evaluate how types of questions differed among the teachers, as well as examine the differences in wait time allowed after each type of question. In addition, the researchers sought to determine if the instructional setting had any effect on the type of questions asked.

Effective communication involves quality interactions between teachers and students in order to gain mutual understanding and enhance learning. This study focused on verbal communication through the Socratic Method of questioning in the classroom. Once a question is posed to students, it is recommended that teachers should give their students a minimum of three seconds wait time to think about the question being asked so that they can formulate a thorough response. Overall, the Socratic questioning method of asking developmental question is an art as it requires experience, listening, and guiding others to learn by thinking and personal reflection. Effective questions can be used in the classroom with students, in the boardroom with employees and managers, and in the public sector to get people of society thinking about the consequences of their individual or collective actions.

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