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Students and Questioning: A Review of the Role Played By Students Generated Questions in the Teaching and Learning Process

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Abstract

Questioning techniques are a heavily used, and thus widely researched, teaching strategy. The questioning process is an essential part of instruction in that it allows teachers and tutors to monitor student competence and understanding as well as increase thought-provoking discussion.In this paper we argue that effective use of questioning arouses curiosity, stimulates interest, and motivates students to seek new information. Students engaged in the questioning process benefit from the clarification of concepts, emergence of key points, and enhancement of problem-solving skills. Using questioning, teachers assess students' knowledge, determine needs for focused re-teaching, and encourage students to think at higher cognitive levels. Thus the purpose of this paper is to highlight the value of students' questions in the learning-teaching process; review the research on student-generated questions in the learning process; and suggest some strategies that teachers can use to foster a culture of inquisitiveness in their classrooms.

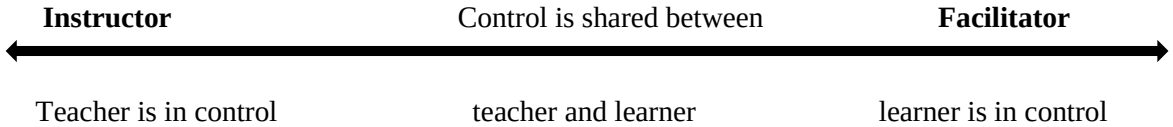
Keywords: students, questioning, teaching, learning, students generated questions.

1. Introduction

What is Teaching and Learning?

Teaching is a multifaceted process encompassing a variety of activities which are all aimed at promoting learning in students and learners. For Marton and Booth (1997), learning is about how we perceive and understand the world, about making meaning. For Fry, Ketteridge and Marshall (2009) learning is not a single thing; it may involve mastering abstract principles, understanding proofs, remembering factual information, acquiring methods, techniques and approaches, recognition, reasoning, debating ideas, or developing behaviour appropriate to specific situations; it is about change. In short learning can simply be seen as change of behaviour resulting from experience (Shumbayaonda and Maringe, 2000).

According to Petty (2004) teaching methods are measured on a continuum of two extremes as illustrated below:



The above continuum poses the question: who should have control over learning, the teacher or learner? Petty (2004) identifies three sets of teaching methods: teacher-centred methods, active methods and student-centred methods. These methods are represented on the above continuum by teacher as instructor; teacher and learner sharing control; and teacher as facilitator respectively. Teaching and learning can take any of these positions or any other variations on the continuum. Petty (2004) sees lecture, demonstration, questioning, notes and handouts as highly teacher-centred methods; supervised student practice, discussion,

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group work and student talk, games and active learning methods, role-play, drama and simulations, seminars and whole-class interactive teaching as active methods in which control is shared between teacher and learner; and reading for learning, private study and homework, assignments and projects, essays and reports, guided discovery, learning from experience, independent learning and self-directed learning as student-centred methods in which learner is in control and teacher takes facilitator role. This paper focuses on student-centred methods.

Learner-centred methods of teaching are derived from constructivism, a group of theories that see effective learning as experiential learning through real life experience. Constructivism advocates for problem based adaptive learning that integrates new knowledge with existing knowledge and allows for creation of original work or innovative procedures. It envisages a self-directed, creative, and innovative learner. The educator's role is to mentor the learner during heuristic problem solving of ill-defined problems by enabling quested learning that may modify existing knowledge and allow for creation of new knowledge. The learning goal is the highest order of learning: heuristic problem solving, metacognitive knowledge, creativity, and originality.

Montessori (1946) observes that education is not what the teacher gives; education is a natural process spontaneously carried out by the human individual, and is acquired not by listening to words but by experiences upon the environment. Thus constructivism encourages the learner to arrive at his or her version of the truth, influenced by his or her background, culture or embedded worldview. Young children develop their thinking abilities by interacting with other children, adults and the physical world. From the social constructivist viewpoint, it is thus important to take into account the background and culture of the learner throughout the learning process, as this background also helps to shape the knowledge and truth that the learner creates, discovers and attains in the learning process (Wertsch, 1997). Furthermore, it is argued that the responsibility of learning should reside increasingly with the learner (Glasersfeld, 1989). Constructivism thus emphasizes the importance of the learner being actively involved in the learning process, unlike traditional educational viewpoints where the responsibility rests with the instructor to teach and where the learner plays a passive, receptive role. Glasersfeld (1989) emphasizes that learner's construct their own understanding and that they do not simply mirror and reflect what they read. Learners look for meaning and will try to find regularity and order in the events of the world even in the absence of full or complete information.

According to constructivists, instructors have to adapt to the role of facilitators and not teachers. Whereas a teacher gives a didactic lecture that covers the subject matter, a facilitator helps the learner to get to his or her own understanding of the content. In the former scenario the learner plays a passive role and in the latter scenario the learner plays an active role in the learning process. The emphasis thus turns away from the instructor and the content, and towards the learner. This dramatic change of role implies that a facilitator needs to display a totally different set of skills than a teacher. A teacher tells, a facilitator asks; a teacher lectures from the front, a facilitator supports from the back; a teacher gives answers according to a set curriculum, a facilitator provides guidelines and creates the environment for the learner to arrive at his or her own conclusions; a teacher mostly gives a monologue, a facilitator is in continuous dialogue with the learners (Petty, 2004). A facilitator should also be able to adapt the learning experience 'in mid-air' by taking the initiative to steer the learning experience to where the learners want to create value (Ibid).

Generally speaking, as observed by the Society for Quality Education (http://www.societyforqualityeducation.org/parents/bkgrnd2.html, accessed 4 November, 2013),

In a classroom situation, a student-centred teacher tries to create an environment which will motivate the students to discover new skills and knowledge. Teachers are no longer supposed to transfer facts into passive students' heads but rather facilitate their discovery of relevant information. As a result, teachers rarely stand in front of the class and teach a lesson. Instead, activity centres may be set up around the room with the children moving from station to station, or students might be assigned to work together in groups on a project. Relatively little whole-class teaching takes place; rather teachers use methods such as peer tutoring,

individual and group projects, and teacher conferencing with one student while the rest of the class works alone.

In the teaching and learning process there two types of questions: teacher generated questions and student generated questions.Teacher generated questions are questions that leave control of the learning process in the hands of the teacher and make students dependent upon the teacher (Bowker, 2010). Student generated questions are generated by students and they give them control and ownership of the learning process and engage the course material as independent thinkers (Bowker, 2010).

The above two types of questions give rise to the Socratic teaching method.According to the University of North Carolina School of Education (not rated), derived from the teachings of the Ancient Greek, Socrates, the Socratic method of teaching is a student-centred approach that challenges learners to develop their critical thinking skills and engage in analytic discussion. Teachers engage students by asking questions that require generative answers. Ideally, the answers to questions are not a stopping point for thought but are instead a beginning to further analysis and research. Teachers can use the method in a variety of subject areas and across grade levels in order to challenge students to examine both contemporary and historical issues.

2. Why Ask Questions in the Teaching and Learning Process?

According to Fries-Gaither (2008), teachers ask questions for a variety of purposes, including:

- to actively involve students in the lesson;
- to increase motivation or interest;
- to evaluate students' preparation;
- to check on completion of work;
- to develop critical thinking skills;
- to review previous lessons;
- to nurture insights;
- to assess achievement or mastery of goals and objectives; and
- to stimulate independent learning'

A teacher may vary his or her purpose in asking questions during a single lesson, or a single question may have more than one purpose.In general, research shows that instruction involving questioning is more effective than instruction without questioning (Marzano, Pickering, and Pollock 2001).

According to Caram and Davis (2005), teacher-initiated questions enhance student learning by developing critical thinking skills, reinforcing student understanding, correcting student misunderstanding, providing feedback for students, and enlivening class discussion. Questions serve as a teaching tool by which instructors manage and direct learning, test student understanding, and diagnose problem areas. The skillful use of questioning can enhance learning and increase student performance.

3. Students' Questions

Dillon (1990) observes that many scholars have argued convincingly that the act of questioning is central to thinking, to storing and communicating knowledge, even to several important types of social interaction. But while scholars have written extensively on questioning, they have focused on how teachers ask questions and how students answer them, largely neglecting to consider that helping students develop their own questioning skills might be a valuable pedagogical objective in itself (Bowker, 2010). Thus the flaw in most Socratic, critical, and problem-based approaches is that the teacher retains control of the inquiry. Students are asked to generate answers in accordance with their roles as naïve interlocutors, while the teacher plays Socrates. When the teacher is the one who constructs questions, problems, or critical challenges, students become dependent upon the teacher.On the other hand,a question-centred pedagogy proposes that these question-posing, problem-making functions be carefully handed over to students,so that students engage the course material as independent thinkers (Bowker, 2010).

Questioning is an integral part of meaningful learning and historical inquiry. The value of student-generated questions in learning has been emphasized by authors such as Biddulph, Symington, and Osborne (1986) and White and Gunstone (1992). Students' questions can serve different functions such as confirmation of an expectation, resolution of an unexpected puzzle, and filling a recognized knowledge gap (Biddulph and Osborne, 1982). Student questioning is also an essential aspect of problem-solving (Pizzini and Shepardson, 1991; Zoller, 1987). The source of questions is a gap or discrepancy in the students' knowledge or a desire to extend knowledge in some direction. Questions may occur spontaneously or in response to stimulation.

Besides helping students learn, student questioning can also guide teachers in their work. Questions indicate that students have been thinking about the ideas presented and have been trying to extend and link them with other things they know. They can also reveal much about the quality of students' thinking and conceptual understanding (Watts, Gould and Alsop, 1997; White and Gunstone, 1992), their alternative frameworks and confusion about various concepts (Maskill and Pedrosa de Jesus, 1997), their reasoning, and what they want to know (Elstgeest,

1985).

A hallmark of self-directed, reflective learners is their ability to ask themselves questions that help direct their learning. These questions could be those pertaining to the historical content of interest, or evaluative questions that help the learners monitor the status of their understanding. Self-questioning provides learners with a way to test themselves, to help them check how well they are comprehending what they are studying. It is a source of feedback that helps students redirect their use of learning strategies. Thus, the effectiveness of self-questioning is attributed to both its cognitive and metacognitive functions. Self-questioning is also consistent with the view of generative learning (Osborne and Wittrock, 1985) as learners try to reconcile their prior knowledge and new information in their attempts to make sense of these ideas.

According to Chin (2002) questions stimulate students to generate explanations for things which puzzle them and to propose solutions to problems. These questions trigger the use of deep thinking strategies which may not be invoked if the questions had not been asked, and thus they play an important role in engaging students' minds more actively. Such questions can help learners initiate a process of hypothesizing, predicting, thought experimenting, and explaining, thereby leading to a cascade of generative activity, and help them acquire missing pieces of knowledge or resolve conflicts in their understanding (Chinand Brown, 2000). When students engage socially in talk and activity about shared problems or tasks, an individual's questions can also stimulate another group member to use these strategies and thinking processes. The questions embedded in the discourse of peer groups help learners construct knowledge during the dialogic and dialectic process (Chin, 2002).

As already noted above, question production is not a usual student role. Consequently, in classroom situations, students are more often expected to answer questions rather than to ask them. Few students spontaneously ask high quality thinking questions (White and Gunstone, 1992). The number and type of questions that students ask may be influenced by their age, experiences, prior knowledge and skills, the attitude of the teacher, teaching style, and nature of the topics, reward structure, classroom evaluative climate, and social interaction patterns (Biddulph and Osborne, 1982). Furthermore, interesting and productive answers are dependent upon being able to first come up with good questions for eliciting them (Shodell, 1995). Low levels of questioning and explanation on the part of students have been found to be correlated with lower achievement (Tisher, 1977).

4. Research on Student-Generated Questions

Watts and Alsop (1995) found that students' questions were indicative of the routes through which students were seeking understanding. In particular, consolidation questions, exploration questions, and elaboration questions illuminated distinct periods in the process of conceptual change. Keys (1998) found that in the context of open-ended investigations, students' questions determined the depth and breadth of the

concepts to be learnt and the cognitive difficulty of the investigative tasks. Allowing students to generate their own investigative questions stimulated curiosity and encouraged profound thinking about relationships among questions, tests, evidence, and conclusions.

In the study by Maskill and Pedrosa de Jesus (1997), the teacher stopped the lessons from time to time and requested the students to write down any questions they had about problems or difficulties they were encountering. Students' questions were found to be a good source of information about each specific moment of the lesson and provided the teacher with a great deal of information with which to organise future teaching according to students' needs. The findings by Dori and Herscovitz (1999) indicate that students' question-posing capability can be used as a means of evaluating higher-order thinking, and suggests the potential of question-posing as a viable evaluation tool that offers an alternative to conventional evaluation methods.

5. Fostering Students' Questions

To promote a classroom discourse that stimulates question-asking as well as higher level cognitive and metacognitive talk, the teacher could ask students to write their questions before performing an activity to help them direct their own inquiry and use these questions as a springboard for investigation and discussion. Through this process of question-asking and explaining, the students verbalize their ideas, reflect on the thinking they have engaged in, and externalise mental activities that are usually covert.

It is not enough merely to provide opportunities for students to ask questions. Teachers need to take a proactive stance and employ strategies to encourage students to ask questions. Biddulph, Symington, and Osborne (1986) suggested four ways of doing this. These include providing students with suitable stimuli, modelling question-asking, developing a receptive classroom atmosphere, and including question-asking in evaluation. To provide students with suitable stimulus material, Jelly (1985) proposed that teachers use anomalous happenings and materials that do unexpected things as question stimulators, and that students be put in contact with interesting materials and given the opportunity to ask questions. Symington (1980) has also reported that letting students enjoy a period of unstructured observation with materials increased the number of questions they were able to ask. Students need to have some basis on which to generate questions; otherwise, they have little idea of what questions to ask.

White and Gunstone (1992) proposed the use of structuring or focusing strategies such as providing a stimulus (e.g. a picture or diagram) on which questions are to be based, providing an answer and asking for questions, and asking students to begin questions in a particular way (e.g. what if, why does, why are, how would) as such questions are more likely to be based on deeper thinking than simple recall. Students may need to be shown how to form questions. Modelling question-asking by the teacher is one way of doing this. White (1977) has suggested that the ability to formulate questions is a skill which needs to be taught rather than left to chance, and that the teacher could provide examples of how to form questions. For instance, the teacher can show a picture of an object or event, say Great Zimbabwe Ruins, and after saying 'What questions can we think of about this?', starts giving examples such as 'In which country do we find these stone buildings?' Subsequently, the teacher can simply present the picture and call for questions.

Students may also need explicit training in questioning strategies such as learning the linguistic forms of effective queries and the syntax of question formulation. King (1994) found that giving students thought-provoking question stems such as 'What is the difference between . . . and. ..?' helped them to generate questions that prompted them to compare and contrast, infer cause and effect, note strengths and weaknesses, evaluate ideas, explain, and justify.

To foster a question rich environment, White (1977: 125) has suggested that 'praise should be given to those who invent questions, repressions should be avoided'. Students would feel comfortable with asking questions only when they have no fear of censure, criticism, or ridicule, and when their questions are valued, no matter how silly they seem to be. Students' questions must always be received with sensitivity and enthusiasm. Several authors (Eisner, 1965; White and Gunstone, 1992) have also suggested that teachers ask students to write questions about aspects of what they are learning which are puzzling to them. Teachers can

also ask their students to record any questions that they have in a diary or learning journal, thus documentingasetof'I wonder' questions (e.g. Kulas, 1995). The teacher can pause at convenient intervals during the lesson and request the students to write down questions they wish to ask, and then use these questions as 'thought provokers' for stimulating discussions (Maskill and Pedrosa de Jesus, 1997).

6. Conclusion

The above review indicates that there is substantial educational potential in student-generated questions in directing students' learning and guiding their construction of knowledge. Students' questions, particularly those posed at a higher cognitive level, can promote conceptual talk that pertains to important concepts, thereby leading to enhanced learning. In addition to bringing about more meaningful learning on the part of the students, these questions can also provide useful information and feedback for the teacher about students' thinking, puzzlement, and the status of their understanding, and thus act as a window to the students' minds. This paper argued that the questioning process is an essential part of teaching and learning in that it allows teachers to monitor student competence and understanding as well as increase thought-provoking discussion. In a typical classroom setting, the teacher presents information and poses questions to which students answer. Rarely do students ask questions to which the teacher responds. Given this state of affairs, it is difficult for the teacher to know the kinds of puzzlement that students have if their questions are not articulated. More importantly, questions are also psychological tools for thinking as they help to scaffold ideas, and can advance students' understanding of historical concepts and phenomena. The act of asking questions and the consequent search for answers is key to active learning. The formulation of a good question is also a creative act. Hence, students should be encouraged to ask questions as this facilitates learning.

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