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Can I ask a question? the importance of classroom questioning

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Abstract

Moving from a teacher-focused teaching to a student-focused teaching implies a new perspective of the approaches to questioning in the classroom. Putting the focus on students' questions rather than on teacher's questions, and valuing students' questions rather than emphasizing their responses is imperative in supporting learners' higher levels of thinking. This paper outlines a workshop with 60 elementary and secondary teachers from different disciplinary fields. A 2-hour workshop was designed and implemented in order to promote teachers' classroom questioning awareness. The workshop comprised several strategies, such as (i) analysis of excerpts of classroom discourse; (ii) discussion on the number and functions of students' and teachers' questions; (iii) analysis of strategies to promote student questioning.

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1. Introduction

Research on the importance of questioning as a teaching and learning strategy is well documented (Chin & Osborne, 2008; Graesser & Olde, 2003). It is suggested that teachers spend up to 50% of class time on questioning and that they ask between 300 and 400 questions a day, while each student asks, on average, 1 question per week (Graesser & Person, 1994). Surprisingly, teachers seem to be not aware of this discrepancy. Several studies also rely on the kind of questions asked by teachers and students, concluding that these are usually procedural and fact-based. This particular study aimed at promoting teachers' classroom questioning awareness through their involvement on a workshop.

2. Classroom questioning

2.1. Teacher questioning

Research has shown that teachers ask a high frequency of questions. In 1960, Floyd (1960) developed a study with 40 elementary teachers and found that these teachers asked 93 percent of all classroom questions. Also during the 60s, Schreiber (1967) found that fifth grade teachers asked about 64 questions each during 30-minute social studies lessons. Later, Levin and Long (1981) conducted a review of effective teaching research and concluded that teachers asked 300-400 questions per day. Cotton (1988) suggested that teachers spend half of the class time asking

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questions. These numbers confirm the results obtained by Stevens in her precursor study about classroom questioning conducted in 1912. This author also found that teachers dominated the verbal interaction in class, asking in average 400 questions each day. Stevens (1912) concluded that 80% of the class time was spent with the teacher's questions and the students' answers. In 1994, Graesser and Person (1994) found that the teacher's questions corresponded to 96% of all questions raised in class. These authors also concluded that a teacher asks, in average, 69 questions per hour, what corresponds to 30000 questions per year! In 2002, Kerry reinforced these numbers, noting that if teachers ask an average of 43.6 questions per hour, in an average career they are likely to ask about 2 million questions. More recently, Almeida and Neri de Souza (2010) conducted a study with secondary science teachers and concluded that the questioning patterns found some decades ago are still prevalent, with teachers clearly dominating the classroom discourse.

Questioning is the most frequently used instructional tool. However, even if teachers ask a huge number of questions per class, the questions posed are consistently of the same kind. It is well-known that teachers typically ask low-level questions, whose answers require mainly memory. The findings on teachers' characteristic use of low-cognitive-level questions have been verified at all school levels, from elementary teaching to university.

2.2. Student questioning

Asking questions is a key element in the learning process. Questioning helps students direct their learning as they try to merge their prior knowledge and new information in their attempts to make sense of these ideas. Students' questions play an important role in meaningful learning and motivation, and can be very revealing about the quality of students' thinking and conceptual understanding, their alternative frameworks and confusion about various concepts, their reasoning, and what they want to know. Student questioning, particularly at the higher cognitive level, is also an essential aspect of problem solving. Also, interesting and productive answers are dependent on being able first to come up with good questions for eliciting them. Low levels of questioning and explaining on the part of the students have been found to be correlated with lower achievement.

Besides helping students learn, student questioning can also guide teachers in their work. Some researchers have explored the potential for using students' questions to influence the curriculum (Rop, 2002). Some questions show that students have been thinking about the ideas presented and have been trying to expand and establish relationships between these and other concepts they already know. Questions can also expose much about the quality of learners' thinking and conceptual understanding (Watts, Gould & Alsop, 1997), students' alternative frameworks and confusion about various concepts, their reasoning and what it is they want to know.

In spite of the educational significance of student questioning, it is well-known that students ask surprisingly few questions, and even fewer in a real search of knowledge. Actually, only a small number of students spontaneously ask high-level questions or open questions.

Presently, a growing number of educators emphasise the importance of students' questions in both teaching and learning processes, and the number of research studies looking for ways to encourage students to generate questions is growing. Studies at different educational levels and contexts generally indicate that learners avoid asking questions. The number and kind of questions that learners ask may be influenced by previous knowledge, experiences and skills, their age, the attitude of the teacher, teaching style, classroom evaluative climate, social interaction patterns and nature of the topics.

Students' questions usually result from a gap or discrepancy in the students' knowledge or a desire to expand their knowledge. Students' questions may be triggered by unknown words or inconsistencies between their knowledge and the new information, which then provoke 'cognitive disequilibrium' (Graesser & Olde, 2003, p. 525).

3. The workshop

A 2-hour workshop was designed and implemented in order to promote teachers' classroom questioning awareness. Sixty elementary and secondary teachers from different disciplinary fields (biology, geology, chemistry,

physics, economy, religious studies, geography, history) participated in this workshop. The workshop comprised several strategies, such as:

- starting from the experience of the teachers, a *moment of reflection and discussion about the importance of teacher and student questioning* was provided;

- *analysis of excerpts of classroom discourse and discussion on the number and functions of students' and teachers' questions* - the teachers were asked to analyse the discourse patterns found in the classroom transcripts, namely the number of questions raised by both teacher and students. Afterwards, they were also asked to analyse the kind of questions raised by the teacher and the students (closed or open questions). The classification proposed by each group was discussed in the larger group.

- *analysis, reflection and discussion about teachers' and students' questioning profiles and questioning patterns*, as defined by Albergaria Almeida (2010).

- *analysis of strategies to promote student questioning* – actually this was the main activity of the workshop. It consisted in the analysis of strategies to foster questioning. Two strategies were proposed to the class. The teachers were invited to read two small texts and ask questions whose answers would assist them to understand the situations presented. The two problem-based cases proposed are shown in Figures 1 and 2. The information presented in each problem-base case was manipulated. A group of teachers analysed a version with all the information, while a second group of teachers received a version with less information. The information that was omitted in this version is underlined in Figures 1 and 2. The manipulation of the information aimed at showing the teachers that the amount and the kind of information available could influence the type and the number of questions asked.

“Intoxication by water”

In normal conditions there is a balance between the ingestion of water and its excretion. In some situations, drinking too much water can lead to a condition known as water intoxication, and to a related problem known as hyponatremia. Hyponatremya is a usual condition in the clinical practice. Several studies explain it as being the most frequent electrolytic change on ill people hospitalized.

Also the marathoners (or other athletes performing intense and prolonged training) are very susceptible if they only drink water during exercise. Another group risk is babies under twelve months, especially until nine months. At this age, the ingestion of too much water can lead to cerebral damage and even to death. Drinking milk from the mother gives the babies all the liquids they need in this phase of development.

Except these situations, and illness cases, the intoxication by water is a very unusual problem.



Ask questions whose answers allow you to obtain relevant information for the understanding of the health problem described above.

Figure 1. Problem-based case “intoxication by water”

Just as an example, in what concerns the problem-based case about hyponatremia, the teachers raised 29 open questions and 33 closed questions, as shown in Table 1.

Table 1. Number of closed and open questions

Open questions	Closed questions
29	33

Twenty one open questions were asked after the analysis of the text with less information, while the group analyzing the problem-based case with all the information only asked 8 open questions. Actually, the text with less information give rise to 40 questions, with the text with the full information only produced 22 questions (Table 2).

Table 2. Number of open and closed questions according to the version of the problem-based case

Less information		More information	
Open questions	Closed questions	Open questions	Closed questions
21	19	8	14

Some examples of questions asked by the teachers:

Closed questions

- What is intoxication?
- What is hyponatremia?
- What are the symptoms of hyponatremia? What are its effects?
- Is it possible to treat hyponatremia? How?

Open questions

- Why our body does allow intoxication by water if it has an excretory system?
- Once these are exceptional situations, why do these happen?

“Sweet indigestion”

Australian farmers are registering their cattle (goats and cows) in a vaccination program aiming to reduce the greenhouse effect. Results obtained by Australian researchers show that this measure can reduce the emission of methane by each animal, in about 20 percent in a year. This is equivalent to 3000.000 tons of carbon dioxide, if 3 millions animals are vaccinated. The vaccine acts in the metabolism of the methanogen bacteria (archaebacteria group). These bacteria exist in the digestive tract and are responsible for the digestion of the carbon hydrates, producing methane.

Adapted from Reuters (2001)

Ask questions that can help you to understand the situation presented. The answers to these questions should not be found in the text provided.

Figure 2. Problem-based case “sweet indigestion”

4. Final comment

Asking questions is of crucial importance for the teaching and learning process. As supported by several authors, asking higher-level questions is not a usual behaviour of teachers and students. Actually, most of the teachers are not aware of (i) the importance of classroom questioning; (ii) the high number of questions they ask; (iii) the low number of questions their students ask; (iv) the low level of questions asked by both teacher and students. This workshop aimed at promoting teachers' awareness about these topics and also at presenting some teaching strategies that can easily be implemented in a regular class.

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