

# COMPARING TEACHERS' BELIEFS IN AND PRACTICES OF QUESTIONING IN THE UK AND CHINA

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## Abstract

This study examines the relationship between teachers' beliefs and their practice in using questions from a cross-cultural perspective. Data were collected from interviewing and observing 11 Key stage 3 teachers at two schools in the middle of England and 12 Year 7-Year 8 teachers at two schools in the north of China. Results suggest that teachers in England seemed to possess more profound pedagogical knowledge about questioning than their Chinese counterparts, but a closer examination into their classroom practices revealed a conflict between their beliefs and practices. By contrast, the Chinese teachers who were less aware of their questioning, indicated a variety of questioning strategies, particularly when a specific context was given, they were able to describe the ways they approached questioning comprehensively.

Keywords: Secondary mathematics classroom; Questioning; Beliefs; Practices; the UK; China.

## 1 INTRODUCTION

Various research efforts have been carried out in the examination of the relationship between teachers' beliefs and their classroom practices [20] in order to have a better understanding of teaching behaviours in classrooms [16], which subsequently aim to improve teachers' professional development or effective teaching practice [12].

This paper aims to provide a particular angle, that is, through the cross-cultural perspective, to examine the relationship between beliefs and practices in the use of teacher questioning in England and China, both at an intra-country level and at a cross-country level.

### 1.1 Teacher Beliefs and Classroom Practice

Teachers' beliefs have a profound impact upon their classroom practices. Under challenging circumstances, it is the belief, rather than the knowledge, that teachers have received from their training that guides their teaching [17] [5]. Before teachers are able to change their teaching behaviours, they have to be aware of not only their behaviours but also their beliefs that prompt the behaviours [19].

A great deal of research has shown that changes in teacher beliefs and changes in teaching practice are correlated and interplayed [5]. Studying the relationship between teachers' beliefs and practices may help to generate a better understanding of the interplay between beliefs and practices, and particularly in this study, the practice of teacher questioning. Teachers have been found to hold strong beliefs about their learners and about teaching [2], which then ultimately shape the kind of learning experiences students have [3], and the kind of questions they ask [2]. [4] showed that teachers' beliefs strongly underpinned their way of posing questions. A teacher who often asks questions with right or wrong answers may see their students' role as memorising the answers and giving back upon their students' request [13]. Alternatively, questions focusing on text-based knowledge could also reflect their beliefs about students' learning capacity, that is, that students are incapable of answering questions requiring higher cognitive thinking and, as a consequence, they demand knowledge of facts and basic concepts to pass exams and tests [24]. As a result of beliefs held by their teachers, students subsequently could easily pick up the right answers from textbooks [23], which in turn, from a cognitive viewpoint, could limit the scope of their thinking, as they are limited in their ability to extend it beyond factual knowledge, and fail to stimulate their critical thinking skills. From a social viewpoint, the use of a textbook might not stimulate their interest and

curiosity and could lead to them getting bored in lessons [25]. Besides, [11] examined the beliefs of K-8 preservice teachers about mathematics and science teaching and learning during a content methods course, which indicated that in terms of teaching paradigms, teachers who hold the Behaviourist belief that learning occurred when knowledge was transferred passively from one to another ended in limiting students' opportunities to learn through asking their own questions or building on their own responses.

## 1.2 Beliefs and Behaviours in Using Questioning

Extensive studies have investigated the relationship between teacher beliefs and practices across different subjects and using different methodologies and theories. Some came to suggest that the beliefs and behaviours are consistent [15]. A study by [15], looked closely into two language teachers' beliefs and practices about CLT in Mexico through observation and interviews, which highlighted teachers preferred to ask more referential and open questions which corresponded with their beliefs in CLT.

However, most studies have suggested the opposite: teachers' beliefs are incongruent with their actual practices in that teachers do less than they claim [12]. For instance, [12] examined 13 beginning ELT teachers' beliefs and practice in terms of questioning purposes, content focus, students' cognitive levels, and wording and syntax through the use of questionnaire and observation, concluded that the lack of experience embedded led to inconsistencies between their beliefs and practices. In contrast to the claim that teachers do less than they claim, [9] investigated the relationship between teachers' beliefs and their practices with a focus on teacher questioning, using observations and interviews with seven to thirteen teachers teaching Numeracy and Literacy at Key Stage 2 (aged 7-11) at four schools in the west of England, and concluded that there was a mismatch between teachers' beliefs and practices, in that teachers did more than they claimed. The methods and methodology may explain why their results contrast with the findings of previous studies. They (Ibid) used ground theory to examine beliefs and practices, involving two stages of interviews and observations, the first stage of interviews was conducted with 13 teachers, with only five of these followed up with observations. The second stage of interviews was carried out with seven teachers, only four of whom were observed. Nevertheless, the research has suggested the significant role of context in determining the consistency and inconsistency between teachers' beliefs and practices [20].

Additionally, there has been very little research into the relationship between teachers' beliefs and their practices focused on questioning, especially in the context of mathematics at key Stage 3 from a cross-cultural perspective. Given the significance and pervasiveness of teacher questioning and the growing attention to cross-cultural comparative studies over the last decades [8], this seems to be an important gap in the literature. Driven by such, we set out to examine a group of teachers' beliefs and practices in questioning in England and China, in an attempt to identify the variations between the two and may even suggest the underlying possible explanations for such mismatch. Precisely, this study therefore examines the relationship between teacher beliefs about questioning and their actual behaviours in the context of lower secondary mathematics classrooms in England and in China respectively at an intra-country level, and goes on to examine the relationship of teacher beliefs and practices in questioning at a cross-national level. Therefore, the present study was designed to answer the following research questions with a specific interest in teacher questioning in England and China.

- What are the current practices of a group of teachers in each of England and China? What are the similarities and differences between the practices of questioning in England and China?
- What are the beliefs of these teachers in each of England and China? What are the similarities and differences between the beliefs about questioning held by these teachers in England and China?
- Are there teachers' beliefs about questioning consistent with their classroom questioning practices in England and China?

## 2 METHODOLOGY

This study used qualitative methods to investigate both Chinese and British teachers' questioning beliefs and practices. Classroom observations and interviews were used to directly compare their beliefs and behaviours in questioning.

A group of 11 mathematics teachers of Key Stage 3 pupils (aged 11-14 years) in England and 12 mathematics teachers of Year 7-Year 8 pupils (aged 11-14 years) in China were selected. Each teacher participant was observed once, in order to identify the potential questioning patterns, and types they

might adopt. Following this, semi-structured interviews were implemented to obtain their beliefs about questioning. The data collected from observations and interviews were audiotaped, transcribed verbatim and later analysed using Nvivo. Thematic analysis was employed in order to identify patterns of teachers' questioning practice in these two nations and their perspectives on the use of questioning.

### 3 RESULTS

Beliefs and values have a significant influence over teachers' teaching practice. In the context of teaching mathematics, there has been a growing interest over the last 30 years in how affective factors such as beliefs [18] [5] influence classroom practice, especially with reference to teacher questioning [9] [12]. Studies have asserted that questioning behaviour is a result of belief [14]. A number of other studies have suggested that teachers' classroom behaviours in practice are more complex than their self-reported beliefs account for in questioning [9]. Therefore, this study aimed to examine what the teachers said about questioning, in order to compare this with their actual practices in classrooms to see if there were any consistencies and inconsistencies between their self-reported and actual behaviour of questioning. As expected, the relationship between teachers' beliefs and their actual practices was complex, and did not fall into a fixed pattern. At a broad level, there were congruencies between the teachers' views and what they did in terms of values, frequency, types of questions, and questioning strategies overall. However, a closer examination of each of these features revealed significant discrepancies.

The findings reveal that at an intra-country level, both divergences and convergences were found in England and in China; whereas at a cross-country level, the English teachers seem to be more aware of and more reflective about their questioning than their Chinese counterparts. The following section will present these across four parts, including values, frequencies, types and strategies of questioning.

#### 3.1 Values and frequencies of questioning

When teachers were interviewed, the Chinese teachers did not seem to give much weight to their use of questioning and claimed that they asked very little of questioning in class; whereas the teachers in England valued highly over questioning, and believed that they asked a lot of questions in lessons.

In the two examples that follow, the Chinese teacher considered questioning as a habitual behaviour, but the English teachers saw questioning as a fundamental pedagogy and was vital for students' thinking.

*"I am not sure whether it is useful to ask questions, but everyone does ask questions in class, I got used to asking questions as well (one Chinese teacher)."*

*"Questioning is key, isn't it? It is the key bit. It is...aiming the right question at the right child to try and tease just that little bit more out of them (one English teacher)."*

Regarding frequencies of questioning, the Chinese teacher said *"I have no questions in my lesson, because even if you ask questions, the students do not respond at all."* On the other hand, the English teachers asked a lot of questions, it is reported that they asked questions *'all the time'* and *'as much as possible, so throughout the class ideally.'*

However, in lessons observed, both groups of teachers asked a huge number of questions, and the Chinese teachers asked many more questions than those in England. They asked a total of 2172 questions, with each lesson lasting about 45 minutes. The average frequency of questioning was therefore four questions per minute. Such inconsistency in Chinese teachers' beliefs and practices seems to coincide with the claim made by other studies that, when asked, teachers often underestimate the number of their questions [6]. In contrast, this claim contradicts to the findings of this research with regards to the English mathematics teachers, as their self-reported beliefs and practices of frequency of questioning were consistent.

#### 3.2 Questioning Strategies

In terms of questioning strategies, the teachers in England often asked why questions following students' answers, which is a good start. But soon after students gave a reply, they tended to wrap up the conversation into a summary or an answer, and no further explanations or elaborations were reported. A typical example can be seen as the follow. In later interviews, it is reported that they preferred to ask their students for explanations using 'why' questions, which may at first appear to be consistent with their practices observed. However, on a close examination of their 'why' questioning and their students' responses, an inconsistency was revealed. According to their responses, their intention of posing why questioning was not to look for any correct answers, but to teach the students reasoning

skills, which they believed to be vital for the students to fit into the world of work outside schools. However, in practice, based on their students' responses, most of their 'why' questions simply asked for explanations of what they did to get answers in a few words.

A teacher's lesson on Pythagoras' problems:

- Teacher: *What is 8?*  
Edward: O.  
Teacher: *Why O?*  
Edward: Because it's the shortest one.  
Teacher: No. O means opposite the given angle.

In this extract taken from an English teacher's lesson. When the student gave an incorrect answer, the teacher immediately followed up with a question "why" which at first, expected an explanation from the student. However, from her follow up with the student' explanation, it is obvious that she was seeking for a correct answer.

Besides, in practice, these English teachers indicated a tendency to say 'almost', or 'close' in response to their students, which may suggest to the students that their teachers were more interested in getting correct answers for solutions from them than finding out what they thought about a particular idea. This pattern of questioning is called 'evaluative' questioning, providing evaluative feedback on students' explanations. Such discrepancy may suggest that question-asking is always contextualized, it is not just the question's "semantic content or linguistic structure' that could determine how it might be interpreted by students [10: 16]." When a classroom culture is not encouraging "curiosity and open thinking," a question asking for explanations might limit students from explorations and ruin dialogue [10].

One possible reason behind such inconsistency may be of the nature of mathematics, where a mathematical problem naturally requires an answer to its solution, because of this, it may constrain the nature of students' response and thinking. Additionally, the way teachers respond to their students' answers might also be a contributing factor.

In contrast, the Chinese teachers did not think that they had any questioning strategies at all, but alongside the interviews, especially when asked about their specific questioning patterns during lesson observed, they started to explain a bit more about their questioning strategies. This frequently mentioned strategy was questioning students of different levels to get an understanding of the entire class. Such questioning was reflected into their actual practices. For instance, the lesson was based on examining an example from the textbook using a fractional equation, the Chinese teacher and her students went through specific steps of this example together, and she wanted to make sure that the students had understood the use of the fractional equation in practical mathematics.

- Teacher: *What is the first step?*  
SS: To remove denominator.  
Teacher: To remove denominator, I have demonstrated to the class. Ok, how to remove denominator? Ling.  
Ling: To times the common denominator.  
Teacher: Times the common denominator. *Where to times the common denominator?*  
Ling: Both sides.  
Teacher: Both sides of fractional equation, *so what is the common denominator?*  
Ling:  $(x - 3)(3 - x)$ .  
Teacher:  $x - 3$  times  $3 - x$ . That is very good. Ok, Jun, *what do you say?*  
Jun: It is the square of  $(x - 3)$ .  
Teacher: Ok, the square of  $(x - 3)$ . Now, stand! Ting.  
Ting: Put  $(3 - x)$  into  $-(x - 3)$ .  
Teacher: *Which becomes a minus []?*  
Ting:  $x - 3$ .  
Teacher: *Put  $3 - x$  into  $-(3 - x)$ ? Or put  $x - 3$  into  $-(3 - x)$ ? Why do you see the minus?*  
Ting: Because  $x - 3$  and  $3 - x$  are inverse numbers.

Teacher: *Did you guys standing up hear that? Including those sitting down heard clearly? He said because  $x - 3$  and  $3 - x$  are what? Inverse numbers! So he decided to take one out into minus. Either one works that way right?*

In this excerpt, the teacher firstly asked Ling and Jun, who gave incorrect answers, then she redirected the same question to a third student Ting. Following his correct answer, the teacher asked follow-up probing questions to get him to elaborate on his ideas and to explain the point that ' $x - 3$  and  $3 - x$  are inverse numbers'. Then the teacher asked questions to the entire class and made sure that the rest of them had all heard this answer. She also went back to Ling to check if she had understood by asking the original question '*what is the common denominator?*' and asked her to give the final answer to this fractional equation.

### 3.3 Questioning Types

Concerning questioning types, most Chinese teachers did not have any explicit theoretical knowledge about the types of questions they asked in that they did focus their aim on getting students to fully understand '*the key mathematical concepts*', and to be able to apply these into practice properly. For example, one Chinese teacher explained '*my questions are mostly to enable students to apply these into skilfully solving mathematical practical issues in real life, after they have had comprehended the concepts.*'

On the contrary, the English teachers were fully aware of different types of questions and mentioned of that they were encouraged to use open-ended questions or open questions. As one suggested, '*so with the questioning, there are so many different types we use. When I started, when I was at the university, they said you must always use open questioning, so higher order skills, and I love it (Teacher A).*' Similarly, another teacher also said '*a teacher should try to give open ended questions, in your opinion like 'in your opinion, how do you do that? Or what can you elaborate? So what are you trying to do is to create not to give many close-ended questions... (Teacher E).*' However, such claim was different in practice: they asked mostly factual, procedural and managerial questions that are regarded as closed questions [1]. They in fact broke open-ended questions into a sequence of narrow and focused questions that eventually funnelled students' thinking into a narrow path. These discrepancies could be due to the complexity of classroom environment.

As [17] indicated, depending on context, questions could be relatively 'open' or 'closed'. [9] claimed that a lack of awareness of contextual factors such as students' level of ability led to inconsistency between teachers' beliefs and practices about questioning. Contrary to [9]'s claim, my research reveals that the teachers in England seemed to acknowledge the variety of ways in which types of questions were developed and modified according to the circumstances. This suggests that there are many other contextual factors contributing to divergences between beliefs and practices, since classroom life is full of complexities, which creates difficulties for teachers to implement what they believe.

## 4 CONCLUSIONS

This purpose of this paper was to examine teachers' beliefs and practices through the use of questioning in England and China. This has revealed a conflict between what teachers intended to do and what they ended up in doing, with regard to the types of questions they asked and their strategies.

Questioning is "dynamic and context-dependent rather than static" [17: 123]. If a particular context was provided, both groups of the teachers were able to describe the way they approached questioning comprehensively, which led to a series of potential explanations. For the first, it may be that the teachers experienced challenges in recognising their implicit beliefs. [17: 312] suggested that "beliefs are created through a process of enculturation and social construction". Thus, the assimilation of learning processes and cultural norms is significant, such as the incidental interactions students and teachers engaged in, the students' abilities, and the classroom climate they experienced. The existing literature has suggested that classroom behaviours are an outcome of beliefs being filtered by experience [26], but not all the teachers were aware of this. Subsequently, did not always show what they actually did in classroom practice. Teachers' unawareness of the impact of their cultural experience was also evident in the fact that neither the teachers in China nor teachers in England critically analysed their own practices and experiences. Therefore, "making implicit belief systems explicit and developing language for talking and reflective thinking" about their practice is vital for teachers' professional development in questioning [9: 382]. Alternatively, it could be that the teachers were not fully aware of the importance of context that influenced the way they asked questions or how this influence operates [9]. Extensive studies have

suggested that context has vital influence upon questioning in classrooms. In other words, questioning is embedded in the activity of the particular environment in which it takes place.

This study further reveals that even if a particular context was given, the Chinese teachers' questioning practices were still richer and more diverse than what they claimed. For example, the Chinese teachers explained their purpose for asking questions that incorporated students' answers to the entire class was only to reinforce and deepen students' memories over some important solution steps and key mathematical concepts. However, in practice, their questioning proved to be much richer. Their reflective questioning encouraged the students to take responsibility for making judgements and justifications for their thinking, and further extended their thinking, leading to the construction of mathematical knowledge, which clearly went beyond mere memorisation. This suggests that questioning is a complex process not only affected by contextual factors, but also a variety of other factors including learning objectives, learning environment, student abilities, social-cultural backgrounds of both learners and teachers, expectations from parents and students, and teachers' access to curricular materials and resources [22].

Overall, the research reveals an inconsistency between the teachers' beliefs and practices in questioning. In other words, both groups of teachers showed a lack of awareness of their questioning. The Chinese teachers' questioning practices were richer and more diverse than what they claimed, and whereas the English mathematics teachers were more aware of their approaches to questioning than their Chinese counterparts. It is also revealed that their beliefs did not automatically translate into practice. The findings from the Chinese teachers seem to contradict to most previous research about teachers' beliefs and practices which has suggested that teachers do less than they claim. Some of the findings from the English is consistent with this claim, however. The findings of this research were mixed is due to the fact that they were more reflective compared to the Chinese teachers, though what they claimed was not always reflected in their questioning practices. It may be that questioning is seen as a distinct teaching pedagogy and had been receiving constant support for developing their approach to questioning from university and in-school training, whereas questioning in China is not considered as a separate teaching pedagogy and skill, but a tool to balance out the relationship between the teacher, the students, and the mathematical knowledge required [7]. More importantly, no training had been given to the Chinese teachers to develop their questioning skills, which may explain why they were not aware of many of their questioning strategies. This examination of beliefs and practices in teachers' questioning in England and China will hopefully contribute towards enhancing their consciousness of their approach to teacher questioning, which should provide them with opportunities to reflect upon, articulate and give meaning to their practices. This should eventually contribute to improving the effectiveness of their use of questioning. Previous studies have indicated that teaching experience plays a major role in the consistency and inconsistency between teachers' beliefs and practice [12]. However, in this current study, no evidence can be found to support this. It may be due to the fact that our study aimed to find the commonly shared beliefs and practices of a group of teacher participants in questioning in England and in China, which may neglect the factor of teaching experience between the teachers that with a wide variety of teaching experiences ranging from one year to forty years. Further research is needed to explore the impact of varying experiences may have on the beliefs and behaviours of questioning.

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