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Investigating the Interaction of an Elementary Teacher's Epistemological Beliefs and His Use of Questions Across Different Subject Matter

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Abstract: *Questions are the staple part of the research focusing on effective teacher questioning to foster the development of higher-order thinking skills among students. However, the relevant literature illustrates that teachers recurrently fail to pose questions that could enhance students' higher-order cognitive skills. One potential explanation for this scarcity may lie in teachers' epistemological beliefs, prompting an examination of questioning strategies within the milieu of these beliefs. This study specifically investigates the questioning practices of an elementary school teacher across three distinct classes-Turkish, science and mathematics-, alongside the teacher's epistemological beliefs. The research employs a typical case study design within qualitative methodologies, involving a fourth-grade teacher as the participant. Data collection was attained through classroom observations and interviews. The types of questions posed by the teacher during lessons, as well as the teacher's responses to students' answers, were systematically documented through observation and reflective interviews. Findings indicate that the same teacher utilizes varying questioning techniques across different classes. Additionally, the results suggest that the teacher's epistemological beliefs are predominantly at a transitional stage. The activities exhibited during the questioning process, along with the responses shared in interviews, are found to align closely with the teacher's epistemological views. Implications suggest that understanding the link between epistemological beliefs and practices in relation about teacher questioning can offer crucial insights for policymakers, teacher educators, and researchers committed to enhancing teachers' effective engagement in student-centered practices.*

Keywords: *teacher questioning; epistemological beliefs; higher-order thinking; elementary education.*

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Introduction

Worldwide, contemporary educational curricula prioritize the cultivation of higher-order thinking skills among students. From an epistemological perspective, the intended outcomes of these curricula position students as engaged learners who actively interact with content through critical thinking, creativity, and problem-solving rather than simply captivating information in a passive manner (e.g., Ministry of National Education, 2018; NGSS, 2013; Budsankom et al., 2015). Higher-order thinking skills are essential for achieving various curricular objectives across multiple disciplines, as they enhance the effectiveness of decision-making by allowing students to relate and adapt their acquired knowledge to novel situations in their everyday lives (Brookhart, 2010; Wijnen et al., 2021). Research examining the impact of instructional methods in classroom discourse has revealed that teachers predominantly utilize questioning strategies (Kayima & Jakobsen, 2020). Thus, questions are recognized as the most common and multipurpose instructional method (Almeida, 2012; Ellis, 1993; Kim, 2015; Wilen, 1987). Chin (2006) emphasized that questions are pivotal elements of classroom discourse, serving a crucial purpose in teaching and learning processes (Nappi, 2017). Some of the primary roles of questions include assessing student understanding, addressing relevant issues, exploring alternative solutions, and fostering higher-order thinking skills (Wilen, 1987).

In their attempt to characterize effective questioning processes, Lee and Kinzie (2012) define high-quality questions as those that stimulate students' cognitive engagement and promote deeper thinking. Similarly, Kim (2015) also asserts that quality questions foster the development of students' cognitive skills. However, as the goals associated with teacher-centered and student-centered approaches evolve, the interpretations of what constitutes effective questioning differ. In a teacher-centered framework, for example, questions typically serve to assess students' knowledge, evaluate their academic performance and readiness, and help teachers prevent classroom management issues. While the focus has shifted from teacher-centered to student-centered teaching (Almeida, 2012), the purpose of questioning has also transformed to cultivate higher-order thinking skills and to encourage active participation among students in the learning process (Chin, 2006). Like Kim (2015), Lee and Kinzie (2012) describe these questions as questions that trigger students' thinking and expand their thinking.

Despite the ongoing efforts to promote student-centered learning environments through curricular reform efforts (Rus et al., 2019), Fan (2024) reported that teachers predominantly engage students in direct instruction for

knowledge delivery and procedure-oriented, hands-on activities that yield predetermined outcomes. Although the purpose of these questions is to enhance the meaningful learning experiences of students with higher-order thinking skills (Wrag and Brown, 2002; Chin, 2006; Lee and Kinzie, 2012; Kim, 2015; Nappi, 2017; Joseph, 2018), evidence derived from the related literature points out that "quality-questions" (Kim, 2015) or "open-ended questions" (Deshmukh et al., 2019) stimulating students' learning process and expanding their thinking are unfortunately rare in elementary grades (Wragg & Brown, 2002) science (Galton et al. 1999; Walsh & Sattes, 2005; Wragg & Brown (2001), mathematics (Desli & Galanopulou, 2015; Kawanaka & Stigler, 1999; Paoletti et al., 2018) and language classes (Diaz et al. 2013; Ernita & Apriliani, 2020; Tan, 2007; Toni & Parse, 2013). Further elaborating on her findings, Kim (2015) explains that most teachers ask questions demanding explicit and factual information rather than student reasoning. Thus, Erdoğan (2017) argues that students are not able to reach higher cognitive levels through questions that are after factual information. The relevant literature on the effectiveness of teacher questions emphasizes the importance of teachers' epistemological beliefs (Jiang, 2020) and discourse in context (Kayima & Jakobsen, 2020) as critical components for a deeper understanding of the functional, cognitive, and affective features of teacher-classroom questioning.

By a "triadic dialog," Lemke (1990) posits that teachers frequently utilize questions to facilitate the instructional process. This sequence involves teachers' first *initiation* to pose questions, followed by students providing *responses* to teachers' questions and concluding with teachers' *evaluation* of the quality of students' responses (Vrikki & Evagorou, 2023). Consequent research has structured a substantial correlation between teachers' beliefs and their instructional practices, an idea reinforced by Lemke's (1990) framework. This body of literature indicates a strong alignment between teachers' beliefs and their instructional approaches, including the strategic use of questioning across diverse disciplines (Ernest, 1998; Gao et al., 2024; Quigley, 2021; Mansour, 2013; Stipeket al., 2001; Tsai, 2006; Adnan et al., 2012).

However, studies have also revealed a more nuanced relationship between teachers' beliefs and their classroom practices (Abd-El-Khalick & Lederman, 2000; Tsai, 2002; Waters-Adams, 2006). Abd-El-Khalick and Lederman (2000), for example, contend that contextual factors can both facilitate and obstruct the application of teachers' beliefs regarding knowledge in their daily practices. Recognizing the critical role of such contextual elements (Chin, 2006) alongside teachers' beliefs (Rott, 2020), this study aims to analyze discourse in contextual patterns at the elementary level across main subjects, including science, mathematics, and language arts. Echoing Berdila

et al. (2019) as well as Louca et al.'s (2004) critiques of existing studies inadequately attuned to field-specific conditions such as the subject matter and learning contexts, Hofer (2006) proposed that teachers' field-specific (contextual) epistemological beliefs are subject to differences in their instructional practices.

Teacher questioning is an internationally recognized and essential area of research that plays a crucial role in assessing and enhancing the effectiveness of instructional practices across diverse subjects (e.g., Jones et al., 2025; Sharma, 2025; Wu et al., 2025). Echoing such importance, this research seeks to enhance the understanding of the functional, cognitive, and affective dynamics between teacher questioning and epistemological beliefs, particularly aiming to foster student development (Kayima & Jakobsen, 2020). Therefore, the primary research question guiding this study is as follows: "How do an elementary teacher's epistemological beliefs interact with his use of questioning across elementary grade science, mathematics and language arts lessons?"

Teacher questioning and context in discourse

Teacher questioning is a staple technique used in classrooms to increase student interest, facilitate teacher instruction, and evaluate learning outcomes (Jiang, 2020). The relevant literature recognizes teacher questioning as a dialogic process (Lemke, 1990) and extensively investigates the use of questions. The literature also proposes diverse criteria to classify and evaluate the types of teacher questions. Thomas & Thorne (2009) identify two major categories of questions on the basis of the source of the responses. *Book questions* seeking answers from documented facts in text and head questions require the respondent's own experience, enabling the student to be aware of the relationship between textual information and prior knowledge and aiding them in utilizing essential strategies when seeking answers to questions.

Wragg and Brown (2002) divide questions into three categories based on their goals: *managerial, information/data and higher-order questions*. For Wragg and Brown (2002), managerial questions are considered lower-order thinking questions that provide little or no cognitively deeper questions to facilitate student learning. Rather, these questions help teachers guide students or help them manage the classroom effectively (Bilaloğlu et al., 2017). An example of a managerial question can be "Who is done with the activity?" Information/data questions are considered low-cognitive-level thinking questions that require short answers. Like book questions, as mentioned by Thomas & Thorne (2009), Ellis (1993) refers to information/data questions as the most relevant type of question within the classroom context. An example of such a question is "How

many legs do insects have?" "Why are not bird insects?" is a typical example of a higher-order question. Arslan (2006) explained that these types of questions require students to use higher-order thinking and reasoning skills. These types of questions scaffold the learning context in which students develop and use higher-order thinking skills (Wragg and Brown, 2002). Concerning the cognitive nature of teacher questioning, teachers' low-level questions encourage students to recall information (Lewis, 2015). On the other hand, teachers' high-level questions primarily help teachers evaluate students' understanding, and these high-level questions also provide an effective context and enhance students' higher-order thinking skills (Chen et al., 2017).

Many of the studies focusing on teacher questioning focus on the dialogical nature of teacher questions. However, questioning is not simply a verbal activity from teachers to students (Zhang et al., 2024), and Smart & Marshall (2013) asserted the importance of the interactions between classroom discourse, teacher questioning, and student cognitive engagement in responding to teachers' questions. The responses that teachers provide to students' answers are as critical as the questions they ask. Wilen (1987) asserts that "feedback is an effective instructional technique at all grade levels and across all subjects" (p. 36). Beccles et al. (2016) noted that properly responding to students' answers enhances and sustains student interest and participation. When teachers ask the right questions, the effectiveness of the inquiry can be amplified through teachers' productive feedback. Moreover, teacher responses can reveal students' thought processes and inform teachers about their beliefs, misconceptions, perceptions, and naive ideas (Beccles et al., 2016). However, some teachers merely repeat students' answers, as feedback lacks efficacy in promoting learning (Wilen, 1987). According to Kawalkar & Vijapurkar (2013), teachers often echo students' responses or utilize them to expand upon lesson content in inquiry-based classrooms.

A more effective strategy in this regard involves acknowledging students' answers, which demonstrates teacher engagement, and supplementing these answers with additional information (Wilen, 1987). Furthermore, McCarthy et al. (2016) reported that many teachers engage only with students' subsequent incorrect responses and fail to provide feedback on correct answers. Beccles et al. (2016) highlighted the impact of teacher responses on student participation by providing a framework that categorizes teachers' reactions to incorrect student answers to teacher questions. The responses are classified into various effects, such as shyness, self-directed learning, and self-confidence. Responses characterized as "reject" include shaking one's head or directly saying "no," whereas a lack of response from the teacher, leading to a respondent student sitting down without further

interaction, is termed "ignore." Both of these responses can cultivate feelings of distress and fearfulness in students, thereby limiting classroom engagement, student interest and their sense of content. On the other hand, with respect to opportunities for promoting student learning, Beccles et al. (2016) categorize teacher responses that encourage student participation as students' self-learning and self-confidence.

In a separate investigation, Smart & Marshall (2013) analyzed the interplay between classroom discussion—particularly the questions raised by teachers—and student cognitive engagement during lessons. They assessed various elements, including question difficulty and level, classroom interaction, and the communication environment. Their analysis revealed a positive correlation between the complexity of questions and the cognitive engagement of students. They identified the following hierarchy at the question level, ranked from most to least frequently employed: basic skill level, application, and analysis. Concerning question difficulty, they distinguished between questions that emphasize obtaining correct answers and those that prioritize evidence and reasoning. The study further revealed that teachers spoke more than students did, controlled the questions and discourse, and often disregarded student responses, which prevented the lesson's focus from shifting toward student contributions. There was an absence of dialog among the students, and the classroom environment was characterized by didactic communication. Two key conclusions emerged from the research: first, a positive relationship exists between the levels of questioning and students' cognitive engagement, and second, basic skill-level questions are predominant in science classrooms.

Teachers' epistemological beliefs

As a cognitive domain, beliefs are shaped by an individual's interactions with their environment, past experiences, and existing knowledge. They exhibit a high degree of resistance to change (Pajares, 1992). Individuals tend to articulate diverse and interrelated beliefs tailored to the various situations and encounters they face in their daily lives (Nespor, 1987; Pajares, 1992; Abelson, 1979). On the other hand, epistemological beliefs directly influence how individuals access, perceive, and acquire knowledge. They display developmental characteristics, meaning that they may evolve or remain stable over time.

An individual's epistemological beliefs can shift based on their experiences and educational background, and the literature provides models that explore the development of epistemological beliefs, their transformation, and the factors that contribute to these processes (Belenky et al., 1986;

Schommer, 1990; Hofer, 2001; Baxter Magolda, 2002). Perry's preliminary research in 1970 significantly propelled the investigation of epistemological beliefs within educational contexts. Schommer also contributed to this field by examining the impact of epistemological beliefs on education. In contrast to Perry (1970)'s sequential and linear model of development, Schommer approached epistemological beliefs as a multidimensional construct. She posited five dimensions, namely, certainty of knowledge, structure of knowledge, source of knowledge, learning speed, and learning skills, within her epistemological belief model, which exhibited varying degrees of independence from one another.

In their critique, Louca et al. (2004) asserted that existing relevant literature often fails to adequately address the specific conditions of various fields, such as subject matter and learning environments, as well as the individual differences among participants, including variations between students and teachers. In light of these concerns, Hofer (2006) proposed that epistemological beliefs ought to be developmental, multidimensional, and sensitive to contextual factors. Acknowledging the necessity for a comprehensive framework that incorporates these developmental, multidimensional, and contextual aspects, Luft & Roehrig (2007) developed the Teacher Belief Inventory (TBI) to assess mathematics and science teachers' epistemological beliefs regarding student-centered instruction. This inventory categorizes teachers' epistemological beliefs into five developmental stages: traditional, which emphasizes the transmission of information from authoritative sources; instructive, which revolves around teacher-centered methods of experience delivery; transitional, which values the importance of teacher–student interactions, subjective judgments, and emotional responses; responsive, which focuses on collaboration, feedback, and the progressive nature of knowledge; and reform-based, which prioritizes the facilitation of student knowledge and interactions (Talaghir et al., 2023).

Research examining teachers and teacher candidates has demonstrated that epistemological beliefs serve as pivotal factors influencing the roles that teachers assume in the classroom, the subjects they choose to teach, the methods of instruction they employ, and the forms of assessment they implement. Additionally, research has concluded that these beliefs shape the strategies, methodologies, and materials utilized in teaching (Chan & Elliot, 2004; Luft & Roehrig, 2007; Marra, 2005; Sinatra & Kardash, 2004). Chan & Elliot (2004) illustrated robust correlations between teachers' beliefs and their instructional implementation within the classroom. Epistemological beliefs not only shape teaching strategies but also influence teachers' receptiveness to diverse student perspectives (Hashweh, 1996), as Hashweh

(1985) reported that teachers whose beliefs about knowledge and learning align with student-centered principles possess a deeper understanding of teaching strategies and are more likely to employ various approaches. Furthermore, Arredondo & Rucinski (1996) suggest that a teacher's epistemological beliefs can also directly impact their students' own epistemological beliefs.

In their 2004 study, Boaler and Brodie investigated the types of questions posed by teachers holding teacher-centered epistemological beliefs and those with student-centered beliefs, revealing findings consistent with those of Hashweh (1996), as their research indicated that teachers who had teacher-centered beliefs tended to dominate classroom discourse and favored questions that elicited rapid responses from students. Chin (2007) conducted a comparative analysis of teachers with teacher-centered epistemological beliefs and teachers with student-centered beliefs to explore the nature of classroom discussions in science classes and the feedback related to teacher questions and student responses. The findings indicated that science teachers with teacher-centered epistemological beliefs often neglected to provide feedback on students' answers, in contrast with the practices of student-centered teachers, for whom constructive feedback constituted an integral aspect of their pedagogical approach. Additionally, Kim (2015) examined the questioning techniques employed by both teachers with teacher-centered epistemological beliefs and their counterparts' classrooms. His findings revealed that a significantly larger proportion of questions posed by teachers with student-centered beliefs were open-ended than those posed by their teacher-centered counterparts. Kawalkar & Vijapurkar (2013) corroborated these results with similar observations.

Methodology and methods

The research methodology guiding all the data collection and analysis methods employed in this study was established in alignment with qualitative traditions to elicit the most profound insights, reflecting the nature of the research questions. The guiding framework for this research is within the subjectivist paradigm, which interprets reality through the lens of human perspectives and thoughts. In contrast to the objectivist paradigm—rooted in the universal principles of the scientific method—the subjectivist paradigm is grounded in inherent human features (Crotty, 1998). While the subjectivist perspective highlights the distinctiveness of individual human experiences without seeking any generalizable assertions (Diesing, 1966).

Guided by a subjectivist research methodology and employing deductive thematic analysis of the data collected by interviews and

observations, a case study design with a typical case was employed for the research. The typical case study design involves participants who represent the typical characteristics relevant to the phenomenon under investigation. The design helps researchers collect extensive and diverse data to provide a comprehensive understanding of these commonplace scenarios (Yin, 2003). The participants in these studies do not reveal the traits of extreme or atypical cases; instead, they reflect normal circumstances, and therefore, typical case studies do not offer themselves generalizations. According to Yin (2003), typical cases yield valuable insights into the experiences of participants or organizations. By employing case study methodologies, researchers can transcend mere quantitative analyses and gain a deeper understanding of the context from the perspective of the individuals involved in the study (Zainal, 2007).

Study context and participants

The participants in the study were selected via purposive sampling, which aims to identify individuals capable of providing rich and comprehensive information pertinent to addressing the research questions (Merriam & Tisdell, 2015). The nature and objectives of the questions predominantly focus on classroom management and fundamental skills in the early grades of elementary education. To ensure alignment with the established framework regarding teacher questioning, it was necessary to work with a teacher from either the third or fourth grade during this research. Thus, selecting a participant from these grade levels within a public school setting became a key gauge for this research. As part of the purposeful sampling method, attention was also given to identifying a teacher who could offer reach and valuable insights and who was readily available (Merriam & Tisdell, 2015). Consequently, following the participant's willingness to volunteer, a fourth-grade elementary teacher, identified as ZY (initials of the pseudonym for confidentiality purposes), was chosen for this study. ZY has two years of teaching experience with a master of science in elementary education. ZY has aspired to be a teacher since his early years, consciously and willingly embracing this profession. He refrains from labeling himself as a "disciplined" teacher. Instead, he holds the view that genuine learning occurs in environments where students feel valued and supported. Furthermore, he asserts that instructional implementations should align with contemporary technological advancements, necessitating a reimagining of educational content and methodology for future relevance. He advocates for an educational framework that meets students' needs and equips them with essential skills for their future endeavors.

ZY is employed at a school that embraces both elementary and middle education, operating within a single facility with students from middle-class families. This institution is located in the Southeastern Anatolia Region of Türkiye. The elementary school employs 29 teachers and serves a student population of 496. As a relatively new establishment, it began its educational programs in 2020. By the time of the study, ZY was teaching 4th graders, and his classroom consisted of 26 students; however, it faced challenges due to a lack of technological resources that would enhance student learning through interactive learning experiences.

Data collection

Different data collection tools were used in this study. The purposes and data collection tools used to investigate these research questions are shown in Table 1.

Table 1. Purposes of the research and employed data collection tools

Purposes	Data Collection Tools
ZY's demographics and teaching philosophy	Interview
ZY's epistemological beliefs	Interview by Teachers' Belief Inventory (Luft & Roehrig, 2007)
-Types and distribution of ZY's questions across different content areas -ZY's reflections to student responses to his questions across the different content areas	Observations
Interactions between ZY's questioning and his epistemological beliefs	Observations, interviews

Interviews

During the study, a total of five interviews were conducted with the participating teacher. The initial structured interview took place before the observation, while the subsequent interviews were performed afterward. The purpose of the first interview was to explore the demographics of the participating teacher and gain insights into ZY's perspective on his profession. The first semi-structured interview was conducted to explore ZY's epistemological beliefs by utilizing the Teachers' Belief Inventory developed by Luft & Roehrig (2007).

The first evaluation interview focused on Observation 1, aimed to gather the participant's thoughts regarding questioning strategies, comprising five specific questions related to questioning processes. The questions were informed by Wragg and Brown's (2002) work on question categories and Beccles et al.'s

(2016) framework for teacher responses to student answers to teacher questions. The second and third evaluation interviews for Observations 2 and 3 were carried out following their respective observations, during which, again, using the theoretical framework informed by the relevant literature, ZY's reflection on his use of questions and evaluation of student responses to them regarding different subject matters were acquired. All the interviews were semi-structured and designed to facilitate a deeper exploration of the observation findings, except for the third evaluation interview. The last interview consisted of unstructured items molding part of this interview as an exit interview, which acquired the final thoughts of ZY on teacher questioning.

Observations

The primary purposes of the observations were to explore a) the types and distribution of ZY's questions across different content areas, b) ZY's reflections on student responses to his questions across the different content areas and c) interactions between ZY's questioning and his epistemological beliefs. The observation form was developed based on the theoretical frameworks established by Wragg and Brown (2002) concerning question categories, as well as the framework by Beccles et al. (2016) addressing ZY's responses to student answers. The researcher conducted observations over five consecutive days. However, data collected during the initial two days were not pertinent to the investigation because of fidelity and validity concerns. In addition to observing mathematics, Turkish, and science classes, the researcher also attended various other lessons taught by ZY. In total, the researcher was present for 26 lesson hours and analyzed the data from 9 of them. The observation was concluded once data saturation was reached via consultation with the first author. Before the observation, the participant was informed about the study; however, the specific focus on questioning practices was not disclosed to maintain a natural classroom environment and ensure the authenticity of the interactions between ZY and his students.

Data analysis

The deductive thematic analysis method was utilized to analyze the data obtained from the interviews and observations. Crabtree & Miller (1999) suggested that rather than extracting themes directly from the data itself, the deductive thematic approach relies on predefined themes, as suggested by the research questions and the relevant literature. These themes were informed by the theoretical and conceptual framework established in the literature pertinent to the study. In this context, ZY's epistemological belief data were analyzed by Luft & Roehrigh's (2007) epistemological beliefs with relevant categories into

five distinct descriptions: (1) traditional (most teacher-centered), (2) instructive (teacher-centered), (3) transitional, (4) responsive (student-centered), and (5) reform-based (most student-centered). ZY's questions were analyzed by Wragg and Brown's (2002) three categories based on the goals of teacher questions: managerial, information/data and higher-order questions. ZY's reflections on student responses to his questions were analyzed by Beccles et al.'s (2016) model, which suggested key themes, including reject, ignore, encouraging, use, and find out.

Quality and rigor of the research

Marshall & Rossman (1989) identify effectiveness and ethical considerations as the foremost quality criteria in the qualitative research paradigm. As ethical considerations and confidentiality are not merely one-time concerns, Clandinin & Connelly (2000) emphasize that obtaining approval from the Human Subjects Committee represents only one of several measures to ensure the ethical integrity of a study. Consequently, the primary critical safeguard in upholding the ethical standards of this research is the principle of confidentiality articulated by Bogdan & Biklen (1998). This principle obliges researchers to protect the identities of participants, which includes employing pseudonyms for institutions, locations, and individuals. This practice is essential for adhering to the approval of the Human Subjects Committee as well as the stipulations set forth by the Ministry of National Education regarding confidentiality, thereby allowing the research to proceed with confidentiality.

The integrity and rigor of the research are also ensured through permanent observation, peer evaluation, long-term participation, and negative situations (Schaller & Tobin, 1998). To achieve a robust understanding of the research context and to obtain rich, naturalistic data, researchers employed continuous full-day observations within the research site. However, initial data collected from these observations were excluded because of fidelity concerns. In conjunction with these consistent observations, the researchers engaged in long-term participation throughout the entire data collection process until data saturation was ensured. Additionally, instances of conflict were viewed as valuable opportunities that could deepen the study and enhance the significance of the insights gathered (Silverman, 2006). Researchers have persistently searched for negative instances to further develop and refine their preliminary concepts into more robust understandings.

Findings

This section presents the findings related to participating teachers' epistemological beliefs as well as the various types of questions they posed

during the Turkish, Science, and Mathematics classes. Furthermore, the findings extend to ZY's reflections on the diversity of question types across different content areas. Additionally, the section incorporates ZY's reflections on student responses and his inquiries across these various subjects regarding his questioning.

ZY's epistemological beliefs

Table 2 illustrates that ZY's epistemological beliefs are predominantly situated within a range that spans transitional to responsive (student-centered) beliefs. Nevertheless, he maintained that the most effective way for students to learn the subject matter is through repetition, which aligns more closely with teacher-centered epistemological beliefs. Additionally, ZY's teacher-centered (instructive) epistemological beliefs demonstrated that he views himself as the primary source of precise knowledge. He assesses student learning based on their ability to meet his expectations by providing the expected correct answers; only then does he conclude that they have grasped the content.

Table 2. ZY's epistemological beliefs

Themes	Sample response	Beliefs
Maximizing Student Learning	*"I care about each students' motivation and their interests. Additionally, I care their needs, interests and happiness."*	Transitional
Teacher Role	"*I need fine relations with my students. I am more of a lovely and funny teacher than a controlled teacher.*"	Transitional
Assessing student understanding	"*At the end of topics, they take an assessment. Additionally, I see if they understand or not in my students' eyes."*	Transitional
Deciding what to teach	"*I decide the topic which I teach according to topics me and my students like and interest in."*	Responsive
Deciding when to move onto new topic	*"If students get bored, I move to a new topic. Because if they get bored, they can't even focus on."*	Transitional
Best way to learn	*"Students learn best through repeating topics consistently."*	Instructive
Assessing student learning	"*It's truly hard to realize if learning is occurring or not during class. However, I ask a question if they reach the correct answer by the similar solution that I taught them, I decide that they learn the topic."*	Instructive

ZY's transitional beliefs emphasized the importance of fostering a strong rapport with his students. He highlighted concerted efforts to cultivate a supportive learning environment aimed at enhancing both student motivation and trust in him. On the other hand, his student-centered

(responsive) epistemological beliefs recognized his students' needs and expectations to decide what to teach in his classroom.

Question types across the subject matters

Data collected via classroom observations were analyzed for the types of questions that ZY used for the Turkish language, science and mathematics. Findings are illustrated by the subject matter.

Utilization of question types in turkish

The findings from the Turkish language lessons indicated that the number of managerial questions exceeded that of information/data and higher-order thinking questions. During two of his Turkish lessons, ZY predominantly utilized managerial questions to check homework assignments. As detailed in Table 3, 13 out of 60 questions focused on information/data, whereas 21 were categorized as higher-order thinking questions. In both the first and second Turkish lessons, the exclamation mark was the topic of his lessons. ZY typically began with information/data questions and subsequently posed why questions (higher-order thinking) to students who had answered the informational questions. Aside from the first lesson, which was dedicated to reviewing homework, ZY spent the majority of the lesson time on text analysis, as specified by the covered national Turkish language lesson standards.

Table 3. Question Types in Turkish

Question types	Lesson 1	Lesson 2	Lesson 3	Total
Managerial	7	13	6	26
Information/data	7	1	5	13
High-Order Thinking	6	12	3	21
Total	20	26	14	60

Managerial questions in the turkish lesson

ZY posed a total of 26 managerial questions across all the observed Turkish lessons. These questions aimed to check students' homework and facilitate classroom management. Examples of homework-checking questions include *"Ender, could you take a seat?" -"Who completed the homework?" -"Irem, why did you not do your homework?"* (Observation, December, Lesson 2)

Information/data questions in the turkish lesson

Throughout all Turkish lessons, a total of 13 out of 60 information/data questions were asked by ZY. Only one of these questions was directed at an individual student *(-"Ender, do you remember that there are three different uses of the exclamation mark?"* (Observation, December, Lesson 1), while the rest were posed to the entire class, which included short-answer questions not requiring high-order thinking (such as *"Which one is correct?"—"Is the first letter after the exclamation mark capital or lowercase?"—"Is there an exclamation mark here?"—"The exclamation mark is at the end of the sentence, right?"*— (Observation, December, Lesson 1) As shown in the examples, these questions aimed to prompt the recall and confirmation of the students' understanding. The questions mostly consisted of short-answer and yes/no questions.

High-order thinking questions in the turkish lesson

ZY asked a total of 21 high-order thinking questions during the Turkish lessons. These questions were designed to prompt justification, analysis, application, and evaluation of the context being taught. Six of these questions were directed at individual students, while the rest (15 questions) were addressed to the whole class. Except one question, the students were able to respond to all of them. Examples of these questions derived from the first observed lesson in December include "Can you provide an example of the usage of an exclamation mark?"; "Why is this answer correct?"; "What is incorrect about your friend's answer?"; and "What made you give this answer?" (Observation, Lesson 1). The student who struggled to answer the survey was specifically selected by ZY because of his lack of active participation in classroom discussions.

Utilization of question types in science

ZY employed all three types of questions at varying frequencies during each science lesson. In the first lesson, higher-order thinking questions were the most frequently used (12/23), whereas managerial questions were the least common (5/23). However, in the second lesson, managerial questions became the most prevalent, whereas information/data questions were again the least used type of question. Overall, a total of 83 questions were posed by ZY throughout the observed science classes.

Table 4. Question Types in Science

Question	Lesson 1	Lesson 2	Lesson 3	Total
Managerial	5	12	12	29
Information/data	6	4	12	22
High-Order Thinking	12	10	10	32
Total	23	26	24	83

Managerial questions

Table 4 shows that the managerial questions vary in frequency across the different science lessons. In the first class, these questions were posed to alert students and served ZY to manage the classroom effectively. In contrast, during the last two lessons, they were utilized primarily to review homework assignments that ZY assigned students on the previous lesson day.

Information/data questions

A total of 22 questions related to information and data were posed in science lessons. Seven of these questions were directed to individual students, while the remaining 15 were conveyed to the entire classroom. These questions aimed to seek confirmation and aid in students' recall. Some typical information/data questions used ZY in the first science class:

-Our school has recycling containers, doesn't it? (Observation, December, Lesson 1)

ZY received no response to this question and moved on without any answer.

-People do not benefit from rain sufficiently, do they? (Observation, December, Lesson 1)

This was asked to assist a student in giving a presentation, yet the other students also failed to respond.

-You came up with this solution, didn't you? (Observation, December, Lesson 1)

-Ender, what was the fourth phase? (Observation, December, Lesson 1)

ZY used this question to capture Ender's attention.

High-order thinking questions

The teacher aimed to generate a discourse with high-order thinking questions. The students' answers could be jointly constructed.

Some examples of high-order thinking questions from the first and second lessons;

-What solution would you offer for this problem? How can we solve this problem? (Observation, December, Lesson 1)

These two questions were posed to the entire classroom.

-How is it? (Observation, December, Lesson 2)

ZY posed this question because of the need for a more in-depth explanation and elaboration. Consequently, the student provided a more detailed account of their solution to comply with ZY's urge.

-Is there any other solution to this problem? (Observation, December, Lesson 2)

This question was for the entire classroom.

-Why? (Observations, December, Lessons 2 and 3)

-How is your solution different than the others? Observations, December, Lesson 2 and Lesson 3)

These typical higher-order thinking questions were directed by ZY toward students presenting their projects and served as a follow-up inquiry, which was posed multiple times.

Utilization of question types in mathematics

In the mathematics lessons, the focal topics included "multiplying two-digit and three-digit numbers" and "predicting the product of two two-digit numbers." During the observed lessons, ZY's questions that required higher-order thinking were the least frequent across all math classes. In contrast, both managerial and informational/data-driven questions presented similar frequencies and were more common than their counterparts (see Table 5).

Table 5. Question Types in Mathematics

Questions	Lesson 1	Lesson 2	Lesson 3	Total
Managerial	29	12	4	45
Information/data	17	27	6	50
High-Order Thinking	2	5	-	7
Total	48	44	10	102

The questioning process throughout the mathematics classes remained relatively stable, characterized by a predictable pattern: ZY started the process by posing a question, a student provided an answer, and subsequently, he directed a question to another student, often concluding with ZY's supplying the correct answer. A total of 102 questions, consisting of 45 managerial questions, 50 information/data questions and 7 higher-order thinking questions, were posed during math lessons. Managerial questions were most prevalent in the initial math class, whereas informational/data questions dominated the second mathematics class. Importantly, no higher-order thinking questions were raised during the third math lesson, and overall, higher-order thinking questions appeared to be very low compared with their counterparts.

Managerial questions

The analysis revealed a significant prevalence of managerial questions during math classes, with a total of 55 questions posed, 34 of which served to assess whether students had successfully solved the problems presented in class. Examples of managerial questions included inquiries directed toward students by name, such as *"Did you solve the question?" "Didn't you?" and "Is there*

anyone else?" (Observation, December, Lesson 1, Lesson 2 and Lesson 3). Additionally, as part of the managerial question, ZY employed questions intended to prompt students' attention, such as *"Why are you standing?"* as well.

Information/data questions

ZY used these questions to elicit recall, ascertain correct answers, and provide affirmation within the math classroom. In the second observed lesson, the number of information/data-related questions posed was greater; however, in the third observed mathematics lesson, ZY did not pose any questions of this nature. Illustrative examples of these questions from the second lesson include inquiries such as *"How do we predict?" and "Do you remember how we do multiplication?"* (Observation, December, Lesson 1). These questions were used to refresh students' memories of topics discussed in previous years. Confirmation questions included statements such as *"I made a prediction for addition, didn't I?" and "Zero simplifies multiplication, doesn't it?" followed by "70 times 60 can be solved more easily, can't it?"* (Observation, December, Lesson 2). These queries were posed to the entire class to seek validation of the concepts discussed in the mathematics lesson.

Higher-order thinking questions

A total of seven higher-order thinking questions were raised throughout ZY's mathematics classes; however, no higher-order thinking questions were posed in the last observed math class. These higher-order thinking inquiries typically served as follow-up questions, although students often struggled to provide responses to them. Examples of such questions include the following:

"Where could they be misled here?" posed to the entire class, which the teacher later answered himself. Despite receiving input from students, he continued with his explanation. Another question asked was "*What mistake did the student who arrived at 7361 make?*"—a question reiterating a previous lesson that went unanswered. The teacher provided an answer himself (Observation, December, Lesson 2). Furthermore, when considering the applicability of past concepts, the teacher queried: "*Cannot we use this in multiplication?"* (Observation, December, Lesson 2). Additionally, ZY prompted a specific student, asking, *"Arif, how did you find it? Explain it. How did you do it?"* This request encouraged the student to articulate the necessary steps in finding the answer, elaborating his solution in detail (Observation, December, Lesson 1).

ZY's reflection on questioning

The participating teacher emphasized the importance of questioning throughout all stages of the learning process. He articulated that he employed questions to stimulate his students' interest, assess their learning, evaluate

understanding, and support recall. He remarked, "Questioning is important because when a question is posed, students concentrate on finding the answer" (Interview of Evaluation of Observation (IEO) 1). Importantly, he emphasized that reaching the correct answer is less critical than his students' cognitive process involved in contemplating the question. The data illustrated that at the commencement of class, ZY focused on asking questions to stimulate interest. When asked about his objectives in questioning, he responded:

> At the beginning of class, I ask questions to increase their interest; during class, I pose questions to measure student understanding, and at the end, I evaluate. Additionally, after some time, I revisit previous topics with questions to support recall" (IEO 1).

He also admitted that he does not always manage questioning effectively, noting that sometimes students are disengaged. However, he believed that if he encourages students to respond, questioning can achieve its intended purpose. He noted that random questions do not consistently fulfill their objectives (IEO 3). In instances of "unsuccessful questioning," he resorted to asking different questions to elicit student responses (IEO 2). He expressed a preference for addressing the entire class with questions but recognized the need for individual engagement when faced with inadequate answers. He believed that students pay greater attention to names when they acknowledge them. ZY recognized that he had never reflected on his own responses following the students' answers. To avoid making students feel that they have failed, they often respond incorrectly with humor and lightheartedness. He stated, "If a student appears nervous when I pose a question, I typically do not press him for an answer. Instead, I will direct the same question to another student" (IEO 1). Furthermore, he tailored his questions on the basis of the interests of his students, often asking them instinctively.

In terms of his preferences to direct a question to a particular student, ZY stated:

> I prioritize encouraging student participation on the basis of their willingness. However, some students are generally reluctant to participate in class activities. I do not use unnecessary pressure on them to participate because I believe that forcing them is ineffective. Pushing students to respond can lead to disinterest, ultimately disrupting the flow of the class (IEO 3).

Additionally, he emphasized that he aimed not to intimidate students into providing answers. While he sometimes selected students randomly rather than solely on the basis of their expressed willingness, he mentioned

that he listens to students even when they have not formally been given permission to speak by him. An analysis of the average number of response opportunities afforded to each student during lessons revealed that a greater number of students fell below the average than exceeded it. In total, 24 students participated at or above the average level. In the Turkish and science classes, 13 students are below the average number of response opportunities, whereas in mathematics, 14 students fall short. The distribution of students below and above the average was relatively balanced across the different subjects. These findings substantiated ZY's assertion that he did not impose pressure on students to engage in class discussions.

ZY also emphasized that his personal knowledge and perspectives about elementary-level subject matters greatly influence the effectiveness of his lessons. Reflecting on the ongoing challenge faced by elementary teachers, who must cover all subject areas, he noted that there can be an imbalance in how different subjects are taught. He stated,

> My strengths are more evident in Turkish, while I feel less confident in other subjects. The absence of a structured plan can result in gaps in my teaching. This might be due to the natural challenges in subjects such as math and science, which have more rigid achievement criteria than do the more flexible, skill-based objectives of the Turkish curriculum (IEO, 4).

ZY explained that his viewpoint and the nature of content in specific subjects shape his instructional practices across these content areas.

ZY's responses to student answers

An examination of the findings regarding ZY's responses revealed that the most prevalent type of response of ZY was encouragement. Although instances of ignoring student responses did occur, predominantly in relation to confirmation questions, ZY often remained unresponsive to the answers provided for information/data questions. Conversely, he frequently employed ignore responses for these information/data questions while also providing encouragement and probing responses in response to higher-order thinking questions. ZY effectively connected student responses following higher-order thinking questions to the lesson's content.

ZY's reflection on students' responses to different types of questions in turkish

During Turkish lessons, students typically engaged in discourse and received feedback on their responses to ZY's questions. ZY also offered encouragement for information/data questions, although in one instance, he

preempted the students' responses by answering his own question without waiting for their input in Turkish lessons.

With respect to his responses to students' answers to information/data questions in Turkish, a total of 13 information/data questions were posed by ZY, and he demonstrated variability in his reactions to identical answers. For instance, he employed both encourage and use responses concurrently for the same question. Among his responses, eight were categorized as ignoring, while one was an encouraging response, another was an encouraging-judging response, one was categorized as usage, and one was identified. An example of an ignore response occurred when the teacher asked, *"Is there any exclamation mark here?"* (Observation, Lesson 1), to the entire class but immediately answered the question himself without allowing for a wait time. In response to this question, some students attempted to answer with affirmative or negative replies, which went unacknowledged. The other six ignore responses primarily concerned confirmation questions, following a pattern similar to the earlier example.

An encouraging question posed by ZY was *"Is the first letter after the exclamation mark capital or lowercase?"* (Observation, Lesson 1). The students responded to this information/data question simultaneously with brief answers, including one incorrect response. ZY utilized an encouraging response by correcting the student and explaining the mistake, thereby demonstrating support for the student's learning. Another instance of an encouraging-judge response arose when the teacher asked, *"Which one is correct?"* ZY reiterated the student's incorrect answer and prompted the teacher to the entire classroom, *"What mistake did your friend make?"* (Observation, Lesson 3). This exemplified judge feedback, along with other responses that can be categorized as encouraging. The usage response question, "Can you recall three different uses of the exclamation mark?", prompted the teacher to listen carefully to the students' answers and later elaborate upon them to enhance the lesson context.

With respect to ZY's reflections on students' responses to higher-order thinking questions, the frequency of ignoring responses to these questions was relatively low during the Turkish lessons, with encouragement being the most common response. The breakdown of ZY's responses was as follows: three were categorized as use, eight as encouraging, three as investigative, two as encouraging, and one as encouraging. An explanatory instance involved ZY asking a question about exclamation marks; post student responses, he followed up with, *"Why is this correct?"* demonstrating supportive engagement, thus being classified as an encouragement response. An example of his usage response involved the question, *"Can you provide examples of how to*

use an exclamation mark?" where ZY noted student answers on the board to expand the topic (Observation, Lesson 1).

ZY's reflection on students' responses to different types of questions in science

In science classes, the data indicated that encouraging responses were predominant, although responses that occurred regularly were ignored. Generally, ignoring responses was associated with information/data questions posed to all the students. Personal queries regarding information/data questions, high-order thinking questions, and high-order thinking questions presented distinct response patterns in ZY's observed science lessons. Throughout all three science lessons, other than two instances of reject responses, encouragement was the primary response type yielded by ZY.

Of the 22 information/data questions in science lessons, 13 received ignore responses. Among those personally addressed, while two were also ignored, five information/data questions yielded encouraging responses from ZY, alongside one instance each of find-out, usage, and reject responses. An illustration of an ignore response might be ZY asking, "Have you ever encountered lithium batteries?", to which students replied negatively, stimulating ZY to provide an explanation without significant engagement with their responses. Upon further review, ZY's reactions mirrored previous cases in which he answered questions himself when no student input was forthcoming. Furthermore, instances also arose where his students answered collectively, causing some of his students to reply without waiting for their turn. Ultimately, ZY maintained a position of indifference regarding short-answer questions posed to the entire class. The prevalent lack of engagement with student responses, particularly in response to incorrect answers, indicates a potential topic of discussion for future science lessons. Notably, ZY posed information/data questions less frequently than other types did. Reject responses were used once in response to an information/data question, guiding students toward deeper inquiry and feedback. In instances requiring creativity, such as "What's one of your solutions?" ZY requested further elaboration by stating, "I expect you to provide a more creative answer." This response can be viewed as a rejective response, although ZY also employed find-out and use responses (Observation, Lesson 2). Along with the reject response, it was observed that ZY also used find-out responses. An example eliciting a find-out response involved asking, "Which of these solutions is more creative?", which necessitated concise answers, leading to a follow-up question of "Why?" to delve deeper into student thinking. The teacher's confirmation question, "Do we have recycling bins at our school?", revealed

that the students had not noticed them, prompting the teacher to provide clarification, illustrating a use response (Observation, Lesson 1). ZY used students' responses to enrich the curriculum content, adjusting focus on the basis of their inputs, thereby fostering an interactive learning environment.

With respect to higher-order thinking questions, a total of 83 questions were posed, with 13 out of 32 high-order thinking questions generating discourse among students across all the observed science lessons. ZY encouraged these discussions through follow-up questions. For 13 of these questions, ZY utilized encouraging, use, and find-out responses. ZY's sixteen responses to various higher-order thinking questions that ZY asked were categorized as encouraging. For example, the encouragement was evident when ZY asked, "What solution have you considered?" (Observation, Lesson 3). This question aimed to elicit students' perspectives, which he attentively acknowledged and reiterated for the students, exemplifying an encouraging response. However, one question, "How are phones powered?" met with an ignore response despite being a higher-order thinking question—ZY did not wait for his students to respond, quickly transitioning back into the lecture (Observation, Lesson 1). Another question he asked was "Both the Earth and magnets have poles, indicating a similarity between the two. Is it possible that the Earth functions as a magnet?" Again, no responses were provided from the students, leading ZY to supply the answer himself, highlighting an insufficient wait time and a lack of probing questions to further student understanding (Observation, Lon 2).

ZY's reflection on students' responses to different types of questions in mathematics

In mathematics, ZY's ignore responses to student responses to his questions dominated. Other responses included encouragement, use, and investigative comments.

ZY's overarching response to information/data questions was predominantly ignored. He aimed to direct each question to every student, correcting answers post discussion. An analysis of the questions and responses indicated that their purpose was mainly to ascertain correct answers. A total of 44 information questions were asked in Lessons 1 and 2. However, students exhibited limited wait time and received limited feedback following their answers, which encouraged them to envision their responses. The question *"What result have you found?"* was presented to the entire class, eliciting minimal responses. ZY, upon hearing answers, reiterated students' responses while emphasizing a variety of answers and behaviors designed to encourage students. He subsequently asked, *"Anyone else?"* to prompt corrections

regarding incorrect responses, which reflect investigative find-out responses (Observation, Lesson 2).

With respect to higher-order thinking questions, ZY employed ignore responses for four of the seven high-order thinking questions and failed to await students' answers. Instead, he delivered his own replies to such questions. Two questions received investigative responses, and one was addressed through a use response in mathematics lessons. Questions directed personally yielded find-out responses. Other class-wide questions were similarly perceived. For example, *"How did you arrive at that solution?"* exemplified ZY's effort to understand the solution process while attentively listening to student responses (Observation, Lon 1).

ZY's reflections on his responses to student responses

During an evaluative interview linked to the classroom observations, he expressed that obtaining correct answers was of lesser importance to him. *"The aim of asking questions is to attract attention, not to secure answers. Questioning has value even if students are unable to respond,*" he stated (IEO 3). ZY also emphasized the importance of stimulating his students' thinking through questioning, thus allowing him to respond to students' answers with affirmations such as *"Wonderful! Good job! You're on the right track*!" (Observation from various classes). In his teaching, immediate feedback was generally provided following simpler questions, whereas he would allow for longer wait times for more complex questions to prevent misunderstandings that could succeed from jumping in too quickly with correct answers. *"For slightly challenging questions, I extend the wait time compared with simpler questions. If I respond immediately, students may see those questions as too difficult to engage with*," he noted (IEO 3).

Initially, ZY tended to engage willing students, expressing reluctance to press them too much, given that doing so often yielded unproductive outcomes. *"When I ask questions, I prioritize willing participants, especially at first. After a while a group may consistently remain disengaged and resistant. I find that pressing them too hard doesn't yield fruitful results*," he elaborated (IEO 3). The data indicated that, in mathematics classes, his responses were significantly more negative than those of other subjects, especially with respect to information/data questions, which often received ignore responses from him. Generally, such questions call for a singular correct answer; thus, ZY's delayed responses stemmed from attempting to stimulate answers from every student. The data reflected that instances of teacher unresponsiveness, particularly when responding to incorrect answers, could be interpreted as discouraging for students. However, the context suggests that this lack of response was aimed at motivating broader participation in questions with singularly correct answers, demonstrating ZY's commitment to

engaging the whole class while fostering emotional investment in learning. In the same interview, ZY also acknowledged the absence of clear classroom rules, such as raising hands, which further impeded his ability to respond to all the students. He articulated,

> I wasn't able to establish a fine classroom management or a culture that was helpful for learning. With many new students entering, traditional order and culture are lacking. Typically, newcomers fall into a structured system, but that did not happen for us, and the disruptions caused by the pandemic during the 3rd and 4th grades contributed to a total breakdown of class rules. I failed to create an appropriate classroom culture, resulting in no system where students raised their hands to speak; consequently, some students became disconnected, and I struggled to engage with them.

ZY noted that higher-order thinking questions were rarely utilized and that those posed often went unanswered. Moreover, apart from one instance, he provided insufficient wait time for the others. ZY also acknowledged that he neither allotted adequate reflection time nor presented additional queries to assist students in navigating complex problems in general.

Discussion

Interaction between epistemological beliefs and questioning

The findings derived from the TBI indicated a predominant inclination toward transitional epistemological beliefs. ZY demonstrated considerable concern for his emotional responses to lessons, which was readily observable. Research conducted by Kang & Wallace (2005), Hashweh (1996), Smart & Marshall (2013), and Ordu (2019) has established a connection between epistemological beliefs and teaching practices. Findings on epistemological beliefs revealed the participating teacher's departure from traditional educational beliefs, emphasizing the importance of students' affective responses. His instructional approaches were heavily focused on students' interests and individual differences, and he underscored the importance of maintaining a positive classroom atmosphere and student rapport. However, the findings illustrated that ZY faced challenges in translating his transformative beliefs into practice. He refrained from compelling any student to participate in the classroom if they were unwilling, believing that allowing students the choice to engage would lead to more effective learning experiences. These perspectives align with his epistemological beliefs. Moreover, it was observed that ZY's epistemological beliefs significantly shaped his allocation of opportunities for student

responses. Throughout the observations, the number of students participating in the lessons remained relatively constant. In the epistemological belief interview, the teacher explicitly expressed his intention to focus on topics that would increase students' interest. Evaluating this within the framework of his epistemological beliefs, it becomes evident that his predominant response is one of encouragement, with infrequent use of approaches that could induce student reluctance—this observation is consistent with his epistemological beliefs as well. Nonetheless, the lessons were not student-centered. Furthermore, the teacher articulated a desire to lecture on subjects of interest to the students; however, findings exemplified his reluctance to stray from the established curriculum, creating a contradiction within his stated epistemological beliefs.

When the data concerning the distribution of students' right to answer were examined, it was observed that ZY wanted his students to be comfortable in the classroom and avoided situations that would make the students uncomfortable. His choice and implementation were in line with his transitional epistemological beliefs (Luft & Roehrig, 2007). ZY's thoughts about participation in the lesson can be seen as one of the reasons for a questioning process dominated by voluntary participation, and this was well aligned with his epistemological beliefs. Another reason may be that ZY thinks that student answers are not very important. It seems that his knowledge of the questions his student answers and the classroom context he wanted to create have an impact on the distribution of students' right to answer. Students who were not forced by ZY to answer were not engaged in the lesson, and students who actively participated in the lesson did not listen to another student while he/she answered. In addition, just they waited for their turn to speak. Aligned with his epistemological beliefs, his student answers were not at the center of the lesson, and questions were asked only to stimulate thinking.

The disparities between the subjects were also analyzed, and for ZY, his existing perceptions of these subjects, including Turkish, science and mathematics, led to varied instructional approaches. This finding aligns with prior research (Lehman, 1994; Wu et al., 2018). ZY noted that the characteristics of different subjects vary considerably, especially in elementary grades. This creates a challenge for elementary teachers, as they must familiarize themselves with the distinct requirements of various subject matters in the elementary curriculum.

Distribution of teacher questions across turkish, science and math classes

Upon the analysis of the data derived from observations and interviews, it was evident that the Turkish lesson fostered a learning environment that encouraged student expression through thoughtfully posed questions. Nonetheless, interactions were limited, as the students who responded to the questions primarily addressed the teacher, resulting in a lack of engagement from peers. Echoing Kayima and Jakobsen (2020) and Zhang et al. (2024), while discourse appeared to be a key component of student-centered classrooms, genuine dialog remained absent in ZY's classroom. This issue extends beyond mere classroom management; it directly impacts teaching methods and the development of Turkish language proficiency. Although the questions posed were well constructed for fostering discourse, the anticipated interactions did not emerge.

Consequently, although ZY's questioning was initiated with appropriate inquiries, the progression of the dialog paused. In the science class, students displayed their project developments. During these presentations, ZY employed higher-order thinking questions, prompting students to elaborate on their work. However, this successful approach diminished in the subsequent lesson as student engagement diminished, leading to issues such as inattentiveness among students during responses. Additionally, the length of student answers began to decrease as well. Blosser (2000) underlines the importance of utilizing varied question types in lessons while advising that the selection should be time- and topic-appropriate. The potential monotony arising from sustained demands for lengthy responses or the presentation of numerous projects in succession may have contributed to student disengagement, especially in elementary grades. In contrast, the questioning strategies in mathematics classes deviated from those in science and Turkish lessons, as more short-answer questions were predominant. The literature supports this trend, indicating a predominance of short-answer inquiries in the classroom (Almeida, 2012; Bilaloğlu et al., 2017; Desli & Galanopulou, 2015; Kılınç & Çalışkan, 2019; Lewis, 2015; Nappi, 2017; Sahin & Kulm, 2008; Wragg & Brown, 2002). The focus on short-answer questions positively influenced the classroom climate, as students presented less anxiety and were more attentive during mathematics, where the clarity of right and wrong responses enhanced their participation. Despite this, the students who remained reluctant to engage still displayed inactivity. ZY's questions received responses from willing students, after which the correct answers were communicated. This focus on assessing student responses allowed him to pay greater attention to students; however, the briefness of student answers resulted in reduced opportunities for active listening and rich discussions among students. Moreover, the increased frequency of questions contributed

to increasing the degree of student focus, mitigating feelings of boredom during lessons. Consequently, ZY's classroom management proved to be more effective in mathematics instruction than in science and Turkish lessons.

Additionally, ZY expressed an intent to spark curiosity through questioning; however, this goal fell short for those students who were less inclined to participate. The interview data suggest that while ZY possessed a clear purpose for questioning—aligned with a student-centered approach aimed at stimulating curiosity—these objectives were not realized during implementation. While his intentions and knowledge appeared adequate, they were undermined by various factors influencing the questioning process, including classroom management, the nature of student answers, and ZY's reactions. An additional variable influencing the questioning process, beyond the theoretical scope of this investigation, is classroom management. The failure of students to adhere to established norms regarding participation, or the absence of such classroom rules and norms, significantly impacts the effectiveness of the questioning process.

Teacher reflections on student responses

Based on the data collected through observations and interviews, it was perceived that ZY refrained from employing reactions that might unsettle the students. He expressed a desire to cultivate a classroom atmosphere conducive to student comfort, both during instruction (TBI) and in the subsequent interviews held afterward. ZY predominantly utilized encouraging and ignoring responses. The use of encouraging responses aligns with the practices typical of ZY at the transitional level (Luft & Roehrig, 2007). However, some instances where he preferred to remain unresponsive—ranked second among the most frequently observed reactions—did not fall into the category of ignore responses, as clarified during the interviews. This implies that situations, where ZY opted for unresponsiveness, did not correspond with the generation of negative emotions in students. Beccles et al. (2016) posited that teachers use encouraging responses for correct answers while employing ignore or reject responses for incorrect responses. This assertion, however, does not align with the findings from the current study. ZY indicated that he remained unresponsive to several students' responses in the mathematics class, prompting inquiries into the rationale behind his unresponsiveness.

This study also suggested that the circumstances in which the teacher remained unresponsive did not correspond with the negative reactions identified in the study by Beccles et al. (2016). When queried about his choice to remain unresponsive to students' answers in science classes, ZY indicated

his intention to avoid deviating from the topic, opting for unresponsiveness toward those who answered without permission. In the findings of Beccles et al. (2016), the ignore response was characterized as one of the negative reactions; although ZY seldom used it in mathematics lessons, he employed this response more frequently in science lessons, disregarding students who provided answers without permission. The discrepancy between this approach and the teacher's overall patterns of interaction, as well as the information gathered from the interviews, aligns with the observations made by Bilaloğlu et al. (2017). They suggested that behaviors such as answering without reflection, offering irrelevant responses, and the tendency of the same students to reiterate identical answers could be understood in the context of classroom management rather than the teacher's specific attitude toward the science lesson.

Furthermore, ZY's reluctance to deviate from the subject matter is echoed in Beghetto's (2007) research, which explored teachers' reactions to diverse student responses. According to Beghetto (2007), teachers acknowledged that divergent student answers could serve as valuable starting points for discussion, thus enhancing student engagement; however, they also expressed concerns regarding potential digressions from the topic at hand. Smart & Marshall (2013) concluded that teachers often overlook students' responses, failing to adequately focus on student contributions and involvement during lessons.

Results and implications

The distribution of question types varies among Turkish, science, and mathematics subjects, and this variation has a noticeable impact on the classroom context and discourse. Specifically, the types of questions posed influence students' attention to the lesson. Observations have indicated that classrooms that frequently employ short-answer questions experience fewer management issues. In mathematics, the teacher rarely uses higher-order thinking questions, and when these questions are posed, they are often left unanswered. Teachers need to broaden the range of question types and increase the frequency of higher-order thinking questions to cultivate student input and engagement. Additionally, when students do not respond to a question, the teacher is inclined to provide the answer, which underlines the importance of allowing sufficient wait time for students and ensuring that they understand how to use that time effectively. However, even with adequate wait time, students often give up when they are unable to solve a problem or respond to a teacher's question. To address these challenges, it is recommended that teachers offer ample guidance, provide effective hints,

rephrase questions in various ways, and ensure that enough wait time is provided for students to think, respond or at least engage.

The distribution of question types also plays a crucial role in the questioning process. Nevertheless, this research indicated that the impact of an effective distribution of question types does not influence the questioning process uniformly. The significance of teachers' responses to students' answers is well documented in both the literature review and the theoretical framework of teacher questioning. Additionally, as part of classroom management, this study revealed that listening and speaking rules in the classroom also influence question-asking dynamics. Furthermore, classroom management is influenced by the types of questions posed by the teacher. Notably, using short-answer questions directed at the entire class can have a detrimental effect on the efficiency of the questioning process. To improve this, it is suggested that the approach to questioning should be personalized, allowing each student adequate wait time to respond. It is essential to raise awareness among teachers regarding this issue and provide them with professional development on effective questioning strategies.

The findings of this research also suggest a connection between teachers' epistemological beliefs and their questioning techniques. Questions serve several purposes: they can spark curiosity, increase interest in the lesson, engage students, encourage positive responses, and avoid pressuring students to answer during class. These practices reflect the influence of teachers' epistemological beliefs. Interestingly, regardless of the types of questions the teacher asked or the lessons delivered, student participation in class remained unchanged. The reasons behind students' inactivity, from both the teacher's and students' perspectives, warrant further investigation. An examination of what actions teachers could take to engage all students in meaningful ways is recommended.

Although the curricula emphasize a student-centered teaching approach, teachers often struggle to implement practices that truly reflect this philosophy. While the teacher effectively initiated questioning via higher-order thinking and information/data questions, the overall questioning process did not adhere to a student-centered approach. The reasons for this shortcoming, as outlined in the findings, include the inadequate distribution of students' opportunities to respond and the failure to center student contributions within the lesson. Notably, these factors influencing the questioning process are also affected by challenges in classroom management and teachers' epistemological beliefs. Despite the existence of studies on the types of questions teachers ask, there is still a need for more in-depth and discourse research on how these questioning practices impact the classroom

environment and interact with various aspects of the questioning process. This study underscores the relationship between epistemological beliefs and student-centered teaching. Teacher training programs should aim to align preservice elementary teachers' epistemological beliefs with those of student-centered methods. Specifically, there should be an assessment of teaching methods and education courses, with a strong emphasis on the necessity of adapting questioning techniques to align with student-centered practices.

Finally, this research highlighted that the existing views of the participating elementary teacher on various subjects significantly influenced his instructional practices, particularly in the context of questioning. Notably, as an internationally common practice in many countries elementary teachers are responsible for teaching content across diverse subjects, each with its characteristics. To alleviate the inherent pressures on elementary teachers, support should be provided at both the local and national levels through in-service professional development activities. This administrative support is especially vital in the fields of science and mathematics, where teachers' perceptions of these subjects can restrict their ability to involve students in higher-order thinking skills and activities.

Limitations and further research

Teacher questioning is a staple component of the teaching and learning process, playing a crucial role in both enhancing and evaluating the effectiveness of instruction within school environments. This study concentrated specifically on the questioning practices of a fourth-grade elementary teacher during science, mathematics, and Turkish lessons, as well as how these practices interacted with his epistemological beliefs. In addition to the small sample size restricting the generalizability of the findings derived from this research (Gokmen et al., 2024), the scope of the research was also limited to the types of questions the teacher asked, the students' responses to these questions, and the teacher's reflections on the students' answers to those posed questions. Additionally, a limitation of this study was its descriptive nature, which restricted a deeper understanding of the observed phenomena. To promote a more theoretically robust and in-depth understanding, future research should involve different grade levels and adopt a broader scope, taking into account contextual factors such as textbooks, available resources, and subject benchmarks shaping teacher questioning processes. Additionally, employing more reflective methodologies, such as experimental design or action research, is also recommended for further studies.

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