

Answer Me! *Factors Affecting Students' Propensity to Ask Questions in Class and How Stimuli Polish Student Questioning*

Chufei Wang^{1,a,*}

¹*Suzhou Foreign Language School, Jiangsu, 215000, China*

a. djun0822@mail.nacc.edu

**corresponding author*

Abstract: Student voluntary question-asking enhances student engagement and academic achievements. Nevertheless, there is little understanding of the mechanism of questioning. Against this background, the primary objectives of the present study were to do a comprehensive evaluation encompassing three dimensions of students' questioning behaviour, namely the motivations underlying their question-asking, the types of questions, and the strategies employed in encouraging more questions. This study has found that classroom environment, students' self-efficacy and self-awareness, peer influence, and gender & cultural factors are the main factors influencing students' propensity to ask questions. Question types can be divided into procedural and content-related, from which students generate their questions. In addition to the unimportant off-task attention questioning, confirmation, on-task attention questioning, and clarification are low-order questioning while evaluation, comparison, problem-solving, cause and effect/correlation, and extended questions are valued as high-order ones. Class material, class strategies, and teacher intervention are supposed to be utilized and upgraded to polish students' question-asking in both quantity and quality. Based on the comprehensive analysis, more research should be done into teachers' perceptions of receiving and responding to different kinds of questions and their proper intervention in student questioning.

Keywords: student questioning, teacher-student relationship, student-centred learning, positive feedback, autonomy

1. Introduction

Student question-asking is becoming the embodiment of students' autonomy in learning [1]. It nurtures curiosity in students, encouraging them to explore and seek knowledge independently. When students ask questions, they become active participants engaging in the learning process. The academic performance and success of students are important for both education institutions and students, together with their families. Research indicates a strong positive correlation between students' academic achievement and their level of participation in the classroom (i.e., effort and persistence) [2].

Both students and teachers are beneficiaries of student question asking. In the learning process, misconceptions and knowledge gaps can be exposed to students and teachers so that both of them can

take action to improve. On students' side, critical thinking and problem-solving skills in both the specific subject matter and related fields will be fostered [3]. Self-efficacy originated from confidence in their abilities to make accomplishments will thus follow.

When considering teachers, as they are often consulted for clarification, it is a chance for them to identify areas of misunderstanding and adapt their instruction accordingly [4]. Students' attributes and traits including confidence, willingness to communicate, and good coping abilities, in correspondence to those of teachers including innate abilities, concern for students' needs and classroom techniques have proven to be factors affecting teacher-student relationship [5]. A harmonious relationship provided teachers with high self-efficacy and motivation to devote more into teaching. Since most attributes and traits can be cultivated by numerous and high-quality questions asked from students explained in previous content, the significance of student question-asking is evident.

This characteristic holds significant value when individuals advance in expertise, as the ability to remember the most challenging concepts for novice students becomes increasingly arduous. Furthermore, it is worth noting that particular concepts may provide greater challenges in comprehension for certain pupils compared to their peers. Engaging in the examination of inquiries and the development of corresponding answers serves to maintain the novelty of the course, even when it is taught regularly. Occasionally, inquiries emerge that compel the instructor to acquire new knowledge, revise lectures, diversify the utilized instances, or gain a fresh perspective on a particular matter.

However, the encouraging outcomes of student question-asking are mostly captured through observation of existing spontaneous questioning behaviors or the allocated groups in which some students are forced to ask while the others keep silent to be indoctrinated with content; but reasons why students have the willingness to express their inquiries and how they generate qualified questions are still in lack of understanding. Some studies centering in the late 20th century have conducted experiments to investigate particular factors but few have integrated their results and analyzed future research direction in this field.

Student-centered learning where student question-asking is a key component which is taking over teacher-centered learning. More specifically, the wide use of inquiry-based learning is well worth attaching importance to compared to the old-fashioned direct instructions. As a result, the blank slate in the growing domain should be explained. Therefore, purposes of the systematic review are to comprehensively investigate the three following questions:

- (1) What are the factors influencing students' propensity to ask questions in class?
- (2) What are the most common types of questions that students voluntarily ask in class?

How can other stimuli (eg. Teachers, tutors, alternative teaching materials) polish student question-asking in class?

2. Method

2.1. Strategy of Search and Selection of Literature

The databases Google Scholar, JSTOR, Taylor & Francis, APA PsycNet, Springer Link, and Elsevier were searched for a combination of relevant key terms about student question-asking in class. A comprehensive literature search was performed using keywords including Classification or Categories or Taxonomy of Questions, Factors Influencing Propensity of Question Asking, Approaches or Strategies to Improve Question Asking, Quality of Questions or Problems, etc.

2.1.1. Inclusion Criteria

Criteria for selecting the subjects were as follows:

For exposure and outcomes: Literature should be published in English between 1980 and 2023 and available online. The literature should investigate common self-generated question types, particular factors affecting student question-asking in class, and stimuli polishing questions (a study should include any/two of the three or all of them.) The subject being taught in experiments could be any discipline that was required in the curriculum.

For participants: Student participants of the included studies had to be students (from primary school students to undergraduates, roughly aged from seven to twenty-two). Class instructors could either be their own teachers or experimenter.

2.1.2.Exclusion Criteria

In a broader scope, studies with insufficient data, unclear findings, or inadequate evaluation methods are ruled out. In detail, research that only focuses on the importance of student question-asking or simply talks about teachers' questioning, or experimental designs that questions are asked after class or online instead of in class are excluded.

3. Results

In total, 17 research were eligible for inclusion, including one teaching plan without generic features of formal articles but providing feasible question-generating strategies mentioned in inclusion criteria. Most studies focused on some particular factors influencing students' propensity for question-asking, while a small number of them, at the same time, discussed common types of questions students asked. The combination of student questioning and teacher answering was also discussed in one study. The remaining articles found some feasible strategies that can be applied to stimulate student question-asking.

The studies fall into three groups: 1. Factors affecting students' propensity to ask questions; 2. Mentioning of types of questions being asked; 3. How stimuli related to class polish student question-asking.

Simplified information about each study and their respective responses to the 3 research questions is shown in *Appendix Table. 1*.

3.1. Factors Affecting Propensity

Multiple elements have the potential to interact synergistically, resulting in increased levels of question-asking.

3.1.1.Students' Self-efficacy and Self-awareness

Self-efficacy includes motivation, independence, perseverance and confidence. Self-awareness can be evaluated by clearly understanding who, what, and why about oneself.

3.1.1.1.Motivation: Student Passivity and Achievement

Intrinsic motivation, interest in the subject area, and students' perceptions of the content's relevance can all motivate students to ask questions. Many studies have indicated that students who are curious, engaged, and feel a sense of ownership over their learning are more likely to ask questions. Substantial evidence in Good et al. supported that low achievers in upper grades ask fewer questions than younger low achievers [6]. One specific fact that exemplify this result is that some low-achieving students continue to be active participants through the third grade; however, by the sixth grade, they have become relatively passive. Another result from Good was in elementary stages, average achievers ask more questions than both the low-achieving and high-achieving students because the high achievers

find the content not challenging and the low achievers do not prioritize it. At higher grades, as schoolwork becomes more abstract and less rote and procedural, high-achieving students are motivated to begin to ask questions, in part because the intellectual tasks are becoming challenging enough to them to do inquiries. These two results embodied the mediating role student passivity plays in the relationship between achievement and students' propensity to ask questions.

3.1.1.2.Independence: Internal Locus of Control

Pre-knowledge for a setting is the knowledge that is acquired through direct experience or exposure to a particular setting, such as a classroom, library, or workplace. King found that students who have abundant pre-knowledge before class asked more questions than those who lack it [1].

Students in the learner-controlled condition performed better on comprehension tests when they were asked to generate their own discussion questions related to the lecture using thought-provoking generic question stems, compared to students in the experimenter-controlled condition who were given questions similar to those generated by students in the same course during the previous semester using identical question stems. The difference in performance suggests that learner control in guided questioning may be a beneficial feature of that strategy, at least for individuals with an internal locus of control. When autonomy is entitled to students, like use of student-centred learning, question-asking can be improved.

3.1.1.3.Confidence and Self-awareness

Students with higher English language proficiency (those who take classes in their mother tongue) were typically more at ease asking questions in class [7].

According to Auster & MacRone, the percentages of both men and women reporting that they felt very comfortable making contributions increased with college years [8]. This may be because they develop better self-awareness through which they can identify who they are, what are good for them, and thus getting better involved in school life. However, sophisticated data analysis on a large sample size revealed that older pupils shown more reluctance than younger ones [7].

3.1.2. Classroom Environment

Physical layout and materials, as well as psychological aspects for teachers and students are considered in this environment.

3.1.2.1.Social Density: Seating Arrangement & Class Type

A strong positive relationship was observed between the measurements of emotional ambience and the number of student questions posed. Consequently, as the level of pleasantness in the emotional ambience decreases, there is a corresponding decrease in the number of inquiries posed. The previous outcome subsequently validated the inverse relationship between indicators of crowding and indicators of emotional ambience. Social density refers to the number of people in a given physical space or environment. It is a factor negatively correlated with emotional ambience. The higher the social density, the less ease and emotional ambience students feel, thus the fewer questions raised [9]. Changes in physical configuration are the method of great convenience to alter social density. Since size of classroom is difficult to alter, changes in seating arrangement and class type are feasible.

The semicircular seating arrangement differs from the row-and-column arrangement in terms of the proximity of seats to important and relatively high-status figure (i.e. the teacher). Physical proximity to teachers increases from front lines to backward lines and from the middle to edges in the former configuration but remains generally the same in the latter one. There is a T-shaped or a

Triangular-shaped action zone in row-and-column configuration in which students interact more with teachers and raise more questions than those outside it, while the action zone spreads out to cover the whole range in semicircular configuration. Additionally, the orientation of the students' seats in relation to both the targeted figure and their peers, specifically face-to-face, is typically closer in the semicircular arrangement.

Marx et al. [10] found that students asked significantly more questions in semicircular configuration than in the row-and-column one; and more questions are generated within action zone than outside it in terms of row-and-column, given that question types remained similar. These results imply that the presence of unimpeded eye contact could be a significant factor influencing the act of asking questions within the semicircle seating configuration. Furthermore, it is plausible that students experience heightened emotions while in the proximity of their teacher, leading them to feel compelled to actively engage and demonstrate interest by courtesy when seated in a semicircular configuration [1].

Graesser & Person revealed that in tutoring where social density is relatively low, a student asked 240 times as many questions as he /she would ask in a classroom study, assuming there was no substantial difference between the amount of questions presented by tutors and teachers [11]. Therefore, it is sometimes beneficial for children to attend small tutoring classes or cooperate with private teachers.

3.1.2.2. Teacher-student Relationship: Teacher Self-disclosure and Positive Feedback

The behavior and attitudes of teachers significantly impact student question-asking. Teachers who encourage and value student questions, provide opportunities for questioning, and respond positively to questions tend to foster active participation.

For self-disclosure, Identity-work refers to the dynamic process of establishing and negotiating identities within the context of social interactions. The exhibition encompasses the manifestation of both professional and individual identities, such as the embodiment of liberal, open-minded attitudes, critical thinking skills, and the perpetuation of gender stereotypes. Self-disclosure is one form of instructors' identity-work. Students often perceive the personal narratives shared by teachers as sincere efforts to show honesty and openness, establish personal ties, and cultivate an inclusive and conducive learning atmosphere. The significance of teacher behaviors incorporating elements of self-disclosure concerning student motivation has been empirically established [12]. Student question-asking prompted by motivation. Cayanus found that relevance, positiveness and amount of teacher self-disclosure are positively correlated with students' question-asking [13].

For positive feedback, almost all studies which answered Research Question 1. have outlined the importance of teachers' positive feedback in response to questioning. Teacher compliments enhance student questioning frequency as they feel their questions are valued and themselves are respected.

3.1.3. Peer Influence

Peer interactions and social dynamics within the classroom can affect students' question-asking behavior. Social learning enables children to imitate appropriate behaviors (i.e. question-asking) from peers.

Sadker and Cooper found that students who observed a videotape of students asking higher-order questions subsequently increased the frequency and level of their questioning in class [14]. According to Barker's behavior setting theory, a behavior setting is a "spatial and temporal context within which a set of behaviors is displayed that has a high probability of recurring in the same or similar form in response to recurring stimuli." In other words, it is a physical and social environment that shapes and reinforces certain patterns of behavior. The students' lack of pre-knowledge made them reluctant to

ask questions in a setting where nobody else asked questions and acted in congruence with the subject [9]. Therefore, social learning makes the influence from peers a significant factor influencing students' propensity to ask questions.

3.1.4. Gender and Cultural Factors

Cultural and gender differences can influence question-asking behavior. Educational practices, gender stereotypes, biases, and demographic disparities may impact the extent to which students are willing to ask questions in class.

In terms of gender, despite cross-sectional data and different participants at different ages, Good et al. found that male kindergarteners ask two and one-half times more inquiries than female ones [6]. Girls catch up to boys in the remaining school years, and noticeably in seventh grade, girls have a higher propensity for asking questions compared to their male counterparts (no mentioning of gender of teacher). In a study on college students, it is found that male teachers received more questions than female teachers, female students asked fewer questions than male students in courses taught by males, and self-reported masculinity, which includes elements of independence, assertiveness, and a task-orientation, was associated with a greater likelihood of question asking. This finding supports the literature on sex roles and sex-role stereotyping, which has shown that question-asking is linked to independence and that independence has been identified as a fundamental element of masculinity [15]. However, previous studies showed that both girls and boys can have high masculinity. In addition, Marx et al reported that German female fourth-grader asked more questions than male ones towards the experienced female teacher. [10]. Moreover, the gender correlations of question-asking comfort revealed significant differences between males and females, with males in general being more at ease to ask [7].

Therefore, the influence of gender on students' propensity to ask questions seems to work with other factors like teacher gender, their confronts in growth.

Cultural factors are often intertwined with the analysis of other factors. Streaming in schools is likely to render low-achieving students a worse condition of question-asking. Allocating high-achieving, average-achieving, and low-achieving students in proportion to a class, and ranking classes like "superior" and "parallel" which consist of only superior students or inferior students are two basic ways of streaming in most schools. In the former style, to ensure the pace of high and average achievers, teachers are sometimes either deliberately or involuntarily oblivious to blind spots from low achievers. Under the circumstance of the latter way, teachers may use a controlling conversational style to keep the whole class running smoothly. Over time, it is plausible that teachers develop a tendency to predict that individuals with lower academic performance may pose incorrect queries, leading them to refrain from selecting them for participation. According to Cooper [16], teachers often overlook the suitability of some questions when addressing low-achieving pupils due to their need to retain classroom management and engage all students. Teachers' feedback to help students manage their impulses and avoid asking unnecessary questions may inadvertently teach students to answer the teacher's questions rather than initiating their own.

There is a disappointing result that students from lower socioeconomic status and low-income backgrounds were substantially less at ease with question-asking than students from higher socioeconomic status and wealthier families [7]. Even when socioeconomic variables are covaried, minority learners were at less ease to ask questions than white ones.

3.2. Types of Questions

It is acknowledged that the process of learning is inherently complex, and therefore, no simplistic assumptions can be made regarding the nature of student inquiries. As an illustration, students can

pose inquiries to divert attention away from the educational process, causing potential embarrassment to the teacher, or concealing their lack of preparation or attentiveness towards the content. Off-task attention questioning is behavior that is unrelated to the assigned task and is primarily meant to bring attention to the individual student or to showcase their abilities [15]. The objective is to focus on specific pupils rather than the entire class or teachers. The questions posed by students may also suggest a reliance on others for reassurance or an inability to think critically and autonomously. Questions being discussed in this study are those related to genuine blind spots of students in the subject matter.

Recategorization of question types was done by combining similarities of types mentioned in the eight studies that answered *Research Question 2*. (see from Table.1)

3.2.1. Questions Types

1. Procedural: the course syllabus, examinations, classroom physical environment, availability of office hours, instructional methodologies used to deliver course content and the requirements of course assignments.

2. Content: explanations for definition key terms, problem-solving procedure, cause and effect, extension, evaluation, comparison [3,6].

3.2.2. Low-order Questioning

1. Clarification: extracted and pellucid delineation of the mentioned factual and procedural aspects that are presented to them.

2. Confirmation: substantiation of procedure, other students' response or task.

3. On-task attention questioning: the act of focusing on the immediate task at hand, with the primary purpose being to draw attention to another student or to demonstrate one's abilities [15].

These inquiries are most likely the result of students' absentmindedness or tedium in class. Sometimes teachers view these inquiries as unnecessary class disruptions, which may cause them to mistrust the students who asked them.

3.2.3. High-order Questioning

1. Evaluation: The student must establish an appropriate standard and determine how closely an idea or object meets it. Discussion should be conducted based on conditions and perspectives.

E.g. Is unemployment always detrimental to the economy?

2. Comparison: Determine whether concepts or objects are comparable, dissimilar, identical, or contradictory.

E.g. Compare laboratory and field experiments by highlighting the similarities and differences between the two.

3. Problem-solving: Require an individual to solve an unfamiliar problem.

E.g. Considering what you've learned in this child care course, how would you gain the trust of a 2-year-old who appears timid and apprehensive around strangers?

4. Cause and Effect/Correlation: Demand an understanding of causal/correlational relationships.

E.g. What impact will the expanding knowledge of British primary school students have on American education?

5. Extended question: Academic curiosity unrelated to the immediate task.

E.g. An adapted way of problem-solving strategy or a self-formulated proving for the Pythagorean theorem.

The generation of these inquiries required the application of critical thinking abilities by the students who posed them. Hence, the teachers' comments must reflect a knowledgeable and logical perspective pertaining to the topic under discussion [10,17].

3.2.4. Combinations of Student Questions and Teacher Responses

West & Pearson [17] discussed combinations of student questions and teacher responses.

1. A query about classroom procedures and a teacher's clarifications---Students who are concerned with completing classroom assignments take the work for which they are evaluated seriously. Clarifying is a crucial responsibility of classroom instructors.

2. general inquiry—content response and clarification response.

Immediate responses will firstly ensure students' absorption of the fresh inquiries and secondly show teachers' academic ability. However, there is high possibility that an inexperienced teacher can be distracted by a question and fails to finish the required content due to too much expansion.

3.3. Stimuli for Polish

"Polish" here emphasizes that encouragement for student questioning should aim at not only increasing numbers but also improving the quality of questions.

For material utilization, the use of research papers in task-related fields to pass on a higher thinking level to students is also of great help.

3.3.1. Strategy Application

The research revealed that learners who were granted autonomy in their learning process by utilizing the Guided Student-Generated Questioning strategy exhibited a higher tendency to choose subjects, concerns, and ideas that they perceived as necessary for further comprehension.

In situations characterised by high population density and limited familiarity with the environment, individuals were seen to ask fewer questions. This observation suggests a proclivity towards mental disengagement and reduced social interaction [9]. As a result, designers ought to deliberate on strategies aimed at mitigating social density inside information-seeking contexts, particularly for novice users who possess limited domain-specific expertise. In a fixed classroom, all students should be arranged in a semicircular configuration or regularly be swapped to seats in action zone.

The prevailing Enquiry-based Learning (EBL) and Peer Enabled Restructured Classroom (PERC) are worth trying [18,19]. In the context of EBL, the instructor assumes the responsibility of setting the task and providing guidance, while the students independently explore various avenues of inquiry, utilize their pre-knowledge, and discern their own learning requirements. In PERC classrooms, the teachers have the responsibility of providing guidance to the Teaching Assistants (TAs) and evaluating their performance as well as the students' learning outcomes. They are involved in developing a course for TAs: learning to teach, learning to learn, learning content, and college knowledge. However, this innovative method has many difficulties to practise: time to cover the curriculum, worries about students' external exam performance, aversion to change, peer pressure from other instructors, and classroom management.

3.3.2. Teacher Intervention

The recommendation to instruct teachers in the practise of being immediate and supportive has been put out as a means to enhance the propensity for students to ask questions and foster positive teacher-student interactions. In essence, teachers possess the ability to bring about improvements in their students.

The favorable influence on student engagement was observed when faculty members displayed actions that indicated a sense of role distance from the professor, who was perceived as strong and all-knowing. Faculty members who exhibited approachability, respectfulness, and a willingness to engage with student input were found to be more effective in fostering a positive and productive learning environment [8]. This was achieved through practices such as actively involving students by calling their names in a large lecture to show respectability or offering positive reinforcement to their answers, and soliciting students' opinions even in cases where they did not volunteer.

Nevertheless, sometimes direct questioning can make timid students reluctant to ask. To boost student inquiry, indirect questioning, early task focus over social factors, and mandatory faculty-student conferences. First, while questioning research has focused on direct inquiry to the teacher in front of other students, questioning time can be switched to prior/post or in-between classes, and forms can vary. Writing on sheets anonymously or using computer-based learning are applicable forms as indirect routes. Early emphasis on tasks indicates that a class should begin by encouraging discussion on a challenging task rather than practising "get-acquainted" social activities. The constructed task-centered atmosphere will increase students' grade pressure, which overrides the social pressure of discussing with classmates and teachers. In terms of mandatory faculty-student conferences, as mentioned in *Research Question 1.*, high social density may discourage students' question-asking, so faculty or grades should organize small-sized, private consultation that is out of classroom situation. The mandatory conference can potentially motivate individuals with low motivation to actively participate in the conference by encouraging them to come prepared for interaction. This can be achieved by the instructor incorporating a task-oriented discussion during the conference, such as seeking instructor approval for a term paper prospectus outline or engaging in a discussion about the key points covered in the most recent reading assignment [20].

3.3.3. Students' Mindset

First-generation students have a higher possibility of perceiving other students' voluntary question-asking as helpful [21]. Hence, if predetermined individuals, commonly referred to as "shills," are strategically placed in sizable lecture settings with the purpose of posing questions during class sessions to incite engagement among first generations and thus spreading the effect to a broader scope, the majority of the class may be activated.

Furthermore, designers are supposed to contemplate strategies for imparting students with the prerequisite contextual knowledge to enhance their comfort and confidence within the given environment. This, in turn, may foster an inclination among students to pose inquiries and actively pursue additional information.

Students can be interviewed about their perceptions of the desirability of asking classroom questions and together reach a consensus with teachers on the appropriateness of their self-raised questions.

4. Discussion

4.1. Premise of the Topic

Based on the findings pertaining to Research Question 2., it is evident that there is a significant disparity between the amount of requests for clarification of fundamental concepts, explanations for superficial phenomena, and inquiries regarding syllabus and test content, as compared to high-order questions that require students to independently employ critical and creative thinking skills and are hard for teachers to forecast. Therefore, one possible explanation for this outcome is that teachers may lack awareness of crucial topics in the curriculum that require their attention, or they may not possess the ability to anticipate students' challenges in comprehension and to provide necessary

explanations during class. Hence, the basis for promoting student inquiry is to have educators ensure the clear clarification of key concepts within each lesson as well as the broader subject matter. In addition, providing an overview of the general framework of the course, outlining specific objectives for each class, and establishing plans for long-term study are of great essence. This proposition would mitigate the influence of confounding factors introduced by teachers and enhance the experimental validity.

Moreover, previous studies rarely mentioned the influence of mind-wandering on children's question-asking. If the premise mentioned above is fulfilled, this can be a convincing reason why students ask low-order questions when children themselves are analyzed. This omitted internal reason may further indicate the importance of keeping students concentrated on major tasks.

4.2. Limitations of Current Studies

Very few studies in the recent decade (2013-2023) are about factors influencing students' propensity to ask questions, and most relevant studies are centered before 2000, mainly from 1970 to 1999. A possible explanation can be that students nowadays can get access to online research engines or their private extracurricular class tutors. With more freedom and privacy, they may choose not to ask questions in class.

When considering the limited generalizability of some methods (especially research paper usage), it is important to note that not all studies are able to establish causal correlations. Furthermore, the applicability of these findings may be restricted to scientific disciplines, rather than encompassing purely liberal arts fields such as Philosophy, History, and Literature & Art. However, when using materials to improve student question-asking, educators can pick out those that are similar to research papers--heuristic, representative, well-developed, exposing some searchable questions, sharing commonalities with class content.

More controls of extraneous variables should be taken into consideration. For example, the sex of instructors teaching the lessons and students' familiarity with them (experimenter as an instructor or real-life teacher as an instructor) should be contemplated. Regarding non-standardization, it is worth noting that there exists variability in the number of questions requested by teachers, with this request varying among different teachers. Additionally, the composition of students in each class differs, and the percentage of absences fluctuates throughout different stages of the class.

4.3. Suggestions for Future Work

During the early phase of establishing a balance in question-asking dynamics between students and tutors, there may be a need for the facilitator to have a more proactive role in the process until a suitable degree of trust has been established. The balance appears to be a delicate one: too much tutor intervention and the EBL process is stifled, too little facilitation and the students may feel anxious or unsupported. Little research has found the balance point of the level. Future investigations are needed to explore the mechanisms behind the reach of the balance. Moreover, whether the financial state of a family and students' standpoint as critical consumers should be counted when discussing question-asking in different size (one-to-one or one-to-many) and nature of classes (free compulsory education or charged private tutoring) should be contemplated.

5. Conclusion

Under the trend of student-centered learning, student questioning, as the dominant embodiment of students' autonomy and learning ability, has proved its importance in educational fields. However, the system behind it is still under investigation. The study aims at conducting a systematic review of three aspects of students' question-asking--why, what, and how.

This study has found that classroom environment, students' self-efficacy and self-awareness, peer influence, and gender & cultural factors are the main factors influencing students' propensity to ask questions. Question types can be divided into procedural and content-related, from which students generate their own questions. In addition to the unimportant off-task attention questioning, confirmation, on-task attention questioning, and clarification are low-order questioning while evaluation, comparison, problem-solving, cause and effect/correlation, and extended questions are valued as high-order ones. Class material, class strategies, and teacher intervention are supposed to be utilized and upgraded to polish students' question-asking in both quantity and quality.

The comprehensive analysis of student questioning in class undertaken here has provided a new understanding of the complex details behind the generation of a voluntary question. Limitations lied in the availability of relevant research in the recent ten years, and the non-standardization of experimental procedures. More broadly, research is also needed to evaluate teachers' perception of receiving and responding to different kinds of questions and determine much intervention teachers should offer to improve student questioning. Notably, economic issues and perspectives are ought to be involved in discussion.

References

- [1] King, A. (1994). *Guiding knowledge construction in the classroom: Effects of teaching children how to question and how to explain. American educational research journal*, 31(2), 338-368.
- [2] Liu, X., & Flick, R. (2019). *The relationship among psychological need satisfaction, class engagement, and academic performance: Evidence from China. Journal of Education for Business*, 94(6), 408-417.
- [3] King, A. (1994). *Autonomy and question asking: The role of personal control in guided student-generated questioning. Learning and Individual Differences*, 6(2), 163-185.
- [4] Harlen, W. (2005). *Teaching, learning and assessing science 5-12. Teaching, Learning and Assessing Science 5-12*, 1-264.
- [5] Ghasemi, F. (2022). *Exploring middle school teachers' perceptions of factors affecting the teacher-student relationships. Educational Research for Policy and Practice*, 21(2), 201-216.
- [6] Good, T. L., Slavings, R. L., Harel, K. H., & Emerson, H. (1987). *Student passivity: A study of question asking in K-12 classrooms. Sociology of Education*, 181-199.
- [7] Daly, J. A., Kreiser, P. O., & Roghaar, L. A. (1994). *Question - asking comfort: Explorations of the demography of communication in the eighth grade classroom. Communication Education*, 43(1), 27-41.
- [8] Auster, C. J., & MacRone, M. (1994). *The classroom as a negotiated social setting: An empirical study of the effects of faculty members' behavior on students' participation. Teaching sociology*, 289-300.
- [9] Fuhrer, U. R. S. (1987). *Effects of social density and pre-knowledge on question asking in a novel setting. Journal of Environmental Psychology*, 7(2), 159-168.
- [10] Marx, A., Fuhrer, U., & Hartig, T. (1999). *Effects of classroom seating arrangements on children's question-asking. Learning Environments Research*, 2, 249-263.
- [11] Graesser, A. C., & Person, N. K. (1994). *Question asking during tutoring. American educational research journal*, 31(1), 104-137.
- [12] Henry, A., & Thorsen, C. (2021). *Teachers' self-disclosures and influences on students' motivation: A relational perspective. International Journal of Bilingual Education and Bilingualism*, 24(1), 1-15.
- [13] Cayanus, J. L. (2005). *Students' propensity to ask questions: Do cognitive flexibility, teacher self-disclosure, student motives to communicate, and affective learning influence question asking in the classroom?. West Virginia University*.
- [14] Sadker, M., & Cooper, J. (1974). *Increasing student higher-order questions. Elementary English*, 51(4), 502-507.
- [15] Pearson, J. C., & West, R. (1991). *An initial investigation of the effects of gender on student questions in the classroom: Developing a descriptive base. Communication Education*, 40(1), 22-32.
- [16] Cooper, H. M. (1979). *Pygmalion grows up: A model for teacher expectation communication and performance influence. Review of Educational research*, 49(3), 389-410.
- [17] West, R., & Pearson, J. C. (1994). *Antecedent and consequent conditions of student questioning: An analysis of classroom discourse across the university. Communication Education*, 43(4), 299-311.
- [18] Lee, V. S. (2012). *What is inquiry - guided learning?. New directions for teaching and learning*, 2012(129), 5-14.
- [19] Keiler, L. S. (2018). *Teachers' roles and identities in student-centered classrooms. International journal of STEM education*, 5, 1-20.

- [20] Aitken, J. E., & Neer, M. R. (1993). *College student question - asking: The relationship of classroom communication apprehension and motivation. Southern Journal of Communication*, 59(1), 73-81.
- [21] Nadile, E. M., Alfonso, E., Barreiros, B. M., Bevan-Thomas, W. D., Brownell, S. E., Chin, M. R., ... & Cooper, K. M. (2021). *Call on me! Undergraduates' perceptions of voluntarily asking and answering questions in front of large-enrollment science classes. PLoS One*, 16(1), e0243731.
- [22] Bauer, H. H., & Snizek, W. E. (1989). *Encouraging students in large classes to ask questions: Some promising results from classes in chemistry and sociology. Teaching Sociology*, 17(3), 337-340.
- [23] Brill, G., & Yarden, A. (2003). *Learning biology through research papers: A stimulus for question-asking by high-school students. Cell Biology Education*, 2(4), 266-274.
- [24] Dogan, F., & Yucel-Toy, B. (2022). *Students' question asking process: a model based on the perceptions of elementary school students and teachers. Asia Pacific Journal of Education*, 42(4), 786-801.

Appendix

Table 1: Responses from Previous Studies to Research Questions [22-24].

Reference	Sample	Responses to Questions	Q1: Factors	Q2: Types of Questions	Q3: Stimuli
Brill & Yarden, 2003	EG: 11th (n=59) and 12th grades (n=10) (male=33, female=36); CG: 17 years old and in 11th grade (n = 38)	2, 3	/	Properties, comparisons and causal relationships	Learning through research papers
Graesser & Person, 1994	27 undergraduates as students & 3 psychology graduate students as tutors	1, 2, 3	1. Cognitive ability (scores high/low) 2. Proximity to teachers/classroom environment	Degree of specification, content, and question-generation	Computer-based question-asking systems to promote active inquiry and learning
Good et al., 1987	13 seventh-grade students poor at algebra as students & 10 high school students as tutors	2, 3	/	Explanation, information, clarification, confirmation, procedural, non-task, off-task, unknown	Ask students about their perceptions of the desirability of asking questions and reach a consensus on the appropriateness of their self-raised questions
Dogan & Yucel-Toy, 2022	Six target students from each classroom (one boy and one girl, representing each of the three ability levels). Total number of participants is not informed. Mathematics and language art classes are used.	1	Teachers' positive feedback and reinforcement	/	/
King, 1994	Fourth-graders and teachers; seven teachers and nine students from three public elementary schools in Istanbul, Turkey	1, 2, 3	Locus of control/self-regulation	Generic questions as examples, basically including explanation, comparisons, conclusions, properties	Guided Student-Generated Questioning strategy

Table 1: (continued).

Fuhrer, 1987	Twenty undergraduates (ten male and ten female) served as subjects in the study. The subjects ranged in age from 16 to 19 years.	1, 3	1. Social density; 2. pre-knowledge	/	Mitigating social density inside information-seeking contexts; imparting users with the requisite contextual knowledge to enhance their comfort and confidence within the given environment
West & Pearson, 1994	628 (340 females;288 males) students enrolled in 30 courses representing seven academic colleges & Thirty teachers	1, 2, 3	1. Teacher positive feedback as a reinforcement	Classroom procedures, general inquiry-content, and clarification	Immediate and supportive teacher guidance
Lee, 2012	4 case studies	3	/	/	Enquiry-based learning
Marx et al., 1999	Twenty-seven German fourth-graders & one female teacher: German and mathematics lesson	1, 2, 3	1. Proximity to teachers; 2. Positive feedback	Based on modified question taxonomy of Kearsley (1976) Mainly including epistemic (why is/what is...) & social control (May I do this?)	Being in action zone, or arranged in a semicircular configuration
Bauer & Snizek, 1989	Students in Chemistry and Sociology classes	2	/	Questions offering paradoxes that demonstrated gratifyingly critical or analytical thought on the part of the student.	/

Table 1: (continued).

Daly et al., 1994	Eighth-grade students (N = 24599)	1, 3	1. Family income, 2. socioeconomic status, 3. English language proficiency, 4. family intellectual environment, 5. educational aspirations, 6. academic performance, 7. self-esteem, and 8. locus of control.	/	EFL (English as a Foreign Language) learners should improve their English speaking, reading, writing and listening skills to reduce anxiety.
Auster & MacRone, 1994	132 university students	1, 3	1. Self-concept; 2. positive feedback	/	Faculty members: high approachability, respectfulness, and a willingness to engage with student
Cayanus, 2005	No access	1	1. Teacher self-disclosure; 2. cognitive ability; 3. motivation	/	/
Keiler, 2018	13 mathematics and science teachers in the PERC Program in these two schools.	3	/	/	Peer Enabled Restructured Classroom (PERC)
Nadile et al., 2021	#1519 from the University of Central Florida and #11614 from Arizona State University.	3	/	/	“Shills” arranged in class to pose questions during class sessions
Pearson & West, 1991	331 college students (157 males; 174 females) & fifteen instructors (9 males; 6 females)	1, 2	1. Genders of students and teacher: # varies as a function of teachers’ biological sex and, within male professors’ classrooms, as a result of the students’ biological sex.	Explanation, information, clarification, confirmation, procedural, non-task, off-task, unknown (based on Good et al., 1987)	/
Aitken & Neer, 1993	156 (female=61%, age mean=19.1 years) in a lecture class	1, 3	1. Motivation to ask questions	/	(a) indirect questioning, (b) early task focus over social factors, and (c) mandatory faculty-student conferences