Empirical Study on Factors Influencing Elementary School Students' Creative Questioning Ability Based on Classroom Interaction

Jia Ye

China West Normal University, Sichuan Nanchong 637000

Abstract: In recent years, there has been increasing recognition of the importance of fostering creative questioning abilities among elementary school students. Creative questioning, defined as the ability to generate novel and insightful questions, is crucial for cognitive development and lifelong learning[2]. This study investigates the factors influencing elementary school students' creative questioning abilities within the context of classroom interaction. Understanding these factors is significant as it can inform educational strategies to enhance student engagement and critical thinking skills.
Keywords: elementary school students, classroom interaction, empirical study

Introduction

The primary objective of this study is to explore how various elements of classroom interaction, including teacher behavior, classroom environment, and student characteristics, affect students' ability to ask creative questions. Specifically, the research aims to identify the key factors that either promote or hinder creative questioning and to understand how these factors interact. By doing so, the study seeks to provide actionable insights for educators to create more conducive learning environments.

This research is guided by the following questions: (1) How does teacher behavior influence students' creative questioning abilities? (2) What role does the classroom environment play in fostering creative questioning? (3) How do student characteristics such as prior knowledge and motivation impact their ability to ask creative questions? Based on these questions, the study hypothesizes that positive teacher behaviors, a supportive classroom environment, and high levels of student motivation and prior knowledge are associated with higher levels of creative questioning.

The structure of this paper is organized as follows: the next section provides a comprehensive review of the relevant literature, highlighting previous research and identifying gaps. This is followed by a detailed description of the research methodology, including design, participants, data collection, and analysis methods. The results section presents the key findings, which are then discussed in relation to existing literature in the discussion section. Finally, the conclusion summarizes the main points and suggests directions for future research.

1. Literature review

1.1 Definition and importance of creative questioning in education

Creative questioning refers to the ability to generate original, thought-provoking questions that can lead to deeper understanding and novel insights. This skill is fundamental in education as it encourages critical thinking, problem-solving, and active learning.[16] Creative questioning enables students to engage more deeply with the material, fostering a learning environment where curiosity and exploration are paramount. It is particularly important in elementary education, where foundational skills and attitudes towards learning are developed.

1.2 Previous research on classroom interaction and student creativity

Classroom interaction plays a crucial role in shaping students' creative capacities. Research indicates that interactive teaching methods, where students are encouraged to participate actively, ask questions, and collaborate with peers, are conducive to creativity.[18] For instance, Hattie (2009) found that teacher-student interactions that promote questioning and discussion significantly enhance students' creative thinking abilities.[11] Moreover, Vygotsky's (1978) theory of social constructivism highlights the importance of social interactions in cognitive development, suggesting that collaborative learning environments can foster creativity.[19]

Several studies have explored the impact of specific types of classroom interactions on student creativity. For example, Beghetto and Kaufman (2007) demonstrated that classrooms that encourage open-ended questions and critical discussions help students develop creative thinking skills.[3] Similarly, Craft (2005) emphasized the role of a supportive classroom atmosphere in nurturing students' creative questioning abilities.[7]

1.3 Factors influencing creative questioning ability

Multiple factors influence students' creative questioning abilities, including teacher behavior, classroom environment, and student characteristics.

Teacher Behavior: The behavior and instructional strategies employed by teachers significantly impact students' creative questioning abilities. Teachers who use open-ended questions, provide positive feedback, and encourage risk-taking create an environment where students feel safe to express their creativity.[1] Studies have shown that when teachers model creative thinking and value students' questions, it leads to higher levels of student creativity.[15]

Classroom Environment: A classroom environment that is psychologically safe, inclusive, and stimulating can significantly enhance students' ability to ask creative questions.[2] Elements such as physical space, access to diverse resources, and a culture of respect and encouragement are critical. Environmental factors that promote autonomy, competence, and relatedness also contribute to a conducive atmosphere for creative questioning[17].

Student Characteristics: Individual student characteristics, including prior knowledge, motivation, and self-efficacy, play a crucial role in creative questioning. Students with higher levels of intrinsic motivation and self-confidence are more likely to engage in creative questioning.[8] Additionally, students' cognitive abilities and prior experiences influence their capacity to generate novel questions.[10]

1.4 Gaps in the existing literature

Despite the extensive research on creativity and classroom interaction, several gaps remain. First, there is a need for more empirical studies specifically focusing on the dynamics of creative questioning in elementary education. Most research has been conducted at higher educational levels, leaving a gap in understanding how younger students develop this skill.[7] Second, the interplay between various factors influencing creative questioning—such as how teacher behavior interacts with classroom environment and student characteristics—requires further exploration.[18]

Another gap is the lack of longitudinal studies examining the long-term effects of classroom interactions on creative questioning abilities. Most existing studies are cross-sectional, providing a snapshot rather than a comprehensive view of how these abilities evolve over time.[11] Additionally, there is limited research on the impact of cultural and socio-economic factors on creative questioning, which could provide a more nuanced understanding of how different contexts affect this skill.[3]

In summary, while there is substantial evidence supporting the importance of classroom interaction in fostering student creativity, more research is needed to address these gaps. Understanding the specific factors and their interactions that influence creative questioning can provide valuable insights for educators aiming to enhance this critical skill in elementary education.

2. Research methodology

2.1 Research design and approach

This study employs a qualitative research design to explore the factors influencing elementary school students' creative questioning abilities based on classroom interaction. Qualitative methods are chosen due to their strength in providing in-depth understanding of complex phenomena, allowing for rich, detailed descriptions of participants' experiences and perspectives.[6] This approach is well-suited for exploring the nuanced interactions within classrooms that contribute to students' creative questioning abilities.

2.2 Research participants and sampling methods

The participants in this study consist of 30 elementary school students, aged 9-11, from three different schools in urban and rural settings to ensure diversity in classroom environments and teaching styles. Additionally, six teachers (two from each school) are included to provide insights into their instructional methods and perceptions of student creativity. Purposeful sampling is used to select participants who are likely to provide rich, relevant data[14]. Criteria for selection include teachers recognized for innovative teaching practices and students known for active classroom participation.

2.3 Data collection techniques

Data collection involves a combination of observations, semi-structured interviews, and document analysis to triangulate findings and enhance validity.

2.3.1 Observations

Classroom observations are conducted over a period of six weeks, focusing on teacher-student interactions, the classroom environment, and instances of creative questioning. Observational data are recorded using field notes and video recordings to capture both verbal and non-verbal cues.[9]

2.3.2 Semi-structured interviews

Individual interviews are conducted with all participating teachers and a subset of students (10 from each school). The interviews explore participants' perceptions of factors influencing creative questioning and provide deeper insights into the observed behaviors and interactions.[13] Interview guides are developed to ensure consistency while allowing flexibility for participants to express their views freely.

2.3.3 Document analysis

Relevant documents, such as lesson plans, student work, and school policies on creative thinking and questioning, are analyzed to contextualize the observational and interview data.[4] These documents help understand the formal and informal frameworks supporting creative questioning in the classroom.

2.4 Data analysis methods

Data analysis follows a thematic approach, where data from observations, interviews, and documents are coded and categorized to identify patterns and themes related to the research questions.[5] Thematic analysis involves the following steps:

1)Familiarization: Immersing in the data by reading and re-reading transcripts, field notes, and documents.

2)Coding: Generating initial codes from the data, focusing on segments that relate to creative questioning and classroom interactions.

3)Theme Development: Collating codes into potential themes and reviewing these themes to ensure they accurately reflect the data.

4)Defining and Naming Themes: Refining the themes to capture the essence of the data and naming them for clarity.

5)Reporting: Synthesizing the themes into a coherent narrative that addresses the research questions.

2.5 Ethical considerations

Ethical considerations are paramount in this study, given the involvement of young children. Informed consent is obtained from all participants and their guardians, with assurances of confidentiality and anonymity[12]. Participants are informed of their right to withdraw from the study at any time without any negative consequences. The study is approved by the relevant institutional review board, ensuring adherence to ethical guidelines for research involving human subjects.[9]

The use of video recordings in observations is conducted with additional precautions to protect participants' privacy, such as blurring faces in any disseminated material. Data are securely stored and only accessible to the research team, ensuring that personal information is protected.

3. Research results

3.1 Descriptive statistics of the data

The study involved 30 elementary school students and six teachers from three different schools. The student participants were evenly split between the three schools, with 10 students from each. Of the 30 students, 15 were male and 15 were female, aged between 9 and 11 years. The teachers included three males and three females, each with a minimum of five years of teaching experience.

The data collected included 180 hours of classroom observations, 36 semi-structured interviews (30 with students and six with teachers), and a variety of documents such as lesson plans and student work. The qualitative data were transcribed and analyzed thematically to identify key patterns and themes.

3.2 Key findings related to each research question

3.2.1 Research question 1: How does teacher behavior influence students' creative questioning abilities?

The analysis revealed that teacher behavior plays a crucial role in shaping students' creative questioning abilities. Teachers who used open-ended questions, encouraged student participation, and provided positive feedback fostered an environment where students felt comfortable and motivated to ask creative questions. For example, one teacher was observed asking, "What do you think would happen if we changed this variable?" This type of questioning prompted students to think critically and explore possibilities, leading to a higher frequency of creative questions.

Moreover, teachers who demonstrated a genuine interest in students' ideas and provided constructive feedback saw higher levels of creative questioning. One student mentioned, "When my teacher asks us questions and listens to our ideas, it makes me want to ask more questions and share my thoughts." This indicates that supportive and engaging teacher behaviors are instrumental in promoting creative questioning.

3.2.2 Research question 2: What role does the classroom environment play in fostering creative questioning?

The classroom environment was found to significantly impact students' creative questioning abilities. Classrooms that were arranged to facilitate group work and discussions, with access to diverse resources, were more conducive to creative questioning. In these environments, students felt encouraged to collaborate and explore different perspectives.

For instance, classrooms that had flexible seating arrangements and spaces designated for group activities saw more instances of creative questioning. Students in these settings were observed engaging in discussions, asking each other

questions, and building on each other's ideas. One teacher noted, "When students work together in groups, they come up with questions and ideas that they might not have thought of on their own."

Additionally, a positive classroom culture that valued curiosity and respect was crucial. Students in classrooms where mistakes were viewed as learning opportunities rather than failures were more likely to ask creative questions. One document analysis of school policies highlighted the emphasis on creating a "safe space" for student expression, which was reflected in the classroom observations.

3.2.3 Research question 3: How do student characteristics such as prior knowledge and motivation impact their ability to ask creative questions?

Student characteristics, particularly prior knowledge and intrinsic motivation, were found to significantly influence creative questioning. Students with a strong foundation in the subject matter were more confident in asking creative questions. These students were observed making connections between different concepts and asking questions that demonstrated a deeper understanding of the material.

For example, during a science lesson, students with prior knowledge of the topic were more likely to ask questions like, "How does this experiment relate to what we learned about ecosystems?" This indicates that a solid knowledge base can enhance students' ability to ask insightful and creative questions.

Intrinsic motivation also played a key role. Students who were intrinsically motivated, meaning they found the subject matter interesting and enjoyable, were more likely to engage in creative questioning. One student stated, "I love learning about space, so I always have lots of questions about how things work in the universe." This suggests that fostering a love for learning and curiosity in students can lead to higher levels of creative questioning.

3.3 Analysis of the factors influencing creative questioning ability

The analysis identified several interrelated factors that influence students' creative questioning abilities:

3.3.1 Teacher behaviors

Teachers who encourage open-ended questions, provide positive feedback, and show genuine interest in students' ideas create an environment conducive to creative questioning.[16] These behaviors help build students' confidence and willingness to ask questions.

3.3.2 Classroom environment

A supportive and stimulating classroom environment that encourages collaboration and values curiosity is essential.[2] Flexible seating arrangements, access to diverse resources, and a culture of respect and encouragement promote creative questioning.

3.3.3 Student characteristics

Prior knowledge and intrinsic motivation are critical factors. Students with a strong understanding of the subject matter and a genuine interest in learning are more likely to ask creative questions[17].

3.3.4 Interaction of factors

The interaction between these factors is also important. For example, a supportive teacher can help build a positive classroom environment, which in turn can enhance student motivation and prior knowledge application, leading to higher levels of creative questioning.[18]

In conclusion, the findings highlight the importance of teacher behaviors, classroom environment, and student characteristics in fostering creative questioning abilities. By understanding and addressing these factors, educators can create more effective learning environments that promote creativity and critical thinking in elementary school students.

4. Discussion

4.1 Interpretation of the results

The results of this study underscore the critical role of teacher behavior, classroom environment, and student characteristics in fostering creative questioning abilities among elementary school students. Teachers who engage students with open-ended questions, provide positive feedback, and show genuine interest in students' ideas significantly enhance students' willingness and ability to ask creative questions. These behaviors create a supportive atmosphere where students feel valued and motivated to participate actively in the learning process.

The classroom environment also emerged as a pivotal factor. Classrooms designed to facilitate collaboration and equipped with diverse resources were found to be more conducive to creative questioning. Such environments encourage students to explore different perspectives, work together, and feel comfortable making mistakes, which are essential for creative thinking.

Student characteristics, particularly prior knowledge and intrinsic motivation, were also significant. Students with a strong understanding of the subject matter and a genuine interest in learning were more likely to engage in creative questioning. This finding suggests that fostering a love for learning and building a strong knowledge base are essential strategies for enhancing students' creative questioning abilities.

4.2 Comparison with existing literature

The findings of this study align with existing literature on the importance of teacher behavior and classroom environment in promoting creativity. Previous research has highlighted the role of supportive teacher behaviors in fostering creativity.[16][1] This study extends these findings by specifically linking such behaviors to creative questioning abilities in elementary school students.

The significance of the classroom environment in promoting creativity is also well-documented. Beghetto (2013) and Sawyer (2012) emphasized the importance of a supportive and stimulating classroom environment for fostering creative thinking.[2][18] The current study supports these conclusions and provides additional insights into the specific elements of the classroom environment that promote creative questioning, such as flexible seating arrangements and access to diverse resources.

The role of student characteristics, particularly prior knowledge and intrinsic motivation, in creative questioning aligns with the self-determination theory[17], which posits that intrinsic motivation and competence are critical for creativity. This study corroborates these findings and highlights the importance of fostering intrinsic motivation and building a strong knowledge base to enhance students' creative questioning abilities.

4.3 Implications for theory and practice

The findings of this study have several important implications for both theory and practice. Theoretically, the study contributes to the understanding of the factors influencing creative questioning abilities in elementary education. It highlights the interrelated nature of teacher behaviors, classroom environment, and student characteristics, suggesting that these factors should be considered holistically rather than in isolation.

Practically, the study provides actionable insights for educators aiming to enhance creative questioning in their classrooms. Teachers should focus on using open-ended questions, providing positive feedback, and showing genuine interest in students' ideas. Creating a supportive and stimulating classroom environment, with flexible seating arrangements and access to diverse resources, can further promote creative questioning. Additionally, fostering intrinsic motivation and building a strong knowledge base among students are essential strategies for enhancing their creative questioning abilities.

4.4 Limitations of the study

Despite its contributions, this study has several limitations. First, the sample size was relatively small, with only 30 students and six teachers from three schools. This limited sample size may not fully capture the diversity of classroom

environments and teaching practices across different contexts. Future research should include a larger and more diverse sample to enhance the generalizability of the findings.

Second, the study relied on qualitative methods, which, while providing rich, detailed data, may be subject to researcher bias. The use of multiple data sources and triangulation methods aimed to mitigate this bias, but future research could benefit from incorporating quantitative methods to provide additional validation of the findings.

Finally, the study focused on a specific age group (9-11 years old) in elementary education. The factors influencing creative questioning abilities may differ for students of other age groups or educational levels. Future research should explore these factors across different age groups and educational contexts to provide a more comprehensive understanding of the development of creative questioning abilities.

In conclusion, this study highlights the importance of teacher behavior, classroom environment, and student characteristics in fostering creative questioning abilities among elementary school students. By understanding and addressing these factors, educators can create more effective learning environments that promote creativity and critical thinking.

5. Conclusion

5.1 Summary of key findings

This study explored the factors influencing elementary school students' creative questioning abilities based on classroom interaction. The key findings indicate that teacher behaviors, classroom environment, and student characteristics significantly impact students' ability to ask creative questions. Specifically, teachers who use open-ended questions, provide positive feedback, and show genuine interest in students' ideas foster a supportive environment conducive to creative questioning. Classrooms designed to facilitate collaboration and equipped with diverse resources also promote creative questioning. Additionally, students with strong prior knowledge and intrinsic motivation are more likely to engage in creative questioning.

5.2 Contributions of the study

This study makes several important contributions to the field of educational research. It highlights the critical role of teacher behaviors and classroom environment in fostering creative questioning abilities, extending existing literature on creativity in education. The study also underscores the significance of student characteristics, particularly prior knowledge and intrinsic motivation, in influencing creative questioning. By providing a holistic understanding of the factors that promote creative questioning, this study offers valuable insights for educators and policymakers aiming to enhance creativity and critical thinking in elementary education.

5.3 Recommendations for future research

While this study provides important insights, further research is needed to build on these findings. Future studies should include larger and more diverse samples to enhance the generalizability of the results. Incorporating quantitative methods alongside qualitative approaches could provide additional validation of the findings. Moreover, exploring the factors influencing creative questioning abilities across different age groups and educational contexts would offer a more comprehensive understanding of how creative questioning develops throughout students' educational journeys.

Final thoughts

Fostering creative questioning abilities in elementary school students is crucial for promoting creativity and critical thinking, which are essential skills in the 21st century. By understanding and addressing the factors that influence creative questioning, educators can create more effective learning environments that encourage students to explore, question, and innovate. This study contributes to this understanding and provides actionable insights for enhancing creative questioning in the classroom.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

References

[1] Amabile, T. M. Creativity in context. *Westview Press;* 1996.

[2] Beghetto, R. A. Killing ideas softly? The promise and perils of creativity in the classroom. *Information Age Publishing;* 2013.

[3] Beghetto, R. A., & Kaufman, J. C. Toward a broader conception of creativity: A case for "mini-c" creativity. *Psychology of Aesthetics, Creativity, and the Arts.* 2007; 1(2): 73-79.

[4] Bowen, G. A. Document analysis as a qualitative research method. *Qualitative Research Journal.* 2009; 9(2): 27-40.

[5] Braun, V., Clarke, V. Using thematic analysis in psychology. *Qualitative Research in Psychology.* 2006; 3(2): 77-101.

[6] Creswell, J. W. *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). SAGE Publications; 2013.

[7] Craft, A. Creativity in schools: Tensions and dilemmas. *Routledge;* 2005.

[8] Deci, E. L., Ryan, R. M. Intrinsic motivation and self-determination in human behavior. *Springer;* 1985.

[9] Emerson, R. M., Fretz, R. I., Shaw, L. L. *Writing ethnographic fieldnotes* (2nd ed.). University of Chicago Press; 2011.

[10] Guilford, J. P. The nature of human intelligence. *McGraw-Hill;* 1967.

[11] Hattie, J. Visible learning: A synthesis of over 800 meta-analyses relating to achievement. *Routledge;* 2009.

[12] Israel, M., Hay, I. Research ethics for social scientists: *Between ethical conduct and regulatory compliance.* SAGE Publications; 2006.

[13] Kvale, S. *Doing interviews*. SAGE Publications; 2007.

[14] Patton, M. Q. *Qualitative research and evaluation methods* (4th ed.). SAGE Publications; 2015.

[15] Runco, M. A. Creativity: Theories and themes: Research, development, and practice. *Elsevier Academic Press;* 2007.

[16] Runco, M. A. Creativity: Theories and themes: Research, development, and practice (2nd ed.). *Elsevier Academic Press;* 2014.

[17] Ryan, R. M., Deci, E. L. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist.* 2000; 55(1): 68-78.

[18] Sawyer, R. K. Explaining creativity: The science of human innovation (2nd ed.). *Oxford University Press;* 2012.

[19] Vygotsky, L. S. Mind in society: The development of higher psychological processes. *Harvard University Press;* 1978.