

Cultivating Critical Thinking Skill in Students Through Questioning Technique: An Action Research Study

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Abstract

The aim of this study was to develop students' critical thinking skills by applying questioning techniques as a tool. The study employing action research approach adopted the spiral model of action research characterized by iterative steps of reconnaissance, planning, action, observation/reflection and re-planning. This cyclical process was repeated in a spiral fashion. The findings suggest that questioning is one of the effective pedagogical techniques to foster students critical thinking skills. The findings reveal four phases of critical thinking skills development. In the initial phase / level of intervention, most of the students almost reproduced the memorized / recalled responses instead of demonstrating critical thinking skills. In the second phase, most of the students somewhat departed from recalling level and demonstrated the ability to analyses the issue from multiple perspectives. In the third phase, most of the students developed the ability to understand the complex interconnections of issues followed by the fifth phase in which students developed action-oriented critical thinking skills to some extent. The study makes strong recommendations for teachers to employ questioning techniques as a tool for developing students' critical thinking skills.

Keywords: Critical Thinking Skills, High Order, Reflective, Action Research, Elementary.

Introduction

Education is about the intellect and encompasses holistic growth and essential 21st-century skills. Critical thinking is one of these critical 21st-century skills. 21st-century skills are important competencies that learners need to thrive in a rapidly evolving world. These skills are generally categorized into three main domains: learning and innovation skills, digital literacy skills, and life and career skills (Dede, 2010).

Not only are critical thinkers inherently more engaged with the learning process in a very thoughtful and helpful way, but they are also intentional and resourceful with the problems they encounter in the classroom and beyond. These students become lifelong learners, those who are naturally curious about learning well beyond the walls of the classroom. They probe questions, they negotiate with the content, they take their own life experience and apply it to the material, and that gives them the ability to react appropriately to so many different situations.

Critical thinking is a skill that can be learned and strengthened with consistent practice. This skill transcends individuals' age, background, and context. Teachers create an enabling classroom environment and incorporate targeted activities into their lessons to foster critical thinking skills among students. Despite its importance in students' personality development, most educators are

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unaware of effective instructional techniques that contribute to the development of students' critical thinking abilities. According to the Reboot Foundation (2020), teachers hold different perspectives on integrating critical thinking skills into learning basic facts. For example, 41% of teachers believe critical thinking should be practised alongside learning facts, 42% think it should follow after mastering facts, and 16% believe they should be taught separately. This division suggests varying levels of awareness regarding effective strategies for fostering critical thinking. The teaching and learning process is expected to equip students with essential skills to thrive in life, including critical thinking. Critical thinking is a vital 21st-century skill for navigating complex challenges in one's life. It is miserable that the current teaching and learning process and prevalent education system often fail to foster students' critical thinking skills. The traditional, teacher-centred approaches still dominate classrooms. The emphasis is still on rote memorization over deep understanding and analytical reasoning. There is a dearth of studies that highlight the dominance of traditional, teacher-centred approaches in education and their impact on fostering students' critical thinking skills. For example, by eighth grade, most teachers have ceased emphasizing critical thinking skills in their classroom teachings (Bouygues, 2022), and 45% of students showed no significant improvement in critical thinking, complex reasoning, or writing skills during their first two years of college (Arum & Roksa, 2011). Traditional teaching promotes factual knowledge rather than critical thinking abilities (Baeten et al., 2010) and 60% of students found not studying critical thinking in school, and only about 55% reported high school fostered their critical thinking skills (Reboot Foundation, 2020).

The situation mentioned above not only hampers students' intellectual growth but also limits their ability to engage in critical thinking and meaningful problem-solving. Subsequently, many students become passive learners, unable to ask high-order questions or think critically about their learning. There is a need to replace traditional instructional methods that hinder critical students thinking skills. To address these challenges, there is a need to incorporate innovative strategies like questioning techniques to transform teacher-centred classrooms to foster critical thinking among students. The situation makes it imperative to do intervention in schools and conduct action research to examine the current practices employed in schools to promote critical thinking and apply the questioning technique to enhance students' critical thinking skills. By addressing this critical area, this study seeks to provide a practical pedagogical framework for fostering critical thinking in students and preparing them to navigate diverse situations with confidence and critical insight. This study intended to:

- Examine the current classroom practices employed to foster students' critical thinking skills.
- Explore how the questioning technique contributes to developing students' critical thinking skills.

Literature Review

This literature review section conceptualizes critical thinking and current instructional practices employed in schools to develop students' critical thinking skills. It also reviews the literature on the role of questioning techniques in developing students' critical thinking skills in classrooms and real educational settings.

What is Critical Thinking?

Thinking is a process that encompasses various mental activities. Thinking involves problem-solving, understanding and decision-making (Ruggiero, 2012). It is a process that involves assessing knowledge and information (De Bono, 1992) and manipulating internal representations to achieve goals. The literature discusses the nature of critical thinking. Some argue that a specific form of thinking is logical and reflective; hence, those forms focus on determining beliefs and

actions (Ennis, 1991). Others argue that thinking involves actively analysing and evaluating information, arguments, and observations (McGregor, 2007). However, others elaborate that thinking includes intentional, self-regulatory judgment and encompasses multiple mental activities such as interpretation, analysis, evaluation, inference, and justification (Facione, 1990). Some scholars taking it beyond the thinking process argue that thinking involves managing thought processes using intellectual standards (Elder & Paul, 2001). The literature also explains that it is the disciplined process of conceptualization, application, analysis, synthesis, and evaluation of information for beliefs and actions (Paul & Scriven, 2003).

The literature often associates critical thinking with practical problem-solving skills (Trilling & Fadel, 2009). Critical thinking skills facilitate effective communication and contribute to students' personal and social well-being (Saiz et al., 2010). Critical thinking helps students address complex problems (Shakirova, 2007) and make informed decisions and sound judgments (Elder & Paul, 2008; Trilling & Fadel, 2009). This is assessing information validity (Zireva & Letseka, 2013) and adapting to changing environments (Brookfield, 2012).

Critical thinking skills promote/direct learning and students' academic success and foster higher-order thinking (Schaferman, 1991). This skill develops one's ability to be impartial, consistent and fair (Siegel, 1990). It enhances students' self-awareness, recognizing opportunities in problems, setting goals, respecting diverse perspectives, developing holistic thinking ability, thoughtful action, emotional maturity, open-mindedness, and active listening (Ruggiero, 2012). Critical thinkers are constantly engaged with problems, sharing insights, seeking feedback, and adapting their viewpoints based on new information (Ennis, 1991).

Current Instructional Strategies for Developing Critical Thinking Skills

According to educational scholars, traditional education systems prioritize teaching indoctrination and socialization over the development of critical thinking skills among students. For example, Apple (1990) asserts that schools often function as institutions of cultural reproduction, and they do it through transmissions of dominant ideologies and norms at the cost of fostering independent thought. Similarly, Giroux (1983) contends that the hidden curriculum within schools subtly reinforces social hierarchies and power structures, limiting students' ability to challenge the status quo. The point of argument is that teachers may not intentionally indoctrinate students, but the structure and content of education certainly serve to maintain existing social order instead of encouraging critical inquiry.

The review of literature on current practices for developing students critical thinking skills identified several instructional strategies employed in schools. The strategies used include collaborative or cooperative learning, defined as joint problem-solving (Dillenbourg, 1999 & Thayer-Bacon, 2000). Instructional activities like concept mapping and argument diagrams and reflective classroom culture are essential components (Duplass & Ziedler, 2002). Other instructional strategies include problem-based learning (PBL) (Eggen & Kauchak, 2012). In inquiry-based learning and problem-based learning students are identify problematic situations and research the problem, select solutions, and then evaluate their work (Eggen & Kauchak, 2012). Another instructional strategy is modelling critical thinking behavior by teachers is also crucial technique for developing students critical thinking skills (Davis et al., 2003).

The Role of Questioning in Developing Critical Thinking Skill

Questioning technique is central to develop students critical thinking (Paul & Elder, 2002). It is a key teaching approach for fostering creativity and critical thinking skill (Elder & Paul, 2013b). The most important point is to construct high order questions that encourage students' creativity and critical thinking, including multiple-choice questions (Duplass & Ziedler, 2002). The students

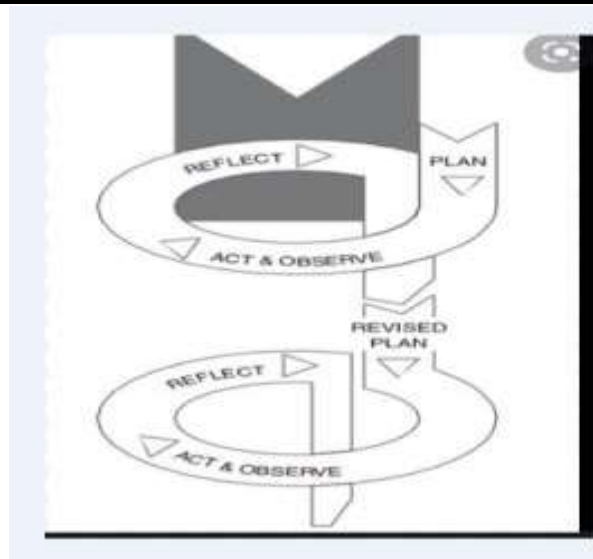
engaged in reviewing and responding questions can reinforce critical thinking. Asking the right questions is crucial. One of the techniques is to use variety of questioning techniques to create an environment for practicing critical thinking.

Another technique used to develop students critical thinking skills is to provide sufficient wait time essential after asking questions because as critical thinking requires time to process information (Schaferman, 1991). In educational literature, peer coaching and involving paired problem-solving and coaching is yet other techniques used to promote critical thinking skills using the framework of questioning technique (Ladyshefsky, 2006).

Research Design and Methodology

This study employed an action research approach within a qualitative paradigm to develop students' critical thinking skills using a questioning approach. Action research design was chosen for its suitability in improving educational practices and addressing classroom issues (Mills, 2011 & Stringer, 2008). The study adopted the spiral model of action research (Kemmis & McTaggart, 2000). This cyclical model is characterized by iterative steps designed for continuous improvement. The process begun with planning, while identifying a problem of critical thinking skill requiring improvement and followed by developing a corresponding action plan. Subsequently, at the "act" stage we implemented the planned actions within the classroom setting. During the "observe" phase, we systematically observed and documented the changes and outcomes resulting from the implemented actions. This was followed by "reflection," a critical stage where we analyzed the observations, identified both the strengths and weaknesses of the implemented plan, and used these reflections to inform the next cycle. Based on this reflection, the plan was then revised ("re-plan"), leading to a new iteration of action, observation, and reflection. This cyclical process was repeated in a spiral fashion.

Figure 1: Spiral Model Action Research by Kemmis & McTaggart, (2000)



Research Participants

The study was conducted in a seventh-grade social studies classroom in one of the private schools in Chitral Khyber-Pakhtunkhwa. The participants were 15 female students with similar

backgrounds in terms of age, income, social standing, and academic ability. This small, homogenous sample was typical of action research conducted within a specific classroom context.

Data Collection

The data collection process was integral to the action research cycles, employing classroom observation, classroom teaching with questioning, and reflective notes as primary methods (Kemmis & McTaggart, 2000). Classroom observation involved systematically observing classroom interactions and student responses during social studies lessons. Concurrently, the planned questioning strategies were implemented during instruction, serving as both the "Act" stage of the action research cycle and a key data source, capturing real-time student engagement (Mills, 2011 & Stringer, 2008). Reflective notes, taken during and after teaching, documented student responses to questions on the effectiveness of the questioning strategies, providing insights into the intervention's impact. This process was iterative; following each planning phase (plan), questioning methods were implemented (act), with simultaneous classroom observations (observe) and reflective notetaking (reflect). The analysis of these data informed the subsequent planning phase, leading to revisions in questioning strategies (revised plan) and a new cycle of action, observation, and reflection. This cyclical process, facilitated by these data collection methods, allowed us for ongoing refinement of the interventions (Kemmis & McTaggart, 2000).

Findings and Discussion

Teacher-centered and Lecture-based Instructions

In the reconnaissance stage, designed to examine the current state of critical thinking skills among students, revealed a predominantly teacher-centered and lecture-based pedagogical approach. For instance, data gathered through classroom teaching observations on minerals in the Muslim world demonstrated a passive and teacher-centered approaches. The teacher primarily translated the textbook, with students passively listening. Often there were no questions from and by students, but questions asked were low-level thinking and recall. The questions asked about the largest oil-producing country or naming minerals and products produced in different Muslim countries are the examples of such low order and recall level questions. These questions focused on factual recall rather than higher-order thinking skills like analysis, evaluation, synthesis, application and creation levels of learning (Anderson & Krathwohl, 2001).

Passive Classroom Environment

The findings from the reconnaissance also revealed that students were passive. The students never initiated questions or responded to the teachers' questions. This lack of engagement suggests a limited development of critical thinking dispositions, such as inquisitiveness and open-mindedness (Abrami et al., 2015). The teacher found providing direct definition of concepts such as monsoon on the whiteboard and students were directed to copy. This approach reinforces rote memorization rather than promoting deeper understanding or critical analysis of the concept. The absence of classroom activities further limited opportunities for students to actively engage with the material and develop their critical thinking hinder the development of critical thinking skills, making learners more dependent on rote memorization rather than analytical reasoning (Freire, 1970). This finding is aligned with Paulo Freire's *Banking Model of Education*, in students are treated as empty vessels to be filled with knowledge rather than active participants in their own learning (Freire, 1970). The pedagogical reliance on lecture coupled with student passivity provided a strong justification for the proposed research intervention for fostering students' critical thinking skills through pedagogical transformation.

Gradual Shift from Rote Memorization to Critical Thinking

The findings reveal that students exposed to high order questions for fostering critical thinking skill show gradual move towards the development of critical thinking skills. For example, In the planning phase of the first intervention cycle, a passage on "Industrialization in the Muslim World" was selected as the stimulus material. This text provided a context for exploring industrial development in various Muslim-majority countries. Following the distribution of the passage, a set of open-ended questions was developed to prompt student reflection and critical analysis of the presented information. The questions include why we are studying industries of other countries. And how can knowing about other countries' industries help you in your daily life? These questions were designed to move beyond simple recall and encourage students to consider broader implications and applications of the concepts discussed in the text.

In response to the questions about the purpose and practical applications of studying other nations' industries, students' responses revealed varying levels of understanding. One student focused on memorization for exam success. She said that "we will memorize...excellent marks," (Student Response, March 2024), indicating a potential emphasis of learning on grades over conceptual understanding. Another student connected learning to future travel, stating they would know "why these countries are famous for, like Saudi Arabia is famous for its oil production" (Student Response, March 2024). The focus mentioned above also suggests a focus on factual recall. However, one student demonstrated a more developed perspective, linking industrial knowledge to potential future action. She explained that "When I would be in a prominent position...I can simply import the needed resource from there" (Student Response, March 2024), indicating an understanding of real-world relevance and application-level learning.

In response to a question about studying the industries of other nations, a different student response represents a significant shift towards the development of critical thinking. She explained that:

We can compare the industrial situation of Pakistan with other nations, and we can compare what are the things missing in our industries and how we can fill these gaps, as well as what techniques they use so they are rapidly growing their industries so we can also use those strategies to have developed industries" (Student Response March 2024).

By suggesting a comparison between Pakistan's industrial situation and that of other nations, the student demonstrates an ability to analyze and identify potential gaps and areas for improvement. Furthermore, the suggestion to learn from the successful strategies of other countries indicates students understanding of knowledge transfer and practical application that is critical thinking. The finding is that the above response moves beyond simple recall and memorization, demonstrating an ability to engage in higher-order thinking skills such as analysis, comparison, and evaluation (Anderson & Krathwohl, 2001). It also suggests an understanding of the dynamic nature of industrial development and the potential for learning from the best practices elsewhere. This response is a positive indicator of the potential of questioning techniques to promote critical thinking and problem-solving skills in students (Abrami et al., 2015). The research findings confirm the above findings that students exposed to structured questioning techniques make transitions from mere recall to higher-order critical thinking skills over time (Chin, 2007).

We provided a passage to introduce the concept of thriving tourism industries in Muslim world. This served as a comparative context for students to analyze the challenges and opportunities within Pakistan's own tourism sector. Following the reading of the passage, students were presented with a series of questions designed to promote their deeper reflection. These questions prompted them to consider the specific challenges facing Pakistan's tourism industry, evaluate the potential advantages and disadvantages of tourism development in general, and propose strategies

for achieving sustainable tourism that balances economic benefits with the preservation of both cultural heritage and the natural environment. This approach encouraged students to apply critical thinking skills by comparing different contexts, analyzing complex issues, and formulating potential solutions for tourism industries of Muslim world.

In another lesson, to stimulate critical thinking and analysis of the tourism sector, students were posed the following questions: What are the challenges faced by Pakistan's tourism industry? Does the tourism industry have disadvantages? How can a robust tourism industry be developed while simultaneously preserving culture and the environment? Can Chitral be considered a tourist spot, and if so, how can it be further developed? Finally, despite Chitral's natural beauty, why is there a lack of significant development in its tourism sector? These questions were designed to prompt students to consider various facets of tourism, from national-level challenges to local development and the crucial balance between economic growth and preservation. The above findings are congruent with the findings of King (1994) who identified questioning techniques gradually fostering students' analytical reasoning and deeper understanding beyond memorization.

The Development of Holistic/Multiple Perspective

The findings suggest that students' frequent and often exposure to questioning techniques contribute to the development of holistic and multiple perspectives. The students' responses offer critical perspectives on the challenges facing Pakistan's tourism industry, moving beyond simple identification of lacking infrastructure. For instance, one student's response about the challenges faced by Pakistan tourists' industry was:

Pakistan doesn't have any facilities for its tourists, such as roads, hospitals and hotels, Pakistan even cannot facilitate Pakistani tourists so how can they facilitate people from abroad. See what happened in Murree. People died of traffic jam. Another student said that it was not the fault of Government because it announced that the weather conditions were poor and people should stay homes, the first student said that just announcing it was not enough where were the police officers why didn't they stopped people from going there after announcement, probably government would have taken action if there was someone special or any closed one of them there but for general public no one takes action (Student response, March 2024).

The findings revealed that the student highlights a perceived deficiency in basic facilities like roads, hospitals, and hotels, suggesting a foundational weakness in the tourism infrastructure. More importantly, the student's commentary on the Murree incident reveals a deeper concern about governance and responsiveness. By questioning the government's actions (or lack thereof) despite weather warnings, the student demonstrates an ability to analyse a specific event/incident and connect it to broader systemic issues. The observation that "probably government would have taken action if there was someone special" reflects a critical awareness of potential disparities in how different segments of the population are treated. This suggests a developing understanding of accountability and the importance of effective governance in managing and supporting the tourism sector (Hall, 2010). The student's reflection on the Murree incident goes beyond simply stating a problem; it analyses the government's response and questions its efficacy and fairness, demonstrating a capacity for critical evaluation (Dwyer et al., 2009). Research findings suggest that students engaged in questioning techniques develop holistic thinking by integrating knowledge across disciplines and contexts (Lee & Tan, 2020). Such techniques encourage learners to explore multiple perspectives, fostering open-mindedness and adaptability in problem-solving (Chin, 2013). By prompting reflective inquiry, questioning enhances cognitive flexibility and nurtures a deeper understanding of complex issues (Lee & Tan, 2020).

Awareness of Complex Interconnections of Issues

Another finding reveals that frequent exposure to questioning technique enable students' ability to be aware of complex interconnections of issues. For example, another lesson was on disadvantages of tourism industry. The questions framed on tourism industry provided further effective as students responses to questions about disadvantages of tourists' industries reflective of deeper learning. The students could explain the complex interconnections of local/global issues.

The tourism industry suffers from several drawbacks as tourists don't care about the environment and they cause a lot of land pollution, and rapid use of transportation and vehicles contributes to noise and air pollution. Culture also gets disrupted because of them (Student response, March 2024).

This student's response effectively identifies several key disadvantages associated with the tourism industry, demonstrating an understanding of its potential negative impacts. The student correctly points out environmental concerns, specifically mentioning land pollution caused by tourists' disregard for the environment. This indicates an awareness of the ecological footprint of tourism (Honey, 2008). Furthermore, the student highlights the contribution of increased transportation and vehicle use to both noise and air pollution, showing an understanding of the relationship between tourism activities and environmental degradation (Gössling, 2002). The student also raises the important issue of cultural disruption, acknowledging that tourism can negatively impact local cultures (Cohen, 1988). This broader perspective suggests an understanding of the socio-cultural impacts of tourism, going beyond purely economic considerations. The response demonstrates a capacity for critical thinking by identifying and articulating multiple, interconnected negative consequences of tourism, encompassing both environmental and socio-cultural dimensions.

The Development of Action-Oriented Approach/Disposition

Another finding is that the nature of questions drives students' level and nature of critical thinking skills. For example, responding to action-oriented questions, students developed action-oriented thinking skills. Responding to "can we consider Chitral a tourist spot"? How can we make Chitral a good tourist spot? They considered Chitral a popular tourist destination:

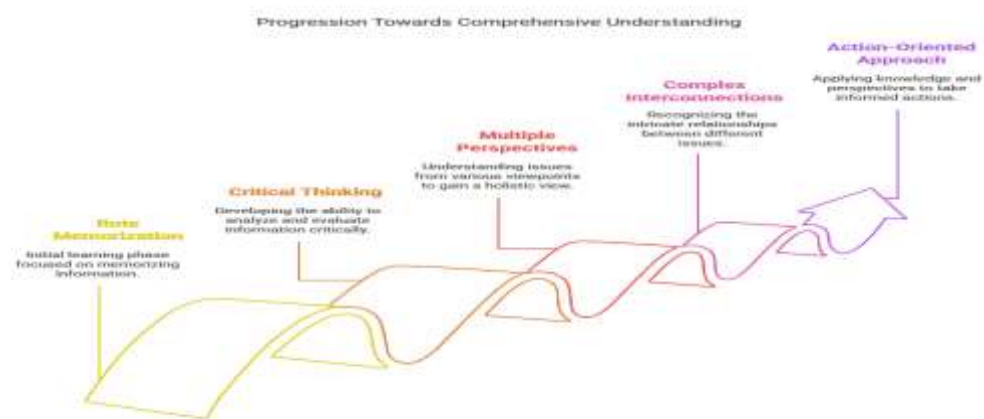
Because of its scenic beauty and lush surroundings, as well as being well known for the Kalash people and their distinctive culture. By putting in new infrastructure, such as hotels, and by sprucing up the area's roads and natural ecosystems, tourism in this area might be increased (Students response March 2024).

The students' recognition of Chitral as a potential tourist spot, based on its "scenic beauty and lush surroundings" and the "distinctive culture" of the Kalash people (Student Response, March 2024), demonstrates an understanding of the key attractions that can draw tourists. Their suggestion to improve infrastructure, such as "new hotels" and better "roads," reflects an awareness of the practical needs for tourism development. Furthermore, their inclusion of "sprucing up the area's...natural ecosystems" indicates an understanding of the importance of environmental preservation in attracting and sustaining tourism. This response suggests a holistic view of tourism development, encompassing not only infrastructure but also the preservation of the very assets that attract tourists in the first place. This aligns with principles of sustainable tourism, which emphasize balancing economic benefits with environmental and cultural integrity (Sharpley, 2009). The students' focus on both tangible infrastructure and intangible cultural and natural assets shows a developing understanding of the multifaceted nature of successful tourism destinations. According to a student Chitral can be a good tourist spot by. "We may advertise Chitral on social media by creating beautiful movies and images, we can also write about Chitral's

history on social media, and by emphasizing historical sites in Chitral." Another student compared this by saying that "producing and selling local foods like (Shoshp, ShpinkMuxi) etc. at a particular hotel may also be useful to attract guests, and it can also become a means of income for the hotel (Students response, March 2024).

These student suggestions demonstrate an understanding of effective tourism promotion and the importance of leveraging local resources. The first student's proposal to "advertise Chitral on social media by creating beautiful movies and images...write about Chitral's history...emphasizing historical sites" (Student Response, March 2024) reflects an awareness of modern marketing techniques and the power of digital platforms to reach a wide audience. Highlighting historical sites also aligns with heritage tourism, a growing segment of the industry (Timothy & Boyd, 2003). The second student's suggestion to "producing and selling local foods like (Shoshp, Shpink Muxi) at a particular hotel...may also be useful to attract guests, and it can also become a means of income for the hotel" (Student Response, March 2024) demonstrates an understanding of the potential for local gastronomy to enhance the tourist experience and contribute to local economies. This aligns with the concept of culinary tourism, which emphasizes the experience of local food and drink as a key component of travel (Hall et al., 2003). The above finding is congruent with the research findings indicating that the nature of questions significantly influences students' ability to generate action-oriented solutions by fostering problem-solving and decision-making skills and apply knowledge in real-world contexts (Tofade et al., 2013).

Figure 2: The Phases of Critical thinking Skills Development



The above diagram reflects the progression and phases of students' critical thinking skills development because of being exposed to questioning techniques intervention. The students' responses in initial phase reflected their recalling / memorization ability instead of critical thinking skills. In the next phase students somewhat showed the ability to see things from multiple perspective. In the third the level of students' critical thinking ability was somehow better as their responses showed understanding of complex nature of issues. In the fourth phase the participants demonstrated understanding of action-oriented thinking skills being exposed to critical questioning technique during action research interventions.

Conclusion

Critical thinking skills are considered one of the most important skills but despite its importance our education system has failed to develop students critical thinking skills with the urgency it

deserves. We discovered that traditional teaching methods used in the education system were not effective in fostering critical thinking skills among students. In response to this challenge, we employed questioning techniques to develop students critical thinking skills in three phases of interventions. The results of the study showed that the questioning strategy was effective in helping students develop deeper thinking processes and encouraging them to consider multiple perspectives, understand complex nature of interconnection, and action-oriented thinking skills. The findings suggest that nature, quality and level of questions have a relationship with nature, and level of learning. The incorporation of questioning strategies in the classroom can be an effective way to promote critical thinking skills and improve the overall learning experience of students. By asking critical questions from students and encouraging students to ask critical questions, teachers can equip students with the critical thinking skills emphasized as 21st century skills.

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