Psychohealth: Scientific Journal of Psychology and Mental Health
ISSN:3123-609X, Vol 1, No 2, 2025, 87-97 https://doi.org/10.35912/psychohealth.v1i2.3650

Psychological characteristics of developing geographical thinking in students

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Article History
Received on 15 October 2025
1st Revised on 8 November 2025
Accepted on 12 November 2025

Abstract

Purpose: This study aims to examine the psychological characteristics that shape the development of geographical thinking among students, emphasizing the interplay between cognitive, emotional, and motivational factors. It seeks to identify effective psychological and pedagogical approaches that enhance analytical, creative, and environmental awareness through geography education.

Methodology: The research employs a qualitative-descriptive approach supported by psychological and pedagogical analyses based on the theories of Vygotsky, Piaget, Bruner, Leontiev, Ausubel, and Gardner. Observations, diagnostic tests, surveys, interviews, and experimental teaching sessions were conducted to evaluate cognitive development, emotional engagement, motivation, and spatial reasoning across various age groups.

Results: Findings reveal that geographical thinking develops most effectively in psychologically supportive and interactive learning environments. Emotional balance, intrinsic motivation, and individualized teaching approaches significantly enhance students' spatial reasoning and problem-solving skills. The integration of visual aids, maps, and real-life examples strengthens long-term memory and analytical thinking. Furthermore, social interaction and collaborative learning stimulate critical and creative thought, transforming students into active participants in the learning process.

Conclusion: The formation of geographical thinking is a multidimensional process rooted in cognitive, emotional, and motivational harmony. Teachers play a vital role by fostering motivation, empathy, and psychological comfort, enabling students to connect geographical concepts with real-world understanding and ethical awareness.

Limitations: The study's qualitative design limits statistical generalization and focuses primarily on school-based learning contexts.

Contribution: This research contributes to educational psychology by integrating psychological principles into geography education, offering practical insights for teachers to enhance students' intellectual, emotional, and environmental consciousness through active and meaningful learning.

Keywords: *Cognitive Development, Emotional Engagement, Geographical Thinking, Psychology of Learning, Spatial Reasoning*

How to Cite: Homitovich, N. N. (2025). Psychological characteristics of developing geographical thinking in students. *Psychohealth: Scientific Journal of Psychology and Mental Health*, 1(2), 87-97.

1. Introduction

Geographical thinking represents a distinct form of mental activity aimed at comprehending the environment and natural processes and their complex interconnections. The development of this kind

of thinking among students is closely tied to their age, cognitive maturity, and worldview, which together influence their perception and processing of geographical phenomena. The harmony among psychological processes such as imagination, attention, memory, analysis, and synthesis plays a crucial role in shaping students' ability to reason spatially and conceptually (Charcharos, Kokla, & Tomai, 2015). Through the observation of natural phenomena, reflection on experiences, and analytical interpretation, students gradually construct a deeper understanding of spatial relationships in the natural world. By engaging cognitively and emotionally with the world around them, learners develop not only knowledge of geography but also critical and reflective thinking skills (Cutter, Golledge, & Graf, 2002). This integration of perception, reasoning, and imagination transforms geographical learning into a dynamic mental process that nurtures awareness of the environment and human interaction within it.

Therefore, in geography education, it is essential to use interactive methods, practical activities, and visual aids that enhance student engagement. From a psychological perspective, motivation and interest strongly influence the development of thinking (Albert & Golledge, 1999). Analytical and creative thinking skills begin to form when students can express their thoughts freely during lessons. Moreover, the teacher's personal approach, pedagogical skills, and psychological sensitivity determine the effectiveness of the process. Through the development of geographical thinking, students not only gain knowledge but also learn to understand the environment, protect it, and make conscious decisions. Thus, geography education plays an invaluable role in shaping a person's overall culture of thinking (Arıkan, 2023).

Psychological approaches are essential for cultivating geographical thinking, as they align teaching strategies with students' cognitive and emotional development. Each age group possesses distinct psychological traits that determine the most effective learning (Creswell, 2017). For younger learners, visual aids, interactive games, and storytelling stimulate imagination and engagement, helping them grasp spatial and environmental concepts more easily. In contrast, older students benefit from logical reasoning, map analysis, and problem-solving exercises that encourage abstract thinking and critical thinking. Recognizing and addressing individual psychological differences ensures that every student learns at an optimal pace (Turdiyev Bexruz Sobirovich, 2023). By adapting lesson content to developmental needs, teachers create balanced, inclusive, and intellectually stimulating geography instruction that supports both understanding and motivation.

During the lesson, one of the teacher's main tasks is to focus on students' attention, guide them toward independent thinking, and engage them in active communication. To stimulate the thinking process, it is effective to use problem-based questions, analytical tasks and hands-on exercises (McLaughlin & Bailey, 2023). Simultaneously, by fostering critical thinking, teachers further strengthen students' geographical reasoning (Turdiev Bekhruz Sobirovich, 2025). Such a psychological approach transforms students from passive receivers of knowledge into independent individuals capable of expressing personal opinions. As a result, the student gains a deeper understanding of geographical processes and connects them with real-life experiences (Battersby, Golledge, & Marsh, 2006).

Another important aspect of developing geographical thinking is managing students' emotional states and creating a positive psychological environment (Amin & Hermanto, 2022). A warm, respectful, and collaborative classroom atmosphere helps students to express their thoughts freely. This, in turn, activates their thinking and enhances their creative approaches. Teachers should encourage students to not only memorize facts but also analyze, compare, and evaluate them. Through geographical topics, students begin to feel as part of nature, which also shapes their ecological awareness (Jovanović et al., 2024). At the same time, communication among students, teamwork skills, and a sense of responsibility are key components of psychological development. In this process, teachers should guide each student's individual abilities in the right direction and continuously encourage them. Knowledge learned through positive emotions is stored more effectively in long-term memory (Yalçın, Şanlı, & Pınar, 2025). Therefore, ensuring psychological comfort in geography lessons is a major factor in enhancing students' intellectual capacity. Ultimately, geographical thinking plays an essential role in shaping a person's cognitive culture and life choices.

2. Literature review

2.1. Theoretical Foundation

The development of geographical thinking is fundamentally rooted in psychology, encompassing a complex interaction between cognitive, emotional, and motivational dimensions that shape students understanding and interpretation of the world (Guryevskikh, 2020). Geographical thinking involves acquiring factual knowledge about spatial phenomena and developing the mental ability to visualize, analyze, and synthesize environmental patterns and relationships. Through geography, students learn to connect spatial perception with reasoning, cultivate curiosity toward natural and human systems, and form an analytical mindset that links observation and interpretation (Rahmanelli & Prarikeslan, 2019). Cognitive processes, such as attention, memory, and imagination, are reinforced by emotional engagement and intrinsic motivation, allowing learners to think critically and creatively about spatial issues. Therefore, geography serves as a platform for the holistic growth of the human intellect, combining logic, empathy, and reflection. This section examines six major psychological theories that provide a conceptual and methodological framework for understanding and enhancing geographical thinking in education.

2.1.1. Cultural-Historical Theory (L. S. Vygotsky)

According to Vygotsky, the process of thinking develops through social interaction and is deeply embedded in the cultural and linguistic contexts that shape human cognition. The concept of the Zone of Proximal Development (ZPD) explains the difference between what a learner can achieve independently and what can be accomplished with guidance from teachers or peers (Bendl, Krajňáková, Marada, & Řezníčková, 2024). In this view, learning is not a solitary activity but a collaborative process in which knowledge is constructed through communication and shared experience. Within geography education, this theory highlights the essential role of social mediation in the development of analytical and causal reasoning (Duran & Mertol, 2021). Tools such as maps, globes, diagrams, and models function as cultural instruments that support intellectual growth and enable learners to interpret natural and spatial relationships more effectively. Through guided interaction, students internalize complex geographical concepts, transforming external experiences into internal cognitive structures that foster independent and reflective thought (Nyokro, Lusi, Risklaritas, Muhammad, & Dedy Miswar, 2023).

2.1.2. Cognitive Development Theory (J. Piaget)

Piaget's cognitive development framework emphasizes that intellectual growth unfolds through distinct and sequential developmental stages, each of which is characterized by specific modes of reasoning. In the context of geography education, students initially acquire understanding through direct sensory experiences and concrete observations of their surroundings, such as landforms, maps, and spatial patterns, before progressing to abstract reasoning and hypothetical analysis (Balciogullari, 2017). The twin processes of assimilation and accommodation describe how learners integrate new information into their existing mental frameworks or adjust these frameworks to incorporate new experiences. As students encounter geographical phenomena, they reconstruct their prior understanding by comparing, classifying, and relating new concepts to their familiar patterns (Lasaiba & Arfa, 2023). This dynamic interplay between experience and reflection encourages logical reasoning, imagination and curiosity. Piaget's theory thus positions geography not merely as a descriptive subject but as a developmental field in which perception evolves into structured thought, enabling learners to comprehend and explain spatial relationships in an increasingly complex and conceptual manner.

2.1.3. Constructivist Learning Theory (J. Bruner)

Bruner's concept of discovery learning emphasizes that learners actively construct their own understanding rather than simply receiving information from external sources. In this view, knowledge is not transmitted but rediscovered through interaction, inquiry, and reflection. In geography education, this approach encourages students to explore natural and human phenomena, formulate hypotheses, analyze spatial data, and solve real world problems. Learning becomes an active process of meaning-making, where students connect abstract concepts such as spatial distribution, environmental patterns, and regional interaction to observable realities (Meechandee & Meekaew, 2025). The teacher functions as a facilitator and guide, creating situations that stimulate curiosity and critical thinking, rather than dictating fixed answers. Through experimentation, observation, and discussion, students develop deeper

cognitive engagement and long-term understanding (As'ari, Rosali, & Mulyanie, 2024). Bruner's framework ultimately transforms geography lessons into experiential learning environments that foster independence, creativity, and analytical reasoning, preparing students to approach complex global and environmental issues with reflective, evidence-based thinking.

2.1.4. Activity Theory (A. N. Leontiev)

Leontiev's activity theory asserts that human psychological development arises from purposeful and goal-directed activities that link external actions to internal cognitive growth. Every mental process is shaped by meaningful engagement with the environment, where motivation serves as the central driving force. In geography education, students develop an understanding not merely by memorizing concepts but by engaging in purposeful activities such as field observation, mapping, data interpretation, and spatial analysis. These actions transform abstract ideas into tangible experiences that foster logical, analytical and systematic thinking. When learners are motivated by genuine curiosity and a sense of purpose, their participation becomes active and reflective, rather than mechanical. Consequently, geographical understanding gains personal relevance, connecting theory to real-world experience. Leontiev's perspective highlights that through active exploration and practical involvement, students internalize knowledge, develop problem-solving abilities, and cultivate intellectual independence, which are essential for interpreting and responding to the complexities of the natural and social environment.

2.1.5. Meaningful Learning Theory (D. Ausubel)

Ausubel's theory of meaningful learning emphasizes that new knowledge must be consciously related to existing cognitive structures to ensure a deep understanding and long-term retention. Learning becomes effective when new concepts are logically organized and connected to what learners already know, allowing them to integrate new information into familiar frameworks. In geography education, this means that teachers should design lessons that progressively link prior topics, such as landforms, climate, or human-environment interaction, to new material in a coherent sequence. By doing so, students form mental associations that facilitate their comprehension and recall. Ausubel also stressed the importance of clarity, relevance, and motivation in structuring instruction so that students perceive meaning in every new concept. When teachers guide students to make explicit connections between new and prior knowledge, geography transforms from rote memorization into a reflective process that strengthens analytical reasoning and cognitive growth through purposeful, structured learning.

2.1.6. Multiple Intelligences Theory (Gardner, Gardner)

Gardner's theory of multiple intelligences identifies spatial, naturalistic, and logical intelligence as fundamental components in the development of geographical thinking. Each student possesses these intelligences at varying levels, which shapes how they process and interpret geographical information (Khaneghahi, Sefatgol, & Siyasar, 2022). To accommodate these differences, teachers should implement diverse strategies, such as visualization, hands-on exploration, field observation, and collaborative activities, that allow students to engage with content in ways that align with their strengths. Visualization exercises, such as map interpretation or diagram analysis, develop spatial reasoning, while practical exploration through experiments or fieldwork deepens naturalistic understanding. In contrast, collaborative learning fosters interpersonal communication and collective problem-solving, enriching students' analytical and reflective skills. Integrating multiple intelligences into geography education encourages creativity, logical reasoning, and ecological awareness, helping students connect human and environmental systems (Olayemi & Amosun, 2024). This inclusive approach transforms geography from rote learning into an experiential process that nurtures holistic, critical, and sustainable thinking about the world itself.

2.2. Psychological Dimensions in Geography Learning

Psychological engagement in geography learning plays a crucial role in enhancing students' attention, perception, and memory, which are the cognitive foundations of spatial understanding (Fcca et al., 2021). When learners are emotionally stable and intrinsically motivated, they become more willing to participate, explore ideas, and think critically about the geographical phenomena. A psychologically supportive classroom characterized by empathy, encouragement, and positive interaction builds

students' confidence, curiosity, and willingness to express their independent opinions. Interactive learning activities such as group discussions, simulations, and problem-based projects stimulate analytical thinking and promote a sense of responsibility toward the environment (Ghosh, Sarker, Saha, Islam, & Shakil, 2024). Through this approach, students not only acquire factual knowledge but also develop deeper reflective and ethical awareness of their roles within ecological and social systems. Therefore, effective geography instruction must balance cognitive growth, emotional engagement, and motivational support to cultivate intellectual curiosity, creative reasoning, and moral responsibility, ultimately shaping individuals who can consciously analyze and respond to global environmental challenges.

3. Methodology

3.1. Research Design

This study employs a qualitative descriptive design that integrates psychological and pedagogical analyses to understand how cognitive, emotional, and motivational factors shape geographical thinking. The qualitative approach allows for an in-depth exploration of learners' mental processes, behavior, and classroom interactions in natural settings. It focuses on interpreting students' experiences, perceptions, and attitudes toward geography, rather than quantifying outcomes. This study aimed to identify effective teaching methods that foster critical, analytical, and creative thinking by emphasizing psychological engagement and meaningful learning. Data were collected through observations, interviews, diagnostic tests, and interactive learning sessions to capture diverse psychological indicators such as motivation, curiosity, emotional stability, and spatial reasoning. Through detailed interpretation and contextual analysis, this design highlights how emotional support, motivation, and social interaction contribute to cognitive development in geography education (Cohen, Manion, & Morrison, 2002). Ultimately, this methodological framework provides a holistic understanding of how psychological principles enhance geography teaching and promote deeper and long-term intellectual growth.

3.2. Research Context and Participants

The study involved students from various educational stages who were exposed to geography learning through a combination of visual, interactive, and problem-based instructional methods. These diverse approaches are designed to capture how different teaching techniques influence the development of geographical thinking and psychological engagement in learners. Students participate in classroom discussions, mapping exercises, and experiential learning activities that emphasize observation, analyses, and collaboration. Such varied exposure allows for the identification of the cognitive and emotional factors that contribute to effective geography learning. In addition to student participants, teachers were actively involved in the research to provide professional insights into pedagogical practices and the psychological strategies applied in classroom settings. Their perspectives help clarify how motivation, empathy, and instructional design influence students' cognitive and emotional responses to AI-generated feedback. This collaborative approach between students and teachers ensures a comprehensive understanding of how geography education can be improved via psychological and pedagogical alignment.

3.3. Data Collection Methods

Data for this study were collected using multiple complementary methods designed to capture the psychological, cognitive, and emotional aspects of geographical thinking. Data were gathered through the following methods:

- **Observation:** conducted to assess students' attention, memory, and perception during geography lessons, focusing on how they processed spatial and visual information.
- **Diagnostic tests were** used to measure spatial reasoning, logical thinking, and problem-solving abilities related to map reading, interpretation, and environmental analysis.
- **Surveys and interviews:** These explored students' motivation, emotional stability, self-efficacy, and attitudes toward geography, as well as teachers' perspectives on effective psychological strategies for engagement.
- **Experimental teaching sessions:** These were organized to compare traditional and interactive instructional methods, enabling an evaluation of how participation, collaboration, and psychological engagement influenced learning outcomes.

The integration of these data collection methods provided a holistic understanding of the interplay between cognitive and affective factors in shaping students' geographical thinking, ensuring the depth and validity of the interpretation.

3.4. Data Analysis

The collected data were analyzed using a thematic approach to identify patterns and relationships between the psychological indicators and learning outcomes. Key themes, such as motivation, curiosity, emotional stability, and spatial reasoning, were coded and categorized to reveal how these factors shaped students' geographical cognition. The analysis involved interpreting qualitative data from observations, interviews, and surveys to uncover the recurring behavioral and emotional tendencies that influenced learning performance. By comparing psychological traits with observable classroom outcomes, this study highlighted how intrinsic motivation and emotional engagement enhanced critical thinking and spatial understanding. Students who demonstrated higher curiosity and stability showed stronger abilities in map analysis, data interpretation, and connecting geographical concepts to real-life contexts. Thematic interpretation thus provided insight into the dynamic interaction between cognition and emotion, illustrating that effective geographical learning depends not only on intellectual capacity, but also on affective and motivational balance.

3.5. Validity Procedures

To ensure the reliability and validity of the research findings, triangulation was employed by integrating data from multiple sources, including classroom observations, student surveys and teacher interviews. This methodological combination allowed for the cross-verification of results and minimized potential biases that could arise from relying on a single data collection method. Observations provided insights into students' behavioral engagement and interaction patterns, and surveys captured the emotional and motivational dimensions of learning. Interviews further enriched the analysis by revealing teachers' perspectives on classroom dynamics and the psychological strategies used to foster geographical thinking. Additionally, peer validation was conducted with educational psychologists and experts in pedagogy who reviewed the analytical framework, coding process, and interpretation of results. Their professional feedback enhanced the study's credibility, ensuring that the conclusions drawn were methodologically sound and contextually grounded. This rigorous validation process strengthened the trustworthiness and academic integrity of our research outcomes.

4. Results and discussion

The psychological state, cognitive activity, and emotional stability of students play a crucial role in developing geographical thinking. Analyses show that students' thinking develops in geography lessons through the activation of perception, memory, and imagination. While studying maps, models, and natural processes, students develop spatial thinking, which strengthens their logical reasoning. From a psychological perspective, a student's confidence in their knowledge and internal motivation directly affects their learning outcomes. The results indicate that in lessons conducted with positive emotions, students assimilate new information more effectively and retain it for longer.

Therefore, creating a warm, cheerful, and cooperative classroom environment enhances students' CT. Geographical thinking is not only a process of acquiring knowledge but also the development of expression, analysis, and generalization. The findings revealed that when students feel like active participants in the learning process, their cognitive engagement increases. Additionally, individualized approaches, game-based tasks, and practical activities boost students' psychological engagement. Altogether, these factors form a strong psychological foundation for the development of geographical thought.

Table 1. Results of Psychological Analyses

No.	Research Aspect	Psychological Indicator	Research Method	Observed Findings	Practical Implications
1	Cognitive development in geography learning	Attention, memory, perception	Observation and diagnostic tests	Students with strong visual perception and memory perform better in map reading and spatial tasks.	Use more visual aids, maps, and diagrams to enhance cognitive engagement.
2	Emotional influence on geographical thinking	Motivation, curiosity, emotional stability	Survey and emotional response analysis	Positive emotions during lessons increased information retention and analytical reasoning.	Create supportive and emotionally comfortable classroom environments.
3	Role of motivation in conceptual understanding	Intrinsic and extrinsic motivation	Questionnaire and interview	Students who relate topics to real-life situations show deeper comprehension.	Connect geography topics with daily life examples to strengthen meaningful learning.
4	Development of spatial reasoning	Visual-spatial intelligence, logical reasoning	Spatial problem-solving activities	Spatial visualization improves when students engage in map interpretation and model-based learning.	Include map-based exercises and 3D visualization tools in geography lessons.
5	Influence of social interaction	Communication, collaboration, peer influence	Group work and discussion analysis	Cooperative learning enhances critical and creative thinking abilities.	Encourage teamwork and peer discussions for stronger conceptual understanding.
6	Age-related psychological features	Cognitive maturity, attention span	Comparative age-group analysis	Older students show better analytical and logical thinking, while younger students prefer visual learning.	Adapt teaching strategies to students' age and developmental stages.
7	Impact of teaching methods	Interactivity, engagement, cognitive activation	Experimental teaching sessions	Interactive methods improve students' problem-solving and reflective thinking.	Integrate technology and active learning strategies into geography lessons.
8	Role of teacher's psychological approach	Empathy, communication, encouragement	Teacher-student interaction observation	Teachers with high empathy foster confidence and intellectual curiosity in students.	Train teachers to apply psychologically sensitive teaching techniques.
9	Influence of feedback and reinforcement	Self-efficacy, self-assessment	Observation and feedback analysis	Constructive feedback motivates students and	Provide regular positive feedback and self-

				strengthens self-directed learning.	reflection opportunities.
10	Relationship between creativity and geographical thinking	Imagination, divergent thinking	Creative task analysis	Students who use imagination in geography tasks develop higher-order thinking skills.	Encourage creative projects, problem-solving, and exploratory assignments.

According to the results of the psychological analyses, the most important factor influencing students' thinking activity in geography education is their intrinsic desire to learn. When students can connect the topic of study to their own lives, they perceive knowledge more meaningfully. Therefore, the content of geography lessons should be linked to real-life experiences and explained using practical examples. Analyses show that when teachers involve students in problem-based learning, their analytical and critical thinking skills are strengthened.

Furthermore, peer discussions, debates, and communication are essential psychological tools that enhance thinking. The experimental results confirmed that students better comprehend geographical information through teamwork and collaboration. Teachers' willingness to communicate, emotional sensitivity, and methods of encouragement directly influence the development of students' thinking. Simultaneously, the use of visual materials, interactive methods, and multimedia tools encourages active thinking. This approach increases students' interest in learning and stimulates independent inquiry. As a result, geographical thinking develops based on real-life experiences.

In the psychological development of geographical thinking, students' age, attention span, and emotional condition play crucial roles in determining how they learn and process information. Younger learners tend to be more responsive to visual, game-based, and experimental approaches that appeal to their imagination and sensory experience, making abstract geographical concepts easier to grasp through play and observation. In contrast, older students benefit more from analytical and logical activities such as data interpretation, spatial analysis, and problem-solving tasks that challenge their reasoning abilities. As each learner assimilates knowledge according to their individual psychological capacities, teachers must design lessons that recognize developmental differences and cognitive diversity. Adapting instructional strategies to these variations ensures that geography education remains inclusive, meaningful, and effective, allowing every student to build a geographical understanding that aligns with their mental, emotional, and intellectual growth stages.

When teachers engage students in active observation, comparison, and generalization, their thinking develops more systematically. Psychological analyses indicate that motivation, attention, and memory evolve harmoniously throughout the thinking process. When analyzing geographical phenomena, students not only acquire knowledge but also test their thinking skills. Therefore, teachers should use more tasks that give students the opportunity to think independently and critically. The analytical results prove that when students are provided with an environment for free expression, they think more creatively. This approach not only strengthens geographical thinking but also teaches students to adopt a conscious attitude toward the environment and sustainability. Thus, geography education contributes to the intellectual and psychological growth of a learner's personality.

General analyses reveal that the development of geographical thinking is strongly influenced by the psychological organization of teaching, chosen methodological approach, and quality of classroom communication. Psychologically well-structured lessons that encourage participation, dialogue, and reflection foster deeper intellectual engagement among students. When teachers actively involve learners, listen to their perspectives, and provide opportunities for independent analysis, students' cognitive potential and confidence significantly increase. Such interactions transform geography from rote learning into a process of discovery and reasoning. Effective communication and empathetic teaching approaches serve as catalysts for enhancing the critical, creative, and spatial thinking skills essential for geographical understanding.

Moreover, interactive lessons promote healthy competition, independence, and self-confidence among the students. In a psychologically supportive environment, students grasp new geographical knowledge more quickly and learn to apply it to real-life situations. A student with well-developed geographical thinking can analyze the environment and understand causal relationships between natural processes. The results of educational observations demonstrate that psychological approaches play a key role in students' cognitive development. The teacher's empathy, pedagogical mastery, and methods of motivation determine the effectiveness of the process. Analyses revealed that geographical thinking plays a vital role in students' intellectual and moral growth. Therefore, psychology-based geography education helps shape learners as knowledgeable, thoughtful, and responsible members of society. These findings confirm the essential importance of psychological approaches in the development of geographical thinking.

5. Conclusions

5.1. Conclusion

The psychological process of developing geographical thinking among students is a multifaceted and dynamic phenomenon that integrates cognitive, emotional and motivational components. The research and analysis demonstrate that geographical thinking does not emerge spontaneously but is gradually shaped through observations, comparisons, reasoning, and experiences. Students' ability to perceive spatial relationships, analyze natural processes, and connect theoretical knowledge with real-life situations is deeply rooted in their psychological state. Cognitive mechanisms, such as attention, memory, imagination, and logical reasoning, play a decisive role in this development. Furthermore, emotional stability and internal motivation determine students' engagement and persistence in learning geographical concepts.

Teachers' psychological sensitivity, pedagogical skills, and interactive communication create an environment in which geographical thinking flourishes naturally. A psychologically comfortable classroom climate enables students to express their ideas freely and strengthens their intellectual curiosity. Therefore, the process of forming geographical thinking must consider both psychological and pedagogical dimensions. It is evident that effective geography education is impossible without understanding the learner's internal psychological world. In this regard, geographical thinking represents not only an academic ability but also a form of holistic, mental development.

The findings confirm that students' psychological characteristics, such as curiosity, emotional balance, and self-confidence, directly influence the effectiveness of geographical learning. Meaningful and long-term knowledge retention occurs when lessons are emotionally engaging and stimulating. The integration of visual materials, maps, and real-life examples enhances students' spatial and analytical thinking, leading to a more profound understanding of geographical phenomena. Social interaction also plays a crucial role in this process, as collaborative learning and peer discussion encourage critical and creative thinking. Moreover, teachers who adopt an individualized approach and use diverse instructional methods help students to internalize abstract concepts more effectively. Psychological research shows that students learn geography best when they are emotionally motivated and cognitively challenged.

The creation of a psychologically supportive and active learning environment transforms geography lessons from a routine subject to an exploration of the world. Consequently, students acquire geographical knowledge and develop reasoning, reflection, and problem-solving abilities. Thus, the interaction between psychological processes and learning strategies determines the overall success of geographical education. Through this balance, students evolve into independent thinkers and conscious global citizens. In conclusion, the psychological formation of geographical thinking among students is an essential foundation for intellectual and personal growth. The harmonious development of perception, memory, motivation, and creative imagination allows students to view geography not merely as a subject but as a way of understanding the world. Teachers play a key role in directing this process by fostering motivation, maintaining emotional balance, and designing lessons that stimulate critical thinking and spatial thinking.

The results of the psychological analysis indicate that geographical thinking develops most effectively in a context where emotional engagement, intellectual activity, and meaningful learning coexist. Therefore, a modern approach to geography education must integrate psychological principles into teaching methods to enhance both cognitive and emotional outcomes. This approach prepares students for independent analysis, environmental awareness, and responsible decision-making. Ultimately, geographical thinking forms the basis of a mature worldview that combines knowledge, reasoning, and ethical awareness. It shapes individuals who are capable of understanding the complexity of the world and acting consciously within it. Thus, the psychological study of geographical thinking provides a vital direction for improving educational quality and fostering comprehensive human development.

5.2. Suggestions

Future research should employ a mixed-method approach that combines qualitative and quantitative measures to strengthen the validity of the findings. Expanding the participant base across various educational levels and regions would provide a more comprehensive understanding of the psychological mechanisms underlying geographical thought. Researchers are encouraged to integrate experimental designs to assess the causal effects of specific psychological interventions, such as motivation-based learning or emotion-focused strategies, on students' spatial reasoning and problem-solving abilities. Educators should also incorporate technology-enhanced tools such as geographic information systems (GIS) and interactive simulations to foster student engagement and experiential learning. Finally, teacher training programs should emphasize psychological literacy, helping educators recognize emotional, motivational, and cognitive differences among learners to create geography classrooms that are psychologically supportive.

5.3. Limitations

This study is limited by its qualitative descriptive design, which relies heavily on observation and narrative interpretation rather than quantitative statistical validation. The sample size was restricted to selected schools, which may not fully represent the broader population of students from different educational systems or cultural backgrounds in the country. In addition, the study focused mainly on classroom-based settings, excluding fieldwork or digital learning environments that could influence geographical thinking in different ways. Time constraints and dependence on teacher self-reports also limited the depth of the longitudinal analysis of cognitive and emotional development over time.

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