2025 Volume 3, Issue 9
Educational Innovation Research
ISSN: 3029-1844(Print)
ISSN: 3029-1852(Online)

Research on the Geographical Teaching Value and Application of Reasoning Language Games

Weiguo Pan*
Guangzhou SCA School, Guangzhou 510500, Guangdong, China

**Author to whom correspondence should be addressed.*

Abstract

Reasoning language games, as a low-cost, highly interactive, thought-provoking form of language games, are highly compatible with geography teaching that emphasizes comprehensive thinking and inquiry ability. It has the unique teaching value of cultivating geographical core literacy through immersive games, stimulating deep learning motivation through fun, and exercising higher-order thinking ability through logical reasoning. Construct the reasoning language game application geography teaching model in accordance with the four fundamental principles of geographical scientificity, logical consistency, thought-provoking and situational story-telling. Taking the lesson "The History of the Earth" as an example, a teaching case based on the game "Who is the Spy" was designed. Practice shows that this model can provide a dynamic and effective new idea for the reform of geography classroom teaching.

Keywords

Reasoning game; Gamified learning; Teaching models; The History of the Earth

Online publication: October 26, 2025

1. Introduction

With the rapid development of information technology and the transformation of educational paradigms triggered by artificial intelligence, diverse ways of learning have begun to emerge. Moocs, micro-lessons, flipped classrooms and AI-assisted learning, educational game-assisted learning are all responding to the question[1] of "how to promote effective learning". The role of gamification in the teaching process has long been widely concerned[2] in the education sector. Gamified learning emphasizes the use of game design elements in non-game contexts to carry out learning practices, highlighting the integration of game features into learning rather than mere entertainment[3]. In the trend of gamified learning, various types of game application teaching are emerging one after another[4], among which reasoning language games show great application potential and educational value with their immersion, interest and logic. Reasoning language games are a type of language game that centers on the process[5] of reasoning, uses text description or language dialogue as the main carrier, and requires participants to gradually solve puzzles and reveal the truth

through logical analysis, information integration, critical thinking and reasonable assumptions. It weakens the reliance on hardware equipment and focuses on the game of thought processes and the contest of linguistic wisdom. Its low cost makes it easy to deploy and implement in a regular classroom setting; The highly interactive nature prompts students to engage deeply with problem situations and their own cognitive structures; Strong thinking orientation directly points to the cultivation of higher-order thinking abilities such as comparison, reasoning, judgment, and critical thinking. Geography, as a comprehensive science[6] that studies the geographical environment and the relationship between human activities and the geographical environment, aims far more than memorizing geographical facts. It aims to cultivate students to form a geographical perspective, master geographical thinking, possess geographical practical ability and comprehensive quality. This means that students need to learn to think[7] like geographers and to study[8] in a questioning or inquiry-based way. This demand is highly consistent with the inherent nature of reasoning language games, the process of constructing logical chains from clues required by reasoning games is similar to the scientific thinking of exploring causes and laws from geographical facts and data in geography learning. Based on the above understanding, this paper focuses on analyzing the application value of reasoning language games in geography teaching and constructing application models. Taking "The History of the Earth" as an example for design and practice, it provides a new idea that is operational and effective for the reform of geography classroom teaching under the orientation of core literacy.

2. The value of reasoning language games in geography teaching

Common reasoning language games include "Werewolf", "Murder Mystery", "Turtle soup", "Who is the Spy", etc. Reasoning language games represented by them demonstrate the following three unique geographical teaching values.

2.1. Develop core geographical literacy through immersive games

From the perspective of situational cognition theory, the acquisition of knowledge and the formation of literacy depend on the context[9] in which they are situated. Reasoning language games build virtual cognitive contexts through narrative frameworks and problem-driven approaches. In this context, students play specific game characters themselves, such as werewolf, villager, witch, and other identities in "Werewolf"; Undercover player identities in "Who's the Spy?" and so on. To complete the reasoning task, one must actively invoke the concept of comprehensive geographical knowledge, a process that goes beyond the memory of individual knowledge and promotes procedural knowledge construction. Students in the game not only know what the knowledge is, but also know when and how to use it in combination with role positioning. Integrated thinking and geographical practical literacy is essentially the ability[10,11] to flexibly apply knowledge to solve problems in specific situations, and the immersive context provided by reasoning games enables abstract disciplinary literacy to be experienced, understood, and internalized in the embodied cognitive process of solving game puzzles.

2.2. Use fun to stimulate learning motivation and classroom vitality

Motivation is the engine of cognitive activity. According to self-determination theory, persistent and efficient learning motivation stems from an intrinsic need[12] for a sense of autonomy, competence, and belonging. The underlying mechanism of the fun of reasoning language games lies in their ability to effectively satisfy these three fundamental psychological needs. The sense of autonomy is reflected in students' control over the reasoning of the game solution process, the choice of game strategies, and team discussions; The sense of competence is strengthened every time a level task is successfully cracked and logically consistent conclusions are reached; A sense of belonging is gained through game cooperation and collective exploration of ideas.

Compared with external stimuli such as scores and material rewards, the intrinsic motivation stimulated by games is more likely to lead students to view learning activities as an intellectual enjoyment and satisfaction, thereby triggering deeper information processing. The classroom thus shifts from a static model of knowledge transmission to a dynamic construction process of

problem-solving, fully stimulating classroom vitality and promoting deep learning.

2.3. Develop higher-order thinking skills through logical reasoning

Geography learning helps students reveal the spatial patterns, spatio-temporal relationships and causal laws of Earth's geographical features, which are essentially logical and inferable. Reasoning games require students to go through a complete cycle of scientific inquiry, from the identification and screening of geographic information to the establishment of spatial, temporal and causal connections to form hypotheses, and then to the use of new evidence to test and revise existing hypotheses. This process compulsorily pushes students' thinking from simple memorization and comprehension to complex analysis, synthesis and evaluation. The game process trains not the reproduction of knowledge, but critical thinking and geographical logic. In this repetitive mental practice, students gradually learn how to make reasonable inferences in uncertainty, how to evaluate the reliability of evidence and the rationality of results, thereby forming correct geographical concepts and a transferable, rigorous scientific critical thinking and innovative thinking and other higher-order cognitive abilities[13].

3. The application model of reasoning language games in geography teaching

3.1. Basic principles of game design

To ensure that reasoning language games can not only stimulate students' interest but also achieve the goals of geographical learning, their design must follow four fundamental principles: geographical scientificity, logical consistency, thought-provoking and situational story-telling. First, geographical scientificity is the foundation of game design. The information, clues, puzzles and final conclusions in the game must be based on accurate geographical facts, principles and laws. Any design that sacrifices science for the sake of playability will lead students to misunderstand geographical concepts. Second, the core of the reasoning process lies in the rigor and completeness of the logical chain. The rules set within the game, the clues provided, and the connections between the clues and the conclusions must form a closed and self-consistent logical system. The clues should be mutually corroborating, complementing, or forming contradictions to trigger deep thinking and avoid unexplicable game bugs or logical breaks. Third, the goal of the game should not be merely to find the sole answer, but to initiate the student's thinking process. Game design should have a moderate degree of openness and hierarchy. For example, distracting information can be set in the game to exercise students' ability to distinguish information; Or design multi-possibility scenarios that encourage students to support their reasoning with evidence, thereby developing the breadth and depth of their geographical thinking.

Fourth, knowledge is more meaningful and sticky in context. Embedding geographical knowledge within a narrative framework can effectively stimulate students' intrinsic motivation and immersion. The story-telling enhances the fun of the game and simulates the application scenarios of geographical knowledge, transforming learning from mechanical memorization to problem-solving exploration and facilitating the contextualized transfer of knowledge.

3.2. Construction of models for applying reasoning language games to geography teaching

The model of applying reasoning language games to geography teaching is driven by questions, carried by games, followed by reasoning, and unfolds under the game learning objectives composed of the dimensions of knowledge, thinking, and literacy.

Under the guidance of the objectives, teachers can create geographical puzzle scenarios using media including story texts, videos, audio, picture combinations, etc. For example, a detective case problem: "A strange event occurred at a hotel on the edge of the desert. Figure out who is lying based on the room distribution map, guest statements, and local climate map." The purpose of this session is to stimulate students' curiosity and immersion, and to clarify the game tasks.

After the task is defined, the teacher takes the lead in formulating the rules and guides the students to start their independent exploration. The rules should include ways to obtain game clues, discussion rules, and presentation of reasoning results, etc. Then provide the clues needed for the game, which should be diverse, such as regional maps,

statistical charts, remote sensing images, text materials, physical photos, geographical models, etc. The design of the clues should contain contradictions or information that needs to be integrated to be discovered.

Playing the game leads to reasoning, which is the core part of this mode. Each group or individual, under the guidance of the teacher, presents preliminary assumptions or conclusions about the core questions of this round based on the initial exploration. Each group presents its reasoning process and evidence, while the other raises questions, supplements, or presents counter-evidence. Teachers act as facilitators, moving between groups or presiding over class discussions, training students' logical reasoning skills and critical thinking through verbal confrontation. If the game problem is not solved or the goal is not achieved after the game, go back to the second round to raise a new question and start a new game. If the game is resolved in this round, proceed to the fourth round. Teachers reveal the mystery and sort out the geographical logic chain from clue to conclusion, and step out of the game plot to guide students to summarize the core geographical concepts, principles and laws contained in the game, elevating the game experience to structured knowledge.

4. Design of geographical teaching applications for reasoning language games

4.1. Game learning objectives

The geography curriculum standard for the section "The History of the Earth" is to briefly describe the evolution of the Earth using materials such as geological chronologies. Based on the curriculum standards and the basic principles of reasoning game design, the game learning objectives are set as follows:

Knowledge dimension: Accurately memorize the names and sequences of important eras in the geological chronology; Understand and match representative animal and plant types and their typical characteristics for each geological era; Get a preliminary understanding of the synergy between the Earth's environment and biological evolution.

Thinking dimension: Based on the given clues such as fossils, rocks, strata, etc., use the geological chronology representation for induction and deduction to reasonably infer the geological age corresponding to the strata or fossils; Associate and sequence biological events and environmental changes from different periods on the geological timescale to establish a macroscopic framework of spatio-temporal evolution; Be able to present evidence for inferring one's own age in a debate, and be able to evaluate the reasoning process and validity of evidence of others.

Literacy dimension: Recognizing that a stratum or a particular region is a "space-time slice" in the long evolutionary history of the Earth and understanding its position and significance in the Earth's history; Form a holistic and dynamic understanding of the Earth's evolution process by integrating biological, environmental and other elements; Establish the concept of respecting the laws of natural evolution and cherishing the current ecological environment.

4.2. Present the situation and pose the question

Tell the story: The origin and evolution of life is a major subject that scientists around the world have been exploring. Many science fiction films or novels imagine that we could travel through time in a time machine, but a time machine doesn't exist. While Chinese academician Zhu Min and his team have been exploring a mysterious ancient fish kingdom for more than 40 years using "fossils" as time machines. Question: Why can fossils become time machines to help us encounter the ancient fish kingdom of the past?

4.3. Make rules and explore on your own

This class unfolds in the form of a reasoning language game called "Who Is the Spy?" Before the game, the teacher must first help students understand the basic concepts of fossils and strata and complete the logical framework of knowledge. After completing the inquiry of knowledge learning, the following rules are introduced: The game requires 5 to 9 participants, divided into the majority of students with the "normal card" and 1 to 2 students with the "undercover card". The teacher prepares in advance a set of words belonging to different geological eras but similar categories as word cards.

The regular player has to find the undercover agent and vote to eliminate him, while the undercover agent

has to hide his identity until the end. The game process is a loop: first the teacher hands out word cards privately, then all players take turns to describe the geographical or biological feature of the word they hold in one sentence, and then vote to eliminate the player with the highest number of votes and show the word card. If the eliminated player is an undercover agent, the ordinary player wins and the game ends; If the eliminated player is an ordinary player, the game goes to the next round of description and voting, and so on, until the undercover player is eliminated, or the undercover player persists until there are only three people left without being eliminated, then the undercover player wins.

4.4. Start the game and lead the reasoning

After clarifying the rules, eight students were invited to the stage to sit in a semi-circle and play the game according to the rules. The rest of the students watched the game and served as voting seats, and cards were distributed.

Normal Card: Your identity is a trilobite from the Cambrian period of the Early Paleozoic

Task Requirements: You were most active in the Early Paleozoic era, so every next round of your speech should conform to the evolutionary characteristics of the Early Paleozoic era. Here are some hints, and you can also add descriptions based on what you have learned.

Tip 1: The sudden emergence of a large number of multicellular organisms during the Cambrian period, this explosive biological evolution event is known as the "Cambrian Explosion of Life". Marine invertebrates with shells and bones were flourishing, among which trilobites, arthropods, were the most prosperous, and thus it was also called the Trilobite Age.

Hint 2: The Ordovician trilobites were still the most abundant; At this time, the number and variety of other invertebrates exceeded those of the Cambrian period; Corals, brachiopods, gastropods, etc. were common. The Earth's land has not changed much because of the continuous photosynthesis of aquatic plants; The oxygen content in the air has increased further, and vast seas breed a large number of invertebrates of various species.

Note 3: The Silurian was the third period of the Paleozoic era. Marine invertebrates still held an important position during the Silurian. Fish began to conquer the waters, creating conditions for the great development of fish in the Devonian. The first appearance of the gymnoferns among terrestrial plants, plants finally began to develop from water to land, which was another major event in biological evolution.

Undercover Card: Your identity is Dunkleosteus from the Late Paleozoic Devonian

Task Requirements: You were most active in the Late Paleozoic era, so every next round of your speech must conform to the evolutionary characteristics of the Late Paleozoic.

Here are some hints that you can also add to your description based on what you have learned, and you also need to confirm what the ordinary card is based on the contestant's description to ensure that you are not eliminated as an undercover agent.

Tip 1: The Devonian period saw the flourishing of gymnosperms, the appearance of primitive ammonites, insects, primitive amphibians, ferns, and primitive gymnosperms. Vertebrates entered a period of rapid development, with an increasing number and variety of fish-like animals, and modern fish - bony fish - began to develop. The Devonian period is often referred to as the "Age of fish".

Hint 2: During the Carboniferous period, the climate was humid, and a new and peculiar forest (the earliest forest on land) emerged, composed of woodthieves, thick layers of ferns, and tall and slender trees. All kinds of shapes and sizes of amphibians flourished in the moist environment, as did the huge insects.

Hint 3: The crustal movement was more active during the Permian period, and the relative movement between the ancient plates intensified, gradually forming folded mountain ranges, and the ancient plates gradually joined together to form a united ancient continent (pan-continent). The important representatives of vertebrates were amphibians and reptiles, and trilobites were on the verge of extinction; Insects began to develop rapidly and multiply in species, so the Permian period is also called the "Insect age".

4.5. Solve problems, summarize and elevate

After voting is over and the conditions for ending the game are met, the teacher first reveals the identity of the "undercover" - a Late Paleozoic Devonian Dungenfish,

and invites both the regular player and the undercover player to explain the geological age basis behind their descriptive words. Then the teacher led the students to review together. Reviewing the initial question: Fossils are "time machines" because they are buried in strata of different ages, forming the chronicle of life on Earth, and by studying them we can decipher the environmental code of the past.

5. Practice reflection and summary

This paper systematically expounds the value of reasoning language games in geography teaching and constructs teaching application models. At the theoretical level, this study combines gamified learning theory with the characteristics of the geography discipline to demonstrate the unique advantages of reasoning language games in creating immersive cognitive situations, stimulating intrinsic learning motivation, and refining higher-order geographical thinking, providing strong theoretical support for the reform of geography teaching under the core literacy orientation. In practice, the teaching design based on the example of "The History of the Earth" shows that the model is highly operational and effective. Through the game form of "Who is the Spy?", the knowledge of geological age and biological evolution was transformed into reasoning tasks, successfully creating an active and profound classroom atmosphere.

However, there is still room for further development in this study. The current reasoning process, which mainly relies on the interaction between text and spoken language, still has limitations. Looking ahead, it is possible to explore the integration of augmented reality and virtual reality technologies, as well as generative artificial intelligence technologies, into the reasoning process. For example, using AR technology to have students dig up virtual fossils and observe their forms, or using VR and AI to build immersive ancient environments that allow students to observe and reason as if they were in various geological eras, deeply integrating logical reasoning with concrete spatial perception.

Disclosure statement

The author declares no conflict of interest.

References

[1] Shang JJ, Pei LC, 2015, Reinventing the way of learning: The Core Educational Value and application Prospect of games. *China Educational Technology*, (05): 41-49.

[2] Bao XY, Zhao YX, 2015, Research Progress and Prospects of Gamified Learning. *Audio-visual Education Research*, 36(08): 45-52.

[3] Deterding S, Dixon D, Khaled R, et al., 2011, From Game Design Elements to Gamefulness: Defining Gamification. In *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, 9-15.

[4] Fan MR, 2018, A Visual Analysis of the Current State of Educational Game Research in China: Hotspots and Trends. *Modern Distance Education*, (02): 27-34.

[5] Han DH, Wang P, 2012, The Theory of Meaning in Reasoning Games: A Seras-centered Exploration. *Journal of Renmin University of China*, 26(01): 54-60.

[6] Anonymous, 2020, *General Senior High School Geography Curriculum Standards (2017 edition, 2020 revision)*. People's Education Press.

[7] Zhang H, Yang JH, 2025, Geography Practice: A New Dimension in the Transformation of Learning Methods. *Teaching of Primary and secondary school textbooks*, (05): 39-44.

[8] Commission on Geographical Education of the International Geographical Union, 1993, International Charter on

Geography Education. *Acta Geographica Sinica*, (4): 292.

[9] Jiang Q, 2019, Geography Teaching Context Design Based on Context Cognition Theory. *Geography Teaching*, (03): 33-36.

[10] Dong QS, Zhang JG, 2017, Geography Practice: An Interpretation of Geography Embodied Education. *Geography Teaching*, (23): 15-18+43.

[11] Wang WJ, Zhou WG, Zhang Q, 2017, The Connotation and Characteristics of "Comprehensive Thinking" in Geography. *Geography Teaching*, (12): 14-16.

[12] Liu LH, Zhang JJ, 2010, Self-decision Theory of Motivation and its Applications. *Journal of South China Normal University (Social Sciences Edition)*, (04): 53-59.

[13] Dong RJ, 2021, Geographical Problem Design for the Development of Higher-order Thinking. *Basic Education Curriculum*, (14): 67-73.