



Spatial competencies and geography textbooks at upper primary level of Maharashtra state board

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Abstract

The higher spatial competencies enhance students' abilities to think abstractly and as a result, the achievement of students in the subject like Geography, Geometry is higher. It is necessary to study spatial abilities, their nature, and their achievement in the relevant grade of school Geography.

Students should be able to conceptualize space, understand its representation and develop spatial reasoning abilities. Consequently, developing the necessary spatial abilities and skills in students is important from the point of view of educational progress.

The purpose of this article is to conduct a general analysis of the textbooks 5th, 6th, 7th and 8th. Standard designed and developed by Balbharti for State Board of Education of Government of Maharashtra from the point of view of spatial competencies.

Keywords: competencies, upper primary level, geography

Introduction

Spatial perception and intelligence have been actively studied over the past decade. It is mainly related to Geo-Spatial technology and navigation technology. The aim is to solve the daily problems of human life by using Geospatial technology. Currently, Geospatial technology is being used extensively. Before researchers focused on Geospatial technology, psychologists and practitioners attempted to measure spatial intelligence, its recognition, and spatial ability. Spatial perception (spatial visualization) is considered as a narrow concept whereas a detailed study of the elements of spatial ability, spatial reasoning, spatial cognition, spatial concept, spatial intelligence and environmental cognition etc. is a broad concept of spatial studies.

The purpose to introduce vital Geographical concepts and skills, local environment, and skills at school level is that it can be used in daily life. What learning outcomes are expected to be achieved by students in the respective grade even if the ability is not specified in terms of ability which the child must achieve in the respective grade. It seems necessary to study spatial abilities, their nature and their achievement in the relevant class of school Geography subject.. The aim of this article is to analyze the spatial concepts in the syllabus of the recognized textbooks of Government of Maharashtra.

Nature of school achievement and cognitive development

Many sub-components of intelligence have been studied from various sources of intelligence. By proposing a single component theory of intelligence, Bee asserted that 'if a person excels in one area, he can excel in other areas as well.' Spearman, a psychologist, proposed that there are general abilities (G) and specific abilities (S) of intelligence through the two-factor theory of intelligence. According to him, general abilities are innate in a person while specific abilities can be developed through training, educational environment and cultured environment. Gilford, a psychologist, has studied various aspects of intelligence by proposing a three-dimensional theory of intelligence. Thorndike and Thurston have proposed a multifactorial theory of intelligence. Through this theory, Thorndike and Thurston asserted that spatial intelligence is also an important component of intelligence.

Spatial concept is the ability to create an imaginary view of an object, component, study various components, aspects of that object abstractly. Just like before erecting a strong and beautiful building, a skilled engineer or architect abstractly draws a picture on a mental, imaginative level and puts it on paper and then constructs the actual building. Spatial reference helps us understand what an abstract, three-dimensional object, its invisible part, will look like. Spatial concepts have to be developed to understand abstract concepts in various subjects. The clearer the spatial references, the more students' ability to think abstractly and consequently the higher the students' achievement in that subject.

Spatial concepts are an integral part of all disciplines. Just as spatial concepts are directly and indirectly used in everyday life. As such, spatial concepts from an educational perspective have not been formally considered at the level of study, teaching, acquisition and evaluation. The educational achievement of the student becomes very important when the current state of education and the challenges facing education are considered comprehensively. Student achievement in various subjects depends on the student's intelligence and how well each component of the academic field functions.

Students should be able to conceptualize space/space, understand its representation and develop spatial reasoning abilities. Consequently, developing the necessary spatial abilities and skills in students is important from the point of view of educational acquisition. Subjects under Geography include map reading skills, population distribution, distance estimation, comparison of routes, pattern recognition, topography, knowledge of directions, measuring distance, slope and density, pattern analysis of maps, mental visualization of 3D images based on 2D information, direction orientation (eg Back-forward, left-right, up-down, front-back, horizontal-parallel-standing) are taught. The content analysis based on this element is done as follows.

Upper primary level onwards, we become more clear, deep and comprehensively familiar with the objectives, content and pedagogic structure of Geography. Definitions and concepts in Geography become more complex. According to increasing age, according to intellectual-linguistic-social-physical etc. development, it is expected to proceed in such a sequential manner in the education program. Its reflection has to be reflected through the textbook in the order of the grades. In this regard, understanding, analysis of Geography textbooks at the upper primary level can be necessary and useful. The following analysis is done keeping this general purpose in mind.

Analysis of Class V Geography Textbook

Considering the study of Geography as a part of environmental and social sciences, this textbook ' Parisar Abhyas Bhag-' has been prepared. In the present study, without considering the structure, content, pictures, graphs of the book, it is analyzed in accordance with the spatial concepts and the following table no. 1.1 is presented in

Table 1: Summary of Class V Environmental Studies Part 1 Concepts, Spatial Perception Components and Learning Outcomes

Sr. No.	Title of lesson	Key concepts	Spatial Perception Factors	Learning Outcomes
1.	Getting to Know India	India-Natural, Major Rivers, India-Geography.	Interrelationships and Consciousness in Spatial Elements (Spatial Relation & Awareness)	Identifies the location of symbols, directions, various objects/landmarks in an area/visited places on a map and directions with respect to a location.
2.	Motions of the earth	Earth's rotation, rotation of the earth, sunrise and sunset, year, lunar phases,	Embodied thinking and consistency (Form Perception & Constancy)	Reads maps with landmarks and symbols on the map.
3.	Getting to Know India	India-Natural, Major Rivers, India-Geography.	Figure and Background Comprehension (Figure ground perception)	Describes the natural structure from the map.
4.	Getting to Know India	India-Natural, Major Rivers, India-Geography.	Figure and Background Comprehension (Figure ground perception)	Geographical, social and cultural characteristics of India are mentioned keeping in mind the Geographical boundaries of India.
5.	Messaging and Media	Good effects of media, Harmful effects of media	Interrelationships and Consciousness in Spatial Elements (Spatial Relation & Awareness)	The overuse of transportation and communication has effects on living beings and the environment.

Table no. From 1.1, it can be seen that the sub-components of spatial abilities such as interrelationships and awareness, figure and background comprehension and concrete thinking and continuity of spatial components in spatial discourse are included in the textbook, but the level of learning outcomes' telling, recognizing, describing, explaining', etc. are related to knowledge and understanding in Bloom's Taxonomy.

Analysis of Class VI Geography Textbook

A separate textbook of Geography has been prepared from the sixth standard even considering a part of social sciences in this sense. By analyzing according to the spatial concepts in these textbooks, it is shown in the following table no. 1.2 is presented in

Table 2: Summary of Class VI Geography Concepts, Spatial Perception Components and Learning Outcomes

Sr. No.	Title of lesson	Key concepts	Spatial Perception Factors	Learning Outcomes
1.	Earth and Altitudes	angular distance, axes, sketches, news network	Knowledge of spatial element position (Position in space)	One imagines the fractional arc occurring in three dimensions.
2.	Temperature	Shape of the earth and distribution of solar rays, temperature cycle, world-ocean currents, isothermal line.	Interrelationships and Consciousness in Spatial Elements (Spatial Relation & Awareness)	Thinks behind the curvature of contour lines in a map.
3.	Temperature	Shape of the earth and distribution of solar rays, temperature cycle, world-ocean currents, isothermal line.	Figure and Background Comprehension (Figure ground perception _	The World Temperature section explains temperature charts.
4.	Importance of Oceans	Ocean Area, Ocean Climate, Ocean and Resources, Ocean and Transport, Ocean Problems.	Figure and Background Comprehension (Fig ground perception _	Shows oceans on globes and maps.
5.	Rocks and types of rocks	Types of rocks, igneous rocks, metamorphic rocks, sedimentary rocks, fossils.	Embodied thinking and persistence (Form Perception & Constancy)	Explain the rock types of Maharashtra using the map.
6.	Power tools	Material based energy devices, Process based energy devices.	Figure and Background Comprehension (Figure ground perception _	The map shows the distribution of important minerals like coal and mineral oil.
7.	Human business	Primary Occupation, Secondary Occupation, Tertiary Occupation, Quaternary Occupation	Interrelationships and Consciousness in Spatial Elements (Spatial Relation & (Awareness)	Explains the relationship between various professions.
8.	Human business	Primary Occupation, Secondary Occupation, Tertiary Occupation, Quaternary Occupation	Tangible thinking and continuity (Form Perception & Constancy)	Business information is verified through field visits.

Table no. 1. 2 From the above, it can be seen that the sub-components of spatial abilities such as knowledge of spatial element position, interrelationship and awareness of spatial elements, figure and background comprehension and concrete thinking and continuity are included in the textbook. The level of learning outcomes is elevated to the application level with knowledge-learning objectives.

Analysis of Class VII Geography Textbook

There are a total of nine units in the class VII textbook representing various branches of Geography. By analyzing according to the spatial concepts in these textbooks, it is the following table no. 1.5 is presented.

Table 3: Summary of Class VII Geography Concepts, Spatial Perception Components and Learning Outcomes

Sr. No.	Title of lesson	Key concepts	Spatial Perception Factors	Learning Outcomes
1.	Sun, Moon and Earth	Motion of the Moon, eclipses, solar eclipses, lunar eclipses, eclipses - a celestial event	Knowledge of spatial component position (Position in space)	Earth's tilted axis, rotation and rotation explain the creation of day and night, seasons.
2.	Sun, Moon and Earth	Motion of the Moon, eclipses, solar eclipses, lunar eclipses, eclipses - a celestial event	Interrelationship and awareness of spatial elements (Spatial Relation & (Awareness)	Recognizes that eclipses on Earth are geological phenomena.
3.	Soil	Elements required for soil formation, soil formation period, soil erosion and degradation, soil conservation	Consistency and Consistency (Form Perception & Constancy) _	The map shows the soil types of Maharashtra.
4.	Air pressure	Altitude and air pressure of the region, air temperature and air pressure, pressure bands on the surface of the earth	perception related to abstract elements (Visual) _	Isometric lines on a map show the air pressure in a region.
5.	The wind	Wind formation, planetary winds, local winds, mountain winds, tidal winds, seasonal winds, circulation, circulation	perception related to abstract elements (Visual) _	Explains the causes of wind formation
6.	Tides	Centripetal force and gravitational force, tides,	Interrelationship and awareness of spatial elements (Spatial	Explain the effect of Sun, Moon, Earth on the movement of ocean

		types of tides, waves.	(Relation & Awareness)	water.
7.	Agriculture	Animal Husbandry, Poultry Husbandry, Sericulture, Nursery business, types of farming, agritourism	Consistency and Consistency (Form Perception & Constancy)	Explain the importance of marketing system for agriculture.
8.	Human habitation	Types of habitations and their distribution	Figure and Background Comprehension (Figure ground perception _	Identify human habitation type diagrams.
9.	Contour line map and landforms	A replica of the surface, a map of contour lines.	Consistency and Consistency (Form Perception & Constancy)	Creates a contour line.

It can be seen from Table no. 1.5 that the sub-components of spatial abilities such as knowledge of spatial element position, interrelationship and awareness of spatial elements, figure and background comprehension and concrete thinking and continuity are included in the textbook. The level of learning outcomes is elevated to the application level with knowledge-learning objectives.

Analysis of Class VIII Geography Textbook

There are a total of six units in the class VIII textbook representing different branches of Geography. By analyzing according to the spatial concepts in these textbooks, it is presented in following table no. 1.4

Table 4: Summary of Class VIII Geography Concepts, Spatial Perception Components and Learning Outcomes

Sr. No.	Title of lesson	Key concepts	Spatial Perception Factors	Learning Outcomes
1.	Local Time and Standard Time	Local Time, Standard Time, Indian Standard Time, World Standard Time	Interrelationships and Consciousness in Spatial Elements (Spatial Relation & Awareness)	Calculates local time and standard time using contours on a globe or map.
2.	The interior of the earth	Earth's interior, Earth's interior structure, Earth's crust, Continental crust, core.	Visual Closure related to abstract elements	Explains about the internal structure of the earth through diagrams/replicas/visual images/audio-audio media etc.
3.	Humidity and clouds	evaporation, Atmospheric humidity, absolute humidity, relative humidity, Condensation, clouds and types of clouds	Form Perception & Constancy _	Predicts precipitation by identifying cloud types.
4.	Seabed structure	Ocean floor structure, continental platforms, continental slopes, oceanic plains, oceanic ridges and plateaus, oceanic troughs and oceanic troughs.	Figure and Background Comprehension (Figure - ground perception _	Identifies marine landforms from diagrams.
5.	Land use	Agricultural Land, Rural Land Use, Urban Land Use, Transitional Areas and Suburbs, Planned Cities	Figure and Background Comprehension (Figure - ground perception _	The land allocation in the map explains the allocation of land for different areas.
6.	Population	Population growth, population density, population composition, Sex ratio	Spatial Relation & Awareness _	Explains by reading a map of the world to understand the unequal distribution of population.

Table no. 1.4, it can be seen that the sub-components of spatial abilities such as knowledge of spatial element position, interrelationship and awareness of spatial elements, figure and background comprehension and concrete thinking and continuity are included in the textbook. The level of learning outcomes is elevated to the application level with knowledge-learning objectives.

Conclusions based on the summary of analysis presented in table no. 1.1 to 1.4 are given below.

Conclusion

The approach of Class V Geography textbook is mainly influenced by Environmental studies, Ecology and the level of objectives is related to knowledge level as per Bloom's Taxonomy. This content is complementary in terms of spatial concept and thought process, but in order to develop spatial ability, there needs to be a change in the educational process, evaluation method.

There is a separate study and textbook for Geography from class VI onwards. The content becomes progressively more complex. Such ascending levels of conceptual content require prior organizational paradigms

along with paradigms such as concept acquisition. There is ample scope for the development of various sub-components of spatial abilities due to independent study and textbook of Geography from class VI onwards. The introduction of local Geography up to the fifth grade to be stronger, broader and deeper, attachment to spatial elements, structures, etc. is not developed with Pusare and selected elements of the sub-component of spatial ability are strengthened and some remain neglected. As the level of objectives is limited to knowledge, comprehension and application range, although the educational ability of this age is high, there are great limitations in the development of conceptual content and spatial ability.

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