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## **The Nature of Geography Textbook Questions and their Role in Assessment**

*Rishabh Kumar Mishra*

*Ph.D Scholar*

*Department of Education*

*University of Delhi*

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**Abstract:** *The aim of the present paper is to analyze the critical role of textbook-questions in assessment processes. National Curriculum Framework, 2005 envisioned textbooks as not only a source of knowledge but also as an interactive space of learners. This ‘interactive space of learners’, provided by textbooks also provides significant sights for assessment. With the same spirit, NCERT textbooks comprises both in text as well as end text questions for gauging learners understanding and enabling them to make linkages within different concept and contexts . On the one hand these questions carry an epistemological meaning and on the other they have pedagogical implications. Through the rigorous content analysis, both quantitative and qualitative, this paper tries to unfold the above mentioned aspects of textbook questions.*

**Key Words:** *Textbook Questions, Epistemology, Pedagogy, Assessment*

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**“Knowing the facts and doing well on tests of knowledge do not mean that we understand.”**

**Grant Wiggins and Jay McTighe (1998)**

One major component of textbook is questions and exercises. Textbook questions improve learner’s comprehension of content, assist them in identifying critical information in the textbook; help in building strategies for processing given information and stimulate their problem solving skills (Jo & Bednarz, 2009). Textbook questions reinforce learning and encourage creative thinking through problems and activities (Ornstein, 1994). These questions not only help the teacher to design their assessment strategy but they also signal what learning is about. Teacher uses textbook questions and exercises for evaluation purpose (DiGisi. & Willett, 1995). Textbook questions and exercises also help and guide teachers to form other relevant questions necessary for teaching and assessment. It has been seen that teachers are concerned about the textbook questions but they do not assess whether the questions are sensible or useful (Wong, 1991). Questions dispersed in text are equally significant pedagogical aids for teaching learning process (Leonard, 1987). Wixson (1983) asserted that in-text questions have potential value for learning experiences. She found that learners who were exposed to in-text questions

performed well on post test. The kinds of questions that are given in textbooks also influence the type of cognitive processes that students engage in as they grapple with the process of knowledge construction. Textbook questions reflect epistemological underpinning of the content as well as pedagogical implications for the classroom. Thus, the nature of textbook questions and their role in teaching learning process should be explored. Against this backdrop the present paper aims to explore following research questions-

1. How does National Curriculum Framework-2005, view the role of textbook questions in teaching- learning and assessment processes?
2. What are the epistemological underpinnings of textbook questions?
3. How does the textbook questions position learners with regard to knowledge and learning?
4. What are the pedagogical implications of textbook questions?

The present paper tries to address these research questions. The study reported in this paper is delimited to only geography textbook questions. The geography textbook of class 9<sup>th</sup> and class 10<sup>th</sup> have been analyzed for this purpose.

### **NATIONAL CURRICULUM FRAMEWORK-2005: PAINTING THE CANVAS OF EDUCATION WITH CONSTRUCTIVIST BRUSH**

National Curriculum Framework (NCF) - 2005, proposed an epistemological shift. In NCF 2005, textbook is not seen as the only source of information but it is seen as suggestive framework of a particular way of understanding issues. Further shifting from traditional approaches which consider textbook as a closed box, NCF 2005 sees textbook as a dynamic document. It envisioned textbooks as not only a source of knowledge but also as an interactive space for learners. This 'interactive space of learners', provided by textbooks also provides significant sights for assessment. With the same spirit, NCERT textbooks comprise both in text as well as end text questions for gauging learners' understanding and enabling them to make linkages within different concepts and contexts .While advocating changes in the approaches to teaching, it was suggested that the shift from mere imparting of information to involvement in

debate and discussion would keep both learners and teachers alive to social realities. NCF 2005 envisions that pedagogy of social sciences should propagate:

- (a) The active and constructivist teaching and learning;
- (b) Meaningful and conceptual understanding of concepts;
- (c) Developing critical understanding to the societal issues;
- (d) The connection of subject knowledge with everyday life experiences.

The goal of Geography teaching in schools should be to develop perspectives towards the people-environment relationship, resources, and their development. It will enable students to understand the relationship between people and their environment and make them aware about the issues related to environment. Keeping in view the broad objectives of teaching geography as a part of general education, all NCERT Geography textbooks will follow functional approach. Emphasis has, therefore, been laid on the understanding of basic concepts and development of skills. In order to promote “learning by doing”, activities have been selected carefully which would help the students to develop necessary geographical skills such as ‘reading and interpreting maps and diagrams’, visual representation and analysis of data, transformation of visual to verbal information and vice-versa, and drawing inferences and conclusions. Parallel to the NCF-2005 recommendations, it is envisioned that the facts and information given in the geography textbook should be used as means rather than ends in them. Instead of confining the teaching to the classroom, children should be exposed to real situations in the environment. Maps are one of the most important tools with geography teachers which provide useful ways of storing and communicating information about people and places.

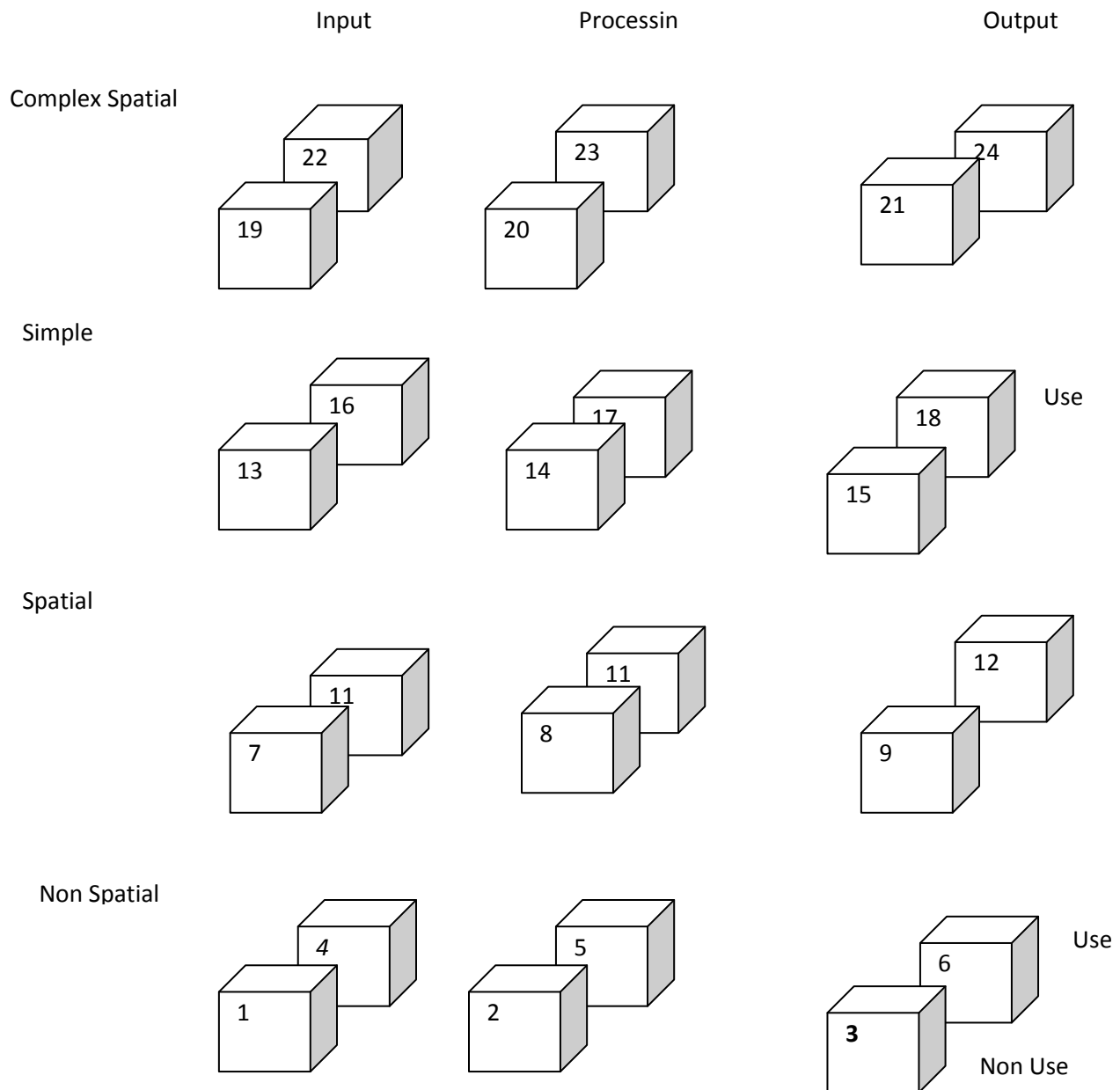
### **METHODOLOGY:**

The geography textbook of class 9<sup>th</sup> and 10<sup>th</sup> published by NCERT were selected for the analysis. The 9<sup>th</sup> class geography book entitled Contemporary India-1 has six chapters- India-

Size and Location, Physical features of India, Drainage, Climate, Natural Vegetation and Wildlife, and Population. The class 10<sup>th</sup> geography textbook entitled Contemporary India-2 has seven chapters- Resources and Development, Forest and Wildlife Resources, Water Resources, Agriculture, Minerals and Energy Resources, Manufacturing Industries, Life Lines of National Economy. Questions pertaining to all the chapters have been analyzed. There are two locations of the questions in each chapter. First one is the in-text questions which are dispersed throughout the chapter and second end-text question located at the end of chapter. There were total 293 questions. All of the questions have been content analyzed. The taxonomy developed by Jo and Bednarz (2009) has been chosen for classifying the questions.

### **The Taxonomy for Classifying Geography Textbook questions: (Figure 1)**

Most of the question-classification systems are composed almost entirely of categories based on the type of cognitive process required to answer the question. Existing taxonomies classify questions on the basis of cognitive processes in which learner will engage while solving a problem. Yet while analyzing questions, the nature of subject and tools of representation are also significant. In the present research it is insisted to take into account the content dimension along with cognitive processes for analyzing questions. The Taxonomy of Jo and Bednarz (2009) is suited to this need. In the present paper taxonomy of spatial thinking developed by Jo & Bednarz (2009) has been used for analyzing the nature of geography textbook questions. This taxonomy takes account of the three dimensions of geographical thinking: spatial concepts, tools of representation and the processes of reasoning. Any question will be based on some concept; will require some kind of mental operation and that operation will need to be done with some tool. This taxonomy comprises all these three dimensions, that is why it is informed decision of the researcher to use this taxonomy for the classification of textbook questions. The three primary categories were divided in two several sub-categories and finally this taxonomy consists of twenty four categories ( $4 \times 3 \times 2$ ). An overview of this taxonomy is as follows-



***Fig.1. Taxonomy for Questions Classification***

***Concepts of Space:***

Adopting Golledge's (2000) scheme of spatial concepts and classification, they categorize spatial concepts in the four categories- Non-Spatial, Simple Spatial, Spatial Primitive and Complex Spatial. The first category comprises of concepts not related to space. Spatial

primitives represent basic and fundamental characteristics of an existence in space, such as place-specific identity, location, or magnitude. Simple Spatial concepts are concepts established by sets of spatial primitives ( e.g., distance is the interval between locations). Complex Spatial concepts are derived by assemblies of sets of simple spatial concepts (e.g., the concept of hierarchy can be derived by combining location and magnitude with connectivity). They identified 31 essential concepts of spatial thinking and categorized them in these four categories.

### ***Tools of Representation:***

Maps, Diagrams, Tables, Graphs and Models etc. are considered tools of representation in this taxonomy. Two sub-categories have been developed- non-use of tool and use of tool. For avoiding complexity of the taxonomy, they further did not form sub categories of ‘use of tool category’.

### ***Processes of Reasoning:***

Three levels of thinking as proposed by Costa (2001) have been taken as three sub-categories for classifying processes of reasoning: the input level of thinking, the process level of thinking and the output level of thinking. The input level represents cognitive processes engaged to gather information from the senses or to recall information from memories, such as recognising, defining, identifying, recalling and listing. At the second level, the processing level, involves mental processes such as analyze, classify, explain or compare information acquired at the input level. This type of cognition is associated with reasoning because it requires making sense of collected information, and therefore, going beyond the information. The third level of thinking, the output level, refers to generating new knowledge or products from the information obtained from the first two levels through the processes of evaluation, generalization and creation.

The example of question coding is given here-  
In which of the following states is black soil found?  
Concept: Spatial Primitive Tool: Use Cognitive Process: Input

To ensure reliability, questions were classified twice. There was fifteen days' time gap between these two classifications. Both the classifications were found highly positively correlated. Along with this, another researcher from the same field was asked to classify some of the questions and her classification was matched with the researcher's classification again. There were similarities between both the classifications.

## **RESULTS AND DISCUSSION**

It emerged from the analysis of data that 80% questions focused on non spatial concepts. Only 4% of total questions dealt with simple spatial and complex spatial concepts. The very nature of Geographical knowledge inherits to use tools of representation. In present study it was found that only 22% of the questions provide scope to use tools such as map, diagram and graphs. Among these 22% of the questions, most of the questions are based on input level of reasoning. If we see the distribution of questions among reasoning classes, it emerged that 45.73% questions are based on input level of reasoning, 32.08% questions are based on process level of reasoning and only 22.1 % of total questions are based on output level of reasoning.

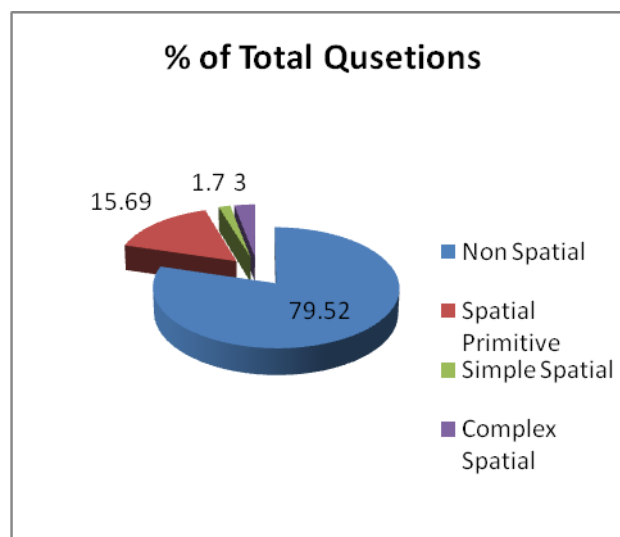


Figure 2. Classification of Questions on the basis of Concepts

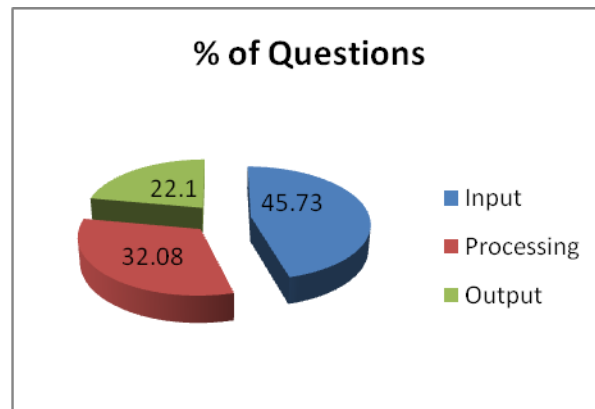


Figure 3. Classification of Questions on the basis of Reasoning Process

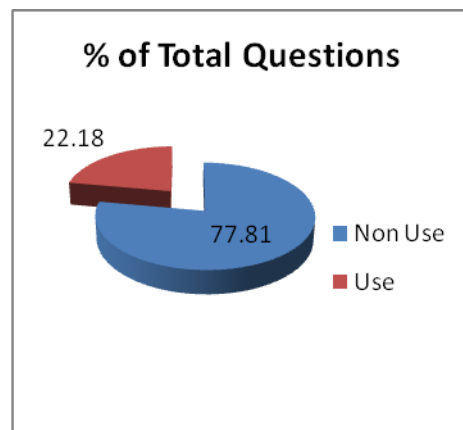


Figure 4. Classification of the Questions on the basis of Tools of Representation

In comparison to other two categories, it encompasses all the forms of reasoning appropriately. Spatial thinking is a complex form of thinking in which a person should integrate knowledge about spatial concepts, abilities to use spatial representations in appropriate and effective ways, and reasoning skills (Jo & Bednarz, 2009). The Geography textbook questions are supposed to be facilitators of spatial thinking. The cells 10, 11, 12, 16, 17, 18, 22, 23, 24 integrate all the three dimensions of spatial thinking. It is found that only 17.06% questions are in these cells. Among these questions 72% questions are based on simple spatial and input form of spatial thinking. One can easily infer that spatiality of textbook questions is very poor.

There are five categories of end text questions-Multiple choice questions, Short answer type questions, Long answer type questions, Map work and activity/project. Most of the questions (76%) belonged to the categories multiple choice questions, short answer type



questions and map work. These questions are fixed answer type questions and their answer can be given in few words or locating an exact point on the map.

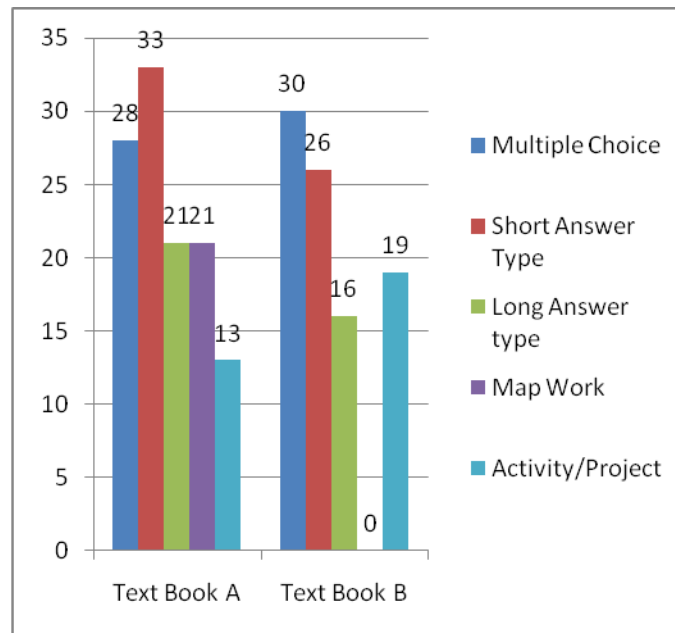


Figure 5. Types and Distribution of End text Questions

These questions demand only input level of reasoning process and reflect that geographical knowledge is objective and given. Questions which are given under the category of long answer type questions use phrases/expressions such as Explain....., Discuss..... Describe..... Although these questions show that learner might be engaged in processing or output form of cognitive processes but in-depth analysis shows that they also demand a certain pattern of information inferred by the book in certain defined ways. They are based on given information in textbook and do not provide any scope for 'multiple explanations'. There would be uniformity in the answer of every learner which will be influenced by the information given in the textbook. The answers of these questions demand the argument as given in books and do not allow learner to go beyond it. Although every answer should be informed by facts or information but it should provide scope to learners to make linkages between their experience and understanding. Example:

*'Why is the rate of growth population in India declining since 1981?'*

*'Where and why is rail transport the most convenient means of the transportation?'*

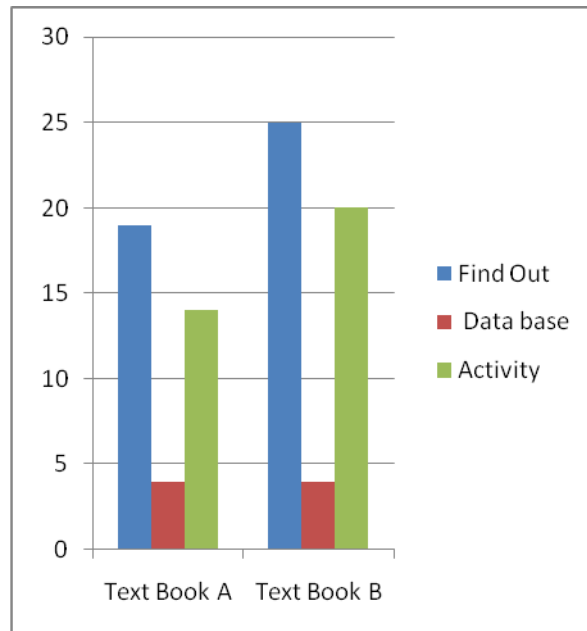


Figure 6. Types and Distribution of In-text Questions

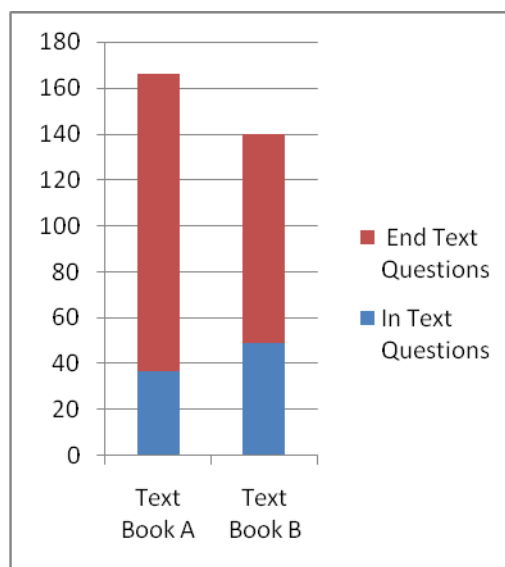


Figure 7. Ratio of In-text and End Text Questions

75% questions given in the category activity/project are the word games where learners have to find some key words and complete the puzzle box with those words. These forms of questions are only 'encyclopedic' questions which facilitate recall and retrieval of information.

As social constructivists argue that activities should be ‘authentic’ and related to real world problems. The analysis of the activities which is supposed to reflect real world situations revealed that they were loosely designed. Besides focusing on the causes of the problems, their focus was on finding the solution of the problems. They saw the government as a problem solver.

*The land under cultivation has got reduced day by day. Can you imagine its consequences?*

*Do you know why food grains production has remained stagnant or fallen for six consecutive years?*

*Find out from the above newspaper cuttings, the main concern highlighted in the given news items.*

*(ii) Collect more information about various endangered species from newspapers and magazines.*

*(iii) Find out various steps taken by the Indian government to protect them.*

The content covered by these questions shows that the importance of any spatial entity lies in its size, quantity and rank etc. Where does this kind of learning lead the learners to?

*Which is the largest river basin in India?*

*Which one of the following places receives the highest rainfall in the world?*

Likewise it also highlights the ‘economic importance’ as a dimension which is valued-

*State some economic benefits of rivers and lakes?*

*Why are rivers important for the country’s economy?*

*Why are the means of transportation and communication called the lifelines of a nation and its economy?*

Here we can see that the economic importance and locational importance are validated and they cannot be questioned. It is objectification of knowledge as well as knower which impedes critical thinking. It promotes linear pattern of knowledge construction which does not allow multiple interpretation.

The different kinds of questions are different in nature but, nevertheless, provide a picture of the approach to learning. It is tried to embed learning process within constructivist approach to learning but subject specific knowledge is not given so much focus. There is a mismatch between content approach and pedagogic approach. Most questions are short-answer questions that require the students to recall factual information, while only a small percentage of questions demand higher cognitive skills. In the present study, lower-order questions were most frequently presented in in-text as well as in end text.

A closer look at the results shows that very less number of questions were concerned with eliciting preconceptions or alternative conceptions of students and the application of the learned material in novel or concrete situations. This means that there is no scope to challenge students to review and resolve inconsistent ideas, or use in-text questions to guide learners to construct new ideas from existing knowledge. On the other hand, while a significant number of application questions were asked, they were not used as a part of the process of effecting conceptual change. They were often used to illustrate how the learned materials can be related to everyday life experiences, rather than to show how the newly constructed conceptions can be fruitfully employed to explain novel and realistic situations. Although it is attempted to give enough space to integrate the learner's personal experience in these questions but they have to match their experience with predefined categories.

Most of the in-text questions fall in the category 'find out'. Mostly they focus on finding information regarding specific place, data, landforms etc. Many a times, the needed information is not given in textbook. In a way, it follows the NCF's assumption to promote learner to move beyond textbook, but at the same time it asks them to locate required information in certain other source. What source it would be? Does everybody have access to such sources? How does this information contribute in classroom discussions? Information is seen as authentic knowledge. Information can be stored in books; it means books are source of knowledge.

All the questions related to map work ask learners to locate places, rivers, mountains and other geographical features in map which basically reinforce map reading skills. Questions related to map construction and map interpretations are rarely found. The content of class 10<sup>th</sup> can provide ample of scope for map construction and map interpretation skills but I could not find any of such exercises. Even in map reading exercises, only 'locating' any physical feature is seen as geographical knowledge. It is also significant to note that there is hardly any scope of using map related skills in long answer type questions. It should be taken care of that maps and other tools of representation are very essential for geographical thinking.

If we see the questions from reasoning point of view, it shows an appropriate picture among three forms of reasoning. It follows the assumption that higher level of question should be followed by lower level of questions. Lower level of questions, basically input questions, provide base for processing and constructing newer knowledge.

NCF 2005 recommends that geography as a school subject will enable learners to critically think about people-environment relationship. Analysis of the questions showed a different picture. In class 10<sup>th</sup> there is one chapter on 'Mineral and Ores'. There is not even a single question which is based on people-environment relationship. For question makers, it is significant to know where the bauxite could be mined? Why the solar energy does has bright future in India but the consequences of mining and other influence of such activities on human beings are not as significant knowledge. Likewise the questions of the chapter 'Manufacturing Industry' focused only on heavy industries such as iron and steel industry and its importance and contribution in development. Agro based industry related questions are as follows-

*‘Why did Mahatma Gandhi lay emphasis on spinning yarn and weaving khadi?’*

This question signifies that yarn and khadi production is important for us because Mahatma Gandhi emphasized it. On the other hand one can find questions such as-

*‘Where would it be economically viable to set up the cement manufacturing units?’*

*Find out where the plants are located in other States of India. Find their names.’*

*Find ten occupations getting raw material from forests and wild life.*

It is the knowledge which is demanded to know where to setup industry and what the viable conditions are for the same without considering its influence on people. It also shows that people’s perception or wishes are not significant for setting up an industry. Industry establishment is totally a profit driven process.

Further it is analyzed how textbook questions position learners with regard to geographical knowledge and learning. For this analysis the words and phrases used in questions were analyzed by adopting the framework of Elisenman & Wagner (2007). It was found that most of the questions were posed in three forms-

1. Verb +you (e.g.,)
2. An inanimate object + an animate object + you (e.g., Make a list of all such goods made of steel that you can think off.)
3. Without specifying any subject (e.g., Find out the current Railway zones and their head quarters )

The first form includes such phrases as ‘Do you know’, ‘Do you think’ or you find, you know etc. these forms of questions are based on the assumption that there is something to be known which is ‘common knowledge’ (Edwards and Mercer, 1987) and with the help of these questions learners will acquire that knowledge. The second and third forms of the questions obscure human subjectivity. It shows that knowledge is something that is constructed on its own without interference of human. While as in reality it is the learner (person) who constructs the

knowledge. It is seen that the auxiliary verb, verbs, adverbs and adjectives used in the questions have ‘strong’ connotation’. Hedges were less used. It shows that questions have a voice of ‘certainty’ rather than any scope of possibility. Rotman (1988) identified two forms of imperatives generally used in text. Inclusive imperatives such as describe, explain, discuss etc.; it demands for reader to be a thinker, and exclusive imperatives such as write, copy, enlist etc; here the role of learner is that of a scribbler. Most of the analysed in-text questions used inclusive imperatives. Most of the end-text question used exclusive imperatives. This imperative allows learner’s actions to be included in a community of learners whereas scribbler imperatives exclude learners from learning community.

Kilpatrick while discussing the role of textbooks in schooling explains –

*“Knowledge is depersonalized and decontextualised, when represented for communication [in books], personalized and contextualized when first encountered [by the learner]; depersonalized decontextualized again as it becomes part of the learners codified language”*

Textbook questions do not situate the content of the questions in any context. They present knowledge as ‘truth’ independent of context. It is hypothesized that intention of the questions will match the perception of the learner.

E.g.:

*Study the figure 6.3 and compare it with figure 2.4 and figure 4.7. Do you find any correlation between these maps?*

*What could be the reason of uneven distribution of population in India?*

*Table 6.1 reveals that despite the decline in growth rates, the number of people being added every decade is steadily increasing. Why?*

Scott (1998) talked about authoritative and dialogic functions of classroom discourse. In authoritative function, questions demand information; responses to the questions typically consist of single, detached word and factual information. Whereas, in dialogic function, questions provide the scope to learners to put forward their ideas, explore and debate points of view. An alternation between these two types of discourses is important for developing conceptual thinking (Mortimer, 1998). The present analysis revealed that in-text questions work in favour of authoritative function. Similarly project/activities given in end-text questions also follow the same pattern. One of the roles of the in-text question is to help in classroom discussion by providing the scope for interaction and participation. Recall of the information should not be the end product or goal. It should be the means to the end of achieving critical thinking. It is analysed that input level of questions were followed by which type of questions. It has been found that in-text input level questions were given in isolation. Mostly they were followed by input level questions. End-text questions were given in such a manner where all input level questions were given in beginning of the exercises in form of multiple choice questions and short answer questions. In next section processing and output based questions were asked. It was found that processing and output based questions were followed by input based questions-

*Make a list of items where substitutes are being used instead of minerals. Where are these substitutes obtained from?*

*What is meant by trade? What is the difference between international and locale trade?*

*Define Mansoon? What do you understand by break in Monsoon?*

It is found there are only five activities which are based on group work. The group work is necessary for learning processes as it provides scope for dialogue, experiences sharing and motivates learner to come out of their comfort zone. Analysis also revealed that there is a lack of interdisciplinary questions. Geography is taught in schools as a subject under the social sciences. It is expected that all the sub disciplines under social sciences will promote interdisciplinary nature of their subjects.



## **USING TEXTBOOK QUESTIONS AS PEDAGOGICAL AID IN PROCESS OF LEARNING AND ASSESSMENT:**

It was found in the present study that the geography textbook questions covered mostly non spatial concepts and not the use of tools of representation .These two dimensions are crucial to spatial thinking. Questions to support spatial thinking must cover complex spatial concepts. The tool of representation should not be used for graphic displaying but they should include processing and output dimensions also. Keeping these points in mind geography teachers should use the textbook questions-

- For facilitating classroom discussion.
- To select and make such questions which include spatial concepts and representations.
- To focus on enabling learner to put the information in context and take a position.

Textbook questions specially in-text questions should generate open discussion or instructional conversations (Tharp & Gallimore,1988) as it can be used to elicit and to gauge the resources brought by the learners from different backgrounds. Shodell (1995) noted that most students perceive science as the study of facts. This is in part true because teachers ask fact-demanding questions rather than questions that require thinking. Kamen (1996) argued that student's alternative assessment has two distinctive features: (a) It includes assessment tasks, which provide an alternative to the traditional multiple choice test; and (b) the tasks that are geared towards assessing student's performance of real-life situations. These findings and suggestions are very similar to the present study. To overcome these issues textbook questions can be used more effectively as a tool for gauging learner's assessment and posing problems to make linkages with real life experiences. It was also noted that students required a great deal of assistance with the questions at the end of the chapter (Mc Carthy, ). Many required the questions to be read aloud to them and sought assistance as to where the answer could be found in the reading passage. If the lesson contains a hands-on activity, the learners will attend the task more efficiently, learning will be joyful and along with these, it will also provide

significant site for assessing learners. Besides seeing learner as a passive responder they should be seen as ‘question-poser’. On the one hand it will make classroom processes more dialogic, on the other it will also throw light on their understanding which can be further used as evidence of assessment. While using textbook questions or designing any kind of assessment tools, teacher should think about these questions-

- How should be the content of the question matched with learner’s context?
- Who are we assessing?
- Who will be benefited from this assessment?
- Whose knowledge is getting reflected in assessment?
- How do we provide scope for learners to integrate their experiences, with subject specific conceptual knowledge and how do they make this integration as integral part of their thinking and acting?

I would like to sum up this paper with one insight and with one question. Good teaching constantly asks about old understanding in new ways, calls for new applications and draws new connections (Shepard, 1997) and good assessment should do the same. Whether assessment should become so much a part of normal classroom discourse patterns that it disguised or whether assessment steps, should be marked and made visible to students as an essential step in learning.

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