Analysis of Visuals in Political Science Textbooks to Identify its Role in Encouraging Higher Order Thinking in Students

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Abstract
Visuals, including photographs, sketches, and schematic diagrams, are a valuable aspect of textbooks. Visuals in the textbook attract attention and help in the retention of information. It also enhances understanding and creates a context for learning. Schools are also emphasizing 'higher-order thinking (HOT)', rather than memorization of a cannon of topics. HOT occurs when a person takes new information and interrelates and/or rearranges and extends this information to achieve a purpose.This study identifies and analyses the role of visuals in political science textbooks in encouraging HOT in students. This study is based on the textbooks of the National Council of Educational Research and Training (NCERT) for classes 6–10. On the basis of their relationship with the content, visuals were categorized as Interactive (physical interaction with the visual), Promptive (thought-provoking questions asked on the visual), Representative (visuals supporting text), Antecedent (visuals explained in text), Nested (layers of information in one visual), Intersecting (no explicit relation between visual and text). Of these categories, Interactive, Promptive, Antecedent, and Intersecting visuals are tools for HOT with different levels of complexity. The overall percentage of visuals that encourage HOT is 48.37% (39.3% photos; 54.9% illustrations). The highest percentage of HOT encouraging visuals were found in class 7th (70.73%). Interactive visuals were found to be higher in class 6th and 7th. Promptive visuals were highest in class 8. Antecedent and Intersecting visuals, though their level of complexity is high, were found to be higher in class 6th and 7th as compared to 9th and 10th.

Keywords: School textbooks, higher order thinking, visuals, political science, NCERT

Introduction

Visuals are one of the most important part of the textbooks. Visuals in the textbook are known to attract attention, to help in the retention of information, to enhance understanding and to create a context for learning (Vinisha, K., & Ramadas, J. (2013)). Visual representations, including photographs, sketches and schematic diagrams, are a valuable yet often neglected aspect of textbooks. Visual means of communication are particularly helpful in introducing abstract concepts in science. For effective communication, visuals and text need to be appropriately integrated within the textbook (Vinisha, K., & Ramadas, J. (2013)).

Visuals have been categorized in various ways. The work of Carney and Levin (2002) focused on five functions of visuals: decorational, representational, organisational, interpretational and transformational. Similarly, the linkage between pictures and text has been emphasised by Kearsey and Turner (1999). Romney and Bell (2012) conducted a picture analysis on Business English textbooks where they categorized pictures as either instructional or decorative.

The concept of higher order thinking (HOT) is derived from the Bloom taxonomy of cognitive domain introduced in 1956 (Forehand, 2010).Stein and Lane (1996) describe HOT as "the use of complex, nonalgorithmic thinking to solve a task in which there is not a predictable, well-rehearsed approach or pathway explicitly suggested by the task, task instruction, or a worked out example. "Higher-order thinking basically means thinking that is taking place in the higher-levels of the hierarchy of cognitive processing. The most widely accepted hierarchical arrangement of this sort in education is Bloom's Taxonomy (Ramos, J. L. S., Dolipas, B. B., & Villamor, B. B. (2013)).

Method

Purpose of study

The purpose of the study was to identify if the visuals in textbooks could help enable higher order thinking in students and if so, are there specific types of images that are better at it?

Data Collection

This study is based on the textbooks of the National Council of Educational Research and Training (NCERT) for classes 6–10.

Most of the larger states in India produce their own textbooks, often with reference to the NCERT textbooks (Vinisha, K., & Ramadas, J. (2013)). The images in the textbooks were analysed on the basis of their relationship with the text and the level of complexity of the relationship was identified. The levels of complexity were identified from the revised version (2001) of Bloom's taxonomy of learning. The stages of the framework are Remember, Understand, Apply, Analyze, Evaluate and Create.

Findings and Discussions

Categories of visuals

Six different types of visuals were identified in the political science textbooks throughout classes 6 to 10 with varying degrees of presence of that visual in the textbook for different classes. The visual types were defined with respect to their relationship to the corresponding text. The following were the identified categories of visuals:

Interactive

Visuals that require the reader to physically interact with the visual in order to understand a concept or the information are called Interactive visuals. These are mostly illustration or sketches. Such a visual has clear instructions about the activity to be performed by the reader with the given visual. The information to be understood in not explicitly mentioned in the text.

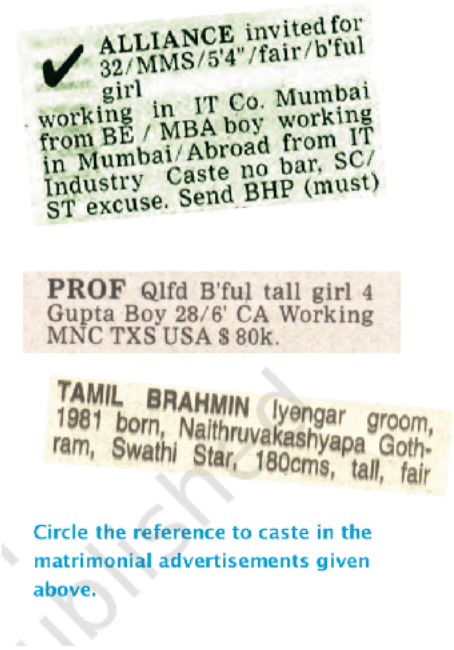

Figure 1: Example of Interactive Visual.

Promptive

Visuals which are accompanied by leading question/s are called Promptive. The accompanying questions are based on the visual given. The answers to the questions are not explicitly mentioned in the text.

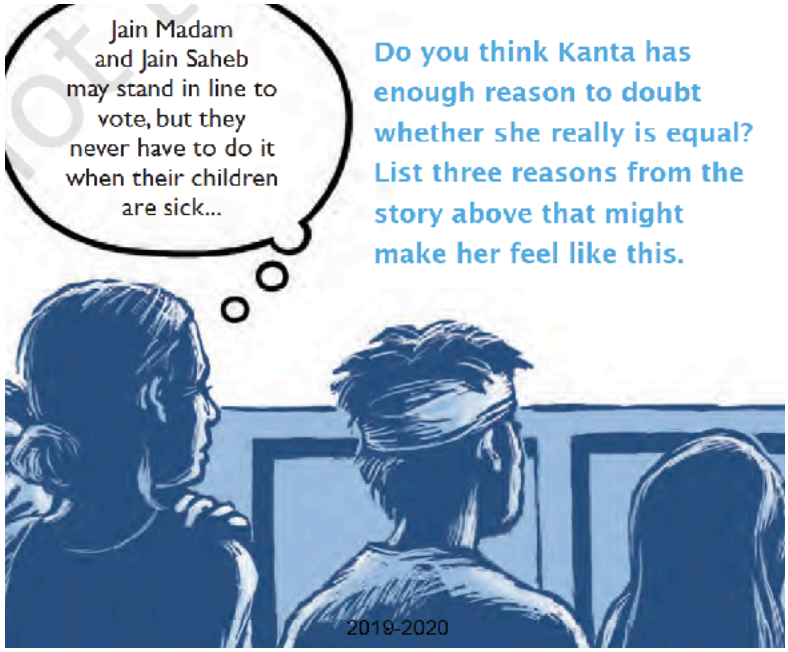

Figure 2: Example of Promptive Visual

Nested

The visuals which has a complex concept represent through an abstract visual which has layers of information is called Nested visual. These visuals contain a lot of labels and small descriptions explaining the abstract visual. These are usually illustration or sketches.

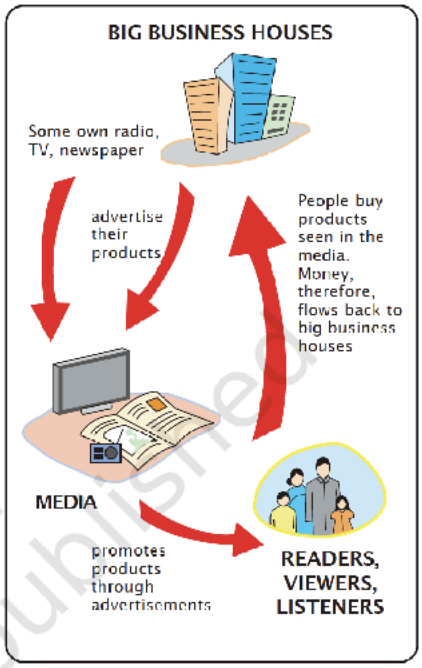

Figure 3: Example of Nested Visual

Representative

Visuals which act as a support to the corresponding text are called Representative. The information represented by these visuals are subset of the corresponding text. The purpose of these visuals is to help understand the given text better.

The above map of India shows the state of Kerala in pink.

The Kerala experience

In 1996, the Kerala government made some major changes in the state. Forty per cent of the entire state budget was given to panchayats. They could plan and provide for their requirements. This made it possible for a village to make sure that proper planning was done for water, food, women's development and education. This meant that water supply schemes were checked, the working of schools and *anganwadis* was ensured and specific problems of the village were taken up. Health centres were also improved. All of this helped to improve the situation. Despite these efforts, however, some problems – such as shortage of medicines, insufficient hospital beds, not enough doctors – remained, and these needed to be addressed.

For more details, visit http://lsgkerala.gov.in/en

Let us look at an example of another country and its approach to issues of health.

Figure 4: Example of Representative Visual

Antecedent

Visuals that are explained through the corresponding text are called Antecedent. The information by these visuals are explained by the corresponding text.

In rural areas, water is needed both for human use and for use by the cattle. The sources of water are wells, handpumps, ponds and sometimes overhead tanks. Much of these are privately owned. Compared to the urban areas, there is an even greater shortage of public water supply in rural areas.

Figure 5: Example of Antecedent Visual

Intersecting

The visuals which are abstract in nature and the information represented through the visual has no explicit relation to the corresponding text are called Intersecting visuals. These are called Intersecting because the information represented through the visual and the information presented through the corresponding text has a part of the information coinciding. The visual represents the text and the text represents the visual but both in an abstract manner.

Figure 6: Example of Intersecting Visual

Visuals and their position in Bloom's taxonomy

The 6 types of visuals have been mapped to different levels the Bloom's taxonomy according to the definition of the visual type.

Promptive

The questions related to the visuals are such that the reader needs to question what has been taught to them till then. The reader not only needs to understand, apply and analyze the situation presented to them through visuals but also evaluate the situation, the correctness or the wrongness or the situation, according to whatever information that has been provided to them.

Nested

Nested visuals breakdown the concept into easy to digest visual representation of the concept and hence these visuals aid the reader to remember and understand the given complex concept.

Representative

Since Representative visuals act as a support to the text and doesn't require the reader to look for information other than that has already been mentioned in the text, it could be said that these visuals would fall under the category of remember and understanding.

Antecedent

The text corresponding the visual is a support to the information represented by the visual. This results in requiring the reader to analyze the visual and supplement previous knowledge that the reader might already have, in order to gain the complete information that the visual holds.

Intersecting

The text corresponding to the visual has very little explicit information about the visual. The reader not only needs to analyse the visual but also question and create new information of the basis of their understanding of the abstract visual in order to establish a relationship between the visual and the corresponding text.

Interactive

The Interactive visual requires the reader to have understood the information provided previous to the activity to be done with the visual and now apply that information for the activity. The visuals are usually an applicative representation of the information given to the reader before in the same section, usually.

According to definitions stated above, the categories could be said to lie in the different levels of the Bloom's taxonomy as below:

Type of visual	**Representative**	**Nested**	**Interactive**	**Promptive**	**Antecedent**	**Intersecting**
Level of Bloom's taxonomy	Remember, Understand	Remember, Understand	Apply	Evaluate	Analyze	Create

Defining Higher Order Thinking Visual

Higher Order Thinking Visuals (HOTV) are defined as the visuals that enable higher order thinking in students.

Though Bloom's taxonomy doesn't define the exact level of differentiation between lower and higher order thinking but rather a progressive chart from lower to higher order thinking, for the purpose of identifying HOTVs, the categories **Interactive, Promptive, Antecedent** and **Intersecting** have been considered as Higher order thinking visuals. This is because these are the categories which go beyond just remembering and recalling the facts.

Results

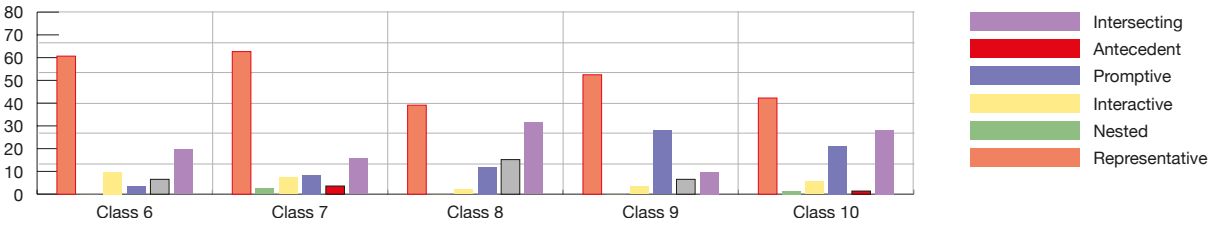

Figure 6: Percentage of visuals across classes

1. The overall percentage of visuals that encourage HOT is 48.37% (39.3% photos; 54.9% illustrations).
2. The highest percentage of HOT encouraging visuals were found in class 7th (70.73%).
3. Interactive visuals were found to be higher in class 6th and 7th.
4. Promptive visuals were highest in class 8.
5. Antecedent and Intersecting visuals, though their level of complexity is high, were found to be higher in class 6th and 7th as compared to 9th and 10th.

Conclusions

Visuals play a big role in learning and development of a child and hence it is necessary that the design of the tools of learning is done in a way suitable to the growth of a child's mindset. Books are an important tool for development of higher order thinking and visuals cannot be separated from that process. The visuals should be presented in the books in a manner which allows students to grow at different stages of their lives progressively. Therefore, it is necessary that the complexity of understanding and interacting with the visuals be kept in mind. The quantity and complexity of the visuals shall increment according to the stage of life the student is at.

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