

Evaluation of Cognitive and Argumentation Skills in Secondary English Textbooks

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ABSTRACT The present study aims to find out how far the secondary level textbooks of English are helpful to develop the young learners' cognitive and argumentative skills by evaluating the exercise questions of the English textbooks for classes 8th, 9th and 10th, published by the National Council of Educational Research and Training (NCERT). The theoretical frameworks adopted for the work are the revised version of Bloom's taxonomy of cognitive demand by Anderson and Krathwohl, and Wolfe's Argumentation Model for argumentation skills. After analysing 326 exercise questions, the researchers found that the cognitive demand of 'Analysis' that requires analytic argumentation skill is the most frequent, followed by 'Understand' requiring text-centred arguments. However, the cognitive demands of 'Create' and 'Apply' have only marginal representation, which implies that the learners' creative and problem-solving cognitive skills are ignored in these textbooks. This study can be helpful to textbook developers and curriculum planners for enhancing the quality of textbooks.

INTRODUCTION

It is now quite a matter of concern for educationists worldwide how one can develop and nourish reasoning and argumentation skills in children (Goldman et al. 2016; Pearson et al. 2018). These skills are crucial for children as they play a vital role in their intellectual and social development and equip children with the tools to think critically, express themselves effectively, solve problems, understand others, and actively participate in their communities. These skills lay a strong foundation for their personal, academic and professional growth, enabling them to navigate the complexities of the world with confidence and competence. Discipline-specific literacy skills required to develop reasoning have been discussed in detail in several works, including those mentioned before. According to Demirel and Kiroglu (2005) and Günes (2002), textbooks are technical manuscripts developed in keeping with teaching programmes to provide knowledge catered to students' cognitive levels, present content from simple to com-

plex, and provide an opportunity for systematic learning growth.

According to Küçükahmet (2003) and Baytak et al. (2011), textbooks substantially impact what students learn and what teachers teach because they pique students' interests and enable them to relate to subjects. Exercise questions are incorporated into textbooks to encourage students' ability to research, analyse, and think critically (Demirel 2000). According to Richards (2001), a learning programme may not be influenced without course books because they give it a structure. Therefore, an evaluation of the textbooks is an essential part of any education program. Though textbook evaluation has been a practice in many countries, there is a dearth of studies in the Indian context especially related to English language textbooks. The current work is an attempt to fill this research gap.

Objectives of the Study

This paper attempts to find out whether, in English studies at the school level, the students are prepared for the challenges in higher academics. Higher academic pursuits demand certain cognitive abilities like critical analysis, creative thinking and application of the acquired knowledge in a new area apart from understanding a

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concept. Keating (1988) claimed there is no evidence of fundamental constraints on the ability of early adolescents to engage in critical thinking. If so, then it is necessary to evaluate the textbooks of the early adolescent period to find out whether such cognitive demands have a place there or not.

The major research questions addressed in this research paper are the following:

1. What are the various levels of cognitive demands as per the revised Bloom's taxonomy (Anderson et al. 2001) required to answer the exercise questions of NCERT English textbooks of standard 8th, 9th and 10th?
2. What are the types of argumentation skills (Wolfe 2011) required by the learners to answer these exercises?
3. What is the quantitative distribution of these two parameters in each standard?
4. Is there any one-to-one mapping between the cognitive demands and the argumentation skills?
5. To what extent do the exercise questions provide the learners with healthy cognitive and argumentative skills?

METHODOLOGY

As a methodology for finding the answer to this, the researchers have analysed the exercises given at the end of the English textbooks developed by the National Council of Educational Research and Training (NCERT) for standards 8th, 9th and 10th. Many studies in educational psychology have discussed the importance of adolescence in developing critical thinking skills. Standards 7th to 10th constitute the early adolescent period, and if one wants to include critical thinking skills in the curriculum, this is the right time to do so. The researchers have classified the exercise questions on the basis of different cognitive demands and argumentative abilities that are needed to answer them. Bloom's Taxonomy of the Cognitive Domain (henceforth BTCDD 1956) and Wolfe's taxonomy for classification of assignments in higher education (2011) have been used to classify the exercises. The researchers analysed each question of the exercises from the above three textbooks and classified them according to the level of BTCDD. BTCDD has been used as

a framework for textbook evaluation in several studies (Hoeppel 1980; Amin 2004; Mosallanejad 2008; Gordani 2008; Ulum 2016; Oktaviani 2018; Zorluoglu et al. 2020). Six types of cognitive skills form the basis of Bloom's classification. Wolfe's taxonomy of assignments can be understood using one or more of them. BTCDD lists down six levels of the domain, which make up two major spheres, that is, one knowledge and comprehension comprise the lower-order thinking skills (LOTS), whereas application, analysis, synthesis, and evaluation make up the higher-order thinking skills (HOTS). However, depending on the relationship between the cognitive level of a student's thinking and the level of questions according to BTCDD, students should be asked questions related to HOTS to develop their thinking skills (Jo and Bednarz 2011).

Review of Literature

Although several works reported in the recent decade use Bloom's taxonomy to evaluate textbook questions, there is a dearth of research on the evaluation of textual exercises on the basis of cognitive taxonomies. Igbaria (2013) examined six units of the ninth-grade English textbook *Horizons*. The study aimed to assess the value of textbooks in fostering students' critical thinking. He selected the Wh-questions because he thought they were crucial for gauging students' comprehension of the information being taught and that they may help students improve their critical thinking abilities. The findings showed that of the 381 Wh-questions in the six units, the percentages connected to the cognitive levels of evaluation to comprehension ranged from 2.36 to 29.66 percent. These findings support the findings from earlier investigations. The remarkable discovery was that the analysis level showed up at 23.36 percent, almost exactly equal to the knowledge level. Understanding metacognitive knowledge and evaluating cognitive knowledge were the least frequent codes with no occurrence at all.

There was yet another research using the six levels of Bloom's Revised Taxonomy by Razmjoo and Kazempourfard (2012). They analysed the tasks and exercises for three units in each of the four course books in the *Interchange* series. The exercises and activities in the course books were coded, categorised, and analysed by the research-

ers using a coding scheme. The findings indicated that *Interchange* course books were frequently used for lower-order cognitive skills (LOTS). The most frequent code in the four-book series was ‘remembering’, the lowest cell in Bloom’s Revised Taxonomy.

Theoretical Framework and Procedures

In order to carry out this work the researchers have integrated two theoretical frameworks that are sought to be fruitful to analyse the NCERT exercise questions and provide a comprehensive explanation about the design and development of textbooks. The first is Bloom’s Revised Taxonomy of Cognitive Demands (BTCDD) (Anderson et al. 2001) and another one is Wolfe’s Argumentation Skills (Wolfe 2011).

Bloom’s Framework

Bloom’s Revised Taxonomy of Cognitive Demands, developed by a group of educational psychologists led by Benjamin Bloom in 2001, builds upon the original cognitive taxonomy proposed by Bloom in 1956. This revised taxonomy provides a framework for categorising educational objectives and learning outcomes, aiming to guide educators in designing instruction that promotes higher-order thinking skills.

The revised taxonomy consists of six levels of cognitive demand, arranged in a hierarchical order. Each level represents a different level of cognitive complexity and depth of understanding. The six levels, from the lowest to the highest are Remembering, Understanding, Applying, Analysing, Evaluating, and Creating.

- I. Remembering: This level involves recalling or recognising information. It includes tasks such as memorising facts, defining terms, or recalling specific details from a text or lecture.
- II. Understanding: At this level, learners demonstrate comprehension and interpretation of information. They can explain ideas or concepts in their own words, summarise information, or interpret visual representations.
- III. Applying refers to using acquired knowledge and skills in new or familiar situa-

tions. Learners can solve problems, apply concepts to real-life scenarios, or demonstrate the practical application of knowledge.

- IV. Analysing: At this level, learners break down complex information into constituent parts and examine their relationships. They can identify patterns, analyse data, or evaluate the validity of arguments.
- V. Evaluating: This involves making judgments or assessments based on given criteria. Learners critically evaluate information, arguments, or theories and provide evidence to support their conclusions.
- VI. Creating: The highest level of cognitive demand, creating involves generating new ideas, products, or interpretations. Learners can design, invent, compose, or construct something new using their knowledge and skills.

This taxonomy acknowledges that learning is not a linear process, and each level builds upon the previous ones.

Wolfe’s Framework

In order to measure the reasoning and argumentation skills, the researchers adopted Wolfe’s (2011) Argumentation Strategy across disciplines. The various types of argumentation strategies discussed by Wolfe (2011) are as follows:

- I. Short-answer argument: It tries to elicit factual information from the learners by triggering their memory.
- II. Text-centred argument: In this the author breaks down an argument into its constituent parts or offers a “reading” of the text from a specific angle.
- III. Analytic argument: In this argument, the main goal is to examine something methodically.
- IV. Empirical argument: Argumentation that evolves from the collection and analysis of data is referred to empirical argumentation.
- V. Decision-based argument: This requires supporting a verdict or a claim.
- VI. Explicitly thesis-driven argument: In this a learner tries to advance upon a central thesis (also called a central claim) with an elaborate explanation by writing articles and essays.

- VII. Proposal argument: The emphasis is upon persuasion towards adopting one course of action over the other in this argument.

Synthesis of the Two Frameworks

The researchers have also attempted to establish a correlation between these two levels of skills. Table 1 presents the same.

Table 1: Mapping between Bloom’s taxonomy and Wolfe’s argumentation skills

<i>Bloom’s Revised Taxonomy of Cognitive Domains (2001)</i>	<i>Wolfe’s Argumentation Skills (2011)</i>
1. Remembering	Short answer arguments
2. Understanding	Text-centred arguments
3. Applying	NA*
4. Analysing	Analytic arguments
5. Evaluating	Empirical arguments
6. Creating	Decision-based arguments
7. NA	Explicitly thesis-driven arguments
8. NA	Proposal arguments

*NA stands for not applicable, or in other words, there is no correlation between the two.
Source: Authors

For five cognitive demands in Bloom’s Taxonomy, there is an analogous mapping onto Wolfe’s Argumentation Skills. However, for the cognitive skill of ‘Applying’ there is no satisfactory counterpart mapping in Wolfe’s Argumentation skills. The two argumentation skills in Wolfe’s lists, namely, ‘Explicitly thesis-driven arguments’ and ‘Proposal arguments’ do not find their analogous counterparts in Bloom’s Taxonomy.

For the purpose of classification and categorisation of the textbook exercise questions, three annotators who were familiar with Bloom’s Revised Taxonomy (2001) and Wolfe’s Argumentation Skills (2011) used their competence of these two frameworks. After that they read and understood the exercise questions from the NCERT English textbooks for classes 8 through 10 in order to determine the cognitive demands that these questions place on the learners’ minds and the argumentation skills that the learners will need to answer the exercise questions, respectively. The researchers examined 326 problems from 32 chapters in the NCERT English textbooks from classes 8th to 10th.

RESULTS AND DISCUSSION

The researchers tried to map the six cognitive demands with the argumentation skills while analysing the final result. Though there are correspondences for five of Bloom’s cognitive demands in Wolfe’s argumentative skills framework, the researchers could not propose a correspondence for the cognitive demand of ‘apply’. The frequency and percentage of both of them are given in the result prepared and discussed below first class wise and then cumulatively.

In class 8th, after analysing 68 questions distributed across 10 chapters, the researchers found the cognitive demand of ‘analysing’ that requires analytic argumentation to be the most prevalent with 41.17 percent of occurrences. However, the researchers do not find any instance of the highest order cognitive demand of ‘creating’ lying under the Higher Order Thinking Skill (HOTS). The same is presented in Table 2.

Table 2: The frequencies and percentages of NCERT English textbook questions of Class 8th

<i>Cognitive demands</i>	<i>Argumentation skills</i>	<i>Frequency</i>	<i>Percentage</i>
Remembering	Short answer arguments	10	14.70
Understanding	Text-centred arguments	22	32.35
Applying		3	4.41
Analysing	Analytic arguments	28	41.17
Evaluating	Decision-based arguments	5	7.35
Creating	Empirical arguments	0	0

Source: Authors

Similarly, in class 9th, after analysing 110 questions distributed across 11 chapters, the researchers found the cognitive demand of ‘Analyse’ that requires analytic argumentation to be the most prevalent with 41.8 percent of occurrences. However, the researchers do not find any instance of the cognitive demands of ‘Create’ and ‘Apply’. For both classes 8th and 9th, the cognitive demand of ‘Create’ is missing. However, there is a drastic decrease in the cognitive demand for ‘Apply’ from 8th to 9th by 4.0 percent. The formation of empirical arguments by the learners is missing. The analysis of class 9th is presented in Table 3.

Table 3: The frequencies and percentages of NCERT English textbook questions of Class 9th

<i>Cognitive demands</i>	<i>Argumentation skills</i>	<i>Freq- uency</i>	<i>Perce- ntage</i>
Remembering	Short answer arguments	25	22.72
Understanding	Text-centred arguments	31	28.18
Applying		0	0
Analysing	Analytic arguments	46	41.8
Evaluating	Decision-based arguments	8	7.27
Creating	Empirical arguments	0	0

Source: Authors

In class 10th, after analysing 148 questions distributed across 11 chapters, the researchers found the cognitive demand of ‘Analyse’ that requires analytic argumentation to be the most prevalent with 45.27 percent of occurrences. One remarkable thing with class 10th’s data is that the researchers found that all the cognitive demands starting from ‘Remember’ to ‘Create’ are required by the learners to attempt the exercise questions. In class 10, the cognitive demand ‘Apply’ and ‘Create’ are quite infrequent, with percentages of 1.35 percent and 2.02 percent, respectively. One remarkable thing with class 10th’s data is that the researchers found that all the cognitive demands starting from ‘Remember’ to ‘Create’ are required by the learners to attempt the exercise questions given. The results of class 10th are presented in Table 4.

Table 4: The frequencies and percentages of NCERT English textbook questions of Class 10th

<i>Cognitive demands</i>	<i>Argumentation skills</i>	<i>Freq- uency</i>	<i>Perce- ntage</i>
Remembering	Short answer arguments	28	18.91
Understanding	Text-centred arguments	32	21.62
Applying		2	1.35
Analysing	Analytic arguments	67	45.27
Evaluating	Decision-based arguments	16	10.81
Creating	Empirical arguments	3	2.02

Source: Authors

Table 5 shows the frequencies and percentages of NCERT English textbook questions of classes 8th, 9th, and 10th based on different cognitive demands and argumentation skills described in the revised version of Bloom’s taxonomy (2001) and Wolfe’s schema for argumentation skills (2011), respectively.

Table 5: Overall frequencies and percentages of NCERT English textbook questions after combining all the three classes (that is, 8th, 9th and 10th)

<i>Cognitive demands</i>	<i>Argumentation skills</i>	<i>Freq- uency</i>	<i>Perce- ntage</i>
Remember	Short answer arguments	63	19.32
Understand	Text-centred arguments	85	26.07
Apply		5	1.53
Analyse	Analytic arguments	141	43.25
Evaluate	Decision-based arguments	29	8.89
Create	Empirical arguments	3	0.92

Source: Authors

Finally, looking at the results of all three classes together, which consisted of 326 exercise questions spread across 32 chapters in the secondary class NCERT English textbooks, the researchers found that the cognitive demand of ‘Analyse’ that requires analytic argumentation skill is the most frequent with 43.25 percent occurrences followed by ‘Understand’ requiring text-centred arguments with 26.07 percent occurrences. However, the cognitive demands of ‘Create’ and ‘Apply’ had the least occurrences, that is 0.92 percent and 1.53 percent respectively, which implies that these cognitive demands have not been given sufficient attention while producing textbooks. Overall, the researchers found that there is a dominance of ‘Analyse’ type HOTS questions in these books.

The researchers will try to compare the findings with some other recent works in language education using BTCD in this section. The researchers found that some studies (Al-hasanat 2016 for Arabic; Riazi and Mosalanejad 2010; Razmjoo and Kazempourfard 2012; Igbaria 2013 for English) actually pointed out a lack of Higher Order Thinking skills (HOTS). But on the other hand, there are studies which indicate that even the highest level of cognitive skill like creating has been given prime importance in the English textbook of Malaysia even in grade 5th (Oktaviani 2018). Another study from Israel (Assaly and Smadi 2015) with 10th class textbook also revealed a 40 percent preference for the HOTS. The result also reveals that HOTS type questions are more than 40 percent in the textbooks though there is clearly an imbalance in their representation. Only analyse type questions from HOTS are well represented compared to the other two of create and apply types. The lowest percentage of ‘create’

type questions in the textbooks can be detrimental for the students to foster the essential creative skill to pursue higher studies and research.

CONCLUSION

The study was meant to enquire whether textbook developers give proper attention to nourish the reasoning and argumentation skills in learners which are much more needed for their intellectual and social development. The result though overall shows that Higher Order Thinking Skill questions like for ‘analyse’ have predominance in the textbooks, and it is also a disappointment to find very less representation of other two higher order thinking skills. Therefore, in the overall scale of cognitive demands the representation of the six skills of BTCD and five corresponding argumentation skills is imbalanced and disproportionate. In both 8th and 9th classes, the cognitive demand of ‘Create’ is missing and the researchers think that there should be some representation of such questions in these classes also. However, a drastic decrease in the cognitive demand for ‘Apply’ from 8th to 9th class by 4 percent is surprising where it should increase with the development of cognitive maturity level of the learners.

RECOMMENDATIONS

With respect to India’s 2020 National Education Policy (NEP), which asserts that learners need to become problem-solvers and critical thinkers, it can be recommended that educators are encouraged to design instruction that engages learners at higher levels of cognitive demand, which correlates to imbibing such mental capacities. The demand of the time is to move beyond mere rote memorisation and comprehension to foster critical thinking, problem-solving, and creativity. Bloom’s Taxonomy is a highly potent instrument that can facilitate educators in developing enhanced and captivating pedagogical encounters for their pupils. Through a comprehensive understanding of the various tiers within Bloom’s Taxonomy, educators possess the capacity to craft pedagogical endeavours that effectively engage students in the realms of critical and creative thinking. The acquisition of this particular mode of education is of utmost importance in

adequately equipping students with the necessary skills and knowledge required to thrive in the contemporary labour market of the 21st century.

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