An Analysis of The TRIO Reading 2 Questions Based on Bloom's Taxonomy

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Abstract: The purpose of the present study was to describe the types and levels of questions available in the textbook TRIO Reading 2, which is used for level two at the English Department, King Khalid University. The study aimed to identify and analyse the questions based on Bloom's Taxonomy (1956) of the cognitive domain. Data were analysed using a coding scheme based on Bloom's Taxonomy. The findings indicated that the questions in the TRIO Reading 2 textbook covered all the cognitive domain levels of Bloom's Taxonomy i.e. knowledge, comprehension, application, analysis, syntheses, and evaluation. The most popular type of questions used was aligned with comprehension followed by knowledge and syntheses, then by evaluation while analysis and application were the least frequently used in the textbook. Results also revealed that among the 335 questions in the textbook, 177 of them focused on the lower level and 158 focused on the higher level ones. The study recommended that EFL teachers and academic policymakers should regularly evaluate the effectiveness of university textbooks and maintain a balance between both higher and lower level questions.

Keywords: Bloom's Taxonomy, English Language Textbooks, Types of Questions, Textbook Evaluation, Learning Objectives

1. Introduction

Learning English is essential in the era of globalization. In the developmental process of educational programmes, three elements became central issues in discussions and research. They are teachers, students and curriculum. There is great emphasis on how to design a suitable curriculum, how to select good teaching materials and how to evaluate textbooks. Textbooks are helpful to the teachers and students. They provide the subject matters as well as activities and questions to assist students' usage of different levels of thinking. Chinoda (1982) highlights the importance of regular evaluation of textbooks. Tomlinson (1998) adds that the evaluation of textbooks is related to the objectives of learning. Sheldon (1988) stresses the influence of textbooks on students' attitude towards learning a second language. Anderson and Krathwohl (2001) discuss the Vygotskian and Piagetian taxonomies for textbook evaluation. One of the earliest available taxonomies is Bloom's Taxonomy (1956) of learning objectives. It helps in matching assessment to course learning objectives (Krathwohl, 2002).

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Marzano and Kendall (2007) discuss the practicality of Bloom's Taxonomy for course evaluation. It can be used to assess teaching materials according to the cognitive learning domain. Bloom et al. (1956) divided the cognitive domain into six levels. The order of cognitive processes from the lowest level which is the simple remembering of knowledge and recognition of facts to the highest complicated and complex level which is evaluation as follows:

Level 1 is Knowledge. It simply consists of recalling of relevant knowledge from long-term memory.

Level 2 is Comprehension. It comes after remembering items and it is concerned with constructing meaning from oral, written, and graphic messages. It covers interpreting, summarizing, or inferring outcomes.

Level 3 is Application. It is concerned with employing acquired data in recent cases. It covers implementing principles and terms in suitable circumstances.

Level 4 is Analysis. It consists of breaking down materials into their elements, to determine how the parts relate to one another and to an overall structure.

Level 5 is Syntheses. It focuses on putting elements together to form a new entity. It covers generating, planning, or producing particular communication.

Level 6 is Evaluation. It means making judgments based on criteria and standards. This level is the highest in the thinking process as it contains thinking processes from all the former ones.

Schultz (2005) states that levels 1 & 2 are considered lower level questions as they require students to respond to the cognitive level of knowledge and comprehension. This type of questions is the foundation for getting high cognitive skills. On the other hand, Levels 3, 4, 5, and 6 are considered higher level questions as they require students to respond to the cognitive level of application, analysis, syntheses, and evaluation. Similarly, Freahat and Smadi (2014) stress the integrative relationship between lower and higher level cognitive questions. Jo and Bednarz (2011) assure the importance of higher-order thinking skills in improving students' thinking skills. Muchlis (2015) assures that comprehension depends on thinking critically and using different levels of thinking.

Zareian et al. (2015) shed some light on the development of Bloom's (1956) taxonomy of learning objectives as follows: In 1984 educators encouraged students to understand, internalize knowledge, comprehend and grasp the core essence of topics. In 1956, bloom's taxonomy of educational objectives was introduced at the University of Chicago. Benjamin Bloom classified the cognitive domain of educational objectives into six levels. The lowest and simplest level is knowledge and the highest and more complex one is evaluation. In 1990, Lorin Anderson, Bloom's former student, gathered with cognitive psychologists, curriculum theorists, instructional researchers, and testing and assessment specialists to update the taxonomy. Changes in the terminology were devised. All of Bloom's categories were changed from nouns to verbs in the new version. The first level knowledge was replaced by remembering and the last level evaluation was moved from the top to the second from the top and creating became the last level in the new version (Anderson & Krathwohl, 2001).

1.1 Statement of the Problem

In language programmes, most of the attention is given to textbook evaluation. Content analysis of the textbooks such as grammar, skills and sub-skills, strategies and functions was conducted. Little attention is paid to the relationship between questioning practices and learning objectives. Matching assessment to course learning objectives needs to be addressed when dealing with the domain of language learning. Among the components of the textbooks are questions. Edward and Bowman (1996) discuss the importance of designing quality questions as they create interest in the subject.

Therefore, the present study aimed at identifying the questions presented in the TRIO Reading 2 textbook based on Bloom's Taxonomy. It would be insightful to know how to assist classroom instruction by stressing the effects of questioning practices on learners' learning.

1.2 Objectives

The present study aims to identify the percentage of questions presented in each level of the cognitive domain as well as to explore the lower and higher level questions of the TRIO Reading 2 textbook based on Bloom's Taxonomy.

The study objectives are as follows:

1. To identify the percentage of questions presented in each level of the cognitive domain of the TRIO Reading 2 textbook.
2. To explore the lower and higher level questions of the TRIO Reading 2 textbook based on Bloom's Taxonomy.

Specifically, the following major research questions are addressed.

1. What is the percentage of questions presented in each level of the cognitive domain of the TRIO Reading 2 textbook?
2. What are the percentages of the lower and higher level questions of the TRIO Reading 2 textbook based on Bloom's Taxonomy?

1.3 Significance of the Study

Textbooks are the core of the teaching and learning processes. Saif (1994) states that students spend 90% of their study time on reading their textbooks. It is the main source that supplies them with information. In addition, Edward and Bowman (1996) present a correlation between question types and interest in subject matter. Similarly, Al-Btoush (2012) reports that textbooks questions should improve students' higher thinking abilities. Therefore, there is a need to analyse the questions of the textbooks. The first is TRIO Reading 2 textbook and the rest of the textbooks for all levels will follow. The researcher intends to identify the questions in relation to the six levels of Bloom's Taxonomy (knowledge, comprehension, application, analysis, syntheses and evaluation). Results could be used by professors, academics course designers and educational decision-makers to modify the materials in their students' curriculum, and in their language classrooms, to help them achieve success and improve the quality of education. This study can add something to the field of textbook evaluation.

2. Literature Review

There is a growing body of research that focuses on the evaluation of curriculum, language programs and textbooks, to benefit teachers, students and other decision makers, and improve the efficiency of the educational process. Tomlinson (1998) describes the evaluation of textbooks as examining its material in relation to its objectives. Among the several studies that evaluate English textbooks are Nurisma, 2010; Al Btoush, 2012; Abdelrahman, 2014; Zareian et al., 2015; Ulum, 2016; Al Raqqad & Ismail, 2018; Shuyi & Renandya, 2019.

Nurisma (2010) examined the types of questions available in the e-book *Developing English Competencies using Bloom's Taxonomy*. A total of four hundred questions were collected from the textbook and analysed. Results indicated that the most frequent type of questions used was knowledge, followed by application, and then by analysis. The least frequent type used was evaluating.

Al Btoush (2012) studied the types of questions presented in four English language secondary school textbooks in Jordan. The questions were categorized according to Bloom's Taxonomy. The findings indicated that 66% of the questions fall under the low level questions of knowledge and comprehension while 29% of questions were directed towards the high level of Blooms Taxonomy. This reflected the dominance of the low level questions in the investigated textbooks.

Abdelrahman (2014) analysed the questions of the tenth grade English textbooks in Jordan based on Bloom's new Taxonomy of the cognitive domain. Results indicated that among the 655 questions identified, the most frequent ones were lower level questions as they belong to the first two levels remembering and understanding.

Similarly, Zareian et al. (2015) examined the questions of two English for specific purposes textbooks in Iran. They are English for Science and English for Engineering. The data were codified according to the new version of Bloom's Taxonomy. The findings revealed that most of the questions belong to the lower level categories, remembering, understanding and applying; whereas, the least of the questions belong to the higher level categories such as analyzing, evaluating and creating.

Again, Ulum (2016) investigated the levels of the reading comprehension questions in the coursebook titled Q: Skills for Success 4 Reading and Writing. Analysis of the data based on Bloom's Taxonomy of cognitive domain revealed that the textbook lacks the higher level cognitive skills such as application, analysis, syntheses and evaluation.

Similarly, AlRaqqad and Ismail (2018) analysed the reading questions of the Action Pack 12 English Language Textbook. Bloom's Taxonomy of the Cognitive Domain was used in the analysis and classification of questions. Results indicated the coverage of all levels of questions in the book. Another finding revealed that 79 questions belong to the thinking processes of knowledge, comprehension and application), on the other hand, 35 questions belong to the thinking processes of analysis, synthesis, and evaluation).

Others such as Shuyi and Renandya (2019) investigated the use of cognitive levels of questions available in secondary school English language textbooks in Singapore. The findings showed that all cognitive

levels of questions were included i.e. high-level questions and low-level ones. However, the cognitive level questions were not diverse. The skills of remembering and applying were neglected and understanding and evaluating were stressed.

In general, previous studies showed that the questions in the above textbooks mostly do not emphasize higher levels of cognitive learning objectives, while lower levels cognitive skills were more dominant.

3. Methodology

3.1 Research Design

The questions of the research were answered by conducting descriptive content analysis. Qualitative data were collected, categorized and analysed to describe the reading comprehension questions according to Bloom's Taxonomy of the Cognitive Domain.

3.2 Participants

A total of 335 questions were presented in the TRIO Reading 2 Textbook which was used for the 2nd level in the English Department at King Khalid University. This TRIO series is for three-levels of academic skills. It is currently taught in the Department of English language to assist students to upgrade their English Language proficiency in reading, writing, listening and speaking.

3.3 Instruments

Bloom's taxonomy is widely used in the evaluation of textbooks. It is probably the most useful among the cognitive process models. It is used in the present study to analyse the questions of the textbook "TROI Reading 2". This textbook comprises nine units. Each unit is divided into three chapters. Each of these chapters consists of three parts i.e. before reading, during reading and after reading. Questions in these units were classified and codified to six levels of Bloom's taxonomy. They are labelled as knowledge, comprehension, application, analysis, syntheses and evaluation. The data were slotted into categories and then the frequency and percentage per each taxonomy level and domain were tabulated.

4. Results and discussion

This section provides a description of the frequencies and percentages of the questions presented in the TRIO Reading 2 Textbook according to the six levels of the cognitive domain in Blooms Taxonomy. Besides, it explores the lower and higher level questions of the textbook according to Bloom's Taxonomy. Nine units with a total of 335 comprehension questions were analysed quantitively and classified by the researcher. The results of the study will provide answers to the following research questions:

4.1 What is the Percentage of Questions in Each Level of the Cognitive Domain of the TRIOŦ Reading 2 Textbook?

To answer the first research question, the frequencies and percentages of questions related to all levels of the cognitive domain were calculated and summarised in Table 1. Results showed that there is a variation in the use of cognitive domain levels involved in answering the textbook questions.

Table 1: Frequencies and percentages of the six levels of the cognitive domains in Bloom's Taxonomy in the TRIO reading 2 textbook

Cognitive Domain Level	Frequency	Percentage
Knowledge	69	20.6%
Comprehension	95	28.4%
Application	13	3.9%
Analysis	32	9.6%
Syntheses	67	20.0%
Evaluation	59	17.6%
Total	335	100%

In terms of overall level, analysis of the 335 questions in the TRIO Reading 2 Textbook based on Bloom's taxonomy revealed that the highest percentages of cognitive processes are related to the comprehension level (28.4%), followed by Knowledge (20.6%) and Syntheses (20.0%), then Evaluation 17.6%). Finally, Analysis (9.6%) and Application (3.9%) received the lowest percentages of cognitive processes.

These results show that the main concern of the questions is to raise students understanding of what they read. The reason behind the dominance of this lower order thinking skill "comprehension" is related to the importance of comprehension in understanding any reading passage. It is the base of all educational objectives. Besides, results show that comprehension is administered in reading questions more than in all the cognitive processes. This result is expected as it supports the findings of almost all the studies presented in the literature review of the present study which state that there is an overuse of lower order kind of questions in textbooks. Moreover, knowledge and syntheses are used at the same rate in TRIO Reading 2 Textbook as they have the same frequency and percentage. Students could develop the processes of recalling relevant knowledge and creating new ideas when putting information together. This also shows that a synthesis of information has the highest percentage among high level questions. Enhancing students' evaluation level is also stressed in the investigated textbook. Students could develop the ability to judge, justify and critique. This finding is contradicted in almost all of the literature review studies which state that higher-order cognitive processes are rarely found in textbooks. Finally, analysis and application are not entirely absent in the investigated textbook but they are used least frequently. Students could break information into small parts and use the knowledge in new situations. They could also link their previous knowledge with the newly gained. In sum, in answering the questions of the TRIO Reading 2 textbook, students can get a mix of lower and higher-order cognitive processes to enhance learning.

In terms of individual-level of questions presented in each unit based on Blooms' taxonomy, descriptive statistical analysis of the frequencies and percentages is illustrated in Table 2. It indicated some variations and similarities in the cognitive process involved in the questions of the TRIO textbook.

Table 2: Frequencies and percentages of the six levels of the cognitive domains in Bloom's Taxonomy for each unit of the TRIO reading 2 textbook

Units	Knowledge		Comprehension		Application		Analysis		Syntheses		Evaluation	
	N	%	N	%	N	%	N	%	N	%	N	%
1	10	21.7	11	23.9	1	2.2	3	6.5	14	30.4	7	15.2
2	6	15.4	10	25.6	2	5.1	7	17.9	6	15.4	8	20.5
3	9	23.7	8	21.1	1	2.6	4	10.5	5	13.2	11	28.9
4	6	17.6	11	32.4	1	2.9	3	8.8	10	29.4	3	8.8
5	7	20.6	7	20.6	1	2.9	5	14.7	9	26.5	5	14.7
6	9	28.1	9	28.1	2	6.3	2	6.3	7	21.9	3	9.4
7	6	17.6	13	38.2	1	2.9	2	5.9	7	20.6	5	14.7
8	6	15.4	13	33.3	2	5.1	4	10.3	5	12.8	9	23.1
9	10	25.6	13	33.3	2	5.1	2	5.1	4	10.3	8	20.5

Table 2 shows that the reading questions in unit 1 cover syntheses level most frequently with a percentage of 30.4%. This indicates that chapter 1 focuses on creating something new by using a combination of ideas. This process helps in the development of a higher level of cognitive domain more than the other levels.

Regarding unit 2, comprehension level is stressed in reading comprehension questions with a percentage of 25.6%. This means that students' ability to see the meanings and process what they read is highly developed. This type of questions assists the enhancement of the lower order thinking skill of Bloom's taxonomy.

On the other hand, in unit 3, the evaluation level is more dominant in reading comprehension questions with a percentage of 28.9%. This reveals that students' capacity to make judgments based on certain principles is emphasized. Again, higher-order thinking skill is stressed in this third chapter.

The reading comprehension questions in unit 4 cover the comprehension level more frequently, with a percentage of 32.4%. This result shows that a lower order thinking skill is emphasized.

In unit 5, the syntheses level is more dominant in reading comprehension questions. The percentage for this level is 26.5%. This indicates that the capacity to connect ideas together in an innovative way is stressed. This shows a high rate of the application of the higher order thinking skills.

The rest of units 6, 7, 8 and 9, all give more emphasis on the comprehension level for the reading comprehension questions with variant percentages for units 6 and 7 as they are 28.1% and 38.2% in order. On the other hand, units 8 and 9 have a similar percentage which is 33.3%. This indicates that the comprehension level is employed more in reading questions than the rest of the cognitive levels. Again, this displays that lower order thinking skill according to Bloom's taxonomy is enhanced in these chapters.

4.2 What are the percentages of the lower and higher level questions in the TRIO Reading 2 Textbook based on Bloom's Taxonomy?

To answer this second question, data were categorized into six levels of Bloom's Taxonomy. These six levels were then classified into two major categories, Lower and higher-order questions. The lower levels represent the first two cognitive processes that involve knowledge and comprehension. The higher cognitive processes involve application, analysis, syntheses and evaluation. The percentage and frequency of lower and higher levels of cognitive processes involved in the questions in the TRIO textbook were illustrated in Table 3.

Table 3: Percentage and frequency of lower and higher levels of cognitive processes involved in the questions in the TRIO textbook

	Lower level		Higher level			
Cognitive Domain Level	Knowledge	Comprehension	Application	Analysis	Syntheses	Evaluation
Frequency	69	95	13	32	67	59
Total	164 (48.96%)		171 (51.04%)			

Table 3 shows that among the total number of questions 335 (100%), there are 164 (48.96%) questions that enhance the lower order of thinking and 171 (51.04%) questions that stress the use of the higher-order thinking skills. In other words, the higher-order cognitive processes (Application, Analysis, syntheses, evaluation) dominate the lower order ones (Knowledge and comprehension). However, the difference between the two is small. This finding contradicts the results of the literature review studies which show that the majority of textbooks questions are lower order cognitive processes.

In general, the table shows that each chapter consists of a high frequency of both lower order thinking skill followed by higher ones or vice versa. In other words, the quantity of both comprehension and knowledge

levels are close to each other. To sum up, this book has both lower and higher cognitive questions. It serves to enhance both the lower and higher level cognitive processes. It can help in attaining knowledge and enhancing the higher-order thinking processes.

5. Conclusion

The current study investigated the percentage levels of questions presented in the TRIO Reading 2 textbook based on Bloom's taxonomy. The results revealed that the main objective of the TRIO Reading 2 textbook was to develop both higher and lower cognitive skills. The questions in the textbook engage both the lower and higher levels of cognitive processes. The lower orders of thinking skills are less frequent and they facilitate the acquisition of knowledge and help comprehension. On the other hand, the higher order of thinking skills is used to develop the other cognitive skills such as application, analysis, syntheses and evaluation. They help students interact more effectively and intellectually. In sum, the findings of the current study reveal that the TRIO Reading 2 textbook is suitable to help learners acquire reading skill as well as enhances their lower and higher order thinking skills. Results also help educational practitioners, academic policymakers, and teachers, to benefit from this book as it incorporates higher and lower order questions to achieve the learning objectives. Students could get practice to comprehend, apply information to generate conclusions, analyse, synthesis and evaluate while processing information. Further research should approach textbook evaluation and the engagement of students in higher and lower levels of the cognitive domain. A good topic for investigation might be the rest of the TRIO series of textbooks. Results could benefit in improving the questions in the textbooks to cover the six levels of Bloom's Taxonomy. Teachers could be trained to engage students' lower and higher cognitive skills by writing questions following Bloom's Taxonomy.

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