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Title                   An analysis of the cognitive rigor of questions used in secondary three English textbooks
Source                  Dean's Commendation for Undergraduate Educational Research Papers: Educational Research AY2017/2018
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Citation: Soong, N. S. (2019). An analysis of the cognitive rigor of questions used in secondary three English textbooks. Unpublished manuscript, National Institute of Education, Nanyang Technological University, Singapore.
An Analysis of the Cognitive Rigor of Questions used in Secondary Three English Textbooks

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Abstract - Textbooks are an essential component in the classroom, making it extremely crucial to regularly evaluate textbooks used in schools so that their pedagogical contributions towards the teaching and learning processes can be guaranteed.

This study aimed to identify and analyse the cognitive levels of questions available in Secondary Three “All About English” textbooks, which have been used in Singapore since 2013. The objective of carrying out the analysis was to determine the overall cognitive rigor of questions, using a matrix superimposing two taxonomies: Revised Bloom’s Taxonomy and Webb’s Domain-of-Knowledge (DOK) model.

The sample of this study consisted of questions from the Express and Normal Technical (NT) English language textbooks from Hodder Education, where 346 questions were analysed in total. The cognitive rigor matrix was used in the classification of the questions.

The results revealed that in the Express level textbook, most questions were within the cell [2,3] (35.9%), consisting of Understand and “Strategic Thinking” questions. In contrary, for the Normal Technical level textbook, most questions were within the cell [5,4] (17.6%), consisting of Evaluate and “Extended Thinking” questions. Overall, there was a good mix of Lower-order thinking skill (LOTS) and Higher-order thinking skill (HOTS) questions. However, not all cognitive levels were clearly varied, with an over-emphasis on Understand and Evaluate questions, neglecting Remember and Apply questions.

In light of the results, it is recommended that coursebook writers incorporate questions of varied cognitive demands. Similar studies should also be conducted regularly to evaluate the effectiveness of school textbooks in their potential in enhancing students’ critical thinking.

Keywords – Secondary Three, English, Textbooks, Cognitive Rigor, Questioning

INTRODUCTION

BACKGROUND

Objectives of the 2010 English Language syllabus

Over the past few decades, the evolution of the English Language syllabuses in Singapore has been shaped by the progress in researches regarding language and pedagogy, in conjunction with changes in national concerns and policies (Lim, 2002). In the eighties, the English syllabus was centred upon developing students’ basic functional literacy in English. In order to achieve the country’s need for a well-read work force of that time, the teaching of English was carried out through a stringent and rigid method of the syllabus, with little emphasis catering to varied student needs and profile (Lim, 2002). However, Wagner (2008) asserts that thriving in the global information economy today necessitates additional skills such as thinking critically and skills to problem-solve.

In 1997, the “Thinking School, Learning Nation” initiative was rolled out to schools, with a key strategy being the addition of critical and creative thinking skills into the Singapore school curriculum (Leen et al., 2014). Today, the current 2010 English syllabus has seen a shift towards developing students to become competent members of the knowledge-based economy. This is achieved through the enhancement of students’ literary techniques, information literacy and critical skills “…to communicate effectively, using the internationally acceptable standard of English, appropriate for different purposes, audiences, contexts and cultures” (Curriculum Planning & Development Division, 2010, pg. 10).

The English curriculum, which was once prominent in teaching discrete grammar items and words through a bottom-up, part-to-whole approach, has now transitioned into a more holistic, book-based, whole-part-whole approach, where students are regarded as active, critical and creative learners with teachers whose job is to facilitate and differentiate learning materials according to the students’ diverse needs and capabilities.
Overview of the Textbook Situation in Singapore

In Singapore, English textbooks are a resource tool utilized by teachers when designing the scheme of work or adapted as learning resources to be used in lessons. Prior to 2001, where textbooks are concerned, the syllabuses for primary and secondary school English were aided by textbooks written by former Curriculum Development Institute of Singapore (CDIS) of the Ministry of Education (Lim, 2002). Today, the private sector has been tasked with the role of textbook writing, where publishers would be provided snippets of the subject’s syllabus in order to produce their own textbooks. Subsequently, school personnel would be given the choice to select the textbooks to be used in their respective schools. According to the latest approved textbook list by MOE, there are currently only three approved English textbook titles for the Secondary level namely: All About English (for all streams in Secondary 1-4), English Access (Secondary 1 & 2 Normal Technical only) and English Empowers (Secondary 1 & 2 Express and Normal Academic only).

Although the intention of delegating the role of textbook writing to the private sector was intended to provide a greater variety and choice for schools, it became apparent that the textbooks were unable to effectively embody the syllabus’ goals and objectives (Lin, 2003). For example, these textbook writers might not have actually comprehended the thought processes and underlying pedagogical approaches which shaped the crafting of certain goals in the syllabus. In her review of primary school textbooks, Teo (2002) states that while they cosmetically represented the revised and updated syllabus, publishers did not necessarily offer resources in alignment to the syllabus’ philosophy.

TAXONOMIES USED FOR THE ANALYSIS OF QUESTIONS

In this research paper, a cognitive rigor matrix, designed by Hess, Jones, Carlock, and Walkup (2009) which superimposes both the Revised Bloom’s taxonomy (2001) and Webb’s Depth-of-Knowledge (DOK) (1997), has been chosen as the framework for analyzing the questions in the English textbooks.

These two models are frequently used in the educational domain for evaluating curriculum, instruction, assessment and materials (Coleman, 2011). Bloom’s taxonomy takes into account six levels for analysing the goals of the cognitive domain among students: Remember, Understand, Apply, Analyze, Evaluate and Create. Bloom’s Taxonomy is hierarchical, with knowledge, comprehension and application categorized as “Lower-order questions” and analysis, synthesis and evaluation as “Higher-order questions” (Feng, 2013). While Bloom’s Taxonomy describes the necessary thinking processes when answering a question, the DOK model accounts for the complexity of content comprehension and the type of skills mandatory to fulfill a question’s requirements from its inception to finale (Hess et al., 2009). Webb’s DOK model provides an alternative perspective of cognitive complexity by analyzing the kind of subject material being assessed in a question and the required task students set out to answer (Webb, 1997).

The combination of these two models, through a Cognitive Rigor Matrix (CRM), forms an overall comprehensive structure for defining questions’ rigor, thus providing a holistic approach in analyzing the questions. CRM has been used a tool by educators and curriculum planners as a strategy for analyzing instructional materials, due to its significant potential in enhancing the planning of instructions and assessments being carried out in the classroom (Hess et al., 2009).

RESEARCH PROBLEM

As stated earlier, one objective of the current English syllabus is to equip students with the literacy and critical skills to communicate effectively and purposefully using the internationally acceptable standard of English (Curriculum Planning & Development Division, 2010). To achieve this, it is necessary to trigger students’ thinking by ensuring that students are able to move on from merely factual recall or procedural levels, and to take part in higher order thinking skills, such as the application, analysis, evaluation and creation of knowledge.

While the recent shifts in the goals of the syllabus have been encouraging, there is the challenge of translating the goal of this new syllabus into appropriate textbooks for students (Mee, 2002). In order to embrace the notion of “students as active thinkers and learners” in our schools today, teachers should be aided by quality textbooks, to provide students the opportunities to remember, understand, apply, analyze, evaluate and create the learning material in the form of questions. The types of questions that educators engage students in, aided by the questions posed in textbooks, to a large extent, impact the type and level of thinking processes which pupils are exposed to and able to practice on a daily basis (Chin, 2004). This calls for the need to investigate if the questions used in textbooks today are aligned with the objectives of the English curriculum to lead students from a situation of merely memorizing material, to the ability of engaging in higher order thinking skills.

RESEARCH QUESTIONS
TEXTBOOKS

OBJECTIVES AND IMPORTANCE OF RESEARCH

Despite the fact that the *All About English* textbooks have been approved by the Ministry of Education (MOE) as the official English textbook to be used in secondary schools since 2013, studies evaluating these textbooks in their alignment to the objectives of the English curriculum seem inadequate in the body of literature. Taking into account the fact that the period approved for “All About English” textbooks is set to be renewed in 2019, it is timely to assess and evaluate the present textbooks used in schools.

The results from the textbook’s evaluation would be able help teachers better comprehend which levels of questioning are emphasized in the textbook to develop students’ thinking, enhancing the effective usage of these textbooks. Lastly, the results from this paper will be a good indicator for future English textbook writers regarding the form, level and efficacy of the questions required in a textbook to develop higher-order thinking in students, a skill required in the 21st century.

LITERATURE REVIEW

A multitude of studies in various countries have been carried out in order to explore the types of cognitive processes used in textbooks’ questions of various subjects, with the usage of Bloom’s taxonomy as a tool for classifying and analysing the questions. Prominent research in this field would include studies conducted by Sunggingwati (2003), Riazi & Mosalejad (2010), Igb (2013), Tarman & Kuran (2015) and Adli & Mahmoudi (2017), which have repeatedly shown that textbooks, ranging from high schools to the Masters’ level still having a preponderance of lower order questions of remembering and understanding. This is despite the fact that education experts have repeatedly stressed the importance to include an impartial number of both LOTS and HOTS questions catered to students’ standards for enhancing students’ achievement (Freaht & Smadi, 2014). While LOTS questions are able to boost students’ attainment of factual knowledge and strengthen the fundamentals of students in their attainment of higher cognitive levels, HOTS questions are often employed in order to stimulate students’ thinking while enhancing their development of intellectual skills to solve problems and make decisions.

Furthermore, a study done by Adli & Mahmoudi (2017) also highlighted the worrying trend that textbooks which supposedly cater to a range of learners’ profiles, had combined a mix of LOTS and HOTS question types indiscriminately. For example, results from the study conducted by Tarman & Kuran (2015) showed that textbook questions catered for higher ability students did not intentionally include a higher number of cognitively demanding questions catered for the student profile. However, questions of varying cognitive levels used in textbooks serve as a platform to improve students’ comprehension of the text (Freaht & Smadi, 2014) as the cognitive level of a question has shown to promote an interplay between pupils’ current schema and the comprehension material (Wixson, 1983). This makes it imperative for the types of questions in the textbook to deliberately take into account the varying aptitude levels of students. It is therefore unsurprising that a common recommendation that these authors have towards textbook publishers is to place more emphasis on questions that encourage an impartial mix of LOTS and HOTS processes, tailored to the learners’ abilities.

While Bloom’s Taxonomy proves to be a useful taxonomy to categorize questions according to their cognitive complexity, it suffers limitations because it incorporates verbs for the differentiation of taxonomy levels although numerous verbs may be included at several levels of complexities. For example, the context in which the verb is situated in modifies the meaning of the sentence. Although a verb might be categorized as requiring LOTS in one context (recognizing a definition of a scientific term), the exact same verb may actually be requiring HOTS in an alternative context (recognizing circumstances which could lead to conflicts in a particular situation) (Stanny, 2016). Regardless of context, there are numerous words used in questions which might have several connotations and meanings, resulting in uncertainty about the level of cognitive skill intended by the writer when classifying the questions. This has led to the lack of articulation of the complexities the taxonomy might have unintentionally brought about (Hess et al., 2009). To address the problem, a novel model to examine the rigor posed by questions, the Depth-Of-Knowledge model (DOK) by Webb (2002), was developed to include the depth of students’ comprehension and the complexity of the content in the required task. A variety of DOK level descriptors were developed for various subjects such as English (Hess, 2004), Science (Hess, 2006) and Social Studies (Hess, 2005). However, as there was a lack of a straightforward and direct correspondence relating to Bloom’s Taxonomy and the DOK model, a matrix was formed to superimpose the both of them (Hess, 2006). The resulting cognitive rigor matrix connects the two schemata, providing teachers a model to analyse the rigor expected from the questions. Since then, studies have been conducted using the CR matrix to analyze homework questions, quizzes and worksheets (Hess et al., 2009).

Lastly, while most studies only used Bloom’s Taxonomy to analyze questions in textbooks, Parker and Hurry (2007) incorporated the use of Blosser’s Taxonomy (1991) to further analyze the reading comprehension questions based on whether they were “Open” or “Closed”, thus providing insight into the form in which questions were being asked. While few studies have used Blosser’s Taxonomy as a means to categorize questions, Blosser’s taxonomy could perhaps illustrate additional methods in which textbook
publishers could hinge on, in order to differentiate question types for students of varying learning abilities.

METHODOLOGY AND PROCEDURES

THE TARGET TEXTBOOKS AND SECTIONS UNDER EVALUATION

The target textbooks under evaluation is the All About English Secondary Three Express and Normal Technical textbooks published by Hodder Education in 2012. The textbooks are split into 6 sections, each section targeting a specific learning objective derived from the 2010 English Syllabus for Secondary school students. Table 1 below indicates the topics covered in the Express and Normal Technical textbooks respectively. For this research paper, only 2 out of the 6 sections (bolded) in each textbook were randomly chosen to have their learning objectives and questions analyzed. In this case, the first two chapters were chosen for the Express textbook, and chapters 2 and 5 chosen for the Normal Technical textbook.

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<thead>
<tr>
<th>SECONDARY THREE EXPRESS</th>
<th>SECONDARY THREE NORMAL TECHNICAL</th>
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<td>1. Using Language to Persuade</td>
<td>1. Using Language to Interact Socially</td>
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<td>2. Using Language to Inform</td>
<td>2. Using Language to Inform</td>
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<td>3. Using Language to Evaluate</td>
<td>3. Using Language to Explain</td>
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<td>4. Using Language to Express Thoughts and Feelings</td>
<td>4. Using Language to Entertain</td>
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<tr>
<td>5. Using Language to Interact with Others</td>
<td>5. Using Language to Persuade</td>
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Table 1: Contents page of the Secondary Three Express and Normal Technical “All About English” Textbooks

STUDENT PROFILE

In the Singapore context, Secondary Three textbooks are catered to 15-year old students. At the secondary level, Singapore students are streamed into one of the three streams (Express, Normal Academic and Normal Technical) based on their Primary School Leaving Examination results. The ‘Express’ stream is referred to as the higher-ability stream and students would sit for an academically rigorous ‘O’ level national examination in Secondary Four. On the other hand, students in the ‘Normal Technical’ stream are referred to as less ‘academically-inclined’ (Moo, 1997) and have to sit for a comparatively less academically rigorous, ‘N’ level national examination.

The level ‘Secondary Three’ has been specifically chosen because it is a critical stage for students, whereby they begin to intensively prepare for the national exams. Students at this level should be adequately exposed and provided the foundation to LOTS and HOTS questions in order to further their thinking skills when entering Secondary Four. Therefore, the examination of the questions found in Secondary Three textbooks would shed light on the extent in which students of that level are exposed to lower and higher-order thinking skills.

DATA COLLECTION AND ANALYSIS

Data required for this research paper was being collected in a total of two stages:

a. **The First Stage:** One copy each of the Secondary Three Express and Normal Technical All About English textbooks were obtained. All 346 questions from the relevant sections in the textbooks were collated and categorized based on Bloom’s Taxonomy and Webb’s DOK levels. The analysis of the Normal Technical textbook consisted of pages 42-77 and 160-195. Similarly, the Express textbook was analysed, consisting of pages 2-42 and 48-90. The questions were listed and analysed according to the level of the cognitive domain according to the cognitive rigour matrix.

b. **The Second Stage:** After all the questions were categorized, the frequency of each level of Bloom’s taxonomy/Webb’s DOK model were organized into graphs and tables.

THE UNIT OF ANALYSIS


In this research paper, Directed Content Analysis was used as the primary research methodology to code the types of LOTS and HOTS questions used in the English textbooks. Content analysis necessitates the establishment of various categories. The data which are collected will be slotted into the categories and the number of occurrences in which they are found in a text will be finally tabulated (Joffe & Yardley, 2004). This form of analysis is noted as a methodical system to compress numerous words into a fixed number of content categories founded on explicit definitions of each category (Berelson, 1952; Krippendorff, 2018). The directed approach to content analysis uses existing theories, which in this case is the Revised Bloom’s
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taxonomy and Webb’s DOK model, to derive initial coding categories and operational definitions for each category.

FINDINGS AND INTERPRETATIONS

DISTRIBUTION OF QUESTIONS BASED ON THE REVISED BLOOM’S TAXONOMY

Secondary Three (Normal Technical)

Distribution of questions in each of the six cognitive levels

Overall Distribution of Higher and Lower Order questions

Based on Figure 1, the two categories of Lower- and Higher-Order questions were tabulated. From Figure 3, the results show that the textbook generally places a greater emphasis on the higher-order thinking processes, at a frequency of 77 questions, as compared to 71 lower-order questions only. However, the difference between the two is small.

Secondary Three (Express)

Distribution of questions in each of the six cognitive levels

Figure 1 shows the frequency and Figure 2 shows the percentages for the questions represented in each level in the NT textbook. The occurrences in the table range from 2-47 with percentages ranging from 1%-32%. The levels that appeared most frequently was Evaluate and Understand, with percentages of 32% and 31% respectively. Apply and Create received the lowest percentage at 1% and 2% respectively. The last two levels Remember and Analyse appeared at almost equal percentages at 16% and 18% respectively.
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Figure 5: Percentages of the Questions in the Six Levels of the Cognitive Domain in the Revised Bloom's Taxonomy in Chapters 1 & 2 in the Express Textbook “All About English”

The frequencies in Figures 4 & 5 ranged greatly from 5-108, with percentages ranging from 2%-54%. The level that dominated the figures was Understand, with a percentage of 54%. The second more represented level was Evaluate, with a percentage of 22%. The level represented the least was Apply, at 2%. The rest of the levels, Analyse, Create and Remember had percentages of 11%, 6% and 5% respectively.

Overall Distribution of Higher- and Lower-Order questions

Figure 6: Frequency of Higher and Lower Order questions in the Express Textbook “All About English”

Figure 6 shows the frequency of higher and lower order questions in the Express textbook after being tabulated. It is evident that lower order questions appeared more frequently, at 61.7% (122 questions), as compared to 38.4% (76 higher order questions).

Figure 7: Frequencies of Questions in the Four Levels of Webb’s DOK model in the Express and Normal Technical Textbooks “All About English”

Figure 7 shows the frequencies of the four levels of the DOK model in the Normal Technical and Express textbooks. In general, both textbooks show the highest number of Level 3, “Strategic Thinking”, questions, followed by Level 2, “Skills and Concepts”, questions, followed by Level 4, “Extended Thinking” questions and finally Level 1, “Recall and Reproduction” questions.

Secondary Three (Normal Technical)
Distribution of questions according to the DOK model

Figure 8: Percentages of the Questions in Webb’s DOK model in Chapters 2 & 5 in the Normal Technical Textbook “All About English”

Figure 8 represents the percentages of the four levels in Webb’s Depth-of-Knowledge (DOK) model. Generally, the levels are quite evenly distributed. The level that appeared most frequently was Level 3, at 32%. Level 2 and Level 4 questions were represented at 28% and 22% respectively. Level 1 questions appeared the least, at 18% only.
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Secondary Three (Express)

Distribution of questions according to the DOK model

Figure 9: Percentages of the Questions in Webb’s DOK model in Chapters 1 & 2 in the Express Textbook “All About English”

In Figure 9, there is once again a large disparity between the levels of questions asked in the textbook. Level 3 dominates the number of questions, with a total of 45%. On the other hand, Level 1 received the lowest percentage of only 6%. Level 2 and Level 4 were 43% and 15% respectively.

OVERALL DISTRIBUTION OF THE COGNITIVE RIGOR OF QUESTIONS

Secondary Three (Normal Technical)

Table 2: Density plot of the cognitive rigor of questions posed in the Secondary Three Normal Technical English textbook “All About English”

Table 2 indicates that the questions posed in the Normal Technical textbook has a majority of questions correlating to the [3,4] cell, at 17.6%. There is also a relatively high number of questions in the [2,2] and [2,3] cells, at 14.2% each.

Secondary Three (Express)

Table 3: Density plot of the cognitive rigor of questions posed in the Secondary Three Express English textbook “All About English”

Table 3 indicates that the questions posed in the Express textbook has a preponderance of questions correlating to the [2,3] cell, at 35.9%. It is also evident that there is a relatively high number of questions in the [2,2] and [5,4] cells, at 15.7% and 10.1% respectively.

DISCUSSION

The results of the study have revealed a number of interesting findings.

Firstly, there is a preponderance of questions which emphasize lower level thinking processes in the Express stream textbook “All About English”. In Figure 6, 61% of the questions required LOTS while 39% required HOTS. This finding is in line with the results of past research previously discussed in the literature review, which shows that the majority of textbook questions consist of lower-order cognitive processes, such as Knowledge and Comprehension. Nonetheless, a higher number of LOTS compared to HOTS questions ought not to affect the judgement of the textbook being analysed. For example, Bloom (1956) stressed the need to also offer LOTS questions to pupils as a foundation for them to subsequently progress on to higher levels of cognition.

Besides, by using Webb’s DOK model as an added layer to analyze the nature of these questions, we realize that the majority of the lower-order Understand questions are categorized under “Level 3”, whereby students exercise “Strategic Thinking” and not merely the application of skills and concepts. For example, in Table 3, a large percentage of questions fall under the cell [2,3] where students are required to explain and generalize ideas from a text, as well as draw inferences about the text’s purpose and intended audience. On page 84, for example, has a question which writes, “What do you think the purpose of the writer is? Why do you think so?” and at page 66, “What kinds of
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readers do you think will find this extract useful? Why?”, found in the textbook. Besides just being able to construct meaning from the texts, students have to make inferences about the author’s intention when writing a particular piece of text. Given that the 2010 and future 2020 English syllabuses heavily hinge on students being able to use English appropriately for various purposes and audiences, this might explain the large number of such questions being posed to students.

Moreover, contrary to past research showing that Evaluate questions are rarely found in textbooks, it is heartening to find that 22% of the questions are Evaluate questions in the Express textbook. Additionally, most of these questions fall under Level 4, “Extended Thinking”, of the DOK model. In Table 3, 10.1% of the questions fall under cell [5,4], whereby students have to reflect and develop personal judgements after analyzing and evaluating the text or the opinion made by the author. For example, in page 73 of the textbook, there is the following question, “Recall some information reports that you have read recently. How do you decide if the information given is credible?” While the question asks students to recall information they have seen previously, students have to reflect on the texts they have seen, comparing and contrasting various aspects of the texts in order to substantiate their argument of what makes a particular text ‘credible’. Once again, the unique mix of Understand and Evaluate questions is actually in line with Bloom’s idea that comprehension should be a prerequisite for in-depth understanding, before students are also given the opportunity to be exposed to higher order processes such as Evaluate and Create (Forehand, 2010). Therefore, while lower-order processes such as Understand were dominant in the Express textbook under study, this study acknowledges the effort placed by the publishers to also ensure that higher-order cognitive processes are not entirely absent so that students get a mix of lower and higher order questions to enhance their learning.

Secondly, another surprising result stems from the fact that the questions posed in the Normal Technical stream textbook have shown a higher percentage of higher-order cognitive processes as compared to lower-order cognitive processes. In Figure 2, the most represented cognitive level is Evaluate, at 32%, followed by Understand questions. While the Express stream textbook has a disproportionate number of Understand questions, the Normal Technical textbook proves to have an almost equal mix of Understand and Evaluate questions. Similarly, when questions were categorized according to Webb’s DOK model, Level 3 appeared most frequently at 32%, with Level 1 questions being the least frequent at 18%. The recurring cognitive rigor of questions which students were commonly engaged in the textbook was cell [5,4] in Table 2, whereby students had to constantly reflect and develop personal judgements based on a piece of text they view or read. An instance of such a question is found in the textbook on page 67, “Use an Internet search engine such as Google to research the various visuals that can be used to present information. How do you decide which one to use?”. It is clear that not only does this question focus on honing students’ evaluative skills to make judgements based on criteria and standards, students are encouraged to connect with technology by browsing internet sites to find various information. Likewise, these questions were mostly open-ended in order to provoke discussions, such as asking students to discuss whether they agreed or disagreed with the author, with no right or wrong answers.

As compared to previous studies, the percentage of Evaluative questions are relatively high, especially so for a textbook catered to students who are academically weaker. These findings are incongruent with past research on textbooks written for students who struggle in English, where authors of these textbooks usually pose questions which call for lower thinking processes and lack levels of Analysis or Evaluation (Igbaria, 2013). It is evident that this NT textbook challenges the assumptions that low-achieving students are unable to engage in higher-order thinking activities as compared to their high-achieving peers. These findings align to a research conducted by Zohar & Dori (2003) which has shown empirical results that all students, regardless of academic ability, who had the chance to participate in HOTS, actually improving significantly relative to their initial grades. While questions in the Express textbook focused more on close-ended questions, where students had to make precise inferences about what a text means, the questions in the NT textbook were often more evaluative in nature, sparking discussions rather than a specific answer.

It is a common practice for publishers of textbooks catered to weaker students to incorporate traditional teaching of English via the bottom-up approach, where students study the rules of the language in a fixed and structured manner (Assaly & Smadi, 2015). However, this new method of using a functional approach to teaching English reflects the publishers’ view of language as a system of communication (Larsen-Freeman, 2000), where language is learned most effectively through real-world discussions which tend to be more interesting and purposeful to students, regardless of their academic ability.

While it is heartening to see a move towards a top-down approach from textbook publishers, one area of concern would be the fact that not all cognitive levels of the questions in the two textbooks were fairly varied. The results show that there was a majority of Understand and Evaluate questions, but few Apply, Remember and Create questions. For example, there were 108 Understand questions and only 5 Apply and 9 Remember questions in the Express textbook. In a research paper by Armbruster and Ostertage (1993), they claim that not all questions should require HOTS, as “...the use of factual questions can be defended on
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the grounds that students need to know certain basic information before they can engage in higher order thinking” (p.2). Therefore, having a number of LOTS questions in both textbooks would provide students with lower level information as a basis for students to progress on to higher levels of reasoning.

CONCLUSIONS AND RECOMMENDATIONS

Classroom teaching has always consisted of three key elements, the teacher, the pupil and the textbook which should embody the curriculum. Given that textbooks are fundamental to the educational progress and curriculum, it is crucial for schools to ensure good textbooks are put in place to fulfil students’ needs in all cognitive processes, where students engage in HOTS questions (Chinoda, 1982).

Based on the analysis of the questions in the two textbooks, we come to the conclusion that the All About English textbooks incorporated reading comprehension questions that necessitated both the lower-level and the higher-level cognitive demands. The cognitive rigor of questions in the textbooks align with the curriculum’s goals regarding the importance of training Secondary Three students, regardless of academic ability, to engage in questions which require high cognitive demands. Besides preparing students for the national examinations, these skills will eventually contribute to students being able to use English as a system of communication effectively, in the workplace and for day-to-day life. This is in accordance to the 2010 English Curriculum which emphasizes critical thinking and skills to communicate effectively, using English appropriate for different purposes, audiences, contexts and cultures.

However, one concern would be the finding that not all cognitive levels were clearly varied, with an over-emphasis on Understand and Evaluate questions, neglecting Remember and Apply questions. Based on the conclusions of this research, it is proposed that coursebook writers incorporate questions of diverse cognitive demands so as to prepare pupils with the capability to accomplish tasks at various cognitive levels in English at the school currently, and the workplace in the future. Next, empirical data should be collected in schools to assess if the cognitive levels of questions in the two textbooks are indeed aligned to the cognitive levels of the students at each stream, and their potential in enhancing students’ critical thinking. Finally, it is imperative for similar studies to be conducted on other levels’ textbooks regularly, in order to evaluate the extent to which these textbooks suit the students’ proficiency, taking into consideration the changing nature of the English curriculum in Singapore.

ACKNOWLEDGEMENTS

I would like to express my sincere thanks to my NIE Educational Research supervisor, Dr Willy A. Renandya, for being my mentor through this process. I am grateful for the time and effort he had taken in order to advise me on various aspects of this project, reading different draft versions of this research paper and providing valuable feedback for the improvement of this paper.
REFERENCES


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