Assessment and Cognitive Demand in Higher Education Accounting Textbooks

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Abstract
Driven by requirements prescribed by professional bodies, the accounting curriculum in many higher education institutions in South Africa and Nigeria demands high cognitive attributes from graduates. Advancing the proposition that assessment drives learning, the authors contend that cognitive demand can be determined by analysing the assessment tasks in students' textbooks. Using a conceptual framework based on Bloom's revised taxonomy and levels of difficulty theory, this article analyses the cognitive demand of assessment tasks in selected chapters of level one Financial Accounting textbooks in South Africa and Nigeria. The findings indicate that the bulk of the assessment tasks in the selected texts are pitched within middle and lower cognitive hybrids with limited tasks at higher levels. The article offers new insights into graduate attributes, assessment tasks and cognitive demand. It also suggests an alternative approach to assessing cognitive skills, specifically within the discipline of accounting to ensure a closer fit between training and the demands of the work place.

Keywords: assessment tasks; accounting textbooks; cognitive demand; layered framework; Bloom's Revised Taxonomy; level of difficulty; higher education; professional bodies

Introduction
Professional accounting institutions expect entry-level accountants to possess a range of high-level intellectual, technical, ethical, professional and personal competences that will prepare them to be life-long learners and enable them to

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respond effectively to demanding workloads in diverse environments (South African Institute of Chartered Accountants [SAICA] 2014; IFAC 2010). As a member of the International Federation of Accountants (IFAC), the Institute of Chartered Accountants of Nigeria (ICAN) pursues the same goal (ICAN 2014). In the same vein, South Africa's National Qualifications Framework (NQF) requires assessments to be conducted in an integrated manner to foster higher-level cognitive skills (SAQA 2012; Bezuidenhout & Alt 2011). It therefore follows, that accounting degree programmes should equip students at all levels of study (Stokes, Rosetti & King 2010) with appropriate cognitive attributes to prepare them for the world of work (Gupta & Marshall 2010). One way of achieving this is via textbooks, which remain pivotal in pedagogical processes, especially in developing countries with limited access to technology. The textbook defines the curriculum (Crawford 2003), providing sequence, content and assessments (Benavot 2011) to aid teaching and learning.

Despite recognition that textbooks play a vital role in education, few studies have addressed the cognitive demands of assessment tasks in accounting (Davidson & Baldwin 2005) even though learning is largely driven by assessment (Biggs 2003). While Stokes, Rosetti and King (2010) examined the cognitive demand of assessment tasks in introductory accounting textbooks in the United States, there is a paucity of such research on the African continent.

This article analyses the assessment tasks in two Financial Accounting textbooks used in Higher Education Institutions (HEIs) in in South Africa and Nigeria. Using evaluation criteria drawn from Bloom's Revised Taxonomy (BRT) and Levels Of Difficulty (LOD) theory, the article seeks to understand the cognitive demands inherent in selected textbooks as it answers the following question: To what degree do first-year accounting textbooks develop cognitive skills/abilities amongst first-year students? The article is divided into four sections: 1) A review of the relevant literature and concepts; 2) Methodology; 3) Data presentation and discussion of the findings; and 4) Concluding remarks and suggestions for future research.

Literature Review

Background

Amongst other professional attributes, the South African Institute of Chartered

Accountants (SAICA) expects entry level members to possess high level intellectual and technical skills, including cognitive attributes that will enable them to examine and interpret information critically, solve problems and communicate effectively (SAICA 2014). The content of the accounting academic programme is thus expected to develop students' understanding of fundamental concepts and principles while cultivating the ability to adapt and apply these in various contexts (SAICA 2010). Specifically, accounting graduates are expected be able to 'analyse, and interpret financial and non-financial data, … and use data, exercise judgment, evaluate risks, and solve real-world problems' (Sudem & Williams 1992: 57) that require higher-order thinking skills. These intellectual abilities which are linked to Bloom's taxonomy (IFAC 2003; 2010) are expected go beyond recall levels to include higher cognitive skills (Gupta & Marshall 2010) at any level of study (Stokes, Rosetti & King 2010; Ngwenya 2012). Having highlighted the cognitive requirements, this article now reviews some of the relevant seminal and contemporary literature on textbooks.

Textbooks in Developing Countries

Textbooks are considered a vital component of the curriculum, as they are regarded as the principal medium for delivering content (Pingel 2010). This is especially true in developing countries, where textbooks tend to be the most cost-effective means of providing access to teaching and learning materials (Mbuyi 1988; Agrawal, Gollapudi, Kannan & Kenthapadi 2011). The role of the textbook is even more crucial in contexts where teachers are alleged to have inadequate subject knowledge and have limited access to curriculum documents (Greaney 2008). Even though scholars have identified concerns relating to quality, clarity of language and sufficiency of information in some textbooks, they remain the primary means for transmitting knowledge to students and improving the quality of education (Agrawal, Gollapudi, Kenthapadi, Srivastava & Velu 2010; Crossley & Murby 1994).

Accounting Textbook Research

To date, much of accounting textbook research has focused on two key domains: **content** (Bracken & Urbancic 1999; Aisbitt 2005; Hoffjan & Wompener 2006; Stokes 2008; Ferguson *et al*. 2009, 2010; Gordon 2011) and

readability (Plucinski & Hall 2012; Plucinski 2010; Chiang *et al.* 2008; Davidson 2005). The few studies that have been conducted on the cognitive demand of assessment in accounting textbooks (Davidson & Baldwin 2005) generally focus on developed countries using Bloom's taxonomy to evaluate the extent to which the cognitive skills in End-Of-Chapter (EOC) materials in intermediate textbooks align with the requirements of the curriculum or professional bodies (Davidson & Baldwin 2005; Gupta & Marshall 2010). The general conclusions from these studies suggest that EOC materials do not adequately focus on cognitive skills at higher levels of the taxonomy, and may therefore not prepare students adequately to meet the requirements of professional institutions or the workplace. Furthermore, the bulk of the assessment tasks address the middle level cognitive abilities of application and analysis. At the introductory level, Stokes, Rosetti and King (2010) reviewed commerce textbooks inclusive of financial accounting to ascertain the congruence between the cognitive levels of the learning objectives and EOC materials and found low levels of cognition with low levels of congruence. In Africa, O'Reilly-Bargate (2008) investigated the readability of third-year accounting textbooks and later examined the criteria used in the selection of prescribed textbooks in 2012. Bezuidenhout and Alt (2011) analysed student examination papers to determine the cognitive levels tested.

Cognitive Demand

This phenomenon is viewed differently by different scholars. Park (2011: 5) views cognitive demand as the 'amount of intellectual activity required to perform a task'. Others perceive it in terms of the 'kind of thinking processes entailed in solving the tasks' (Henningsen & Stein 1997: 529). Drawing from both views, this article describes cognitive demand as including both the *quantity* of thinking and the *type* or *level* of the thinking processes involved in successfully resolving an assessment task in order to gain a rich understanding of the phenomenon. By examining the cognitive demand, one is able categorise the thinking that occurs in the mind of the student.

As noted earlier, one of the tools that researchers in accounting have employed to investigate cognitive demand is Bloom's taxonomy of educational objectives (Bloom *et al.* 1956). Following its revision in 2001, this study draws on the Bloom's Revised Taxonomy (BRT) by Anderson *et al.* (2001) to provide theoretical insight into the phenomenon of cognitive demand. Premised on the

notion that learning takes place progressively from simple to complex and from concrete to abstract, the taxonomy occurs in two dimensions (Anderson *et al*. 2001). The cognitive process dimension addresses the verb/verb phrase of an instruction whilst the knowledge dimension later relates to the noun/noun phrase (Anderson *et al*. 2001). The former consists of six levels starting with Remember in level one. Tasks in this level assess students' ability to retain that which was learned either via recall from long-term memory or identification (Anderson *et al.* 2001). Assessment tasks in this level may require students to name the five users of the financial statements. At the second level is the category Understand which assesses one's ability to make meaning of learned information (Anderson *et al.* 2001). An assessment task at this level could demand that students explain the straight-line method of depreciation. The third level, Apply is described by the authors as the ability to execute or implement procedures in a new situation such as the preparation of general ledger accounts. The fourth level pertains to the ability to break down information; find the relationships between the different parts and determine how the structure fits together (Anderson *et al.* 2001). Reconciliation of various accounts fits into this level. At the fifth level is the ability to make sound judgements based on criteria which may require students to justify their choice of a particular investment decision. At the top of the echelon is the ability to think creatively to address problems which may be familiar or unfamiliar.

The authors describe four different categories of knowledge within the knowledge dimension as summarised in table B below. Factual knowledge aids the acquisition of disciplinary language which the novice first-year accounting student needs to be acquainted with in order to converse and solve problems within the discipline (Anderson *et al.* 2001; O'Reilly-Bargate 2008). Also termed disciplinary knowledge, conceptual knowledge is more concerned with interrelationships between different knowledge elements and serves to advance disciplinary expertise (Anderson *et al.* 2001). While these two categories of knowledge are generally referred to as the knowledge of 'what', procedural knowledge is referred to as the knowledge of 'how' as it helps to equip students with the skills required to perform diverse accounting functions (McCormick 1997; Anderson *et al.* 2001). The authors of the taxonomy describe meta-cognitive knowledge as including general strategies for learning and also including one's self-awareness of one's cognitive abilities in addition to contextual knowledge.

While the BRT provides insight into the level of thinking in successfully resolving a task, the LOD theory (Leong 2006) offers insight on the demand on cognition arising from quantity and other variables. He describes four parameters involved in varying the difficulty of a test item, namely, Task, Content, Stimulus and Expected Response. This article draws on elements of the task and content parameters in providing an understanding of the cognitive demand embedded in assessment activities. In relation to task, Leong (2006) posits that the difficulty of an assessment task can be varied by the number steps required to accomplish it. Assessment tasks that require more steps are usually more difficult than those that require less. Moreover, those that provide clear instructions are generally easier to complete than those that do not. Amongst other variables, Leong (2006) states, that the content parameter relates to one's level of familiarity with the task and the number of knowledge elements assessed. Tasks that assess familiar content are generally less difficult to accomplish than those that involve unfamiliar content. Similarly, the author asserts that it is relatively easier to solve questions involving one knowledge element than those involving more.

This article, which is part of a larger on-going study, analyses the cognitive demand of assessment tasks in selected textbooks using a content analysis methodology that is explicated in the following section.

Methodology

This article adopts a qualitative content analysis methodology to understand the representation of cognitive demand in level-one financial accounting textbooks. This approach uses analytical constructs or guidelines to infer meaning from text by making deductions from the text to the context (Marsh & White 2006). The analytical tool for this article was developed drawing on the six levels of the cognitive dimension (Table A) and four levels of the knowledge dimension (Table B) of the BRT (Anderson *et al.* 2001) in addition to the task and content parameters from the LOD theory (Leong 2006) (Table C). The analytical tool is not simply a combination of two theories; rather, it is a layered framework, which provides some deep insights into the nuances in the comprehension of cognition embedded within these assessment tasks as represented in figure 1.

Table A: Structure of the cognitive dimension (Adopted from Krathwohl's 2002:215 Table)

1.0 **Remember** – Retrieving relevant knowledge from long-term memory. The two sub-categories are recognizing and recalling

2.0 **Understand** – Determining the meaning of instructional messages including oral, written and graphic communication. Seven sub-categories: interpreting, exemplifying, classifying, summarizing, inferring, comparing and explaining

3.0 **Apply** – Carrying out or using a procedure in a given situation. Two sub-categories, namely, executing and implementing

4.0 **Analyze** – Breaking down into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose. Three subcategories – differentiating, organizing and attributing

5.0 **Evaluate** – making judgments based on criteria and standards. Sub-categories are checking and critiquing.

6.0 **Create** – Putting elements together to form a novel, coherent whole or make an original product. The subcategories are generating, planning and producing.

Table B: Structure of the Knowledge dimension (Adopted from Krathwohl's 2002:214 Table)

A. **Factual Knowledge** – Basic ideas that students need to be acquainted with in order to function within the discipline and resolve problems in it. Two subcategories – knowledge of terminologies; and specific details and elements.

B. **Conceptual knowledge** – Interrelationship among elements within larger structures that allow them to operate together. Subcategories include knowledge of, classification and categories; principles and generalization; and theories, models and structures.

C. **Procedural Knowledge** – How to do things. Included are subject-specific skills and algorithms; techniques and methods; and criteria for determining when to use appropriate procedures.

D. **Metacognitive Knowledge** – Knowledge about cognition in general as well as awareness and knowledge of one's own cognition. Three subcategories – strategic knowledge; knowledge about cognitive tasks including appropriate contextual and conditional knowledge; and self-knowledge.

Table C: Level of difficulty (Leong 2006)

i. **Content Difficulty** – This relates to the difficulty of the subject matter (facts, concepts, or procedures) which could be basic, adequate or advanced depending on familiarity, number of knowledge elements or types of knowledge.

ii. **Task Difficulty** – Difficulty encountered by students as they try to work out a solution to the problem. It is related to the cognitive process and the criteria include number of steps and level of guidance

In selecting the level-one financial accounting textbook used in two African countries, consideration was given to the textbook used by top ranking institutions in both countries in 2014. Coincidentally, in South Africa, the selected text was also the most widely used. The South African text was labeled Textbook A and the Nigerian text Textbook B.

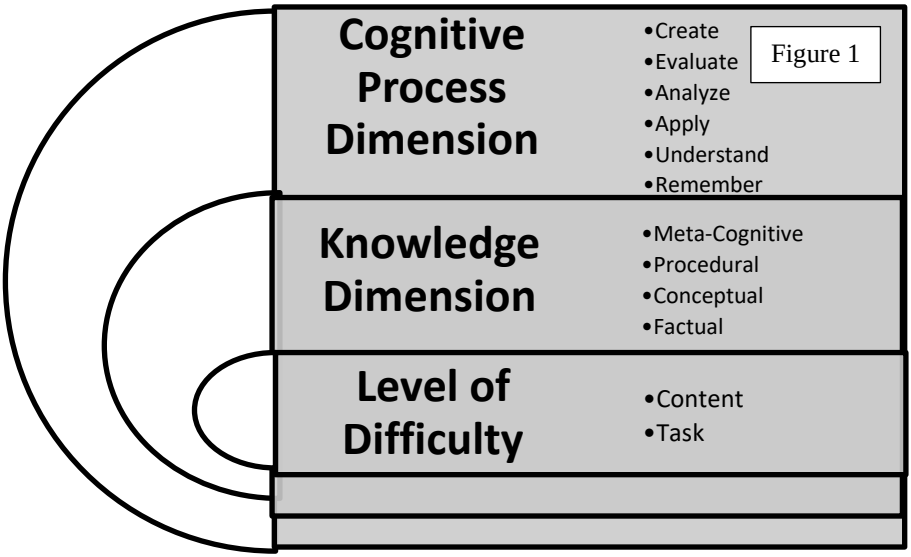


Figure 1

In the selecting the chapters for analysis, we aimed to incorporate a broad range of cognitive attributes by including chapters that are both textual and computational, because it was not realistic to examine every question in the textbooks (Davidson & Baldwin 2005). Therefore, we categorised all the chapters into four broad groups and selected one chapter from each group in line with the strategy used by Chiang *et al.* (2008) and detailed below in table D:

Table D		
Group	**Text A (Chapter selected)**	**Text B (Chapter selected)**
1. Introduction	4. Conceptual framework (42)	2. Introduction to financial statements (17)
2. Basic content of accounting	6. Adjustments (65)	8. End of year adjustments (19)
3. More technical content	11. Property, plant and equipment (73)	3.Understanding some relevant (IFRS) (12)
4. Financial statements	15. Financial analysis (77)	16. Interpretation of financial statements (21)
Pages covered	257	69

While the titles of the chapters in the texts do not necessarily correspond in groups one and three, some topics contained therein are quite similar. In each textbook, we examined intertextual assessment tasks, EOC materials and those contained in the question book. Each part of a question with more than one part was treated as a separate question, based on the cognitive process requirement. To promote trustworthiness of the claims in this article, repeated reading was undertaken and member checks were carried out through the University of KwaZulu-Natal (UKZN) higher education doctoral cohort and supervisors. Details of our findings and discussion thereof are presented hereunder.

Data Presentation and Discussion

Our analysis of the assessment tasks using the criteria drawn from the BRT and LOD set out in our layered framework gave rise to the multiple hybrids presented in table E.

Table E	Texts A & B - Hybrids						
	Hybrids	Variables	Sub-Hybrids			Total	Knowledge
			Basic	Moderate	Advanced		
BRT / LOD	Remember / Content / task	Familiarity	17	50	1	68	Factual 76% Conceptual 24%
		No of K Elements	66	2	0	68	
		No of steps	65	2	1	68	
		Level of Guidance	67	1	0	68	
BRT / LOD	Understand / Content / task	Familiarity	25	80	7	112	Factual 56% Conceptual 44%
		No of K Elements	95	17	0	112	
		No of steps	94	17	1	112	
		Level of Guidance	110	2	0	112	
BRT / LOD	Apply / Content / task	Familiarity	35	149	13	197	Procedural 100%
		No of K Elements	105	73	19	197	
		No. of Steps	97	49	51	197	
		Level of guidance	162	16	19	197	
BRT / LOD	Analysis / Content / Task	Familiarity	3	34	3	40	Factual 35% Conceptual 65%
		No of K Elements	31	7	2	40	
		No of steps	20	7	13	40	
		Level of Guidance	32	2	6	40	
BRT / LOD	Evaluate / Content / Task	Familiarity	8	31	1	40	Factual 13% Conceptual 87%
		No of Knowledge	27	11	2	40	
		No of steps	0	25	15	40	
		Level of Guidance	15	17	8	40	
BRT / LOD	Create / Content / Task	Familiarity	0	1	0	1	Conceptual 100%
		No of K Elements	0	0	1	1	
		No of steps	0	0	1	1	
		Level of Guidance	0	1	0	1	

Of the total of 458 assessment tasks analysed, the Apply-Task-Hybrid (ATH) in the middle cognitive range is the most significant, accounting for 43% of the entire task spectrum. This is followed by assessment tasks in the lower cognitive range with the Understand-Content-Hybrid (UCH) at 25% and the Remember-Content-Hybrid (RCH) at 15%. However, as the graphical

overview in figure 2 below shows, the representation is not quite the same across both textbooks.

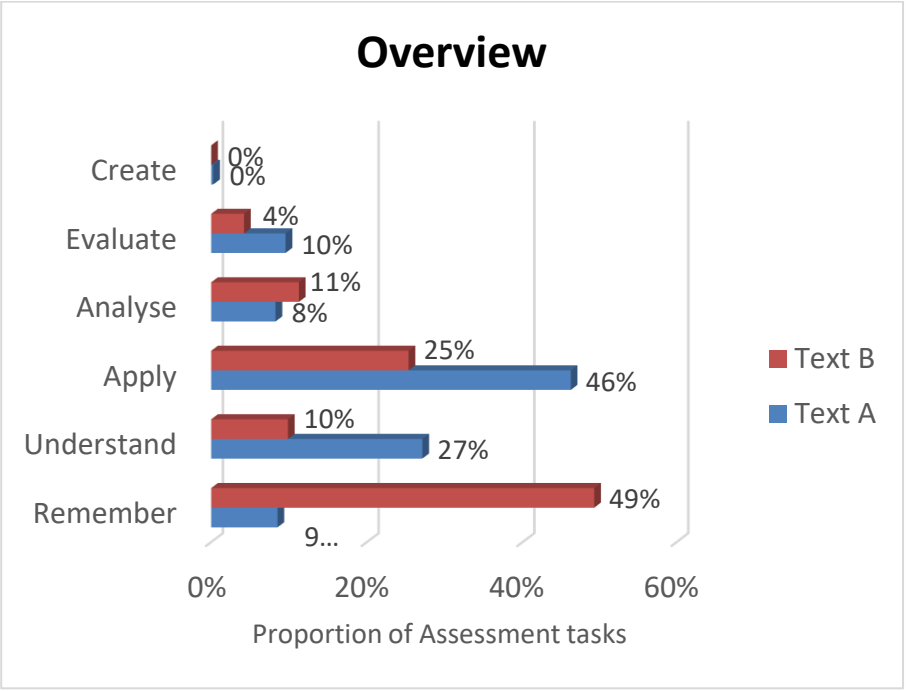


Figure 2

In text A, the dominant hybrid is the ATH while the RCH accounts for about half of the cognitive representation in all the assessment tasks reviewed in text B.

Apply-Task-Hybrid (ATH)

Assessment tasks within the Apply cognitive level entail the use of steps, rules, formulae and processes to find solutions to exercises and problems (Anderson *et al.* 2001). This could involve the use of known processes to solve familiar exercises that are fairly routine – subcategorized as 'execute' or the development of processes based on one's understanding of the underlying

concepts to resolve unfamiliar problems – subcategorised as 'implement'. The following examples are used to discuss the cognitive representation in the ATH.

Example 1 – EOC A10 – Text B

The equity of a business is one-third of its total assets. The total of its liabilities amounts to 3,000,000. What is the amount of its total assets?

A. 1,500,000
B. 3,000,000
C. 4,500,000
D. 6,000,000
E. 9,000,000

Example 2 – QB 7.2 – Chapter 11 – Text A

Based on the information provided, users were required to:
Calculate the depreciation expense for the oven for the year ended 31 August X2 using

a) Straight line method
b) *Diminishing balance method at a rate of 20% per annum* (p. 111)

Example 3 – IT7 – Text A

Based on the information provided, students were required to:
Prepare all the necessary journal entries to record the transactions that occurred between 1 January X1 and 31 December X3 (p. 364).

Example 1 is a Multiple-Choice Question (MCQ) that requires students to determine the total assets. This entails the application of previously learnt methods and principles in a different context. Similarly, example 2 requires students to 'calculate' depreciation expenses using two different methods. Using known formulae on the information relating to Simbani Chips' business, the accurate depreciation expense can be derived. In example 3, students are required to 'prepare' journal entries to record transactions relating to a machine. To answer the questions correctly, students follow the steps required to prepare journal entries by applying the rules of debit and credit, drawing on the accounting equation. Since the methods for all three questions are known and the solutions are fairly fixed, this question is subcategorized as *execute* un-

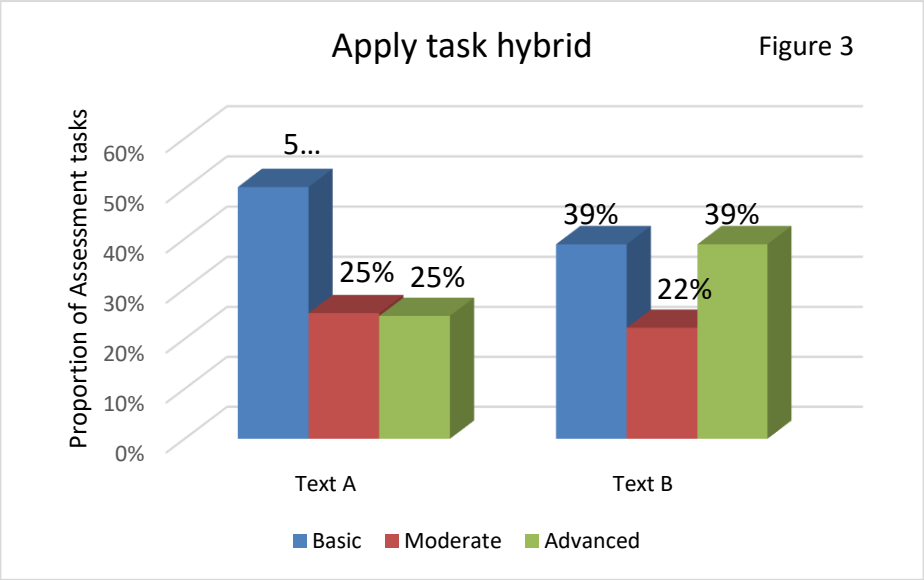
der the cognitive level *Apply*.

In almost all the questions in the Apply category, there is an element of task difficulty relating to the number of steps required to provide a solution. Example 1 requires one step, which is the process of using mathematical calculations to derive the total assets. In example 2, students are required to calculate depreciation for an oven in the second year of operation using two methods. After deriving the depreciable value, they can apply the formulae for the straight-line method and the diminishing balance method to obtain the expense. In total, this will entail four steps, as the latter method requires different amounts for the two years. For example 3, students need prepare all the journal entries pertaining to the purchase, upgrade and impairment of an oven from 1 January X1 to 31 December X3. For the three years under consideration, a total of seven sets of journal entries will be made. In most cases, the variables required to prepare the journal entries were not readily available. Furthermore, for each change, the depreciable amount together with the annual depreciation expense needs to be re-calculated. In total, this assessment task requires 18 steps.

Using the lens of BRT, all three examples fall within the Apply cognitive level. However, the number of steps involved in obtaining the correct solution varies from one task to another. While example 1 requires one step, example 2 requires four, and the third example calls for 18 steps. Using the layered framework, it is apparent that the demand on cognition is not the same due to the extent of intellectual activity involved. More time and thinking is required in deriving the correct amounts for each journal in example three. The student works with more information and has to be systematic in his or her approach because there is a greater propensity to err. The work involved in accomplishing the task becomes increasingly more complex as one set of information feeds into another. Indeed, the student's capability to process large quantities of information is highly associated with the degree of cognitive complexity (Davidson 1996). Scholars such as Jones and Wright (2012) found that individuals with high cognitive skills are more proficient in working through / with voluminous information than others. By inference, the amount of activity involved in fulfilling a task is crucial in defining the cognitive demand of an assessment task.

In this article, we further classify assessment tasks that entail one or two steps as 'basic'; those involving three to four steps as 'moderate' and tasks that require five or more steps as 'advanced'. Following from these sub-

categories, our results show that the bulk of the assessment tasks in this category in text A fall within the Basic-Apply-Task sub-hybrid while text B seems to have an even spread of assessment tasks at the basic and advanced sub-sets as shown in figure 3 below.



In mathematics, assessment tasks that involve the use of simple algorithms with one step are classified under the lowest level of learning – 'recall', based on Webb's depth of knowledge classification (Schneider, Huff, Egan, Gaines & Ferrara 2013). By implication, assessment tasks in text A, which is dominated by the Basic-Apply-Task sub-hybrid, are relatively easier to resolve, as the demand on cognition is low even though they fall within the ATH. The basic sub-hybrid may assist in developing basic transfer skills, but the advanced sub-hybrid goes further to assist students to handle voluminous data, thereby equipping them with skills to address complex situations.

Our findings from the analysis of text A contradict the work of Davidson and Baldwin (2005) who concluded that EOC materials in intermediate accounting texts facilitate the development of analytical skills partly because the preparation of journal entries was classified in this category.

However, our findings in text A affirm prior research (Davidson & Baldwin 2005; Gupter & Marshall 2010; Stokes, Rossetti & King 2010) that concluded that accounting texts mainly focus on promoting middle level skills and do little to equip students with high cognitive attributes. This could be attributed to the rule-based nature of the discipline (Gupta & Marshall 2010). If the discipline is indeed akin to assessment tasks at the Apply level because of its very nature, students' exposure to voluminous tasks will aid the development of the high-level skills required to manage complexities. With a more balanced spread of assessment tasks at both the basic and advanced sub-hybrids, it would appear that text B is better poised at this level to equip students with skills to manage complexities than text A.

As stated earlier, the noun or noun phrase depicts the knowledge element. In example 1, the noun phrase is the 'amount of total assets'. While the amount may appear to be factual knowledge because it is an element or attribute of an asset, it has to be derived using mathematical calculation because it is not readily given. Therefore, this assessment task does not intend to assess the knowledge of 'what', 'that' or 'why', but the knowledge of 'how' because the correct procedure determines the answer. The same applies in example 2, where the focus is on the two methods (straight-line and diminishing balance) of calculating the depreciation expense of the oven. An alternative method would yield an incorrect answer. Example 3 requires different journal entries for three years. In as much as there is a fixed format for journal entries, the student has to derive the correct amount to post to the journals. S\he has to exhibit skills that show 'how' to obtain the correct amount and 'how' to prepare journal entries. In all three examples, if the steps or processes are implemented correctly, the result is one correct answer that can be predetermined and fixed. Consequently, these questions fall within the *Knowledge of Subject specific skills and algorithms* sub-category within *Procedural Knowledge* in the knowledge dimension in the BRT. As seen from the hybrid analysis in table 1, the underlying knowledge element in the ATH is procedural knowledge as all the assessment tasks within this category seek to equip students with the skills required to process journal entries, adjustments, general ledgers, financial statements, etc.

Assessment tasks pitched at the Apply-Task-Hybrid seek to measure the extent to which the student is able to use previously learned concepts, facts, formulae, processes, or theories in a different / new situation. Since learning is largely driven by assessment (Biggs 2003), these tasks enable students to

acquire skills that aid the transfer of learned procedures. Ultimately, learning at this level paves the way for the student to use academic and general knowledge in the world of work to address challenges that may be familiar or unfamiliar. This category is particularly important because the bulk of what is learned is intended for application in the real world (Bloom *et al.* 1956:122). It would therefore appear that this level provides the base for future accountants to thrive in that world. However, it is only the base. To succeed in their professional endeavours as required by professional bodies and HEIs, they need to transcend application. Students are expected to develop high cognitive attributes that will enable them to examine and interpret information critically, exercise judgment, evaluate risks, solve real-world problems and communicate effectively (Sudem & Williams 1992; SAICA 2014). Consequently, assessment tasks that mainly assist students to develop skills that promote transfer of learning do not sufficiently equip them with the high cognitive skills expected of accounting graduates to enable them to make a meaningful contribution to society. By implication, text A, where the dominant cognitive hybrid (ATH) promotes transfer of learning, may not adequately prepare students for the world of work.

Remember-Content-Hybrid (RCH)

As noted earlier, our findings reveal that the RCH accounts for 15% of the total assessment tasks examined in both texts. These tasks seek to examine the extent to which students can remember what was taught (Anderson *et al.* 2001). This could either be done via the recall of information from long-term memory or by recognising the required information when prompted to do so. Examples of such assessment tasks are given below.

Example 4 – IT12 – Text A

Can you list the fundamental and enhancing qualitative characteristics which financial information should have to make the information useful to the users when making economic decisions? (p. 119)

Example 5 – EOC 1 – Text B

A company is said to be highly geared when the company has:

A. More of equity capital in relation to fixed interest capital
B. More fixed interest capital in relation to equity capital

C. *No fixed interest capital*
D. *More of current assets in relation to current liability*
E. *More of current liabilities in relation to current assets* (p. 300)

Example 6 – EOC B2 – Text B

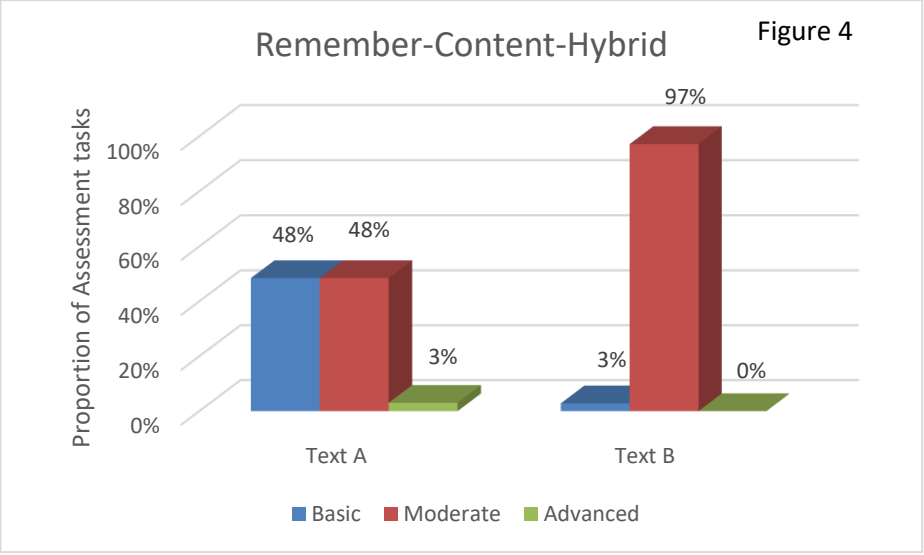
What are the main costs to be included in the initial cost of an item of PP&E? (p.42)

The active verb 'list' in example 4 involves retrieving already learned information from memory and repeating it as taught or learnt from the textbook. It is more or less regurgitating that which was learnt. Such tasks are classified under the sub-category *recalling* within the cognitive process *Remember*. Similarly, example 6 which requires students to state the main costs entails recall of learned information. The difference between these two examples and example 5 is that the latter presents options that serve as prompts to assist the remembering process. By looking through the options provided, the student can identify the correct answer based on what was retained in memory. Thus, this example is subcategorised as *recognising* within the category *Remember*. The task element of the LOD provides little insight into variations in cognitive demand in this category because the assessment tasks do not necessarily involve a number of steps. The following section focuses on the knowledge dimension.

The noun phrase or subject matter in example 4 – 'fundamental and enhancing qualitative characteristics' are attributes or elements financial statements should possess to make them more beneficial to users. Similarly, the components of the initial cost of a tangible asset in example 6 refer to the cost of the various elements that make up its initial cost. Such elements fall within the subgroup *knowledge of specific details and elements* under *Factual knowledge*. The Knowledge element in example 5 focuses on gearing. To answer this question, one needs to understand the concept of gearing, and what makes a business highly geared. This falls within the subset of *knowledge of principles and generalisation* within *Conceptual* knowledge.

Research has shown that familiarity can vary the cognitive demand of assessment tasks (Berger, Bowie & Nyaumie 2010). Where the student has encountered this knowledge element in previous chapters, s/he would have had sufficient time to practice related questions and would be generally familiar with the subject matter. These reduced demands on cognition tasks are termed

'basic'. However, where the student has only been introduced to the topic in the current chapter, s/he may not have had sufficient opportunity to practice the assessment tasks related to the topic and may therefore experience some degree of difficulty in answering these questions. These are termed 'moderate'. Where the assessment task precedes the discussion of related topics the student is likely to find such a task more cognitively demanding because of lack of familiarity. Assessment tasks in this category are termed 'advanced' because they are more challenging. Our classification aligns with that of Leong (2006) and O'Callaghan *et al.* (2004) where assessment tasks relating to previous grade content were classified in level 1; those relating to the current grade in level 2, and others of a more complex nature and those requiring insight in the upper levels (Schneider *et al.* 2013: 105). Based on this criterion, the knowledge elements in examples 4 to 6 were considered moderately demanding because the task relates to topics that were introduced earlier in the same chapter. A similar pattern was observed in text B where 97% of the assessment tasks were found to be of moderate content difficulty as seen in figure 4 below. In text A, the representation was more evenly spread with 48% at both the basic and moderate levels of cognition. In both texts, the advanced level was not represented in this hybrid.



The objective of learning in the RCH mode is to promote retention of concepts /content. Assessment tasks in this hybrid seek to assess the extent to which students can remember accounting terms, facts, concepts, methods or processes learned in class or from a textbook via recall or identification. This is a primary educational objective, especially for subjects like accounting, where some foundational ideas such as the double entry system do not change and have remained the same for centuries. Promoting retention is also important because it provides the cognitive foundation for learning at higher levels (Anderson *et al.* 2001). However, retention in itself is insufficient to facilitate any meaningful learning as the student practically learns to regurgitate what was learned. In other words, retention promotes memorization and rote learning which is grossly deficient in preparing the future accounting graduate for the work place.

By implication, text B can be said to be deficient in meeting the cognitive requirements of the HEI curriculum and the expectations of professional accounting bodies. With about half of the assessment tasks at the lowest level, the text appears to prepare students for retention of accounting terms and facts at rote learning level. The big question is why an accounting text that is expected to equip students with high cognitive skills is focused on the lowest cognitive attributes. To answer this question, we consider different possibilities. First, unlike the other text where there are none, 56% of all the assessment tasks reviewed in text B are MCQs. Generally, MCQs lend themselves to questions that require identification at low levels of thinking (Schneider *et al*. 2013). Although some of the MCQs in text B address higher levels of cognition, such as example 2 above, the majority require students to recognise the correct answers from the options provided. Secondly, it is possible that the producers of the text support the mastery of retention of basic accounting terms, concepts and procedures at foundational year in HEI. In addition, it could be argued that novice accounting students should be taught basic accounting concepts at low levels in order to encourage them to continue their accounting studies because many first-year students are unsure of what they wish to major in. However, other scholars argue that the accounting education programme, including textbooks, should assist students in developing high cognitive attributes irrespective of the level of study (Stokes, Rosetti & King 2010; Ngwenya 2012) to prepare them for the world of work. Indeed, if the secondary school curriculum in South Africa requires that middle and higher cognitive levels should make up 40% and 30%, respectively of the cognitive representation of assessment tasks, the first-year accounting pro-

gramme in HEIs should not demand less. Having discussed the most signify-cant hybrid in the two textbooks, we now briefly present our findings on second dominant hybrid in both texts.

Understand-Content Hybrid

Of the total of 485 assessment tasks analysed, 25% fall within the Understand-Content-Hybrid. Using the BRT, questions in the Understand category require students to make meaning of what they have been taught or learnt from the textbook (Anderson *et al.* 2017). The underlying knowledge elements in this hybrid were factual and conceptual knowledge. Overall, factual knowledge accounted for 56% of the content in this hybrid while conceptual knowledge comprises 44%. Having discussed factual knowledge at length in the RCH, this section focuses on the latter.

Conceptual knowledge embodies the 'concepts, principles, models, or theories' (Anderson *et al.* 2001:42) of a domain or discipline. It goes beyond the acquisition of a large number of facts or bits of information and focuses on the interconnectivity amongst the facts (McCormick 1997). Conceptual knowledge is the content base of the domain and is also termed disciplinary knowledge (McCormick 1997; Anderson *et al.* 2001). Educators aspire for their students to have a deep understanding of conceptual knowledge because it usually signifies expertise in any field (Anderson *et al.* 2001). By implication, assessment tasks that examine accounting concepts and principles in an integrated manner are more likely to promote the development of deeper conceptual understanding and expertise. Our findings indicate that the composition of the knowledge element in text A (57%) in this hybrid is tilted slightly in favour of factual knowledge while the reverse is the case in text B where conceptual knowledge accounted for 57% of the knowledge assessed. In effect, it would appear from the proportions, that in this hybrid, the two texts have equal chances of fostering the acquisition of disciplinary language and disciplinary expertise, respectively.

Other Hybrids

The other hybrids linked with the top three cognitive levels – Analyse (9%), Evaluate (9%) and Create (0%) together account for 18% of all the assessment tasks in both texts. These levels equip students with the ability to analyse and

interpret data, make decisions and develop creative solutions to problems. While the percentage representation in text B is higher than that of text A in the analyse level, the reverse is the case at the evaluate level. In addition, no assessment tasks demand creative solutions in text B. On the other hand, text A has only one assessment task at the highest cognitive level that required students to write a letter to management incorporating some ratios in view of a planned issue of a prospectus for new shares. The task is placed under Create because it requires learners to engage in letter writing, which is something new and relatively different. Developing a prospectus would involve synthesizing information into an integrated whole.

Conclusion

Amongst other outcomes, the accounting programme of education in accredited HEIs aims to equip students with high cognitive attributes in line with the requirements of professional bodies. In the African context, the textbook remains a key resource in the pedagogical process in equipping students with these skills, especially in the large classes associated with first-year courses. This article examined the assessment tasks from four chapters in two level-one financial accounting texts with a view to understanding the representation of cognitive demand embedded therein using a layered analytical framework specifically designed for it. Our results indicate that the assessment tasks in both textbooks did not adequately prepare students to meet the demands of the work place as expected by HEIs and professional bodies. More specifically, text A was dominated by assessment tasks in the Apply-Task-Hybrid in the middle cognitive level. With about half of the assessment tasks in this hybrid, it aims to promote transfer of accounting procedures at very basic levels of learning. However, as revealed through our layered framework, tasks that involve voluminous data, though few, assist students in developing the skills required to handle complex problems in the work place. On the other hand, text B facilitates the retention of accounting facts and terms, although also at very basic levels as the majority of the assessment tasks fall within the Remember-Content-Hybrid in the lowest level of cognition. Furthermore, the cognitive demand in both texts appears to be concentrated in the lower half of the hierarchy while tasks addressing the top three hybrids only account for 18% of the total. The minimal representation at the top three levels implies that the texts do not adequately equip students with the skills required

to analyse financial information, make judgements and proffer creative solutions to complex real life issues.

These findings have implications for HEIs and professional bodies, which expect accounting graduates to possess high cognitive skills (SAICA 2014). Academics that rely on textbooks should be more circumspect in selecting assessment tasks to aid learning. Where possible, they could consider developing their own assessment tasks or incorporating appropriate tasks from other sources to augment those in the texts. Producers of textbooks should consider developing and incorporating assessment tasks that require voluminous steps and those that address higher levels of cognition to promote higher levels of learning. This is particularly important in the African setting, where access to other sources of assessment materials may be limited. In countries confronted by an erratic electricity supply, poor internet connectivity and low per capita income, the options are limited as academics and students depend on practice questions and EOC materials in textbooks to consolidate learning. The need to enhance the quality of textbooks to facilitate higher levels of learning can thus not be over-emphasised.

Finally, in presenting these findings and conclusions to the academic community, the authors raise some caveats: Firstly, this analysis is derived from two textbooks used in two different African countries that were not randomly chosen. A more random selection could reveal different results. Secondly, we reviewed assessment tasks found in four chapters of each textbook. While we aimed to incorporate chapters that are both conceptual and computational to obtain wide coverage of the cognitive spectrum, a bigger sample size might produce a different outcome. Thirdly, we used a layered analytical framework that provided deeper insight into nuances in cognition that may not be observed via other frameworks. Finally, our assumption that the average first-year accounting student has not been exposed to accounting in an academic capacity may not apply to all students. To test the veracity of the findings and conclusions in this article, future studies could seek to answer the following questions:

1) Does the first-year Financial Accounting curriculum lend itself to assessment tasks at higher levels of cognition?
2) How does the cognitive representation of assessment tasks compare across all levels in the financial accounting and reporting textbooks in the African context?

3) How does the cognitive representation of assessment tasks compare amongst financial accounting textbooks used by HEIs in one country?

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References

Agrawal, R., S. Gollapudi, A. Kannan & K. Kenthapadi 2011. *Identifying Enrichment Candidates in Textbooks.* Paper presented at the Proceedings of the 20th international conference companion on World wide web ACM. pp. 483-492.

Agrawal, R., S. Gollapudi, K. Kenthapadi, N. Srivastava & R. Velu 2010. *Enriching Textbooks through Data Mining.* Paper presented at the Proceedings of the First ACM Symposium on Computing for Development. p. 19.

Aisbitt, S. 2005. International Accounting Books: Publishers' Dream, Authors' Nightmare and Educators' Reality. *Accounting Education* 14,3:349-360.

Anderson, L. W., D.R. Krathwohl, P.W. Airasian, K.A. Cruikshank, R.E. Mayer, P.R. Pintrich, J. Raths & M.C. Wittrock 2001. *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives.* Abridged Edition. White Plains, NY: Longman.

Benavot, A. 2011. Improving the Provision of Quality Education: Perspectives from Textbook Research. *Journal of International Cooperation in Education* 14,2:1-16.

Berger, M., L. Bowie & L. Nyaumwe 2010. Taxonomy Matters: Cognitive Levels and Types of Mathematical Activities in Mathematics Examinations. *Pythagoras* 71:30-40.

Bezuidenhout, M. & H. Alt 2011. 'Assessment Drives Learning': Do Assessments Promote High-level Cognitive Processing? *South African Journal of Higher Education* 25,6:1062-1076.

Biggs, J. 2003. Aligning Teaching and Assessing to Course Objectives. *Teaching and Learning in Higher Education: New Trends and Innovations* 2:13-17.

Bloom, B.S. (ed.), M.D. Engelhart, E.J. Furst, W.H. Hill & D.R. Krathwohl 1956. *Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook I: Cognitive Domain.* New York: David McKay.

Bracken, R.M. & F.R. Urbancic 1999. Ethics Content in Introductory Accounting Textbooks: An Analysis and Review. *Journal of Education for Business* 74,5: 279-284.

Chiang, W.C., T.D. Englebrecht, T.J. Phillips Jr & Y. Wang 2008. Readability of Financial Accounting Principles Textbooks. *The Accounting Educators' Journal* 18:47-80.

Crawford, K. 2003. The Role and Purpose of Textbooks. *International Journal of Historical Learning, Teaching and Research* 3,2:5-11.

Crossley, M. & M. Murby 1994. Textbook Provision and the Quality of the School Curriculum in Developing Countries: Issues and Policy Options. *Comparative Education* 30,2:99-114.

Davidson, R.A. 1996. Cognitive Complexity and Performance in Professional Accounting Examinations. *Accounting Education* 5,3:219-231.

Davidson, R.A. 2005. Analysis of the Complexity of Writing Used in Accounting Textbooks Over the Past 100 Years. *Accounting Education* 14,1:53-74.

Davidson, R.A. & B.A. Baldwin 2005. Cognitive Skills Objectives in Intermediate Accounting Textbooks: Evidence from End-of-chapter Material. *Journal of Accounting Education* 23,2:79-95.

Ferguson, J., D. Collison, D. Power & L. Stevenson 2009. Constructing Meaning in the Service of Power: An Analysis of the Typical Modes of Ideology in Accounting Textbooks. *Critical Perspectives on Accounting* 20,8:896-909.

Ferguson, J., D. Collison, D. Power & L. Stevenson 2010. The Views of 'Knowledge Gatekeepers' About the Use and Content of Accounting Textbooks. *Accounting Education: An International Journal* 19,5:501-525.

Greaney, V. 2006. Textbooks, Respect for Diversity, and Social Cohesion. Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.540.7968&rep=rep1&type=pdf. (Accessed on 09 October 2017.)

Gordon, I.G.S.C. 2011. Lessons to be Learned: An Examination of Canadian and U.S. Financial Accounting and Auditing Textbooks for Ethics/Governance Coverage. *Journal of Business Ethics* 101:29-47.

Gupta, S. & L.L. Marshall 2010. Congruence Between Entry-level Accountants' Required Competencies and Accounting Textbooks. *Academy of Educational Leadership Journal* 14,1:1-12.

Henningsen, M. & M.K. Stein 1997. Mathematical tasks and student cognition: Classroom-based factors that support and inhibit high-level mathematical thinking and reasoning. *Journal for Research in Mathematics Education* 524-549.

Hoffjan, A. & A. Wömpener 2005. Comparative Analysis of Strategic Management Accounting in German- and English-language General Management Accounting Textbooks. *Schmalenbach Business Review* 58:234-258.

International Federation of Accountants (IFAC) 2003. *Towards Competent Professional Accountants. International Education Paper.* Available at: http://www.ifac.org/about-ifac/organization-overview. (Accessed on 28 August 2017.)

International Federation of Accountants (IFAC) 2010. *Handbook of International Education Pronouncements:* Available at: http://www.ifac.org. (Accessed on 28 August 2017.)

Jones, S.H. & M. Wright 2012. Does Cognitive Style Affect Performance on Accounting Examination Questions? *Global Perspectives on Accounting Education* 9:31-52.

Krathwohl, D.R. 2002. A Revision of Bloom's Taxonomy: An Overview. *Theory into Practice* 41,4:212-218.

Leong, S.C. 2006. *On Varying the Difficulty of Test Items.* Paper presented at the 32nd Annual Conference of the International Association for Educational Assessment in Singapore pp. 1-6.

Marsh, E.E. & M.D. White 2006. Content Analysis: A Flexible Methodology. *Library Trends* 55,1:22-45.

Mbuyi, D. 1988. Language and Text in Africa. In Altbach, P.G. & G.P. Kelly (eds.): *Textbooks in the Third World: Policy, Content, and Context.* New York: Garland Publications.

McCormick, R. 1997. Conceptual and Procedural Knowledge. *International Journal of Technology & Design Education* 7,1/2:141-159.

Ngwenya, J.C. 2012. *Formative Assessment in Accounting: Exploring Teachers' Understanding and Practices.* Doctoral dissertation, University of KwaZulu-Natal, Durban.

O'Reilly-Bargate, K. 2008. *An Investigation of Prescribed Managerial Accou-*

unting and Finance Textbooks Used by B. Com Accounting Students at Some Universities in South Africa Unpublished Master's thesis. University of KwaZulu-Natal, Durban, South Africa.

Park, A.M. 2011. Comparing the Cognitive Demand of Traditional and Reform Algebra 1 Textbooks.

Pingel, F. 2010. *UNESCO Guidebook on Textbook Research and Textbook Revision.* 2nd Edition. Paris: UNESCO.

Plucinski, K.J. 2010. Readability of Intermediate Accounting Textbooks. *Academy of Educational Leadership Journal* 14,2:49-57.

Plucinski, K.J. & L.A. Hall 2012. A Comparison of the Readability of Advanced Accounting Textbooks. *Business Education Innovation Journal* 4,1:45-50.

Schneider, M.C., K.L. Huff, K.L. Egan, M.L. Gaines & S. Ferrara 2013. Relationships Among Item Cognitive Complexity, Contextual Demands, and Item Difficulty: Implications for Achievement-Level Descriptors. *Educational Assessment* 18,2:99-121.

South African Institute of Chartered Accountants (SAICA) 2010. *Competency Framework Detailed Guideline for Academic Programme*. Available at: https://www.saica.co.za/Portals/0/LearnersStudents/documents/INTEGRITAS-292277.pdf. (Accessed on 18 August 2017.)

South African Institute of Chartered Accountants (SAICA) 2014. *Competency Framework Detailed Guideline for Academic Programme*. Available at: https: ://www.saica.co.za/LearnersStudents/Examinations/Informationonwhatwillbeexamined/CompetencyFramework/tabid/780/language/en-ZA/Default.aspx. (Accessed on 18 August 2017.)

South African Qualifications Authoriry (SAQA) 2012. *Level of Descriptor for the South African National Qualifications Framework.* Available at: http://www.saqa.org.za/docs/misc/2012/level_descriptors.pdf. (Accessed on 18 August 2017.)

Stokes, L. 2008. A Preliminary Study of Learning Objectives Across the Curriculum: An Analysis of Various Accounting Textbooks. *Advances in Accounting Education* 9:307-326.

Stokes, L., J.L. Rosetti & M. King 2010. Form Over Substance: Learning Objectives in the Business Core. *Contemporary Issues in Education Research (CIER)* 3,11:11-20.

Sundem, G.L. & D.Z. Williams 1992. Changes in Accounting Education: Preparing for the Twenty-first Century. *Accounting Education* 1,1:55-61.

The Institute of Chartered Accountants of Nigeria (ICAN) (2014). *Regulation and Examination Syllabus for ICAN*. Available at: http://icanig.org/ican/documents/PS2014.pdf. (Accessed on 16 August 2014.)

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