

A study of the performance difference in multiple-choice questions and short questions in BAFS Paper 1 between candidates taking the Accounting Module and the Business Management Module

2020

Introduction

1. Business, Accounting and Financial Studies (BAFS) is one of the elective subjects in the Hong Kong Diploma of Secondary Education Examination (HKDSE).
2. The BAFS curriculum comprises a compulsory and an elective part to strike a balance between breadth and depth in different business areas. The compulsory part provides a broad-based foundation for students for more in-depth study of concepts and knowledge in specific modules in the elective part. (CDC & HKEAA, 2015).
3. The compulsory part of the BAFS curriculum covers four main areas, namely: Business Environment, Introduction to Management, Introduction to Accounting and Basics of Personal Financial Management.
4. The elective part, which builds upon the knowledge and skills in the compulsory part, provides students with an opportunity to pursue a more in-depth study in a focused area. Students can choose either Accounting or Business Management Module, according to their interests and inclinations. (CDC & HKEAA, 2015)
5. The assessment objectives of HKDSE BAFS are consistent with the design of the curriculum. The overall aim of the public examination is to assess candidates' ability to demonstrate their knowledge and understanding in different areas of business and to apply this to novel situations in the context of business decisions.
6. The public examination of HKDSE BAFS consists of two papers. Paper 1 and Paper 2A Accounting Module/Paper 2B Business Management Module. Details are shown in Table 1 below.

Table 1: Assessment Framework of 2020 HKDSE BAFS Examination

Component		Weighting	Duration
Public Examination	Paper 1 Compulsory part	40%	1 hour 15 minutes
	Paper 2 Elective part (choose one only) 2A Accounting module 2B Business management module	60%	2 hours 15 minutes

- All candidates are required to take Paper 1, in which two sections are included: Section A multiple-choice questions and Section B short questions. Questions will be set on the compulsory part of the curriculum. For Paper 2, there are short-questions, accounting problems, business cases and essays which require integration of knowledge and skills learnt in the compulsory part to demonstrate in-depth knowledge of the module.

Details of the Assessment Framework could be accessed via the following link:

http://www.hkeaa.edu.hk/DocLibrary/HKDSE/Subject_Information/bafs/2020hk_dse-e-bafs.pdf

- Different types of questions are used to assess students' performance in a broad range of skills and abilities. The question types of Paper 1 include multiple-choice questions and short questions. Multiple-choice questions facilitate a more comprehensive coverage of the curriculum, while short questions can be used to test basic knowledge and essential concepts. (CDC & HKEAA, 2015).
- During the school consultation about the future development of business subjects conducted in 2017, it was claimed that candidates taking the Accounting Module are normally stronger in numerical skills but weaker in writing, therefore they may have poorer performance in the short questions set in HKDSE BAFS Paper 1, when compared with the performance of candidates taking the Business Management Module. As a result, some stakeholders suggested that eliminating the short questions and setting only multiple-choice questions (MCQs) in Paper 1 could make the assessment fair to all candidates taking either module.
- The purpose of this study is to investigate whether the abovementioned claim is supported by past HKDSE BAFS examinations statistics.

11. With candidates' raw scores in all the questions of Paper 1 and Paper 2, it is possible to conduct a related comparison on the performance of the candidates of the two modules. The result can help assess the fairness issue from an objective and evidence-based perspective, which subsequently helps the HKEAA to respond to this claim in a professional manner.

Review of Literature

12. Written communication skills comprising spelling, grammar, punctuation, and clarity of exposition are considered important for accounting students (Riley & Simons, 2016).
13. Previous research showed that accounting students were found to have poor written skills in the areas of sentence structure, grammar and spelling as well as an inability to express their understanding of the application of accounting theory to particular transactions (Fleet & Turner, 2003).
14. Tanner and Cudd (1999) found that accounting students are generally perceived to be weak in writing, verbal, and mathematical skills and consequently provide a teaching challenge for finance professors.
15. However, the scope of these researches is restricted to students taking accounting courses at undergraduate level. The research findings may only help to formulate the course contents and assessment rubrics of undergraduate courses which are more complex and require a higher level of written communication skills for the presentation of accounting and auditing advice. For BAFS students taking the Accounting module in the HKDSE, they are required to answer short questions with brief elaborations on the points given only.
16. Therefore, more researches are warranted to investigate whether the writing communication ability of Accounting students would affect their performance in answering short questions when compared with the performance of Business Management students.

Research Question and Methods

17. Research Question:

Is there any performance difference in multiple-choice questions and short questions in BAFS Paper 1 between candidates taking the Accounting Module and the Business Management Module?

Data

18. The raw score data of Paper 1 of the HKDSE BAFS exam from 2015 to 2019 were analysed. The number of candidates in the two modules are summarised in Table 2. In each paper, there are two categories of items: multiple-choice (MC) questions in Part A and open-ended (OE) short questions in Part B.

Table 2 Number of candidates in different modules of HKDSE BAFS (2015-2019)

Module	Year				
	2015	2016	2017	2018	2019
Accounting	9,624	8,593	8,010	8,285	7,204
Business management	3,902	3,401	3,006	2,896	2,537
Total	13,526	11,994	11,016	11,181	9,741

Methods

19. Logistic regression method is adopted for DIF analysis (Swaminathan & Rogers, 1990), which can be expressed as:

$$\log \left[\frac{P(Y=1)}{P(Y=0)} \right] = \beta_0 + \beta_1 X_i + \beta_2 G_i + \beta_3 X_i G_i, \quad (1)$$

where Y is a binary score (1 = correct and 0 = incorrect); X_i is the test score of student i as the matching variable; G_i is a dummy variable referring to the group membership of student i ; and β_0 , β_1 , β_2 , and β_3 are the regression coefficients for the studied item.

20. An item is flagged as DIF when β_2 or β_3 does not equal to zero: if $\beta_3 \neq 0$, then the item is deemed to exhibit nonuniform DIF; if $\beta_3 = 0$ and $\beta_2 \neq 0$, then the item is deemed to exhibit uniform DIF. We examined uniform DIF only in this study.
21. The DIF analyses for MC items were carried out with an R package *difR* (Magis, Béland, Tuerlinckx, & De Boeck, 2010). The scale purification method (Wang, 2008) was implemented in order to control the false-positive rate (i.e., the chance that DIF-free items are be mistakenly classified as DIF items) at a nominal level ($\alpha = 0.05$).
22. In addition to the significance of β_2 coefficient, the DIF size was also concerned. The difference ΔR^2 between two pseudo R^2 of the two nested models (i.e., $\beta_2 = \beta_3 = 0$ in the reduced model and in $\beta_3 = 0$ in the full model) was calculated to quantify the DIF size.
23. Zumbo and Thomas (1997) suggested three DIF levels (negligible, moderate, and high) based on the following criteria: (ZT)
- (a) Negligible: $0 < R^2 < 0.13$,
 - (b) Moderate: $0.13 < R^2 < 0.26$,
 - (c) Large: $0.26 < R^2 < 1$.
24. Similarly, Jodoin and Gierl (2001) proposed the new stricter criteria: (JG)
- (a) Negligible: $0 < R^2 < 0.035$,
 - (b) Moderate: $0.035 < R^2 < 0.07$,
 - (c) Large: $0.07 < R^2 < 1$.
25. The two classifications were adopted to judge the DIF sizes for MC items in this study.
26. Although logistic regression can accommodate open-ended items with partial credit, applying it to the OE items in part B is inefficient because the OE items have too many score categories (e.g., 0 to 20). Alternatively, the linear regression has been adopted to assess DIF in OE items:
- $$\hat{Y} = \beta_0 + \beta_1 X_i + \beta_2 G_i + \beta_3 X_i G_i. \quad (2)$$
27. Note in Equation 2, X_i is the summed score of DIF-free MC items. Likewise, we assessed the occurrence of uniform DIF on OE items only, so that β_3 was fixed at 0 during analysis. To the best of our knowledge, none of the studies suggested a guideline for evaluating the DIF size by using linear regression. Therefore, we

temporarily used the two criteria (e.g., ZT and JG) to judge the DIF size for OE items.

Procedures

28. Step 1: Conducting DIF analysis on MC items

- (a) Detecting possible DIF items (with scale purification procedures) by using difLogistic function in difR
- (b) Calculating the summed scores of DIF-free items as the matching variable for the next stage of analysis.

Step 2: Conducting DIF analysis on OE items

- (a) Assessing (dichotomously scored) ES items (short questions in Part 2 of Section B) by using difLogistic function
- (b) Assessing (polytomously scored) ES items by using olr function

Results

29. As illustrated in Tables 3 and 4, a few items were detected as exhibiting DIF.

30. In Table 3, for example, based on the criterion set by both Zumbo and Thomas (1997) and Jodoin and Gierl (2001), the flagged MC item in 2015 (MCQ 6) was found preferred candidates taking the business management module, whereas the flagged MC item in 2019 (MCQ 2) was found preferred candidates taking the accounting module.

Table 3 Results of DIF analysis for MC items

DIF size	Year				
	2015	2016	2017	2018	2019
<i>Criterion: ZT</i>					
Negligible	29	30	30	30	29
Moderate	0	0	0	0	0
Large	1	0	0	0	1
<i>Criterion: JG</i>					
Negligible	29	30	30	30	29
Moderate	0	0	0	0	0
Large	1	0	0	0	1

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31. For the MC items, performance differences were identified in two questions, i.e. 2015 Q6 and 2019 Q2. The two questions were included in *Annex*.
 32. 2015 Q6 is a question about the importance of management which was found preferred BM candidates, while 2019 Q2 is a question covering accounting concept and assumption which was found preferred Accounting candidates. Nevertheless, there are in total 150 MC questions from the 5 years' data, so the difference is considered insignificant.
 33. In Table 4, a few OE items were considered favourable to either the Accounting candidates or the Business Management candidates, though the results should be interpreted with caution because of the limitation of the analysis stated in Para 27 above.

Table 4 Results of DIF analysis for OE items

DIF size	Year				
	2015	2016	2017	2018	2019
<i>Criterion: ZT</i>					
Negligible	5	5	15	10	14
Moderate	0	0	0	1	0
Large	0	0	0	2	0
<i>Criterion: JG</i>					
Negligible	5	3	13	10	13
Moderate	0	2	2	0	0
Large	0	0	0	3	1

34. There are 52 sub-questions in total from the 5 years' data from 2015 to 2019.
35. For the OE items, based on the criterion set by Zumbo and Thomas (ZT), 3 sub-questions in 2018 Paper 1 were found preferred BM candidates, while a total of 8 sub-questions were found preferred either Accounting candidates or BM candidates if the stricter criterion set by Jodoin and Gierl was used.
36. In Table 5 below which shows the topics covered in the 8 sub-questions, it reflected that Accounting candidates performed better in 3 accounting sub-questions while BM candidates performed better in 3 management questions, 1 business environment sub-question and 1 accounting sub-question. (Refer to Annex 1 for the relevant questions in the live paper)

Table 5 Topics covered in the 8 sub-questions found preferred either AC or BM candidates

Year	+ Accounting	- BM
2016	+ (X1B_1_1) Accounting	- (X1B_3_1) Business environment
2017	+ (X1B_4_1) Accounting	- (X1B_3_3) Management
2018	/	- (X1B_5_1) Accounting - (X1B_5_2) Management - (X1B_5_3) Management
2019	+ (X1B_3_1) Accounting	/

Note: (X1B_1_1) refers to Paper 1B Q.1(a)

37. One possible reason for accounting candidates and BM candidates performed better in the accounting and management OE items respectively is that they have inclination when choosing the electives. Students having better accounting senses and interested in accounting would choose accounting as their elective, same case for BM. Besides, the curriculum of the electives is built upon the compulsory part, so candidates taking the Accounting or BM modules could master the basics of the respectively modules better.
38. Out of the 8 sub-questions identified, there is only 1 question covering business environment found preferred BM candidates, while there is no question covering introduction to personal financial management, in which both Accounting and BM students are required to study in the compulsory part but not in the elective part. It means that their overall performances in these topics are similar and there is no advantage for either stream of candidates.

Conclusions and Recommendations

39. The findings of this study reveal that Accounting candidates performed better in some questions while BM candidates performed better in others. There is no evidence to show that Accounting candidates have poorer performance in the short questions set in HKDSE BAFS Paper 1, as compared with that of BM candidates.
40. As different question types serve different purposes in assessing students' learning, and certain topics of the compulsory part could be more effectively assessed by using short questions, e.g. factors affecting business decisions, the impact of globalisation on business, etc., it is recommended to keep both multiple-choice questions and short questions in Paper 1 based on the findings of this study.

Future Research

41. It is found in this research that performance difference in multiple-choice questions and short questions in BAFS Paper 1 between candidates taking the Accounting Module and the Business Management Module is insignificant. Future research can be done by analysing the past examination data to see whether candidates' performance in multiple-choice questions is consistent with their performance in short questions in Paper 1.

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Annex

MCQs and OE items found preferred either the Accounting Module and BM module

2015 MC 6 (found preferred candidates taking the business management module)

4. Which of the following show the importance of management?
- (1) enhance the efficient use of resources of the business
 - (2) help staff achieve the goal of the business effectively
 - (3) prevent the business from being affected by external factors
- A. (1) and (2) only
- B. (1) and (3) only
- C. (2) and (3) only
- D. (1), (2) and (3)

2019 MC 2 (found preferred candidates taking the accounting module)

2. According to accounting assumptions, principles and conventions, which of the following accounting treatments is correct?
- A. A sole proprietor records his own rental expenses in the books of the firm.
- B. Mr Chan owns three firms. He keeps separate accounting records for each firm.
- C. All assets are valued at current market price if a business is expected to cease operating in the following month.
- D. Once an accounting method has been adopted, the method should not be changed unless the new method leads to a higher profit.

2016: - (X1B_3_1), + (X1B_1_1)

3. Carlo operates a reputable restaurant chain in Italy with customers from all over the world. He is planning to establish branches in Hong Kong. A business consultant suggests him to operate the branches in the form of franchising.
- (a) Give two reasons why Carlo should establish the branches in the form of franchising instead of setting up his own restaurants in Hong Kong. (4 marks)

1. Annie runs a shop selling bicycles. One day, Annie took one of the bicycles home for her son's use. The cost and selling price of the bicycle are \$500 and \$980 respectively.

(a) Prepare the journal entry to record the above event. Narration is not required.

(2 marks)

2017: - (X1B_3_3), + (X1B_4_1)

3. Recently, the warehouse of Company A caught fire, which led to substantial losses.

(c) Which department of Company A should be responsible for claiming insurance compensation? Explain one main role of this department in the company.

(3 marks)

4. (a) Prepare for John's firm a trial balance as at 31 December 2016.

(5 marks)

2018: - (X1B_5_1, Accounting) (X1B_5_2, X1B_5_3) BM

5. On 1 January 2018, the cash at bank account of Vincent's firm carried a debit balance of \$20 000. The following transactions took place in January 2018:

2018

Jan	3	Purchased goods on credit with a list price of \$10 000. The supplier offers a trade discount of 2% for purchase orders over \$5 000 and a cash discount of 3% for settlements within 10 days after purchase.
	7	Repaid the supplier for the purchase made on 3 January 2018 by cheque.
	10	Paid rent by cheque for \$7 000.
	25	Sold goods on credit for \$12 000.

(a) Prepare the T-accounts in the books of Vincent's firm to record the above transactions.

(5 marks)

During the year, Vincent's firm aims to reduce costs. However, the marketing manager wants to launch a large-scale sales promotion campaign. The budgeted cost of the campaign is 50% of last year's sales.

- (b) State the principle of effective management that has been violated in the above case.
(1 mark)
- (c) Explain two reasons for adopting the principle of effective management in (b) above.
(4 marks)

2019: + (X1B_3_1) Accounting

- 3.(a) prepare appropriate T-accounts to record the above transactions for Chung's firm.
Balancing off the accounts is not required.
(4 marks)