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Do secondary school-leaving English examination results predict university students' academic writing performance? A latent profile analysis

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ABSTRACT

Secondary school-leaving English examination results are often regarded as indicators of students' competence to study in English-medium universities, which is usually demonstrated through source-based academic writing. In English as a second or foreign language (ESL/EFL) contexts, many English-medium universities require local undergraduates to enrol in an academic writing course, unless they received outstanding English results in secondary school-leaving examinations. This study investigates the relationship between ESL undergraduates' secondary school-leaving English examination results and their academic writing performance through latent profile analysis. Results show that students can be grouped into four classes of academic writing performer (AWP), namely Complex-AWP, High-AWP, Medium-AWP and Low-AWP. Surprisingly, the Complex-AWP group had the highest means in structure, argument and language, but the lowest in citation. Secondary school-leaving English examination results can generally predict students' class membership in language, argumentation and, to some extent, structure, but not citation. An important implication is that students with high English proficiency do not necessarily do well in all aspects of academic writing. This study can inform university senior management on how to set policies about who needs an academic writing course and provide appropriate training in various aspects of academic writing for university students with diverse English proficiency.

KEYWORDS

Latent profile analysis; academic writing performance; high-stakes testing; English as a second language

Introduction

Results from high-stakes school-leaving examinations are often used as the admission criteria for higher education. For universities using English as the medium of instruction (EMI), English language results in national and international gatekeeping tests such as the International English Language Testing System (IELTS), Scholastic Assessment Test (SAT) and Test of English as a Foreign Language (TOEFL) are often regarded as important evidence of students' ability to study in the English medium. This ability is often demonstrated in essays and related written work (Elander et al. 2006; Cai and Cheung 2019), through which students 'display their critical and analytic skills, their use of English for reasoning and persuasion, their grasp of subject matter issues and their ability to shape an argument using the conventions of their field' (Hyland 2017,

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24). To train students how to write academically, many universities in English-speaking countries offer pre-sessional or in-sessional English for Academic Purposes (EAP) courses for non-native English speaking international students who do not meet certain English standards (Wingate and Tribble 2012; Murray 2015; Fenton-Smith et al. 2017). On the other hand, universities in English as a second or foreign language (ESL/EFL) settings usually mandate that all local students enrol in an EAP course unless they reach outstanding English language results in those gatekeeping tests (Hyland 2014; Jenkins 2014).

This policy assumes that native speakers of English or high-achieving ESL/EFL students already possess the necessary English proficiency to study in higher education and do not need an EAP course to learn academic writing (Wingate and Tribble 2012; Murray 2015; Yung and Fong 2019). However, as Read and Von Radow (2013) argue, 'the successful completion of secondary school qualifications may not provide sufficient evidence that matriculating students have the necessary level of language proficiency or academic literacy to ensure adequate achievement in their university studies' (p. 90). Toh (2016) and Evans and Morrison (2016) also suggest that the English proficiency of local entrants in ESL/EFL contexts may not have prepared them to embark on new academic journeys in higher education, despite their EMI secondary education (see also Cai and Cheung 2019). Moreover, such a policy has failed to take into account that students with different English proficiencies may perform differently in different aspects of academic writing, some of which may not be directly related to students' English proficiency (Hyland 2016b). Therefore, it is necessary to look at the relationship between students' English proficiency and their academic writing performance from a person-centred approach, in order to identify the distinct groups of students with differential academic writing performance profiles.

Many studies have focused on the differentiation of academic English competence between domestic native English-speaking students and international ESL/EFL students in English-speaking countries (e.g. Murray 2015; Read 2015). There is a paucity of research on how the different English proficiencies of non-native English-speaking students admitted to EMI universities in ESL/EFL contexts have an effect on the various aspects of their academic writing performance. This is an important area of concern considering the global trend of internationalisation in higher education, particularly in ESL/EFL countries where English plays an important role as a *lingua franca* as well as in students' learning (Jenkins 2014). To fill this gap, this study investigated (1) the extent to which students in an ESL international EMI university can be grouped into different latent classes according to their academic writing performance, and (2) the effect of the ESL students' general English proficiency determined by a high-stakes secondary school-leaving examination on their performance in different aspects of academic writing in an EAP course.

Framework for assessing academic writing

In higher education, students are usually required to cite academic texts to support their arguments in writing. Many universities therefore assess students' academic writing ability through reading-into-writing tasks (Bruce and Hamp-Lyons 2015; Hirvela 2016b). These tasks typically require students to mine the source texts for ideas, select ideas and synthesise them from the sources, use accurate language, organise sentences and paragraphs in appropriate style and adhere to academic conventions such as citation and referencing (Knoch and Sitajalabhorn 2013; Hyland 2017).

There are several shared elements to assess academic writing despite the different requirements across disciplines. Based on an analysis of published assessment criteria in psychology, business studies and geography, Elander et al. (2006) identified four core elements in academic writing, namely critical thinking, use of language, structuring and argument. In reading-into-writing tasks, students' ability to cite and reference sources should also be assessed. Therefore, when designing an academic writing course for ESL students in Hong Kong, Bruce and Hamp-Lyons (2015) included

'source integration' in the rubric to assess students' ability to paraphrase and acknowledge sources (i.e. citation and referencing), in addition to task fulfilment (responding to the given prompt and arguing with a convincing stance), discourse competencies (organisation of paragraphs and effective use of cohesive devices) and language competencies (grammatical accuracy and a wide variety of appropriate vocabulary).

In this study, the participants' academic writing performance was measured in a summative, end-of-course reading-into-writing examination in an EAP course; considering that students already had plenty of opportunities to practise writing in a formative, process-oriented approach in class. Although written examinations have been criticised for limiting the benefits of process writing which values prewriting, drafting and revising (Hyland 2016b; Lee 2017); they challenge students to use the academic writing skills and write in an 'on-the-spot and succinct manner' (Hirvela 2016a, 302). In the examination, candidates are given a prompt and six related academic sources to write in 3 hours 1000–1200 words for either an essay or a report, the two most common genres in university written assignments and examinations (Hirvela 2016a; Hyland 2017; Cai and Cheung 2019).

The assessment criteria include the core elements for reading-into-writing tasks discussed in the literature (e.g. Elander et al. 2006; Knoch and Sitajalabhorn 2013; Hirvela 2016b) and are in line with Bruce and Hamp-Lyons's (2015) framework (see Table 1). The first criterion 'ability to structure an academic text' (structure) assesses students' appropriate use of elements of structuring such as introduction, topic sentences, section headings and conclusion. The second criterion 'ability to express academic arguments' (argument) focuses on students' argumentation of their stance in addressing the given prompt with the support of appropriate evidence from the given academic sources. Students' language use, including the complexity of grammatical patterns and range of vocabulary, is assessed in the third criterion 'ability to write grammatically accurately with accurate use of vocabulary' (language). The last criterion 'ability to cite and reference accurately' (citation) assesses students' ability to paraphrase, summarise and acknowledge sources. Since different disciplines use different styles of citation and referencing, instead of teaching the students a particular style, it is more important that students understand the idea of adhering to a required style. In this regard, this criterion also assesses students how accurately they can follow the style in the citation and referencing style guide (a simplified author-date style) provided throughout the course and the examination (Table 2).

Method

This study investigated the relationship between ESL undergraduates' English proficiency based on their secondary school-leaving English examination results and their academic writing performance at university. It addressed two research questions:

1. Can students be grouped into different classes according to their academic writing performance?
2. Can students' results in secondary school-leaving English language examination predict their class membership of academic writing performance? If so, how?

Context and participants

The study was conducted in an English-medium international university in Hong Kong. Like other government-funded universities in Hong Kong, this university admits local students who studied the Hong Kong secondary school curriculum and learnt English as a second language. The students took the Hong Kong Diploma of Secondary Education Examination (DSE) at the end of

Table 1. Assessment rubric of academic writing.

	A+, A, A−	B+, B, B−	C+, C, C−	D+, D	F
Ability to structure an academic text **25% of grade**	All key elements of structuring are present. All key elements are well-handled.	All key elements of structuring are present. There are one or two examples where the key elements are not well-handled.	One or two key elements of structuring are missing. There are more than two examples where the key elements are not well-handled but also quite a few examples where they are well-handled.	More than two key elements of structuring are missing but there is evidence of some of them. There are frequent examples where the key elements are not well-handled but also a few examples where they are well-handled.	There is virtually no evidence of the key elements. These key elements are almost always not well-handled.
Ability to express academic arguments **30% of grade**	You can, at all times, critically justify / argue for a consistent stance in the main question. This stance is always backed up with appropriate evidence from a range of sources. There are no irrelevancies in the text. The stance is, at all times, clear and concise. There is never any confusion or ambiguity for the reader.	You can almost always critically justify / argue for a consistent stance in the main question. This stance is almost always backed up with appropriate evidence from a range of sources. There are no irrelevancies in the text. The stance is almost always clear and concise. There is never any confusion but there may be isolated examples of ambiguity for the reader.	You can justify / argue for a stance, but at times this tends to be simplistic rather than critical. However, there is some sustained evidence of the ability to express a critical stance in the main question. This stance is usually backed up with appropriate evidence from a range of sources. There maybe one or two examples of irrelevancies in the text. The stance is usually clear and concise. There may be isolated examples of confusion for the reader and ambiguity.	You are rarely able to critically justify / argue for a stance. The majority of the text presents a simplistic, rather than critical stance although there may be isolated examples of a critical stance. You might have failed to answer the main question. This stance is rarely backed up with appropriate evidence from sources and may rely on only one or two sources. You rely mostly on the use of personal opinion although there are one or two examples of the ability to back up the stance with appropriate evidence. There may be multiple examples of irrelevancies in the text. The ability to express a clear and concise stance is limited. In some places, the text causes confusion for the reader and she may need to infer the meaning. However, there are one or two examples of an ability to express a stance clearly, if not concisely.	There is virtually no evidence of an ability to critically argue for a stance. There is an almost total lack of evidence used to back up sources. The text causes confusion for the reader almost throughout the text. The text might be significantly under length which means a position is not able to be expressed. The text is totally off topic.
Ability to write grammatically accurately with accurate use of vocabulary **30% of grade**	Written language is almost always grammatically accurate and contains very few, if any, systematic errors in simple and complex grammatical structures. You always use a wide range of vocabulary accurately. The errors in grammar and vocabulary never impede the understanding of the reader.	Written language is often accurate but contains a few systematic errors in complex grammatical structures but a very high level of accuracy in simple structures. You almost always use a wide range of vocabulary accurately. The errors in grammar and vocabulary never impede the understanding of the reader.	Written language is generally accurate. Errors, when they occur, are more often in complex grammar and there is evidence of accuracy of simple grammar although this is not sustained throughout the whole text. You usually use vocabulary accurately but the range tends to be a bit limited and inaccuracies arise with the use of low frequency vocabulary items. The errors in grammar and vocabulary impede the understanding of the reader in one or two places.	Written language can be followed by an academic audience but it contains frequent errors in complex and simple grammatical structures throughout the text. You have a noticeably limited range of vocabulary although there is some evidence of correct use of high and low frequency vocabulary items. The errors in grammar and vocabulary impede the understanding of the reader in more than two places but not the majority of the text.	The errors in complex and simple structures are so frequent that they cause sustained confusion for the reader. Range of vocabulary is so limited that the you are unable to express a simple position.
Ability to cite and reference accurately **15% of grade**	The reference list is complete There are only one or two mechanical problems in the reference list and citations. There is no evidence of copying word for word from the reading texts at all. All ideas from the texts have been cited.	The reference list is complete. There are a few mechanical problems in the reference list and citations. There is no sustained evidence of copying word for word from the reading texts but there are one or two instances where text has been copied word for word on the clausal level. All ideas from the texts have been cited.	The reference list may be missing one or two entries. There are a number of mechanical problems in the reference list and citations. There is no sustained evidence of copying word for word from the reading texts however there are several instances where text has been copied word for word on the clausal level. There is some lack of citation for ideas from the texts.	There are fewer than half of the required entries in the reference list. There are citations but no reference list. There are frequent mechanical problems in the reference list and citations. There is no sustained evidence of copying word for word from the reading texts however text has been copied word for word on the sentence level in one or two places but not consistently throughout the text. There is a consistent lack of citation for ideas from the texts.	There is no reference list and no citation. **If there is evidence of copying from the text word for word at the sentence level in more than two places you receive an automatic fail for this criterion

Table 2. Citation and referencing style guide in the academic writing examination.

You are introduced to the citation and referencing style that you will use in the CAES 1000 assignments and written exam. You should learn that various citation and referencing conventions are required in different disciplines and academic purposes. We are using this simplified author/date style for two reasons:

1. CAES1000 students come from all 10 faculties in the university. Different faculties use different styles. For this reason, it doesn't make sense to teach one particular style as it would not be useful to all CUE students. What is useful for you, as a first-year university student, is for you to understand the basic conventions of citation and referencing and have practice following one simplistic style.
2. Each individual style is quite complicated. It would be too time consuming for you to learn and use one particular style in the written exam.

In your second or third year, you will take an English in the Discipline course with CAES and in this course you will be introduced to a specific style which can be used in your major. You need to ask your course teacher which style you should use in your Faculty assignments.

CITATIONS

Citation Type	Example	
One source	**Single author (Format 1: Integral citation)** **author's surname (year of publication)** e.g. Smith (2007) found that air pollution levels have risen.	**Single author (Format 2: Non-integral citation)** **(author's surname, year of publication)** e.g. Statistics show that air pollution levels are rising sharply (Smith, 2007).
	Joint authors (Format 1: Integral citation) **author A's surname, author B's surname and author C's surname (year of publication)** e.g. Biber and Cortes (2004) define … e.g. Peters, Green and Bright (2009) argue against this plan …	**Joint authors (Format 2: Non-integral citation) (author A's surname, author B's surname, & author C's surname, year of pub.)** e.g. Rapid population growth has worsened the water quality in Victoria Harbor (Tong & Lee, 2014). e.g. Air pollution levels have risen drastically (Andrews, Corbett, & White, 2011).
	If author is an organization, replace author's surname with the full name (not the abbreviation) of the organization. If author is unknown, replace author's surname with the first few words of the article title enclosed in inverted commas e.g. 'The Global Credit Squeeze (2008) in Integral citation and ('The Global Credit Squeeze', 2008) in Non-integral citation.	
More than one source This is when you synthesize information from multiple sources.	**(author A's surname, year of publication; author B's surname, year of publication)** e.g. Recent studies (Adams, 2011; Hong Kong Environmental Protection Department, 2012; Smith & Brown, 2007) show that air pollution levels have risen dramatically in most developed countries. *[Inside the citation brackets, arrange the author's surname in alphabetical order.]*	
With a direct quotation	**(author's surname, year of publication, page number when available*) You must put inverted commas around the direct quotation.*** e.g. … the birth rate has been in 'rapid decline' (Baxter & Baker, 2007, p. 20).	
A secondary citation This is when you cite a source that was mentioned in another source.	**author referred to in text (as cited in author of the text you read, year of publication)** e.g. Johnson (1998, as cited in Smith, 2000) argues that … *In the example above, Smith cited Johnson's work. You have read Smith but you **haven't** read Johnson. You want to cite Johnson's ideas.*	

REFERENCES

List references in alphabetical order according to author (i.e. according to the first author's surname, or the name of the authoring organization, or the article title if author is unknown).

Type	Example
Book	**Author's surname, Author's initials. (Year of publication). Title of Book. Publisher.** e.g. Weiner, I. B. (2015). Handbook of Psychology. John Wiley.
Edited book chapter	**Author's surname, Author's initials. (Year of publication). Title of Chapter. In Editor's initials, Editor's surname (Ed.), Title of Book (page numbers). Publisher.** e.g. Ma, K. (2000). Is Genetic Engineering Ethical? In H. Brown (Ed.), Ethics in Science (pp. 82-96). Oxford University Press.
Journal article	**Author's surname, Author's initials. (Year of publication). Title of Article. Title of Journal. Volume Number, Issue Number when available. Page numbers.** e.g. Wong, S. (2009). Public Housing: The Case For and Against. Hong Kong Journal of Real Estate. Volume 71, Issue 3. 145-176.
Report	**Author's surname, Author's initials. (Year of publication). Title of Report. Publisher.** e.g. Hong Kong Department of Housing. (2011). Public Housing for the Needy. Hong Kong Department of Housing.
Web page ***(excluding online news/ magazine articles)***	**Author's surname, Author's initials. (Year of publication). Title of Web Page. Retrieved from URL of web page** e.g. American Heart Association. (2009). Learn Your Levels. Retrieved from http://www.americanheart.org/presenter.html
News/magazine article ***(online version with known author)***	**Author's surname, Author's initials. (Date of publication). Title of Article. Title of Newspaper/Magazine. Retrieved from URL of article** e.g. Brown, S. (2011, 2 March). Snow Brings European Airports to a Standstill. CNN.com. Retrieved from http://cnn.com/news/122
News/magazine article ***(print version with known author)***	**Author's surname, Author's initials. (Date of publication). Title of Article. Title of Newspaper/Magazine. Page numbers when available.** e.g. Lamb, J. (2010, 20 October). HKMA Data Shows Hard Times are Ahead. South China Morning Post. p. 3.

Important Notes:

- If the author is an organization, replace the author's surname and initials with the full name (not the abbreviation) of the organization.
- If a source has more than one author, then reference it as follows: **Author, A.; Author, B. and Author, C. (Year of publication) … etc … …**
  e.g. Smith, C.; Jones, T. and Chan, W. (2012). China's Strategic Role in Asia. HKU Press.
  e.g. Rayson, F. and Frost, J. (2000). A Study of Digital Literacies in Pre-School Children in Vietnam. Educational Technology Journal. Volume 22, Issue 1. 1-9.
- If author is unknown, replace author's surname with the first few words of the article title in the references e.g. The Global Credit Squeeze, (2008).
- If you use a secondary citation, you should only write a reference for the source that you read.

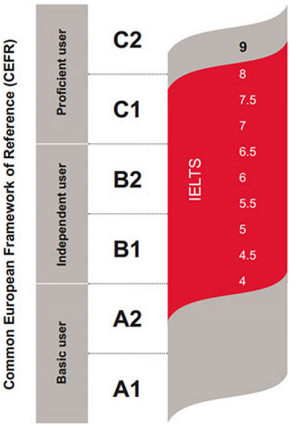

Figure 1. The relationship between CEFR and IELTS results.

Secondary Six (Grade 12), the results of which were used for university admission. In the DSE, candidates' performances are reported in five levels (Level one to Level 5), with Level five being the highest. Among the Level five candidates, those with the best performance are awarded a Level 5**, and the next top group are awarded a Level 5*. The English language component of this examination was benchmarked against IELTS, which is mapped to the Common European Framework of Reference for Languages (CEFR) (Figure 1). To be admitted to any local university, a minimum of Level 3, equivalent to 5.48–5.68 in the IELTS and B2 in CEFR (Independent user), is required. The highest level is 5**, equivalent to 7.51–7.77 in the IELTS and C1 in CEFR (Proficient user). This study included 917 local students (52% girls and 48% boys) who consented to participate in the study. Their English proficiency ranged from Level three to Level 5** in DSE. Such a large population of students with a wide range of English examination results offered a meaningful and interesting sample for clustering students through latent profile analysis (LPA).

In the university, all first-year undergraduates were required to enrol in Core University English (CUE), an EAP course with a major component in academic writing. However, those who attained the highest DSE level (Level 5**) could choose to be exempt from it. Hyland (2017, 27) describes CUE as a 'bridging course in English that brings students up to speed with general academic English'. It covers features such as nominalisation, impersonality, argument, metadiscourse, stance and citation. The written genres of essays and reports appear in most of the assessment tasks in students' common core courses. The assessment criteria for academic writing in CUE are in line with those in the field of EAP (e.g. Elander et al. 2006; Hirvela 2016b) and those commonly used in other higher education institutions (e.g. Bruce and Hamp-Lyons 2015). All the participants in this study completed CUE in the first semester in their first-year of university studies.

Measures

The marking of writing in the CUE examination went through a rigorous standardisation and moderation process. Before marking, all markers received training in a meeting where standards of grading were discussed based on the assessment rubric and sample scripts. Each marker was required to submit at least 10 marked scripts to the course coordinators, who were expert markers, for double marking. After marking, moderation of grades was conducted by the coordinators. These procedures ensured the accuracy of scoring (see Brown, Glasswell, and Harland 2004).

In line with the policy of many international universities, the general English proficiency was determined by students' overall grades in English language examinations consisting of various

Table 3. Means and standard deviations of scores.

	Mean	SD
Structure	8.66	1.47
Argument	8.12	1.57
Language	8.04	1.55
Citation	5.01	3.30
DSE	4.92	1.02

papers, namely reading, writing, listening and speaking. The Hong Kong DSE is administered by the Hong Kong Examinations and Assessment Authority. Reliability of marking is ensured through markers' training, double marking and moderation from expert markers.

Each of the assessment criteria for academic writing in the rubric was measured in a 12-point scale, from A to F with augmentation of holistic grades (i.e. plus or minus). The 12-point scale in the four aspects of academic writing performance ranges from A+ (12), A (11), A− (10), B+ (9), B (8), B− (7), C+ (6), C (5), C− (4), D+ (3), D (2) to F (1). Among the participants' scores in the CUE examination, the highest mean was with Structure ($M = 8.66$, S.D. = 1.47), followed by Argument ($M = 8.12$, S.D. = 1.57), Language ($M = 8.04$, S.D. = 1.55), and then Citation ($M = 4.92$, S.D. = 1.02). The participants' DSE results are measured in a 7-point scale, ranging from Level 5** (7), Level 5* (6), Level 5 (5), Level 4 (4), Level 3 (3), Level 2 (2) to Level 1 (1). The average result was 4.91 (S.D. = 1.02) (Table 3).

Data analysis

To address the first research question, we conducted a LPA using the four criteria in the writing rubric to identify the patterns of students' performance. The general practice of LPA was to fit a series of models (usually from a 1-class model to a k-class model) to the data and then compare each new model (e.g. the 4-class model) with the old model (i.e. the 3-class model). The optimal model (or number of classes) was evaluated based on multiple criteria. Log likelihood value (LL), Akaike information criterion (AIC) and Bayesian information criterion (BIC) with lower values indicate better fit of a corresponding model. Among these indices, BIC and sample size-adjusted BIC (ABIC) have been shown in simulation studies to function particularly well in selecting the 'correct' latent class model (Dziak, Lanza, and Tan 2014) and were used as the main criteria in the current study. Complementary indices for model comparison include the *p*-value for the Lo-Mendell-Rubin adjusted Likelihood Ratio Test (LRT), and the *p*-value for bootstrap likelihood ratio test (BLRT). The significance of these *p*-values indicates the new model (e.g. 3-class model) fits better, while non-significance indicates the old model (e.g. 2-class model) fits better (Nylund, Asparouhov, and Muthén 2007). An entropy value larger than .80 indicate good classification quality.

To address the second question, multinomial regression was used to describe the association between DSE and class membership. LPA and LPA with predictor in this study was conducted on Mplus 7.4 (Muthén and Muthén 1998–2018) using the estimator of robust maximum likelihood (MLR).

Results

Identifying latent classes of academic writing performance

Using the four aspects of academic writing as indicators of students' ability, LPA with one to seven classes were tested. The results of fit indices are shown in Table 4. According to the table, meaningful improvement in AIC, BIC and a-BIC values began to slow down substantially until the 5-class model. Beginning with the 5-class model, membership probabilities for some classes

Table 4. Model fit statistics for latent class models.

Class	LL	AIC	BIC	ABIC	Entropy	LRT	BLRT
1	−7303.961	14635.921	14704.000	14659.536	–	–	–
2	−6879.993	13797.986	13890.379	13830.035	.980	.000	.000
3	−6620.077	13288.155	13404.861	13328.638	.960	.000	.000
4	−6483.771	13025.542	13166.562	13074.459	.986	.000	.000
5	−6396.134	12860.267	13025.601	12917.618	.986	.016	.000
6	−6206.609	12491.218	12680.865	12557.003	.998	.000	.000
7	−5749.876	11587.751	11801.713	11661.970	.998	.225	.000

dropped below 3% (and would be problematic for examining covariate associations with class membership). Thus, the 4-class model was considered for interpretation.

The features of each identified class were described by the means of the four aspects of academic writing that we used to conduct LPA. **Class 2** was labelled as complex academic writing performer (Complex-AWP) as this class had the highest mean in conventional indicators for academic writing ability (i.e. structure, argument and language) but the lowest in citation across all four classes. This cluster had the largest portion of students out of the total sample (37.6%). **Class 3** was labelled as high-academic writing performer (High-AWP) because this class had the second highest means in all four aspects of academic writing, including the three conventional writing ability indicators and citation. This class contained the second largest portion of students (34.9%). **Class 4** was labelled as Medium-AWP as this class had the third highest means in conventional writing ability indicators and second highest mean in citation. This class included 17.6% of the total sample and was the third largest class. **Class 1** was labelled as Low-AWP because they were lowest in three of four indicators. This class contained 10% of the total sample and was the smallest class. The estimated means in the four criteria of the rubric by class are shown in Figure 2.

Effect of DSE on class membership of academic writing performance

The results of odds ratios represent the effect of DSE on the assignment of membership. An odds ratio greater than one indicated that for every one-unit increase in DSE, the likelihood for classification in a class was increased as compared to classification in the normative class (in this case, Class 1, also the Low-AWP class). On the contrary, an odds ratio smaller than one indicated that the increase in DSE decreased a student's likelihood for classification in the corresponding class relative to the normative type. According to Table 5, relative to the Low-AWP (Class 1), for every one-unit increase in DSE, the likelihood of a student being classified in the Complex-AWP type was significantly larger (odds ratio = 1.689 times of the likelihood of being classified in the normative class, $p = .006$). Although the likelihood of a student being classified in the High-AWP and Medium-AWP types were also larger, the effects are nonsignificant (OR = 1.399, $p = .06$; and OR = 1.090, $p = .679$, respectively).

Within each class, the right block shows within-class effect of DSE on academic writing performance. DSE could significantly predict all conventional indicators with Complex-AWP and High-AWP students. The strongest effect was on Language ($\beta = .49$, $p = .000$ with Complex-AWP and $\beta = .47$, $p = .000$ with High-AWP students), and relatively smaller effects were found on Structure ($\beta = .27$, $p = .000$ with Complex-AWP and $\beta = .16$, $p = .001$ High-AWP students).

Among Medium-AWP and Low-AWP students, the largest DSE effects were also on Language ($\beta = .42$, $p = .000$; and $\beta = .60$, $p = .000$, respectively). DSE effect varied with the two lower groups: this effect was significant only with the Low-AWP students ($\beta = .42$, $p = .000$) but not with the medium-AWP students ($\beta = .21$, $p = .077$). No significant effect on Structure was found with either of the two lower performer groups ($\beta = .12$, $p = .288$ and $\beta = .17$, $p = .221$, respectively).

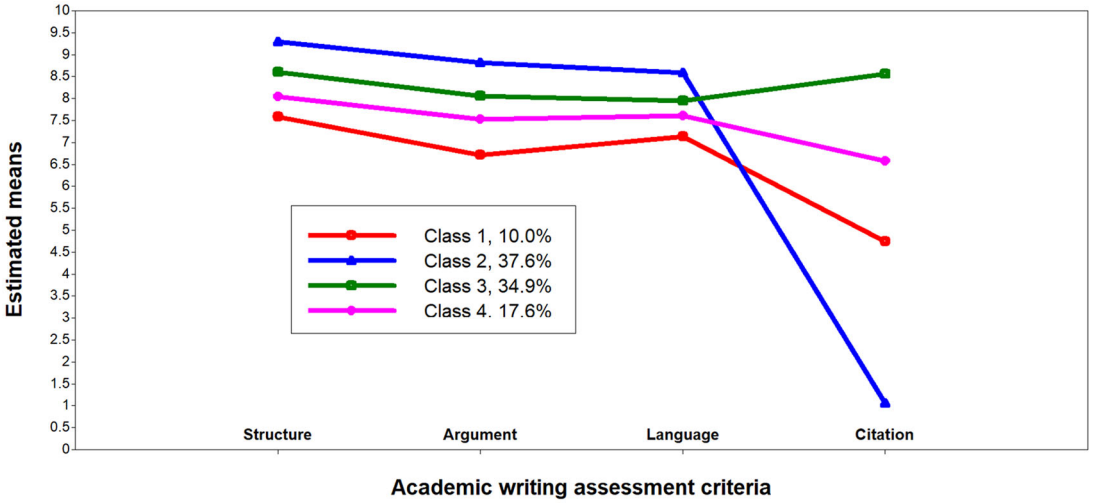

Figure 2. The estimated means of academic writing performance by class.

Table 5. Effect of DSE on class membership (parameterization using reference class 3).

	Between-class effect of DSE						*Within-class effect of DSE*			
	Multinomial logistic regression			*Odds ratios (OR)*						
	Beta	S.E.	*p*	OR	S.E.	*p*	Assessment Criteria	Beta	S.E.	*p*
Complex AWP (C2:37.6%)	0.52	0.15	0.000	**1.70**	0.25	0.006	Structure	0.27	0.06	0.000
							Argument	0.34	0.05	0.000
							Language	0.49	0.04	0.000
							Citation	−0.10	0.05	0.047
High-AWP (C3: 34.9%)	0.34	0.15	0.027	**1.40**	0.21	0.060	Structure	0.17	0.05	0.001
							Argument	0.31	0.05	0.000
							Language	0.47	0.04	0.000
							Citation	0.14	0.06	0.025
Medium-AWP (C4: 17.6%)	0.09	0.20	0.666	**1.09**	0.22	0.679	Structure	***0.12***	***0.12***	***0.288***
							Argument	0.21	0.12	0.077
							Language	0.42	0.11	0.000
							Citation	***−0.13***	***0.16***	***0.396***
Low-AWP (C1: 10%)	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	Structure	***0.17***	***0.14***	***0.221***
							Argument	0.41	0.11	0.000
							Language	0.60	0.07	0.000
							Citation	−0.49	0.21	0.023

The effect of DSE on Citation showed a different picture across all four classes of students. The effect was negative with the two extreme classes: $\beta = -.10$, $p = .047$ with Complex-AWP students and $\beta = -.49$, $p = .023$ with Low-AWP students. This effect was not significant with Medium-AWP students ($\beta = -.13$, $p = .396$) but then became significantly positive with the High-AWP students ($\beta = .14$, $p = .025$). The effect shift indicated that the predictive effect of DSE on citation fluctuated across the four classes with the continuous increase in conventional indicators of writing ability (i.e. structure, argument and language).

Discussion

To address the first research question, the results from LPA show that students can be grouped into four different classes according to their academic writing performance. These classes are Complex-AWP (Class 2), High-AWP (Class 3), Medium-AWP (Class 4) and Low-AWP (Class 1). As

expected, the High-AWP class did better than the Medium-AWP class, who did better than the Low-AWP class in all four aspects of academic writing. However, what is surprising is the performance of the students in the Complex-AWP class, who had the highest means in conventional writing ability indicators but the lowest mean in citation among the four classes. This was the most salient group (i.e. the largest class). A possible explanation is that these students spent excessive time drafting their text and strengthening their arguments, and sometimes making extra effort in using sophisticated expressions and vocabulary to 'beautify' their language (Yung and Fong 2019). It turned out that despite their well-polished arguments and language, they might not have enough time to write their references at the end of the text in a timed examination condition (Hirvela 2016a). Another plausible reason is that they may have directly used the arguments and complex grammatical patterns and vocabulary from the source texts to make their writing appear more convincing in arguments and advanced in language. This can result in 'patchwriting' due to insufficient paraphrasing and risks committing plagiarism (Li and Casanave 2012; Hirvela and Du 2013), severely lowering their score in citation. Furthermore, these students may think citation is less important compared to structure, argument and language, because its rating is the lowest (15%) among other criteria in the rubric; thus they pay less attention to it.

Regarding the second research question, in general, students' results in secondary school-leaving English examination can positively predict their class membership captured by the criteria in the rubric for the academic writing examination. This means that students with higher general English proficiency based on their DSE English results tend to belong to the Complex-AWP and High-AWP classes, while those with medium and low English proficiency belong to the Medium-AWP and Low-AWP respectively. This suggests that students with higher English proficiency or better English language results in secondary school-leaving examinations may have some advantage in academic writing performance in university. However, when having a close look at this finding by taking into account the different aspects of academic writing performance, we can see a more complicated picture.

While DSE effects on conventional writing indicators were all positive, they varied across the three indicators (largest on language, followed by argument and structure). The effect on structure diminished to be nonsignificant with the two lowest classes. This suggests that students with high language competence, namely grammar and vocabulary, and good argumentation skills such as critical thinking and justification of stance, have some advantage in academic writing. However, the structure in academic writing is different from that in secondary school writing, in which students often rely on the five-paragraph structure (i.e. an introduction, three paragraphs of the main body and a conclusion) (Li and Casanave 2012; Bruce and Hamp-Lyons 2015). Thus, students, regardless of their DSE English results, need to learn structure as a new skill in university for the more complex academic writing structure. Those with lower English proficiency may invest even more time in this aspect of academic writing to compensate their weaker foundation in argumentation and language use.

Interestingly, however, DSE effect on citation displayed an arched pattern across the Low-AWP through High-AWP to the Complex-AWP classes (i.e. negative-positive-negative). Specifically, DSE only positively predicted Citation with High-AWP students but negatively predicted students at both ends (i.e. Complex-AWP and Low-AWP). A possible reason is that students with the best secondary school-leaving examination results (Complex-AWP) were over-confident and believed they could handle academic writing well. In particular, those who attained Level 5** and were entitled to course exemption may have chosen to enrol in CUE simply because they thought the course was easy for them, thus lacking the motivation to learn the content, including the citation skill which was supposed to be new to first-year undergraduates (Murray 2015; Yung and Fong 2019). This problem may be fuelled by the design of the Integrated Skills paper in the DSE English language examination in which candidates are rewarded for including key content points from a data file in their writing without being required to attribute the source, resulting in 'poor academic attribution practices' (Bruce and Hamp-Lyons 2015, 68).

On the contrary, although students with low DSE English scores (i.e. the Low-AWP class) did not do well in conventional writing indicators, their performance in citation was better than expected. To secure a satisfactory grade in CUE, these students may have worked harder in learning citation because it is a skill they probably could handle more easily, at least the mechanics of adhering to the citation and referencing style guide, compared to other aspects such as language and argument (Hirvela 2016b). There is also a possibility that these students were less capable of mastering all aspects of academic writing due to the high cognitive load in strategy use, particularly when they are under time pressure (Walczyk 2000; Perfetti and Hart 2002; Cai and Kunnan, forthcoming). As a result, their performance in structure, argument and language was sacrificed when they spent more time and effort ensuring the accuracy of the format of citation and referencing.

Conclusion and implications

This study aimed to understand the relationship between first-year undergraduates' general English proficiency determined by their results in the secondary school-leaving examination and their academic writing performance in an end-of-course reading-into-writing examination in a university EAP course. The results have revealed that students can be grouped into four different classes according to their academic writing performance in various aspects. Their results in the school-leaving English language examination can generally predict their class membership of academic writing performance. However, the predictive linear relationship can only be seen in the aspects of argument, language and, to a limited extent, structure, but not citation. This finding is novel in that it highlights specific aspects of academic writing that even high-achieving ESL students may not be able to handle well. Based on these results, this study conveys an important message to various stakeholders in higher education such as EAP practitioners and policymakers that English language results from secondary school-leaving examinations need to be used with caution, particularly when they are used for gatekeeping and university admission purposes and implementing course exemption policies.

The findings offer pedagogical implications for the teaching and learning of academic writing in higher education. EAP practitioners need to have sufficient knowledge of their students' English learning background regarding what they have learnt before entering the university. They may highlight how the kind of English students generally use in secondary school is similar to and different from that required in academic writing. For instance, based on the results of this study, while students may have some advantage if they have acquired good argumentation skills and advanced vocabulary and language patterns in secondary school, they still need to learn the structure of academic writing as a distinctive genre. Extra effort should also be made in the teaching and learning of citation and referencing. In addition to teaching the skills of paraphrasing and summarising (Li and Casanave 2012; Hirvela and Du 2013), EAP practitioners should also highlight the importance of adhering to the format of a certain style. As Hirvela (2016a, 132) suggests, citation practices 'cannot be treated only as generic operations devoid of contextual influences. Instead, students must also learn to be sensitive to what a particular academic community prefers'. These focuses in teaching can facilitate a smooth transition from general English to EAP (Campion 2016).

This study can also inform senior management and curriculum developers in higher education of how to set policies about who need an academic writing course. The view that there are no native speakers of academic writing has been well established in the field of EAP (e.g. Braine 2002; Hyland 2016a). Still, this notion does not seem to have been widely accepted for policy making in higher education, as evidenced by the assumption in many universities that native speakers of English or high-achieving ESL/EFL students can be exempt from an EAP course (see Murray 2015; Yung and Fong 2019). As the current study has shown, students who excelled in

secondary school-leaving English examination do not necessarily perform well in all aspects of academic writing. This resonates with Murray's (2015, 170) argument that 'the pre-enrolment tests currently used by English-medium universities as screening mechanisms lack authenticity for they do not sufficiently reflect the actual language requirements of students' future degree programmes'. When this group of high-achieving students are given an option of exemption from an EAP course, few will choose to enrol if they do not see the value of the course, thus missing the opportunity to learn skills unique to academic writing such as citation (Yung and Fong 2019). Therefore, we argue that an academic writing course should be made an essential component in the university curriculum and no one should be exempt regardless of their English proficiency or results in gatekeeping English tests. Remedial English language courses may be provided for low-proficiency students to consolidate their foundation of argumentation and language use before they learn new academic writing skills. Faculty teachers should also understand how their students can benefit from the academic writing course, such as better presentation and argumentation of ideas and more accurate use of citation and referencing.

To our knowledge, this study is the first attempt to use LPA, a person-centred approach, to categorise ESL undergraduates into different classes based on their academic writing performance and analyse their performance in different aspects of academic writing. This is an important contribution to the field since previous studies tend to focus on the whole group of students with a wide range of English proficiency (e.g. Evans and Morrison 2016), or either high-achieving (e.g. Yung and Fong 2019) or low-proficiency students (e.g. Alexander 2012; Bruce and Hamp-Lyons 2015). To provide information regarding different patterns of students' writing performance, more studies based on a person-centred approach should be encouraged.

This study also goes beyond the dominant research of native local or international ESL/EFL students studying in universities in English-speaking countries (Wingate and Tribble 2012; Jenkins 2014; Murray 2015) and focuses on local students studying academic writing in EMI universities in ESL/EFL countries. It can therefore offer implications to the higher education sector worldwide which is increasingly internationalised by admitting more non-local ESL/EFL students based on their secondary school English language results. Future studies may investigate the relationship between undergraduates' results in international standardised English tests or those in national secondary school-leaving examinations (preferably benchmarked against international standardised English tests like the Hong Kong DSE) and their performance in different aspects of academic writing in other ESL/EFL settings. More in-depth qualitative analysis of why different groups of students with diverse English proficiencies and learning backgrounds may perform differently in academic writing is also a valuable direction for further research.

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References

Alexander, O. 2012. "Exploring Teacher Beliefs in Teaching EAP at Low Proficiency Levels." *Journal of English for Academic Purposes* 11(2): 99–111. doi:10.1016/j.jeap.2011.12.001.

Braine, G. 2002. "Academic Literacy and the Nonnative Speaker Graduate Student." *Journal of English for Academic Purposes* 1(1): 59–68. doi:10.1016/S1475-1585(02)00006-1.

Brown, G. T. L., K. Glasswell, and D. Harland. 2004. "Accuracy in the Scoring of Writing: Studies of Reliability and Validity Using a New Zealand Writing Assessment System." *Assessing Writing* 9(2): 105–121. doi:10.1016/j.asw.2004.07.001.

Bruce, E., and L. Hamp-Lyons. 2015. "Opposing Tensions of Local and International Standards for EAP Writing Programmes: Who Are we Assessing for?" *Journal of English for Academic Purposes* 18: 64–77. doi:10.1016/j.jeap.2015.03.003.

Cai, Y., and H. T. Cheung. 2019. "Classifying the Writing Assessment Tasks of English as the Medium of Instruction Programs Using Latent Class Analysis." *International Journal of Educational Research* 95: 143–152. doi:10.1016/j.ijer.2019.02.003.

Cai, Y., and A. J. Kunnan. (forthcoming). Mapping the fluctuating effect of strategic competence on nursing students' English reading performance: An approach of multi-layered moderation analysis.

Campion, G. C. 2016. "The Learning Never Ends': Exploring Teachers' Views on the Transition from General English to EAP." *Journal of English for Academic Purposes* 23: 59–70. doi:10.1016/j.jeap.2016.06.003.

Dziak, J. J., S. T. Lanza, and X. Tan. 2014. "Effect Size, Statistical Power, and Sample Size Requirements for the Bootstrap Likelihood Ratio Test in Latent Class Analysis." *Structural Equation Modeling: A Multidisciplinary Journal* 21(4): 534–552. doi:10.1080/10705511.2014.919819.

Elander, J., K. Harrington, L. Norton, H. Robinson, and P. Reddy. 2006. "Complex Skills and Academic Writing: A Review of Evidence about the Types of Learning Required to Meet Core Assessment Criteria." *Assessment & Evaluation in Higher Education* 31(1): 71–90. doi:10.1080/02602930500262379.

Evans, S., and B. Morrison. 2016. "Adjusting to Higher Education in Hong Kong: The Influence of School Medium of Instruction." *International Journal of Bilingual Education and Bilingualism* 21: 1016–1029. doi:10.1080/13670050.2016.1228600.

Fenton-Smith, B., P. Humphreys, I. Walkinshaw, R. Michael, and A. Lobo. 2017. "Implementing a University-Wide Credit-Bearing English Language Enhancement Programme: Issues Emerging from Practice." *Studies in Higher Education* 42(3): 463–479. doi:10.1080/03075079.2015.1052736.

Hirvela, A. 2016a. "Academic Reading into Writing." In *The Routledge Handbook of English for Academic Purposes*, edited by K. Hyland and P. Shaw, 127–138. New York, NY: Routledge.

Hirvela, A. 2016b. *Connecting Reading & Writing in Second Language Writing Instruction* (2nd ed.). Ann Arbor, MI: University of Michigan Press.

Hirvela, A., and Q. Du. 2013. "Why Am I Paraphrasing?": Undergraduate ESL Writers' Engagement with Source-Based Academic Writing and Reading." *Journal of English for Academic Purposes* 12(2): 87–98. doi:10.1016/j.jeap.2012.11.005.

Hyland, K. 2014. "Re-Imagining Literacy: English in Hong Kong's New University Curriculum." In *English Language Education and Assessment: Recent Developments in Hong Kong and the Chinese Mainland*, edited by D. Coniam, 139–151. Singapore: Springer.

Hyland, K. 2016a. "Academic Publishing and the Myth of Linguistic Injustice." *Journal of Second Language Writing* 31: 58–69. doi:10.1016/j.jslw.2016.01.005.

Hyland, K. 2016b. *Teaching and Researching Writing* (3rd ed.). New York, NY: Routledge.

Hyland, K. 2017. "Learning to Write for Academic Purposes: Specificity and Second Language Writing." In *Teaching Writing for Academic Purposes to Multilingual Students: Instructional Approaches*, edited by J. Bitchener, N. Storch, and R. Wette, 24–41. New York, NY: Routledge.

Jenkins, J. 2014. *English as a Lingua Franca in the International University: The Politics of Academic English Language Policy*. New York, NY: Routledge.

Knoch, U., and W. Sitajalabhorn. 2013. "A Closer Look at Integrated Writing Tasks: Towards a More Focussed Definition for Assessment Purposes." *Assessing Writing* 18(4): 300–308. doi:10.1016/j.asw.2013.09.003.

Lee, I. 2017. *Classroom Writing Assessment and Feedback in L2 School Contexts*. Singapore: Springer.

Li, Y., and C. P. Casanave. 2012. "Two First-Year Students' Strategies for Writing from Sources: Patchwriting or Plagiarism?" *Journal of Second Language Writing* 21(2): 165–180. doi:10.1016/j.jslw.2012.03.002.

Murray, N. 2015. *Standards of English in Higher Education: Issues, Challenges and Strategies*. Cambridge: Cambridge University Press.

Muthén, L. K., and B. Q. Muthén. 1998–2018. Mplus 8.2 [Computer software]. Los Angeles, CA: Muthén & Muthén.

Nylund, K. L., T. Asparouhov, and B. O. Muthén. 2007. "Deciding on the Number of Classes in Latent Class Analysis and Growth Mixture Modeling: A Monte Carlo Simulation Study." *Structural Equation Modeling: A Multidisciplinary Journal* 14(4): 535–569. doi:10.1080/10705510701575396.

Perfetti, C. A., and L. Hart. 2002. "The Lexical Quality Hypothesis." In *Precursors of Functional Literacy*, edited by L. Verhoeven, C. Elbro, and P. Reitsma, Vol. 11, 189–214. Amsterdam: John Benjamins Publishing.

Read, J. 2015. *Assessing English Proficiency for University Study*. London: Palgrave Macmillan.

Read, J., and J. Von Radow. 2013. "A University Post-Entry English Language Assessment: Charting the Changes." *International Journal of English Studies* 13(2): 89–110. doi:10.6018/ijes.13.2.185931.

Toh, G. 2016. *English as Medium of Instruction in Japanese Higher Education: Presumption, Mirage or Bluff?*. Switzerland: Palgrave Macmillan.

Walczyk, J. J. 2000. "The Interplay between Automatic and Control Processes in Reading." *Reading Research Quarterly* 35(4): 554–566. doi:10.1598/RRQ.35.4.7.

Wingate, U., and C. Tribble. 2012. "The Best of Both Worlds? towards an English for Academic Purposes/Academic Literacies Writing Pedagogy." *Studies in Higher Education* 37(4): 481–495. doi:10.1080/03075079.2010.525630.

Yung, K. W. H., and N. Fong. 2019. "Learning EAP at University: Perceptions of High-Achieving First-Year ESL Undergraduates." *ELT Journal* 73(3): 306–315. doi:10.1093/elt/ccz019.