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Mind the gap: Academic vocabulary knowledge as a predictor of English grades

Abstract

Knowledge of academic English vocabulary is necessary for Norwegian speaking upper secondary students for the completion of their English course and to qualify for university studies. General academic vocabulary occurs in academic texts across disciplines (for example, *furthermore*, *research*). The focus of this article is meaning-recognition knowledge of written academic English vocabulary and associations with English course grades. The academic sections from versions one and two of the Vocabulary Levels Test (VLT) (Nation, 1990; Schmitt et al., 2001) were administered to 134 Norwegian-speaking students aged 15 - 17. Participants were first-year upper secondary school students taking the final obligatory English course provided in the Norwegian educational context. On average, learners had high levels of meaning-recognition knowledge (80.93%). However, 58.21% failed to reach minimum mastery levels of 52/60 for the test, and results varied considerably (SD = 8.31). A Spearman correlation revealed significant associations between VLT scores and English course grades. Compared to students who did not reach a mastery level, the odds of receiving a higher English grade were nine times greater for students with a maximum of two mistakes on the academic section of the VLT, and four times greater for students who reached the minimum mastery level. Findings indicate a need for these learners to attain a greater understanding of academic vocabulary in English and suggest the need for a principled focus on academic vocabulary acquisition.

Keywords: academic vocabulary; academic achievement; vocabulary testing; second language learning; mastery levels

«Mind the gap» - Akademisk ordforråd som prediktor for karakterer i engelsk

Sammendrag

Kunnskap om akademiske ord er nødvendig for at norske elever i videregående skole skal kunne gjennomføre engelskfaget og for at de skal kunne kvalifisere seg til høyere utdanning. Akademiske ord omfatter ord som forekommer i vitenskapelige tekster fra ulike akademiske disipliner (for eksempel *dessuten*, *forskning*). Fokuset i denne artikkelen er forholdet mellom elevers kunnskap om skriftlige akademiske ord og karakterene deres i engelsk. 134 norsktalende elever på Vg1 studiespesialiserende

mellom 15 og 17 år tok Nations (1990) VLT, den akademiske delen fra versjon en og to av Schmitt et al. (2001) reviderte test. Resultatene viser at elevene i gjennomsnitt hadde en høy VLT- poengsum (80.93%), men 58.21% ikke klarte å oppnå den laveste anbefalte poengsummen på 52/60 og det var en høy grad av variasjon i resultatene (SD = 8.31). En Spearman-korrelasjon viste signifikante forbindelser mellom resultatene fra VLT og elevenes engelskkarakterer. Sannsynligheten for å ha en høyere engelskkarakter var ni ganger større for elever med maksimum to feil på VLT- testen og fire ganger større for de som oppnådde minimumskravet på 52/60. Funnene indikerer at disse elevene har behov for å utvikle en bedre forståelse av akademiske ord, og de antyder dermed også et behov for fokus på utvikling av akademisk ordforråd i engelskundervisningen.

Nøkkelord: akademisk ordforråd, testing av vokabular, engelsk som andrespråk, språkundervisning

Introduction

Academic English vocabulary is needed by first language (L1) English speakers to function well in educational settings. With the use of English as a global language, increasing demands are placed on knowledge of academic vocabulary also for second language (L2)¹ English learners' completion of secondary and university level education. Despite upper secondary English subject curriculum aims in Norway outlining the need for students to understand and use formal and informal language since 2006 (Norwegian Directorate for Education and Training, 2006/2013), questions have been raised regarding how well English language courses prepare students for the demands of university studies (Hellekjær, 2005, 2019a, 2019b). Newly revised curriculum aims specifically call for first-year upper secondary students to listen to, understand, and use academic language when working with oral and written texts (Norwegian Directorate for Education and Training, 2019a). Academic vocabulary is a key component of academic language (Nagy et al., 2012; Truckenmiller et al., 2019) and knowledge of this lexis is essential for the comprehension and production of academic discourse (Nation, 2013). The aim of the present study is to examine the extent of receptive academic vocabulary knowledge and possible associations to English course grades for L1 Norwegian students in upper secondary education.

General purpose academic vocabulary present on word lists such as Coxhead's (2000) Academic Word List (AWL) and Gardner and Davies' (2014) Academic Vocabulary List (AVL), occurs across university disciplines, accounting for between 10% (Coxhead, 2000) and 14% (Gardner & Davies, 2014) of the vocabulary in academic texts and around 4% coverage for "non-academic texts

¹ In the Norwegian context, the terms English as a foreign language (EFL) and English as a second language (ESL) fail to accurately describe developments in the English subject curriculum and students' extensive exposure to the language (Rindal & Brevik, 2019). For the current study, English is, therefore, broadly defined as a second language (L2), i.e., a language learned "later than in earliest childhood" (Mitchell et al., 2013, p.1).

such as newspapers” (Nation, 2013, p. 294). Academic English vocabulary is found across frequency levels (Cobb, 2010; Gardner & Davies, 2014; Hancioğlu et al., 2008), also in high-frequency vocabulary such as Nation’s (2017) 2000 and 3000 BNC/COCA frequency levels. As such, this lexis is necessary for language learners’ proficiency development (Schmitt & Schmitt, 2014; Vilkaitė-Lozdienė & Schmitt, 2020; Webb & Nation, 2017). Examples of high-frequency AWL items from the VLT (Schmitt et al., 2001) include *access, achieve, alter, convert, correspond, evidence, investigation, link, topic, retain, and visual*.

Previous research conducted with speakers of North Germanic (Scandinavian) languages has shown vocabulary knowledge, including knowledge of academic vocabulary, to be important for reading comprehension of L2 English learners’ in upper secondary school (Edgarsson, 2017) and writing proficiency (Henriksen & Danelund, 2015; Olsson, 2016). Unfortunately, the research conducted in Denmark (Henriksen & Danelund, 2015), Iceland (Edgarsson, 2017), and Sweden (Olsson, 2016) suggest there may be a lack of academic English vocabulary knowledge among these upper secondary students. As such, assessing knowledge of academic vocabulary in English can be particularly valuable in educational contexts where students are proficient in conversational English but in which there are signs that they struggle to comprehend academic discourse because “there is a danger of assuming academic language competence from evidence of fluency in everyday language” (Humphrey, 2016, p. 447).

Research has also found correlations between knowledge of academic English lexis and academic achievement, beyond the knowledge of general English, for minority language students in lower secondary education (Townsend et al., 2016; Townsend et al., 2012) and university students (Masrai & Milton, 2017, 2018). Two studies conducted in Iceland and Sweden have focused explicitly on academic English vocabulary knowledge among upper secondary students (Edgarsson, 2017; Olsson, 2016). Icelandic students, age 18-20 were shown to lack academic English reading proficiency necessary for university studies (Edgarsson, 2017). A study of Swedish learners showed positive correlations between holistic evaluations of written essays and amount of academic English vocabulary as defined on the VLT (Olsson, 2016). However, Olsson’s (2016) study did not assess the correctness of use for the academic English vocabulary found in the essays, and comparisons were not made with high-stakes course grades. Other previous Nordic research has highlighted the necessity of English proficiency (e.g., Arnbjörnsdóttir, 2018; Hellekjær, 2005, 2009; Pecorari et al., 2012), and vocabulary knowledge (Busby, 2020; Malmström et al., 2018) among university students, though virtually none have focused on Norwegian students’ needs for academic English vocabulary knowledge during their upper secondary studies.

The current study is part of a larger project conducted in the Norwegian educational context and examines upper secondary and university student academic English vocabulary knowledge in relation to achieved academic grades,

and knowledge of Latinate cognates present in this lexis. All participants completed two vocabulary tasks and a questionnaire providing language background information. The two vocabulary tasks included academic sections from two versions of the VLT (Nation, 1983, 1990; Schmitt et al., 2001) and a decontextualized, second to first language (L2 – L1) cognate translation task designed for the project. A quantitative study conducted with use of the translation task investigates form-recall knowledge of Latinate cognates present in academic English vocabulary and to what extent cognates are recognized and used by upper secondary students at different proficiency levels. A qualitative analysis of group work discussions among university students explores students' semantic knowledge of Latinate cognate word pairs and how Latinate cognates are discussed. As a first step in the project, quantitative research reported in the present article examines initial meaning-recognition knowledge of academic vocabulary in English and compares this to the students' course grades.

The following questions guided the current research:

1. To what extent do Norwegian speaking English language learners in upper secondary education show mastery of written academic English vocabulary knowledge?
2. What associations are found between receptive knowledge of academic vocabulary in English and English course grades for these learners?

Defining Academic English Vocabulary Knowledge

In the field of vocabulary research, words are commonly grouped either by frequency of occurrence (Cobb, 2000; Nation, 2006; Schmitt & Schmitt, 2014) or into categories of general, academic and technical vocabulary (Chung & Nation, 2003; Nation, 2013; Pecorari et al., 2019). One of several ways to define academic vocabulary is by placing this lexis between general and technical vocabulary (Coxhead, 2020). With this starting point, a general academic vocabulary is defined as words that are common across academic disciplines and occur more frequently in academic texts (Charles & Pecorari, 2016; Coxhead, 2000; Gardner & Davies, 2014; Townsend et al., 2016). For the current study, *academic* and *general academic vocabulary* are used synonymously.

Coxhead's (2000) AWL and Gardner and Davies' (2014) AVL remain in wide use for research and language education. These lists are often seen by researchers and language teachers as helpful for narrowing the daunting task of vocabulary acquisition for L2 English learners (Nation et al., 2016; Townsend et al., 2012). Nonetheless, the functionality of such lists has been questioned by researchers who argue that polysemous tendencies for academic words (Hyland & Tse, 2007; Martínez et al., 2009) and differences in vocabulary use for differing disciplines (Durrant, 2014) suggest the need to learn this lexis within discipline-specific

contexts. Others argue that core meanings inform student understanding and lessen the learning burden for more discipline-specific use of these words (Nation, 2013). As an example, *structure*, which is used in literary studies referring to how a text is constructed, is easily transferred from the more general term *structure* in the sense of a building that is also constructed, not of words, but of materials.

Measuring Academic English Vocabulary Knowledge

Though there is an increasing need for academic literacy in English, few tests assess academic vocabulary specifically (Pecorari et al., 2019). Recent developments in academic vocabulary testing include work by Masrai and Milton (2018) and Pecorari et al. (2019). Masrai and Milton (2018) designed and validated the Academic Vocabulary Size Test (AVST) based on the AWL. The test was constructed “as a checklist test” (Masrai & Milton, 2018, p. 47) in which test takers are asked to mark known words (Milton, 2009). The AVST contains 114 test items and 19 control words to adjust results for guessing, as was done in Meara and Milton’s (2003) *X-LEX*. Yes/No test formats work well for quickly assessing form-recognition knowledge and have the advantage of making it possible to test a larger number of items (Milton, 2009). Yet, form-meaning connections are not measured directly with these tests. Pecorari et al. (2019) constructed a test of meaning-recognition knowledge targeted for university students, the Academic Vocabulary Test (AVT), using a multiple-choice format similar to the VLT explained below (Nation, 1983, 1990; Schmitt et al., 2001). Test items were selected from Gardner and Davies’ (2014) AVL. Neither of these tests were available for use at the time of data collection for the present study. In addition, we wished to compare our results to the results of other studies and therefore chose to use the original VLT.

The VLT initially developed by Nation (1983, 1990), and subsequently revised (Schmitt et al., 2001), assesses written meaning-recognition knowledge of vocabulary at 2,000, 3,000, 5,000, and 10,000 frequency levels and academic English vocabulary based on Coxhead’s (2000) AWL. It has been suggested that the academic section of the VLT may be “useful as a separate measure for teachers in academic contexts” (Kremmel & Schmitt, 2017, p. 2). The test employs a multiple-choice format in which test-takers are presented with single-word items and asked to match these with synonyms or brief definitions. The VLT provides “an indication of ... an initial [receptive] knowledge of the most frequent meaning sense of each word” (Schmitt et al., 2001, p. 62). Therefore, answering VLT items correctly suggests learners have only a very basic receptive knowledge of the form-meaning connection for the target words. There are also disadvantages with the multiple-choice format of the VLT, which allows for guessing and of testing strategies such as the process of elimination, something that could exaggerate responses and needs consideration when reporting results (Gyllstad et al., 2015;

Pecorari et al., 2019; Schmitt et al., 2019). Concerns have been raised because the revised VLT (Schmitt et al., 2001) has not been updated since 2001 (Schmitt et al., 2019). Nonetheless, there has been “no better measure available for the purpose of diagnosing the written receptive word meaning knowledge of learners at different levels” (Kremmel & Schmitt, 2017, p. 4). Webb et al. (2017) have constructed and validated an Updated VLT, but this test does not contain an academic vocabulary level.

Mastery levels of the VLT

The VLT is not a pass/fail test. Instead, reaching a specified score for each level on the test constitutes “mastery,” i.e., an indication that a test taker has demonstrated sufficient knowledge of the level. Mastery levels have been recommended for use with the VLT as a means of helping teachers set appropriate vocabulary learning goals (Nation, 1983; Schmitt et al., 2001; Webb et al., 2017). Schmitt et al. (2001) suggested $26/30 = 86.7\%$ as an appropriate mastery level for all frequency levels, based on research in the UK. For their Updated VLT, Webb et al. (2017) have advised increasing the mastery level for the 1st, 2nd and 3rd 1,000 levels from Nation's (2017) BNC/COCA lists to $29/30$ (96.7%) because of the importance of high-frequency vocabulary for English proficiency and the “relatively shallow knowledge of a word” that is tested (p. 56). For the 4th and 5th 1,000 levels, Webb et al. (2017) suggest that mastery levels might be lower at $24/30$ (80%).

Setting mastery levels for AWL items is slightly complicated because the list contains high and mid frequency items. Cobb (2010, p. 191) showed that “about half of [the AWL headwords] are [BNC] first-2,000 level items”. A small proportion ($5/60 = 8.33\%$) of the VLT academic section test items occur outside the 1st, 2nd, and 3rd 1,000 BNC/COCA levels. This means a frequency-based approach to academic vocabulary does not provide clarity on mastery levels, particularly since the Webb et al. (2017) Updated VLT is aimed at general English vocabulary, not for learners of English for Academic Purposes.

Academic vocabulary is needed by L2 English students seeking higher education and the higher level of 96.7% mastery would indicate a fuller knowledge of this lexis. Scores below that level would indicate the extent to which learners and teachers need to focus on goals for academic vocabulary learning. Clearly, learners who score 50% or under would require different advice and support compared to those who score 80% or higher. For use in empirical studies, it may be worthwhile to investigate differences in mastery levels in classroom-based intervention studies.

Previous research conducted in classroom settings for first-year upper secondary level students has used the VLT to show associations between vocabulary level knowledge and lexical demands in English language textbooks (Coxhead & Boutorwick, 2018a), as well as learners' written production (Henriksen & Danelund, 2015). The longitudinal study of German EMI students

revealed that, on average, all of the non-native English-speaking learners first mastered the academic section of the VLT at the 86.7% mastery level in the 11th grade (Coxhead & Boutorwick, 2018a) and the average participant did not reach the 96.7% mastery level recommended by Webb et. al (2017). VLT test scores revealed that the lexical demands of textbooks could make reading comprehension challenging for many of these non-native English-speaking learners.

Research conducted among Danish upper secondary students in two English language classes (N=52) revealed significant positive correlations between vocabulary knowledge and vocabulary sophistication in a free writing task. The average VLT score for one class was far below the recommended 86.7% mastery level (see Table 1) and only 7.7% of the students in a second class reached this level of mastery (Henriksen & Danelund, 2015). These findings were unexpected considering the amount of English language instruction and exposure to English language media experienced by these learners.

Table 1

Danish and German studies using the academic section of the VLT (Schmitt et al., 2001) and percentage of average correct responses (maximum score = 30)

Authors	Country	Sample	Age	M	%
Coxhead and Boutorwick, (2018a)	Germany	N= 26	15-16 yrs. (nns)	28.7	95.67
		N= 16	15-16 yrs. (nnseal)	27.2	90.67
Henriksen and Danelund (2015) Study 1	Denmark	N= 26	16-17 yrs.	11.73	39.10
				11.38	37.93

Note. Non-native English speakers (nns), Less proficient non-native English speakers (nnseal)

Suggested reasons for a lack of vocabulary knowledge among students in Nordic countries include the lack of “diagnostic language testing” and the “communicatively oriented, meaning-based learning environment” in the Danish educational context (Henriksen & Danelund, 2015, p. 50-51) and in the Swedish context a “need for more focused attention” to academic vocabulary, even in Content and Language Integrated Learning (CLIL) settings (Olsson, 2016, p. 94). A focused examination of receptive academic English vocabulary knowledge in educational contexts that places high demands on English language proficiency for upper secondary level students could provide important insight into the extent of knowledge these learners have.

Academic Vocabulary Knowledge and Academic Achievement

Further examples of the significance of academic vocabulary knowledge can be found in studies that show correlations between academic vocabulary knowledge and academic achievement. Masrai and Milton (2017, 2018) tested the

contributions of academic and general vocabulary knowledge, among other factors, to grades achieved on English course exams. They found academic vocabulary knowledge correlated most with academic achievement and conclude that “knowledge of academic words provides some unique, albeit marginal, variance ... in addition to general vocabulary size” (p. 139). That said, the authors questioned the value of academic vocabulary as defined through the AWL, due to the considerable overlap of the 570-word families on her list with Nation’s (2017) BNC/COCA 3,000 frequency level. Nonetheless, Masrai and Milton’s (2017, 2018) findings lend support to Townsend et al. (2012), who tested lower secondary, monolingual English speakers and language minority students. In their study, academic vocabulary knowledge was measured with the academic section of the VLT (Schmitt et al., 2001) and the Vocabulary Subset of the Gates-MacGinitie vocabulary test (MacGinitie et al., 2000). A state-wide achievement test of four disciplines, i.e., reading comprehension, math, social science, and natural science, provided academic achievement scores. Townsend et al. (2012) found that regardless of L1, “general academic word knowledge explains considerable, unique, and significant variance in academic achievement across standardized measures and disciplines” (p. 513).

In upper secondary educational contexts that demand an understanding and use of both every day and academic discourse, there is a need for learners to differentiate between the two, and for language teachers to raise student awareness of academic and colloquial differences (Norwegian Directorate for Education and Training, 2006/2013, 2019a). To exemplify, students need to understand and use words like *alter* and *retain* (both on the VLT) versus *change* and *keep*, plus understand the register these words represent. Therefore, an investigation of academic English vocabulary knowledge in ecologically valid settings and an examination of associations between this knowledge and English course grades could move research and pedagogy forward in settings with students who are highly proficient in everyday communication but who may struggle in academic contexts.

Materials and Methods

Participants

One hundred and fifty-two (152) first-year upper secondary students participated in the current study. All participants completed the background questionnaire which included questions on age, gender, language background, years of English instruction in Norway and learning difficulties, such as dyslexia and problems concentrating that may affect reading. The results of participants who reported learning difficulties and L1(s) other than Norwegian were excluded from the analyses to reduce external factors that may influence the findings. One participant who did not provide information about learning difficulties was also

excluded, bringing the number of participants for the current study to 134. Gender was evenly distributed with 62 female and 70 male participants. Two participants chose not to identify with these gender descriptions. Participants were between the ages of 15 and 17, with an average age of 15 years and 11 months. The students were taking college preparatory courses, including their final obligatory English course, before qualifying for university studies. Participants were tested in seven intact classrooms located in three regions of Western Norway. Norwegian Data Protection Services (NSD) gave ethics approval for the research project and all participants signed consent forms. Guardians were also informed of the study and encouraged to co-sign the forms with their children. Participants permitted their English class teachers to share mid-term English grades and grade point averages (GPA) from their cumulative lower secondary education.

Course grades and GPA

GPA scores achieved during lower secondary schooling are used by students when applying for admittance to upper secondary schools in Norway. Scores are based on an average of final assessment grades and exam results. Final grades are given by course teachers, but exam results are given by external examiners. Norwegian students do not have exams in all courses.

English course grade averages and lower secondary GPA scores for the participants of the current study were compared to national and regional averages to assess variation. In Norway, course grades are given in number values from one (1) to six (6), with one a failing grade and six a sign of excellence. As shown in Table 2, participant GPA scores were above national and regional averages (Norwegian Directorate for Education and Training, 2019b) likely because these students are enrolled in college preparatory courses that often demand higher entrance scores than for vocational studies. The participants achieved slightly higher English grades compared to the national average for written exams, but lower than regional averages (see Table 2). As such, average grades suggest participants have English proficiency comparable to national and regional averages.

Table 2

English course grades and cumulative grades compared to national and regional averages

	Course grades	GPA
<i>Participant average</i>	4.01	4.80
<i>National average</i>	3.90	4.18
<i>Regional averages</i>	4.10	4.17 – 4.23

For first-year upper secondary students, the English course grades are based on written and oral production. Teachers give a mid-term exam grade in early January and a final accumulative grade for the year in June. Not all students take the nation-wide written exam given in the spring. As a result of the choice to test

in intact classes for ecological validity, it was not possible to obtain grades other than those teachers would provide. Because the students would need knowledge of academic English vocabulary during their year of study, testing was conducted two to three months before the mid-term grades were given, but only weeks before students would be sitting a mid-term exam. It was hoped that this timing would increase student motivation during testing.

Instruments

The instruments used for the current study were the academic sections from version one and two of the VLT (Schmitt et al., 2001) and a questionnaire providing background information. These instruments were provided electronically for participants. Meaning-recognition knowledge of academic vocabulary in English was measured with the academic sections from the VLT versions one and two (Schmitt et al., 2001) based on Coxhead's (2000) AWL. There were twenty clusters of VLT test items, each containing three definitions and six target words. The VLT sections were presented in a grid format (Figure 1) similar to those used in the Updated VLT (Webb et al., 2017), and answered by participants on their personal computers. By placing the six keywords and distractors across the top and the three definitions down one side, the grid format helps make the task "more transparent" for test-takers (Webb et al., 2017, p. 37).

3	consent	enforcement	investigation	parameter	sum	trend
total	<input type="radio"/>					
agreement or permission	<input type="radio"/>					
trying to find information about something	<input type="radio"/>					

Figure 1

Cluster example from the academic levels of the VLT adapted from Schmitt et al., 2001

Both VLT versions were used so the test contained 60 items, bringing the total AWL word families tested to ($60/570 = 10.5\%$). The recommended 86.7% (Schmitt et al., 2001) and 96.7% (Webb et al., 2017) levels for mastery were used during analysis.

Procedure

The data collection process for this study was conducted during regular English course hours. The first author presided over each 90-minute session so questions from the participants could be answered in a similar manner in every class, however, course teachers or school administrators were also present. Each session started with the researcher reading an introductory information sheet aloud and asking participants if they had any preliminary questions. Participants completed the academic sections of the VLT and the 60-item translation task during the first 45-minute session. No time constraints were placed on the participants, but they

normally finished both vocabulary tasks well within the 45-minute time frame. Participants were given a short break after completing both vocabulary tasks and before answering the questionnaire.

Data analyses

Descriptive statistics were used to compare participant grades and GPA scores to national and regional averages and the extent of meaning-recognition knowledge among participants at two levels of mastery. Median values were also provided where appropriate. The results from the VLT academic sections were not normally distributed, and outliers have not been removed so we can report findings in an ecologically valid manner for classroom settings. Non-parametric tests, i.e., Spearman correlation, Kruskal-Wallis and Wilcoxon rank-sum tests, and an ordinal logistic regression analysis were conducted to examine the associations between VLT scores and English course grades.

Results

Academic English vocabulary knowledge

The first research question focused on scores from VLT academic sections and any variations. As shown in Table 3, the median value of the participant scores was 50.5/60 or 84.16%, slightly higher than the average of 48.56/60 or 80.93%. There was wide variation in participant results with the lowest participant scoring 19, and three participants (2.24%) reaching the maximum score of 60.

Table 3

Average number of correct items and test variation on the academic section of two VLT versions

	M	SD	Mdn.
Correct task items	48.47	8.31	50.50

Note. The maximum score is 60.

Results were also investigated in light of two mastery levels, 52/60 = 86.7% and 58/60 = 96.7%. Findings show that 56 (41.79%) of the participants achieved the 86.7% mastery level on the academic VLT, and 11 (8.21%) of these students reached the 96.7% mastery level (see Figure 2). A total of 58.21% of the participants did not reach either of the recommended mastery levels.

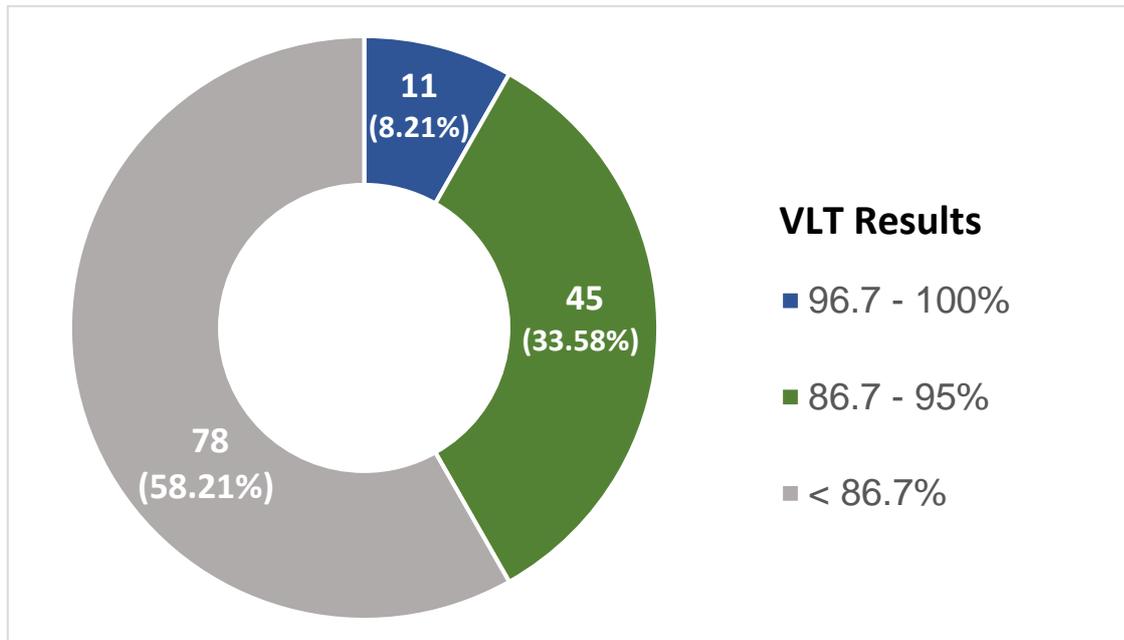


Figure 2

Mastery levels of the VLT academic sections

Note. N = 134. Mastery is represented in the colored sections.

Academic vocabulary scores and associations with English course grades

Results of the Spearman correlation indicate that there was a significant positive association between VLT scores and English course grades ($r_s = .37$, $p < .001$) with a moderate effect size (Plonsky and Oswald, 2104). To further compare these associations, participants were grouped by course grades. Because no participants received grade one (a fail grade), and only a few received course grades two (low achievement) or six (distinction), grade two was merged with the set of results for grade three (i.e., 2 and 3 – left column in Table 4), and grade six was merged with grade five (i.e., 5 and 6 – third column in Table 4). A Kruskal-Wallis test revealed a significant difference in VLT scores and English course grades ($H(4) = 24.74$, $p < .001$). For a closer examination of the differences in VLT scores and course grades, two-tailed Wilcoxon rank-sum tests were conducted. As shown in Table 4, the results revealed significant differences in VLT scores between those with grades 2 - 3 and 5 - 6, and between participants with grades 4 and 5 - 6. As suggested by the closeness in median values for learners with grades 2 - 3 and 4, there was no significant difference in VLT scores between participants with these grades.

Table 4

Pairwise comparisons of VLT scores for participants with different English course grades

Grade	Mdn. score	Grade	Mdn. score	Wilcoxon rank-sum results
2 - 3	46	5 - 6	55	$W = 257.5, p < .001$
4	49	5 - 6	55	$W = 542, p < .001$
2 - 3	46	4	49	$W = 1009.5, p = .56$

Note. Maximum score = 60.

To investigate further the use of two mastery levels, the relationship between mastery of academic vocabulary sections of the VLT and course grades was also examined. An ordinal logistic model, using R: Venables and Ripley (2002) (“MASS”), was run to reveal the likelihood that participants who reached set mastery levels also achieved a higher English course grade. The analyses revealed that, for students with 86.7% mastery levels on the VLT, the odds of having a higher English grade are 4.00 times that of students below the mastery levels (OR = 4.00, 95% CI = 1.90 – 8.70). For students with mastery at the 96.7% level, the odds of having a higher English grade are 9.74 times that of students who did not reach set mastery levels of academic vocabulary in English (OR = 9.74, 95% CI = 2.67 – 41.10).

Discussion

The primary purpose of the current study was to examine receptive knowledge of written academic English vocabulary for Norwegian speaking learners in upper secondary education, and whether results on a measure of meaning-recognition knowledge were associated with English course grades. Findings are discussed in connection with the use of VLT academic sections as a measure of vocabulary knowledge and as a pedagogical tool.

Mastery of Academic Vocabulary

One aim of the study has been to assess receptive academic vocabulary knowledge among Norwegian upper secondary students. The average participant results in our study, 80.78%, are much higher than a previous study of Danish-speaking English L2 learners (38.52%) (Henriksen & Danelund, 2015), but lower than average results from students in a German EMI context (95.67% and 90.67%) (Coxhead & Boutorwick, 2018a). The higher scores from the German study could be expected due to student immersion in the English language across subjects. Similar differences were also found in Swedish students’ written production of academic English vocabulary when comparing 15-16-year-olds in CLIL and non-CLIL classroom contexts (Olsson, 2016). Differences in the results of the current study compared to the Danish study (Henriksen & Danelund, 2015) are more

difficult to explain because these learners have closely related native languages and similar exposure to English. The amount of English course instruction is also similar, with 600 – 690 hours for the Danish students (Henriksen & Danelund, 2015) and approximately 650 – 700 hours of instruction at the time of testing for these Norwegian students (Norwegian Directorate for Education and Training, 2006/2013). Despite similarities in hours of instruction and exposure to English, deviations in test scores may be due to differences in data collection procedures across these educational contexts.

Even with the higher average test score compared to the Danish study (Henriksen & Danelund, 2015), over half (58.21%) of these Norwegian students do not reach the 86.7% mastery level for the academic section of the VLT. These results indicate a lack of appropriate receptive knowledge for these learners that can lead to difficulties with reading (Laufer & Ravenhorst-Kalovski, 2010) and listening comprehension (Stæhr, 2009). Because findings from the current study have shown only 8.2% of these participants reached the mastery level of 96.7%, it appears that L2 English teachers in the Norwegian educational context could work with their students to improve their knowledge of academic vocabulary.

There was also wide variance in average participant test scores ($SD=8.31$) indicating large differences in academic English vocabulary knowledge, even among these students with Norwegian as their L1 and without learning difficulties. As such, teachers could expect even wider variation in their classrooms, making it especially important that they understand the importance of academic English vocabulary knowledge and the need to spend class time for explicit teaching of this lexis (Nation, 2013, p. 32).

The findings suggest that language teachers may not assume students have prior knowledge of academic vocabulary. As such, the VLT could be used in pedagogical contexts to “inform decisions concerning whether an examinee is likely to have the lexical resources necessary to cope with certain language tasks, such as reading authentic materials” (Schmitt et al., 2001, p. 56). Seen in light of the curriculum that also requires oral and written productive use of academic language, this lack of academic vocabulary knowledge in English supports previous recommendations from Nordic educational research that suggest the need for explicit instruction of academic vocabulary for our students (Henriksen & Danelund, 2015; Olsson, 2016).

Findings from the current study also support previous Norwegian research that has shown a lack of vocabulary knowledge to be one issue students gave as a hindrance to reading proficiency (Hellekjær, 2005, 2009). Busby (2020) also raises the question of whether university students in Norway perhaps choose their field of study based on the amount of recommended reading of English textbooks or other academic texts. As such, improved knowledge of academic vocabulary could perhaps also have larger repercussions than improved reading and listening skills, if students felt they were more capable of coping with English language course materials at university.

The current study was limited to measuring receptive form-meaning knowledge, an initial form of word knowledge (Schmitt et al., 2001). L2 English students in upper secondary education are also required to produce academic English lexis. Because receptive word knowledge has been shown to precede productive knowledge (e.g. Webb, 2008) further research into productive academic vocabulary in a Norwegian setting would be beneficial.

This study is also limited to a focus on academic English vocabulary knowledge for upper secondary students and it should be made clear that knowledge of this vocabulary alone is not enough for accurate comprehension of academic discourse. Previous research has shown the need for knowledge of mid-frequency vocabulary beyond general academic vocabulary to comprehend written (e.g. Nation, 2006) and oral (e.g., Stæhr, 2009) texts for L2 English learners. A master's thesis has also shown this to be the case for comprehension of factual texts in course materials used for upper secondary students in Norway (Skjelde, 2015). Nonetheless, knowledge of academic English vocabulary is necessary for comprehension and has been shown to correlate positively with academic achievement. Let us now turn to that point.

Course grades and academic English vocabulary knowledge

Not surprisingly, participants with higher VLT scores largely obtained higher English course grades on comparisons made in the current study. Findings lend support to previous research that indicates academic achievement correlates with academic vocabulary knowledge for L2 English learners (Masrai & Milton, 2017, 2018; Olsson, 2016; Townsend et al., 2012). That said, these studies are not directly comparable due to differences in methods, participant groups, and educational contexts.

Significant positive correlations were found between VLT scores and English course grades with a moderate effect size. The strength of this correlation may have been affected by the nature of the course grades given (see Methods) because the VLT is a measure of written receptive knowledge and it may be expected that some students achieve better results when oral assessment is also a part of the final grade. In addition, outliers were not removed in keeping with ecological validity for classroom research.

A closer investigation of associations between VLT scores for students with different levels of achieved grades revealed significant differences between those with lower (2-3) and higher (5-6) grades and for those with mid (4) and high (5-6) grades. There was no significant difference for participants achieving low- and mid-range grades (see Table 4), likely due to the large variation in test scores among these participants.

Finally, comparisons of course grades for students grouped by VLT academic section scores also showed that participants who achieved set VLT mastery levels had higher odds of achieving better grades. For participants achieving the 96.7% mastery level, the odds of achieving a higher English grade was over 9 times that

of students who did not reach mastery levels, and for those reaching 86.7% mastery the odds of achieving a higher English grade was 4 times that of students who did not reach mastery levels.

These findings are of importance because previous research in Norway has suggested that upper secondary education may not adequately prepare students for university studies (Hellekjær 2005, 2019a, 2019b) and the newly revised English curriculum (Norwegian Directorate for Education and Training, 2019a) aims for first-year upper secondary students to both comprehend and produce academic English language.

These results also provide evidence in support of using higher mastery levels for vocabulary below the 4000 frequency level as recommended by Webb et al. (2017) and lend support to results found by Olsson (2016) when comparing holistic assessment of written essays to the amount of academic vocabulary used by students. Further, findings suggest that improved receptive knowledge of this vocabulary may be especially beneficial to struggling English L2 learners because receptive knowledge is often acquired before productive use (e.g., Webb, 2008). Note that for students who might struggle with taking tests such as the VLT, individual administration is recommended to ensure more opportunity for learners to demonstrate their actual knowledge (see Coxhead et al., 2018b).

The use of only one English course grade, set by course teachers, as a measure of academic achievement is a limitation of the present study. Because secondary students do not take exams in all courses in the Norwegian system, it was not possible to obtain a course grade and an exam grade for these participants. A study of academic vocabulary use in written production during national exams would provide a means to compare two high-stakes English grades in the Norwegian educational context and should be considered for further research.

Conclusion

The current study has provided further evidence supporting the need to address academic vocabulary knowledge for upper secondary students seeking higher education in a Nordic context, and preliminary evidence for the state of academic vocabulary knowledge among Norwegian upper secondary students. While we must be careful not to generalize from the results of one study, these preliminary results suggest the need for teachers to further support student learning of general academic vocabulary to meet the vocabulary demands of the newly revised English subject curriculum (Norwegian Directorate for Education and Training, 2019a).

More specifically, findings support previous research that suggests upper secondary English learners in Denmark (Henriksen & Danelund, 2015), Iceland (Edgarsson, 2017) and Sweden (Olsson, 2016) would profit from direct learning of academic English lexis. Sundkvist (2020) asks how English language

classroom instruction in Sweden will cope with increases in students' informal language learning, i.e., English acquisition outside of classroom instruction. Perhaps one answer is to encourage teachers to use tests such as the VLT (Schmitt et al., 2001) or the AVT (Pecorari et al., 2019) to uncover and address any gaps in learners' knowledge of academic English vocabulary

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