CHAPTER X

SUMMARY AND CONCLUSIONS

Overview

In this section the main findings of the study are summarized and some conclusions are drawn. These conclusions are considered in relation to previous related research. In addition, some of the strengths and limitations of the study are discussed, and areas of further investigation are outlined. Finally, some possible implications of the study for vocabulary research and teaching are discussed.

The main purpose of this study was to estimate the size of students' active and passive vocabulary in English after seven years of English in the Finnish comprehensive school. The students started learning English at the age of nine and had some 450 clock hours of classroom instruction, usually 2-3 lessons a week. The estimation was to be done so that the results would apply to the whole student population as well as to the entire universe of taught vocabulary. Thus, a high degree of generalizability of the results was a central research objective. Other objectives included the possibility of assessing the quality of the data and the dependability of conclusions.

In addition to the main research question, the study was designed to provide answers to some more specific quantitative questions: (1) How many words are known passively and actively of the ones taught during different stages in the seven-year course (lower stage, upper stage, and upper stage extra vocabulary)? (2) What is the relationship between the taught and learned vocabulary? (3) What is the relative contribution of students vs. items to

observed variation in scores of vocabulary items?

The study also had some objectives related to methodological questions. It sought to draw on recent advances made in test and sampling theory (multiple matrix sampling, generalizability theory) and in test construction (criterion-referenced measurement). The hope was that this exercise would increase our knowledge about their applicability in general but especially in L2 research. Specifically, we wanted to get at least tentative answers to questions like the following: (1) How does multiple matrix sampling work in vocabulary research? (2) How do the variance components estimated with the generalized symmetrical sums approach, which allows an unbalanced multiple matrix sampling design, compare with the ones computed with standard analysis programs that set more constraints on design? (3) What is the optimal trade-off between the number of word items and the number of students in terms of measurement accuracy? (4) To what extent do students' word-analysis skills and their ability to utilize context in inferring word meanings affect the estimates of vocabulary size?

The main findings and conclusions will be presented following the research questions and beginning with the estimation of the overall size of the active and passive vocabulary.

Total Size of Passive and Active Vocabulary

The results, presented in Table 35, can be summarized briefly as follows: (1) The average size of the total passive vocabulary in Set A is about 1,550 words (Textbook 1: 1,498 words; Textbook 2: 1,607 words). The 95% confidence interval ranges from 1,255 to 1,940 words.(2) In Set B, the corresponding figures are about 950 (T1: 891; T2: 999) words with the confidence

interval extending from 628 to 1,369 words. (3) In Set C, about 450 (T1: 340;T2: 538) words are learned passively and the 95% confidence level ranges

Table 35

Original and Corrected Estimates for the Total Passive and Active Vocabulary Sizes, by Set

Set	Original estimates		Corrected estimates	
	Passive	Active	Active	Passive/context-aided
Set A	1,550	1,450	2,000	2,200
Set B	950	850	1,025	1,050
Set C	450	350	450	-

from 178 to 842 words. (4) The average size of the total active vocabulary in Set A is about 1,450 words (Textbook 1: 1,441/1,341; Textbook 2: 1,569/1,515) - about 100 less than for the passive vocabulary estimate. The 95% confidence interval for the mean ranges between 1,163 and 1,853. (5) The size of active vocabulary in Set B is about 850 words (T1: 752/821; T2 891/917) - about 100 words less than the passive vocabulary estimate. The confidence interval extends from 599 to 1,189. (6) The active vocabulary size in Set C is about 350 words (T1: 297/379; T2: 282/414) - about 50 words less than the passive vocabulary estimate. The confidence interval ranges from 150 to 625.

By applying weighting, we can estimate the mean size of vocabulary knowledge in the whole student population, disregarding the setting. This leads to the following conclusions: students using Textbook 1 know about 955 words passively and 840-925 words actively. Students using Textbook 2 know about 1145 words passively and 1040-1100 words actively. If we continue this

line of broad generalization, we can conclude that the "average student" knows about 1000 English words after completing comprehensive school. This generalization, while useful as a rule of thumb, is an idealization and the examination of the results by set clearly demonstrate that there is great variability in vocabulary knowledge.

Students' ability to use word analysis skills and to utilize context for inferring word meanings influences vocabulary estimates. Such skills were not expected to be well developed for several reasons: (1) because of teaching traditions with the dominance of syntax, morphological skills were not expected to have been taught systematically, (2) because of the fact that English and Finnish are not related, students were not expected to be encouraged to develop hypotheses about word formation rules without prompting, (3) because of the expected prevalence of "intensive" work on texts, students were not assumed to have formed such hypotheses on the basis of "extensive" reading and listening.

The results of a small-scale experiment support the assumptions. While the original estimates of active and passive vocabulary sizes need to be upgraded on account of students' word formation and context utilization skills, the correction is modest in comparison with what the discussion in Nagy and Anderson (1982) suggests for native language speakers. The maximum figure is 45% for context aided passive knowledge of word meanings for Set A and the lowest figure is 7% for non-context aided active vocabulary for Set C. The corrected figures for the three sets are as follows: for Set A, active vocabulary 2,000 words, context aided passive vocabulary 2,200; Set B, active vocabulary 1,025 words and context aided passive vocabulary 1,050 words; Set C, active vocabulary 450 words, context-aided passive vocabulary could not be

estimated. Probably it would not be much above 450 words. The corrections may appear large for someone who is not familiar with literature on vocabulary research. In fact, they are modest in comparison to the five to tenfold variation (i.e., 500% 1000%) in several vocabulary size estimates. Still, they are not negligible and suggest that much can be achieved in this respect with some changes in instruction.

The picture that emerges from the results, when we examine the means for the total passive and active vocabulary in all three sets and for both textbooks, is that the passive vocabulary is somewhat larger than the active vocabulary within each set. The difference does not appear to be large, however. When we use a stringent criterion by examining the confidence intervals within which the means for the passive and active vocabulary can be expected to be located with 95% level of confidence, we note a considerable overlap between the upper limit of the active vocabulary and the lower limit of the passive vocabulary. Hence, we are led to conclude that there is no reliable difference between the size of passive and active vocabulary as they are measured in the present study.

Another consistent finding is that there is a clear and reliable difference between the three sets so that Set A students have learned about 1.7 times more words passively and actively than Set B students and about four times more than Set C students. Set B students, in turn, have learned 2.4 times more words passively and actively in comparison with Set C students.

Since we know the amount of time that students have available for English in the comprehensive school (450 clock hours), we can estimate how many words students learn per hour. Obviously, students were learning other things

besides vocabulary, so the estimate is by no means a measure of their total learning performance. Still, relating the size of learned vocabulary to the available time provides a very concrete idea of the rate of vocabulary learning. The results show that, per hour, Set A students learn about 3.4 words passively and 3.2 words actively. The corresponding figures for Set B students are 2.1 and 1.9 words, and for Set C students 0.9 and 0.8 words, respectively. With corrected figures, the estimates are 4.9 and 4.4 for Set A, 2.3 for Set B, and 0.9 for Set C.

If we only take into account the vocabulary taught during the upper stage (uncorrected figures), we note that students in Set A had learned about 4 words per hour, students in Set B about 2 words, and students in Set C somewhat less than one word. These figures are corroborated by the results obtained by Karkkainen (1983): she reports 6 words learned passively in the more advanced set and about 4 words in the basic set. It will have to be taken into account that she used the multiple choice format, and this could easily account for the observed difference. The results obtained by von Mentzer show that students in the Swedish comprehensive school had learned about 2.4 words actively per hour and 7.5 words passively. Thus, we conclude that students typically learn a maximum of 7 words passively in an hour and the active knowledge may be up to three times lower. We have to keep in mind that Finnish is not related to English, whereas Swedish and English both belong to the Germanic language group.

Size of Passive and Active Vocabulary by Stratum

How many words are known passively and actively of the ones taught during different stages in the seven-year course (lower stage vocabulary,

upper stage vocabulary, upper stage extra vocabulary)? Figures that provide the answer to the above question are presented in Table 36, which is a condensed form of more detailed tables presented in the Results chapter. The two active vocabulary size estimates obtained with the intensive and extensive samples have been collapsed simply by getting the average of the two. This is a rough measure but probably adequate for the present purposes.

Typically the passive vocabulary estimates in all sets using both textbooks are somewhat larger than the active vocabulary estimates. When the interval within which the estimates can be expected to lie with 95% level of confidence is used as a criterion, it is the case that the passive and active vocabulary intervals overlap, and hence there is no reliable difference between the two measures of vocabulary knowledge in any vocabulary stratum. The passive and active knowledge of lower stage vocabulary, upper stage vocabulary and upper stage extra vocabulary is essentially the same within each stratrum. On the other hand, there is no overlap between the three sets. Consequently, there is a reliable performance level difference between the three sets, with Set A doing much better than the other two, and Set B clearly outperforming Set C in all strata.

Students using Textbook 1 know about 200-300 more words belonging to the vocabulary introduced during the lower stage than those taught first during the upper stage. Yet, the number of words taught is about the same (1,011 vs. 1,164/Sets A & B). There is no such difference in the case of Textbook 2 users. Unlike Textbook 1, the vocabulary taught to Sets A and B during the upper stage is twice the amount taught during the lower stage (812 vs. 1,690).

Table 36

Summary of Passive and Active Vocabulary Size Estimates, by Stratum, Textbook and Set

Textbook and vocabulary stratum	Set A		Set B		Set C	
	Passive	Active	Passive	Active	Passive	Active
Textbook 1 Lower stage	895 (W= 1,011)	764	656 (W= 1,011)	510	266 (W= 1,011)	274
Upper stage	594 (W= 1,164)	506	232 (W= 1,164)	209	74 (W= 405)	63
Upper stage, extra	- (W= 323)	120	- (W= 323)	67	- (W= 54)	3
Textbook 2 Lower stage	741 (W= 812)	628	544 (W= 812)	389	196 (W= 812)	176
Upper stage	771 (W= 1,690)	781	424 (W= 1,690)	424	134 (W= 1,078)	93
Upper stage, extra	95 (W= 352)	132	20 (W= 352)	91	98 (W= 450)	160

A study of the 95% confidence level limits for the vocabulary estimates shows that Textbook 1 users tend to learn reliably more lower stage words than Textbook 2 users, whereas the opposite is true of the upper stage vocabulary.

Relationship between Taught and Learned Vocabulary

The relationship between the taught and learned vocabulary is about the same for both textbooks. Students in Set A learn passively and actively about 55% of taught vocabulary, Set B students about 32% and Set C students about 20%.

In Set A, the proportion of the lower stage vocabulary known passively is about 90% and about 75-80% known actively. About 45% of upper stage vocabulary was known both passively and actively. About 35-40% of upper stage extra vocabulary is known passively and actively.

In Set B, the proportion of the lower stage vocabulary that is known passively was about 65% while the corresponding figure for active knowledge was about 50%. The passive and active mastery of upper stage vocabulary is of the order of 20-25%. About 20% of the upper stage extra vocabulary is learned passively and actively.

In Set C, about 25% of lower stage vocabulary is known passively and actively. The share of upper stage vocabulary learned passively and actively is about 10-15%. The estimates for the upper stage extra vocabulary range from 6% for active knowledge for Textbook 1 to 22% for the passive knowledge of Textbook 2 words.

As Tables 22 and 23 indicate, there is an interesting difference between the two textbooks: Textbook 1 teaches about 200 more words during the lower stage than Textbook 2 (1,011 vs. 812 words), whereas in the upper stage Textbook 2 includes about 500 more words for Sets A and B than Textbook 1 (1,690 vs. 1,164) and for Set C more than twice the amount of words (1,078 vs. 405). Textbook 2 contains about ten times more upper stage extra vocabulary than Textbook 1 for Set C (450 vs. 45) whereas the the amount for Sets A and B is about the same (352 vs. 323).

Since the proportion of known vocabulary is rougnly similar for both textbook users, it appears that Textbook 1 with its larger input during the lower stage is better adapted to students' learning capacity. By contrast,

its low input during the upper stage is less than optimal, and the clearly higher input of new words by Textbook 2 leads to a higher learning yeild.

It was noted that a larger proportion of lower stage vocabulary is known than of upper stage vocabulary. Several reasons could be advanced to explain the observed trend. First, it is possible that the words were chosen following quite closely frequency counts and were either naturally or by design repeated often, even during the upper stage. Second, it is possible that the lower stage vocabulary is somehow inherently more learnable than the upper stage vocbulary. It might, for example, be more concrete. A third possibility is that younger students (aged 9-13) learn foreign words better than older students (aged 13-16), either because of more appropriate processing or higher motivation or both. The data in their present form do not make it possible to test any of the above hypotheses.

The relationship between what is taught and what is learned is important and interesting for a number of reasons. In terms of learning effectiveness, is it better to have a close relationship between what is taught and what is learned or is it better to have a clearly higher target level than is actually achieved? The relationship has also important consequences depending on the grading and promotion policies. If a rigid mastery level standard is set and it is relatively high, i.e., a high percentage of what is taught must also be learned for passing, the implications for failure rates and for learning yield are important. To take a hypothetical example, if, for instance, 85% of taught vocabulary must be known after the lower stage in order to be eli-gible to study either in Set A or B (which give full qualification for further studies) rather than in Set C (which gives limited access to further studies), this may have important consequences depending on which

textbook is being used. As has been pointed out in the foregoing discussion, Textbook 1 taught 1011 words during the lower stage and Textbook 2 812 words. 85% of 1011 is 859 words - more than was taught in Textbook 2 - whereas 85% of 812 is 690. What would count as non-mastery in the case of Textbook 1 would be ceiling performance in the case of Textbook 2. If we assume that students in Sets A and B were learning optimally, and if the 85% minimum standard were set such that even all Set B students would pass it, the number of taught vocabulary in the case of Textbook 1 ought to have been about 766 (656 is 85% of 766) words in the lower stage, instead of 1,011. That would have meant, however, that a considerable percentage of students in Set A would not have learned as much as they could have, if the input had been higher, as it was in the actual case.

It remains for subsequent experiments to ascertain what the optimal relationship is between the amount of taught vocabulary and the learned vocabulary. Since the ceiling was not reached in the present study, except in the case of Set A, Textbook 2, lower stage vocabulary, the lower boundary for Set A students seems to be 800 words during the lower stage. In fact, the 1,000 words taught by Textbook 1 seems to be a more appropriate target. On the other hand, during the upper stage Textbook 1 with its 1,150 input seemed to be less optimal than Textbook 2 with its 1,700 word input.

In making these speculations it should be borne in mind that the learning of the lower stage vocabulary was, in fact, tested 3-7 years later than when the words were first met. Thus, the result reflects both forgetting and increased opportunities for the words to have been repeated during the three years in the upper stage school. Thus, it would be necessary to obtain

similar assessment data right at the end of the lower stage to see how much is, in fact, learned during the lower stage and how much the learning of the lower stage vocabulary improves - or deteriorates in the case of low-repetition words - during the upper stage.

Students and Items as Sources of Variation in Obtained Results

One of the most useful outcomes of variance components analysis is that it makes it possible to assess the relative role that the various facets (factors, independent variables) of the design have for the variation in scores. In the present study, variance components were estimated with a new computer program which allows missing data and an unblalanced multiple matrix sampling design.

In 44 cases out of the total of 47, the variance component for items was larger than the subject variance component. Usually the difference is sizable, the items component being twice or three times larger than the subjects component. This confirms the expectations that were held during the design stage: it is relatively easy to get an estimate of the "typical student" but it is much more difficult to talk about the "typical word", since difficulties vary so much across words. Even if the subject and item interaction component, which also includes the error component, is usually the largest of the three components, it is smaller than has usually been the case in earlier studies in Finland and can be regarded as relatively small. This means that students can be arranged in the order of ability with a relatively small number of items, since an easy item tends to be easy for all students and a difficult item tends to be difficult for everybody.

Word difficulty seems to be stable across students but words differ greatly in terms of their difficulty. Several questions can be raised to deal with this observation. First, to what extent is the difficulty variation likely to be due to the way words have been taught? Has there been substantial difference in the amount that different words have been repeated in the teaching material and in classroom discourse? Are recently taught words known and remembered better than words taught at an early stage or vice versa? Second, to what extent are some words or word classes inherently more difficult to learn than other words or word classes? For instance, are concrete nouns easier to learn than abstract nouns, and both in turn easier than verbs, adjectives, adverbs, and especially structural words (e.g., conjunctions)? Third, are culturally divergent words harder than culturally convergent words? Fourth, would there be a greater subject x word interaction at a higher level of study when students might have been exposed to different kinds of vocabulary according to their interests and hobbies? Such questions can only be raised at this point. Some answers may be forthcoming when the data are subjected to further analyses.

Vocabulary as an Object of Criterion-referenced Measurement

How does vocabulary size estimation fulfill the requirements of criterion-referenced measurement? It was assumed in the planning stage that vocabulary measurement would be a good starting point for trying out new ideas in sampling and test theory. Unlike in the case of domains like reading and listening comprehension, it is possible to define the domain quite adequately and even list the items belonging to the content universe. It is also a straightforward task to choose a random sample of items from the universe. The practical experience with the study confirmed the expectations.

The implementation of the study was manageable, even though very complex and laborious.

The fact that the domain was adequately defined and strict random sampling applied to the selection of words makes it possible to interpret obtained scores in relation to the whole domain, i.e., it is possible to generalize the scores to the whole taught vocabulary.

Now that there is practical experience on carrying out criterion-referenced measurement in one important aspect of L2 teaching, it is time to tackle other, more complex domains. While obtaining generalizable results for the receptive and productive language skills will no doubt be more difficult than for vocabulary and grammatical structures, there is no reason to doubt that progress can be made if systematic and rigorous conceptual work is devoted to the specification of these domains.

Assessment of the Strengths and Weaknesses of the Study

Beginning with the limitations of the study, the most obvious one has to do with how vocabulary knowledge was measured. Even if the choice of test types was based on a careful consideration of the merits and weaknesses of various test types, it is clear that only limited aspects of vocabulary knowledge have been measured: decontextualized active and passive knowledge of words, requiring relatively solid knowledge of and easy access to words in long term memory. Thus, it was not possible to get an estimate of different degrees of partial knowledge of words. Similarly, it was not possible to estimate the vocabulary size as it manifests in the production and comprehension of discourse. It is both interesting and important to extend vocabulary study to cover both of these aspects.

If the study inevitably has some such limitations, it is fair to say that it also has certain merits. These are substantive and methodological. If we take up the first point, the study has produced new information in an area where there is relatively little solid knowledge but which is an important aspect of language learning and teaching. We now have relatively good estimates of students' vocabulary learning in a situation where we are actually measuring the effects of teaching rather than the confounding effects due to a large number of cognates, structural relatedness of L1 and L2, etc. This "substantive" contribution to L2 research was, however, possible only because of certain methodological principles applied in the design and implementation of the study. The fact that these principles were tried out with a fair degree of success makes it possible to carry out subsequent studies with greater methodological sophistication.

One of the greatest methodological yields of the study is the demonstration that it is possible to use an unbalanced multiple matrix sampling and still be able to get unbiased estimates for all important statistical moments (e.g., mean, variance, standard deviation) and to estimate their standard errors. This was not possible with the SPSS programs which set more limitations on research designs. A new, more flexible approach, based on the use of generalized symmetrical sums, is a great advantage particularly in large scale evaluation studies, where a large number of items has to be administered to a large number of students, leading to inevitable problems with the construction of test forms and with missing data.

Due to the new approach in estimating variance components, it was possible to get a more detailed idea of vocabulary as a learning target. An

examination of variance components brings what appears to be new empirically confirmed knowledge about vocabulary learning in L2 research. Thus we now know that words seem to make more difference than students. Some words are easier than others, and they tend to be so irrespective of students' general proficiency in the studied language. This leads to two further questions that ought to be pursued: what words/word categories are relatively easier vs. harder than others, and what could account for that distinction? Thanks to the large item bank collected in the present study, it will be possible to pursue further studies along these lines.

An obvious implication for vocabulary size estimation is that it is important to make sure that a relatively large vocabulary sample is drawn if the vocabulary is not stratified on the basis of an earlier knowledge of how e.g., word class affects word learning. The number of students seems to be a less important consideration. If we only want norm-referenced interpretation from our data, relatively few word items are needed: any quite small sample of words will probably be able to put students in the relative order of level of proficiency.

When we examine the size of standard error of the mean proportion correct scores, we note that measurement is more accurate when there are more items and students than when there are less. This is not unexpected, but the fact that it was demonstrated with Set C students (i.e., the slow learners) is significant in that at least indirectly it supports the view that even they tended to take the task seriously, and that the low estimates of their vocabulary size are not to be explained away because of motivation problems. Another finding is that simply more than doubling the student sample from

about 50 to 120 does not necessarily lead to diminished error of measurement. On the other hand, in eight out of ten cases where there were fewer items presented to a greater number of students (i.e., the intensive sample) in comparison to the extensive sample (more items but fewer students), the standard error was smaller in the latter case. Thus, in agreement with Lord and Novick (1968), measurement accuracy can be achieved more efficiently by increasing the number of items than by increasing the number of subjects. If the standard error for 12 items presented to 104 students is .0774, with 59 items and 610 students it can be more than halved to .0345. This means in practice that, in the example used to demonstrate the difference, the confidence interval can be reduced from 306 words to 132 words (350 - 656 vs. 435 - 571). The good pay-off of increasing the number of items faster than the number of persons was also clearly demonstrated in the present investigation. The low figures (some 50 randomly sampled students taking a randomly sampled test of 50 words produced a standard error, which decreased very slowly, especially even if the number of students were increased) would probably only be obtained in a study which stratifies in a similar way both the student sample and item sample.

It is the unquestionable merit of focus on the size of measurement errors that the researchers have to specify what they consider as error, to consider the kinds of conclusions that they want to draw on the basis of data in relation to acceptable error, and to consider the consequences of wrong or risky conclusions. Thus, focusing on the size and type of error in measurement forces the researcher (as well as possible "clients") to go beyond traditional reliability coefficients and more recent generalizability coefficients, and to weigh the trade-offs in terms of accuracy and cost of

different designs.

Implications for Classroom Teaching

Teaching in the classroom takes place in a context where a great number of factors have to be taken into account in deciding what to teach, when to teach it, and how to teach it. Thus, one should be careful in recommending some new ideas and approaches. Before recommending that schools do more of X, one should think about the likelihood of achieving the intended outcome and about possible unintended outcomes. Would some valuable activities be crowded out because of the recommended new emphasis? Could the current emphasis be appropriate, if the larger context is considered? An additional reason for caution in pedagogical recommendations is the fact that we have not related the learning outcome results to the extensive data that were obtained from teachers and students with questionnaires. The questionnaire data may contain some important information that puts the learning outcomes in specific context. To link the background data with the learning data will be the next step in the authors' research program on vocabulary learning.

In the case of the present study, the obvious candidate for a pedagogical recommendation for L2 teachers is for teachers to give more attention to students' poorly developed word analysis and context utilization skills. But before making such a recommendation, it is important to work out the arguments for and against such a recommendation. Let us begin with two basic questions. Can it be that the current situation is quite satisfactory, given the circumstances in which foreign languages are taught in Finland? Can the development of such skills be left to a later stage? I suggest that the anwer is no to both questions. For some students, the comprehensive

school constitutes the major part of their L2 studies. Since word analysis and contextual inference are so important for discourse comprehension in particular, but also for discourse production, students ought to be encouraged to start developing such skills as early as possible so that they can make maximum use of their vocabulary when they are no longer in school.

A possible counter-argument would be that such skills are difficult and best left to a later stage. While there is no solid research-based knowledge of this, it is hardly likely. Students start learning English at the age of nine and have extensive implicit knowledge of word-analysis in their highly inflected mother tongue, Finnish. Basic derivations like -ing (verbal noun), -ness (abstract noun indicating quality), -er (agent), -ful (adjective),-less (adjective), and the like are not conceptually difficult. Knowledge of such basic derivations and the habit of actively utilizing such knowledge could be taught already in the early grades.

It could be argued that word-analysis and context utilization would be boring to students, and thus the effort to encourage students to develop such skills would be a waste of time. Again, there is no, or at least no well-known, research-based knowledge about this question in L2 research literature. It seems unlikely that this would be the case, however. Omanson et al. (1983a, 1983b) were quite successful in engaging young children in extended vocabulary work in L1 through a variety of activities. Similarly, it would be possible to show to students how much more English they can know if they learn these skills. It is likely that such demonstration would be rewarding and help maintain or even improve motivation to study English.

Recommendations for Further Research

Now that a new approach to a large-scale assessment of vocabulary size has been developed, tested empirically and found to be a promising line of study, several research questions suggest themselves. These can be divided into two major groups. One has to do with the test types and the other with student populations.

As was mentioned in the above, it was possible to test only limited aspects of vocabulary knowledge, namely relatively solid and easily accessible passive and active knowledge of words. Several experiments ought to be conducted with other test types that tap more partial knowledge of word meanings and see how vocabulary size estimates are affected. von Mentzer found that Swedish students knew about 3 times more words passively (using the multiple choice format) than actively (using the constructed answer format with sentence context). Morgan and Oberdeck (1930) found that college students' passive vocabulary was about 3.2 times larger than their active vocabulary after the first semester, and the corresponding figures were 2.2, 3.2, 2.4, 2.3, and 1.9 for the second, third, fourth and fifth term, and for teacher education, respectively. Thus, there was a somewhat uneven trend towards a decreasing difference, which is a somewhat surprising result. They also found a roughly inverted U-shaped curve so that among lowest-scoring students, the size of the active vocabulary was about 60% of the size of the passive vocabulary, around 30% among the mid-scoring students, and climbing close to 60% again among the highest-scoring students. It would be useful to explore similar questions and see if the pattern would hold.

Similarly, students' knowledge of vocabulary in the context of discourse comprehension and production ought to be estimated. Such experiments would provide data to complement the baseline data collected in the present study. It would then be possible to estimate, with a certain degree of confidence, that if students' decontextualized and firm knowledge of L2 words is X, their more partial knowledge of vocabulary is X + Y words, etc. It can be conjectured that partial knowledge of a fair amount of basic words combined with some knowledge of basic morphological rules and the availability of an adequate context can lead to an adequate comprehension of test passages and to provide a good opportunity for more word learning.

The study ought to be extended to other populations. With regard to the present study, it would be important to test students' knowledge of lower stage vocabulary at the end of that school stage. This would make it possible to explain with greater confidence the finding that lower stage vocabulary was known better than upper stage vocabulary. Is this so already at that stage or is lower stage vocabulary repeated during the upper stage, and thus the difference in learning is attributable to an increase in the opportunity to learn lower stage vocabulary? This question could be studied in even greater detail by looking at each successive grade and comparing the results.

Vocabulary size assessment should also be extended to older populations. How many words do students know at the end of the senior secondary school? How many words do L2 majors at the university know?

Other studies ought to address the question of how students' ability to use word analysis skills develops over time as the study of L2 progresses. Teaching experiments ought to be carried out in which students of different age levels are taught word analysis and context utilization skills in order

to see what effect such direct teaching would have on students' vocabulary efficiency (cf. Carpay, 1975).

Further, since it was found that exposure to more words had a favorable influence on vocabulary learning, it should be studied what exposure leads to optimal word learning for students of varying ability. It seems likely that the relationship is not linear but more likely an inverted U-shaped curve.

In terms of curricular implications and educational equality concerns, it would be important to study when the observed large differences in vocabulary size in L2 emerge, and whether setting/streaming (and using different textbooks with different input) tends to increase or decrease such differences. Is limited input (i.e., smaller vocabulary size taught) better for slow learners or is that a misguided notion?

In addition to such empirical research, it would be useful to devote some attention to more theoretical questions on the nature of vocabulary learning, teaching, and research. Is it, for instance, in the very nature of a domain like vocabulary that the input should be large, and that the number of words known solidly, would not (or conversely the number of words almost forgotten) would be high? What would that mean for teaching, testing and grading? Is, for instance, the observed large item variance component an indication of the failure of teaching, or is it a natural characteristic of L2, and for that matter L1, learning and performance?

It is obvious that a whole research program is needed to increase our knowledge about vocabulary teaching and learning both in L1 and L2. Close links between L1 and L2 vocabulary research are of great importance for optimal progress. It may be more laborious to keep track of what is being

done in both L1 and L2 research, but that is necessary to avoid duplication of effort and to utilize the state of art knowledge. This is one of the main lessons that work on this investigation has provided. It is time to put that belief into practice, now that the data invite further elaboration. This will be a rewarding experience, since vocabulary research tends to have a special fascination of its own. Its range of interest is as wide as life itself. As Vygotsky so aptly put it, a word is a microcosm of human concsiousness.

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Tiivistelmäkortti

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Kaksivaiheista stratifioitua ryväsotantaa käyttäen otostettiin 39 koulua. Kaikkiaan n. 950 sanaa esitettiin n. 2 400 oppilaalle matriisiotannan mukaisesti: sanat oli jaettu 20 eri versioon, jotka rotatoitiin satunnaisesti luokassa. Oppilaat kirjoittivat irrallisten englantilaisten sanojen suomenkieliset vastineet (passiivinen hallinta) ja päinvastoin (aktiivinen hallinta). Arvioitsijoiden välinen yksimielisyys oli 90 % luokkaa. Passiivisen ja aktiivisen sanaston koon välillä ei todettu luotettavaa eroa. Tämän oletetaan johtuvan useista esitetyistä syistä. Laajakurssilaiset olivat oppineet n. 1,500 sanaa, keskikurssilaiset n. 900 ja yleiskurssilaiset n. 450 sanaa. Sananmuodostuksen alkeiden ja lauseyhteyden perusteella tapahtuvan päättelyn ansiosta arvioita voidaan korottaa n. 45 %, 17 % ja 7 % eri tasokurssien osalta. (Englanninkielinen, suomenkielinen yhteenveto). Hakusanat: sanasto, vieras kieli, äidinkieli, arviointi, yleistettävyys, matriisiotanta, varianssikomponenttianalyysi

Abstract card

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A two-stage stratified random sample of 39 schools (2,415 students) was drawn and some 950 randomly sampled words were presented in 20 randomly rotated test forms to the students, following multiple matrix sampling procedures. Students wrote the Finnish equivalents of decontextualized English words (passive knowledge) and vice versa (active knowledge). Interrater agreement was 90 % or higher. No reliable difference was found in the passive and active vocabulary size. Several reasons were cited to explain the result. Fast learners had learned about 1,500 words, average students 900, and slow learners about 450 words. The estimates can be revised upwards by 45 %, 17 %, and 7 %, respectively, due to word formation and contextual inference skills. (In English).
Descriptors: vocabulary, foreign language, mother tongue, assesment, generalizability, matrix sampling, variance component analysis