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A cross-sectional study on reading among young L1 and L2 students in Sweden

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ABSTRACT

According to the Simple View of Reading, decoding and linguistic comprehension are essential for reaching efficient reading comprehension. Students with Swedish as a first (L1) or second language (L2) in grades 1–3 might need special support to develop reading comprehension. In order to identify needs in reading in L1 and L2 students, the current study aimed to investigate how they perform in screening tests measuring vocabulary, decoding, and reading comprehension in Swedish. The present study has a cross-sectional design and includes over 46,000 students who followed the curriculum for Swedish as a first or as a second language. Data consisted of decoding, vocabulary, and reading comprehension tests, which were statistically analysed. The results showed that L2 students in grades 1–3 had significantly weaker decoding, vocabulary, and reading comprehension than L1 students. A performance below average in the tests indicates a need for extra support in reading which a significantly higher proportion of L2 students had compared to L1 students. Therefore, screening and systematic reading instructions are crucial to promoting reading development among L1 and L2 students.

KEYWORDS

L2; primary school; decoding; vocabulary; reading comprehension; cross-sectional

Introduction

Reading is a crucial skill for children to acquire in primary school. One of the most important issues for every teacher is developing and stimulating their students' reading. It is a school-long task covering all grades and subjects. Reading can significantly influence both the academic achievement and further personal development of students (Herbers et al. 2012; Reed, Petscher, and Truckenmiller 2017). Low reading presents a critical and persistent challenge. Not attaining a level of reading performance that allows participation can have long-term negative consequences. In the long run, being literate has a social and democratic value (UNESCO 2018).

An increasing number of children are growing up with more than one language, and multilingualism can today be seen as a norm rather than an exception. Many children worldwide face acquiring this skill in a language other than their home language. International and national reading assessments have shown that students with Swedish

as a second language have weaker reading comprehension than their peers with Swedish as a first language. These differences in reading comprehension between students with Swedish as their first (L1) and second language (L2) have been reported for several years (Programme for International Student Assessment [PISA], 2012, 2015, 2018; Progress in International Reading Literacy Study [PIRLS], 2011, 2016; Swedish National Agency for Education 2015, 2019). However, when it comes to younger primary school students in Sweden, data from 1993–1996 show that students with an immigrant background have weaker performance in decoding and reading comprehension tests in grade 3 than students without immigrant background (Fredriksson and Taube 2001). When comparing students with immigrant backgrounds, those born abroad showed the weakest reading skill. To our knowledge, younger students in grades 1 and 2 in primary school have not been investigated in either reading comprehension or decoding. Therefore, in the present cross-sectional study, students in grades 1–3 who study according to the curriculum for Swedish as a first (L1) or a second language are investigated regarding decoding, vocabulary, and reading comprehension.

In the Simple View of Reading proposed by Gough and Tunmer (1986), reading comprehension is defined as the product of decoding and language comprehension. With the Simple View of Reading as a theoretical basis, both decoding and linguistic comprehension need attention. Decoding is the ability to read isolated words quickly and accurately. Linguistic comprehension refers to the ability to understand single words, sentences, and spoken discourses (Gough and Tunmer 1986). Decoding, or the accurate and fast retrieval of the phonological code for written word forms, has proved to be essential for the development of reading comprehension (Gottardo and Mueller 2009; Perfetti, Landi, and Oakhill 2005). Findings from longitudinal studies investigating minority language children, reading in L2, reported decoding as a strong, early predictor of reading abilities (Droop and Verhoeven 2003; Hou et al., 2021; Lervåg and Aukrust 2010; Verhoeven and van Leeuwe 2012). Overall, the developmental pattern of young L2 students' decoding and the relationship with reading comprehension essentially mirror that of the L1 students (Geva and Wang 2001), but with a minor delay (e.g. Droop and Verhoeven 2003). Automatised decoding frees mental resources for closer consideration of the meaning of a text and thereby allows the reader to employ reading as a tool for the acquisition of new information and knowledge (National Reading Panel 2000; Perfetti 1998). Linguistic comprehension consists of various components such as vocabulary, language structure, background knowledge, text structure, and interpretive strategies (McCardle, Scarborough, and Catts 2001). The association between vocabulary knowledge and reading comprehension is well established (Grabe 2009; Koda 2005; Stanovich 2000). Researchers have also argued that the most challenging factor in Simple View of Reading for second language students is language comprehension and that vocabulary will be predictive of reading comprehension growth in both L1 and L2 readers. However, to a larger extent in L2 readers (Bernhardt, 2011; De Groot and Keijzer 2000; Schmitt 2014). Hence, vocabulary might be a bottleneck for reading comprehension achievement in L2 readers (Droop and Verhoeven 2003; Nation 2009).

The importance of vocabulary for L2 reading development is confirmed in a longitudinal study by Lervåg and Aukrust (2010). They found that among students in grades 1–3, vocabulary was a critical determinant of reading comprehension growth. Thus, a prerequisite for efficient language comprehension is a developed vocabulary that students

can build up by regular reading. The more words students learn, the deeper their understanding becomes, and the opportunities to cope with linguistically demanding situations increase (Nation 2009; Keuleers et al. 2015; Schoonen and Verhallen 2008). Hence, reading comprehension and vocabulary are related and dependent on each other. In the first language, the child is exposed to large amounts of information and constant opportunities for repetition. They are in a continual interaction where the words appear in different contexts. Lervåg and Aukrust (2010) point out that as this is not always possible for those learning a second language, the school becomes an important part and must take great responsibility for the student's language development. Moreover, studies show that the student must understand 75–99% of the words in a text to comprehend the content, which means that if more than 20–25% of the words in a text are unknown, the student has difficulty understanding the content (Geva and Wang 2001; Purves 1991). However, this can be a challenge for L2 students. They usually have not had the same time and possibilities to develop a vocabulary in their second language as their peers with Swedish as their first language.

Further, Lervåg and Aukrust (2010) have emphasised that in the primary grades, the development of decoding is similar among L1 and L2 readers. In contrast, early reading comprehension growth might be stymied by lower vocabulary in L2 readers in different languages (Geva and Wang 2001). To our knowledge, decoding and vocabulary have not been investigated in young L1 and L2 students in Sweden during the last 20 years. Both national and international results have, however, shown that L2 students in later grades (4–9) have weaker reading comprehension than L1 students in Sweden (e.g. Program for International Student Assessment [PISA], 2012, 2015, 2018; Progress in International Reading Literacy Study [PIRLS], 2011, 2016; Swedish National Agency for Education 2015, 2019). As decoding and linguistic comprehension are essential factors for efficient reading comprehension (Gough and Tunmer 1986; Hoover and Gough 1990), both L1 and L2 students might need special support to develop such comprehension in Swedish. Therefore, to identify their needs in developing reading comprehension, the current study aimed to investigate how L1 and L2 students perform in screening tests measuring vocabulary, decoding, and reading comprehension in primary school in Sweden.

Research questions:

- Do results on screening tests differ among students with Swedish as L1 and L2?
- How are vocabulary and decoding related to reading comprehension among students with Swedish as L1 and L2?
- According to the results on the screening tests, what proportion of students with Swedish as L1 and L2 need special support to develop good reading ability?

Method

Participants

The sample consists of 46,714 students in Sweden, of which 9 218 are in Grade 1, 18,975 in Grade 2, and 18,521 in Grade 3. The students either followed the curriculum for Swedish as a first (L1) or as a second language (L2). Among the participating students, 1 398 (15.1%) have Swedish as a second language in Grade 1, 2 798 (14.7%) in Grade 2, and 2 966 (16.0%) in Grade 3.

Procedure and materials

The data is obtained from LegiLexi's (LegiLexi, 2021) database, including students' performance in different reading tests. LegiLexi is an educational reading program, free of charge for schools, to develop all students reading in grades 1–3. Reading proficiency data at both student and class levels can be used by individual teachers to plan teaching at each grade level. Assessments within the LegiLexi tool used in this study were carried out during April–June in 2021 when the students were at the end of their first, second, or third school year. The following variables were included in this study: decoding, vocabulary, reading comprehension of a short text for Grade 1, and reading comprehension of a longer text for Grade 2 and 3. All testing was performed by class teachers or special education teachers in a group setting except for the decoding tests performed individually. The test results were recorded in the LegiLexi database.

Decoding

The decoding test (Fälth et al. 2017) evaluated the students' competence in decoding single words and was performed individually. The test consisted of 144 common words that gradually increased in length and difficulty. The students were asked to read as many words as possible for one minute, and the test leader noted the number of correctly read words. The maximum score for the test was 144. The reported test-retest correlation for children in Grade 1 and 2 at this test was $r = .88$.

Vocabulary

The test leader said a word (both nouns and verbs were used), and the students had to identify the picture that best corresponded to the word among five images (Fälth et al. 2017). Words were successively more complex, and the test measures vocabulary. There were 24 words, and thus maximum score was 24 points. The test is not time-limited. The test-retest correlation is reported for Grade 1, $r = .74$, and Grade 2, $r = .79$.

Reading comprehension – short text

The short reading comprehension test (Fälth et al. 2017) consists of 12 tasks and measures the students' ability to find information (read on the line) and draw conclusions (read between the lines). The students read short texts with gradually increasing difficulty individually, with LIX 3–18. LIX <30 is classified as very easy to read, for example, children's books. After each text, the students must choose one of five similar pictures best describes the text read. The test is limited to 5 minutes and aimed at students in Grade 1. Test-retest correlation reported $r = .75$.

Reading comprehension – long text

In the extended reading comprehension test (Fälth et al. 2017), students read four texts, with three questions attached to each text, and choose the answer that best corresponded to the content and meaning of the text. This test is aimed at students in Grade 2 and 3. The time constraint was 7 minutes, and the maximum score was 18 points. Test-retest correlation reported $r = .77$.

Statistical analyses

We analysed data with IBM SPSS Statistics, version 27. Comparisons on test results between students with and without Swedish as a second language were investigated by using ANOVA and chi2. Relationships between the variables were analysed with Pearson's r .

Results

Differences in screening results among students with Swedish as L1 and L2

According to the results, the same pattern was established for students in all three grades in primary school. Students with Swedish as L2 performed significantly weaker in tests measuring vocabulary, decoding, and reading comprehension than those with Swedish as L1 (see Table 1). Since our sample size is large, the power is high, and therefore, effect sizes could reveal more than just the significant results between the groups of students with Swedish as L1 and L2. The effect size was large for the vocabulary test ($\eta^2 = 0.18\text{--}0.19$) for students in all three grades. There was a small effect size for the decoding ($\eta^2 = 0.02\text{--}0.03$). The reading comprehension had a small effect size in grade 1 ($\eta^2 = 0.03$), whereas there was a tendency for a medium effect in grades 2 and 3 ($\eta^2 = 0.05\text{--}0.11$).

Reading comprehension and its relationship with vocabulary and decoding skills

For students with Swedish as L1 and L2, vocabulary and decoding are significantly and positively related to reading comprehension (see Table 2). Independently of grade, the decoding skills for students with and without Swedish as a second language are strongly related to reading comprehension. This means that students performing higher in the decoding test also perform higher in the reading comprehension test. A similar pattern is also found regarding vocabulary and reading comprehension, but the relationship is not as strong as for decoding and reading comprehension.

The proportion of students in need of extra support

We used percentile ranks to investigate how many students with Swedish as L1 and L2 require extra support to develop adequate reading comprehension. At first, the test scores were transformed to percentile ranks for each grade, respectively. Students with percentile ranks below 22 were considered as performing below average on the vocabulary, decoding, or reading comprehension tests. They were regarded as in need of extra support. Students' results corresponding to percentile ranks between 23 and 76 were considered to reach an average performance, whereas percentile ranks between 77 and 100 were regarded as above-average performance.

When comparing students with Swedish as L1 and L2 on the categories below average, average, and above average, a significantly higher proportion of L2 students needed extra support in developing vocabulary, decoding, and reading comprehension than L1 students. Compared with L1 students in grades 1–3, a significantly higher proportion of L2 students performed below average in decoding and vocabulary. The same pattern was also revealed for below-average performance in all three tests measuring vocabulary, decoding, and reading comprehension. A higher proportion of L2 students performed below average in all three tests than L1 students (see Table 3).

Table 1. Comparison of test scores between students with Swedish as L1 and L2 in grade 1 to 3.

| Test | Grade 1 $n = 9219$ | | | | Grade 2 $n = 18,975$ | | | | Grade 3 $n = 18,521$ | | | |
|-----------------------------------|--------------------|---------|---------|-------------|----------------------|---------|---------|-------------|----------------------|---------|---------|--|
| | L1 | | L2 | | L1 | | L2 | | L1 | | L2 | |
| | M (SD) | F | eta^2 | M (SD) | M (SD) | F | eta^2 | M (SD) | M (SD) | F | eta^2 | |
| Vocabulary | 14.0 (3.6) | 2136.7* | 0.19 | 16.2 (3.7) | 11.2 (3.5) | 4461.6* | 0.19 | 17.8 (3.2) | 12.6 (3.6) | 6358.6* | 0.26 | |
| Word decoding | 26.0 (21.3) | 208.9* | 0.02 | 56.9 (23.6) | 45.2 (24.3) | 576.6* | 0.03 | 76.3 (23.1) | 64.9 (25.5) | 586.4* | 0.03 | |
| Reading comprehension, short text | 4.1 (3.1) | 296.8* | 0.03 | 8.3 (3.1) | 5.7 (3.2) | 1714.4* | 0.08 | 10.1 (2.2) | 7.9 (3.1) | 2222.0* | 0.11 | |
| Reading comprehension, long text | - | - | - | 8.19 (4.0) | 5.6 (3.2) | 1079.8* | 0.05 | 11.5 (3.9) | 8.1 (3.7) | 1935.3* | 0.10 | |

*significant at $<.001$. Effect sizes with η^2 and 0.01 is considered as a small effect, 0.06 as a medium effect, an 0.14 as a large effect.

Table 2. Relationships between test measuring reading comprehension, vocabulary and decoding skills among students with Swedish as L1 and L2 in grade 1 to 3 calculated with Pearson's *r*.

| | Grade 1 | | Grade 2 | | Grade 3 | |
|---------------|-----------------------------------|-----------------|----------------------------------|-----------------|----------------------------------|-----------------|
| | L1 | L2 | L1 | L2 | L1 | L2 |
| | <i>n</i> = 7822 | <i>n</i> = 1398 | <i>n</i> = 16,178 | <i>n</i> = 2798 | <i>n</i> = 15,556 | <i>n</i> = 2966 |
| | Reading comprehension, short text | | Reading comprehension, long text | | Reading comprehension, long text | |
| Vocabulary | .328* | .269* | .314* | .348* | .410* | .459* |
| Word decoding | .716* | .590* | .680* | .577* | .637* | .620* |

*significant at <.001. The correlation coefficient calculated with Pearson's *r* is also represent the effect size. A value of .1 is considered as a small effect, whereas a medium effect is around .3 and a large effect is larger than .5.

Table 3. Number of students with and without Swedish as a second language scoring below, average, and above average in tests measuring vocabulary, decoding and reading comprehension in grade 1 to 3.

| Tests | Grade 1n = 9219 | | | | Grade 2n = 18,975 | | | | Grade 3n = 18,521 | | | |
|--|-----------------|------|------------------|------|-------------------|------|------------------|------|-------------------|------|------------------|------|
| | L1% | L2% | chi ² | phi | L1% | L2% | chi ² | phi | L1% | L2% | chi ² | phi |
| Vocabulary | | | | | | | | | | | | |
| Below average | 14.2 | 66.8 | 2049.6* | 0.46 | 11.7 | 67.4 | 6082.9* | 0.51 | 13.0 | 70.8 | 5867.4* | 0.51 |
| Average | 48.5 | 29.8 | | | 51.5 | 29.3 | | | 57.7 | 27.0 | | |
| Above average | 37.3 | 3.4 | | | 36.8 | 3.3 | | | 29.2 | 2.1 | | |
| Decoding | | | | | | | | | | | | |
| Below average | 19.2 | 36.8 | 259.3* | 0.16 | 20.6 | 40.9 | 693.4* | 0.18 | 20.5 | 37.8 | 504.2* | 0.16 |
| Average | 55.0 | 50.1 | | | 54.7 | 47.1 | | | 54.3 | 48.0 | | |
| Above average | 25.8 | 13.1 | | | 24.6 | 12.0 | | | 25.2 | 14.2 | | |
| Reading comprehension | | | | | | | | | | | | |
| Below average | 10.3 | 18.7 | 265.6* | 0.17 | 18.2 | 36.6 | 1005.7* | 0.22 | 13.6 | 37.5 | 1736.1* | 0.28 |
| Average | 58.0 | 69.5 | | | 51.5 | 56.4 | | | 22.3 | 34.8 | | |
| Above average | 31.6 | 11.9 | | | 30.4 | 7.1 | | | 64.1 | 27.7 | | |
| Below average in vocabulary and decoding | 5.6 | 28.8 | 773.6* | 0.29 | 3.7 | 29.2 | 2258.8* | 0.35 | 4.2 | 29.6 | 2134.0* | 0.34 |
| Below average in all three tests | 1.8 | 8.3 | 190.4* | 0.14 | 2.0 | 17.0 | 1352.5* | 0.27 | 2.5 | 20.9 | 1633.4* | 0.30 |

* $p < .001$. Percentiles are calculated and presented for each grade. Below average correspond to percentile ranks between 0 and 22, average 23 and 76, and above-average 77 and 100. Effect sizes with *phi*, and 0.1 is considered as a small effect, 0.3 as a medium effect, and 0.5 as a large effect.

Discussion

The primary goal of this study was to examine the needs among L1 and L2 students in the development of reading comprehension. The results showed that L2 students perform lower on vocabulary, decoding, and reading comprehension tests than their L1 peers in grades 1 to 3. Both L1 and L2 students' decoding is more strongly related to reading comprehension than vocabulary. A remarkably high proportion of students with L2 were identified to require special support to develop reading as their L1 peers. Among them, about two out of three L2 students in grades 1–3 need special support to build vocabulary, and about two out of five should be provided with specific instruction in decoding. In addition, about one out of five L2 in Grade 1 need special support in reading comprehension, compared to two out of five in grades 2 and 3.

Our results are in line with previous international and national reports (e.g. PISA 2012, 2015, 2018; PIRLS 2011, 2016; Swedish National Agency for Education 2015, 2019), which has demonstrated that about 40% of L2 students in Grades 4 to 9 have weak reading

comprehension. Already in the 1990s, students with an immigrant background in grade 3 in Swedish primary schools were reported to perform weaker in decoding and reading comprehension tests than their peers without immigrant background (Fredriksson and Taube 2001).

Pedagogical implications

Results from the current study show that the young L2 students' have needs for special support already grades 1–3 in primary school. Therefore, early screening and systematic reading instructions are crucial for L2 students to provide them with similar possibilities to develop reading comprehension as their L1 peers (cf. Cho, Kim, and Jeong 2021). As a large proportion of the L2 students have weak decoding and vocabulary, they will have challenges to develop good reading comprehension in line with the theoretical model of Simple View of Reading (Gough and Tunmer 1986). Hence, the young L2 students should be provided special efforts to develop both decoding and vocabulary (Cho, Kim, and Jeong 2021). Also, instructions on syntactic knowledge, which is an essential component of linguistic comprehension, will support the L2 students in developing reading comprehension (Van Gelderen et al. 2003). Several studies have demonstrated that decoding is related to reading comprehension among L1 and L2 students (Lesaux, Rupp, and Siegel 2007; Tannenbaum, Torgesen, and Wagner 2006).

The ability to read with a good understanding is fundamental to many subjects in primary school and is an essential part of a student's knowledge acquisition (Duke and Pearson 2009) and academic achievement (Herbers et al. 2012; Reed, Petscher, and Truckenmiller 2017). For students who cannot read with an adequate understanding, the education must be differentiated. Here, all teachers are important for L2 students' language development. Teachers must work together so that the responsibility does not solely lie on the special needs teacher in specific lessons (Batt 2008). According to Pasquarella, Gottardo, and Grant (2012), teachers should not have a generalising approach in educating L2 students who are in the early stage of acquiring a new language. Generalisation in teaching should only be made among L2 students with a similar level of L2 proficiency and background characteristics.

Consequently, pedagogical adjustments are necessary to meet individual needs and strengths in reading among L2 students. Adjustments in teaching languages and other school subjects are fundamental as well as to pedagogically involve L2 students in their education. For example, the teachers might need to provide L2 students with additional instructions on words, concepts, or adapted texts. By adjusting the education, the student's participation and learning are possible (Ganuza and Hedman 2015). In the long run, pedagogical adjustments in the classroom and special support are necessary for the students to learn and master the new language to complete their education (Mokhtari et al. 2021) and to have a prerequisite to participate in society (cf. UNESCO 2018).

As a result of the increasing proportion of multilingual students, the schools need to build up and strengthen their preparedness in various ways to meet the students and provide education and opportunity for all to reach the knowledge requirements (Batt

2008). Research has shown that support in the L1, for L2 students, is an essential factor for students' school success and positively impacts the development of the second language (Ganuza and Hedman 2015; Nilsson and Axelsson 2013; Thomas and Collier 2002). Therefore, home language teachers are important when teaching multilingual L2 students as they both contribute knowledge about the students' needs and can support the students in their home languages. Also, L2 students that are able to acquire knowledge and read in their home language, will be given possibilities for educational development by transfer effects from their first to their second language (Cummins 1979; Singhal 1998). In this way, L2 students do not have to wait to gain sufficient knowledge of Swedish to be able to participate in education. Also, research shows that multilingual students will reach higher educational attainment if teachers create a supportive environment where students' home language is respected and actively used in teaching (Cummins 1979; Thomas and Collier 2002).

Limitations

The current study is based on cross-sectional data of a large group of primary school students in Sweden. Hence, the results cannot demonstrate the students' reading development over time. Although several L2 students in grades 2–3 need special support in reading, it cannot be assumed that their needs will increase in the higher grades. To be able to draw such conclusions, a longitudinal study is needed. Also, our results regarding the diverse needs among students in grades 1–3 cannot be linked to the ongoing Corona pandemic. A recent report showed no differences among Swedish students in grades 1–3 when comparing decoding and reading comprehension before and during the pandemic (Hallin et al. 2021; Purves 1991).

Swedish statistics from 2018 show that among all children under the age of eighteen, 9% were born abroad, and 15% were born in Sweden and have an immigrant background (Statistic Sweden 2020). Therefore, the categorisation of students as L1 and L2 in the present study does not automatically reflect the number of students with Swedish as a second language and should not be generalised to all students' with an immigrant background in Sweden. Our categorisation is based on students level of Swedish according to the curriculum due to the teachers' consideration of the individual student's ability to follow the curriculum of Swedish as a first language. The number of students following the curriculum Swedish as a second language in the current study is 14.7% – 16.0% which is a lower proportion than the national statistics on proportion of students with immigrant backgrounds (24%).

Conclusions

A large proportion of students with Swedish as a second language struggle with decoding, vocabulary, and reading comprehension in early grades. Without screening and special support, these students are at risk of not acquiring sufficient reading, which might affect their educational attainment and participation in school and society.

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Author contributions

Linda Fälvh: Conceptualization, Methodology, Writing- Original draft preparation.

Heidi Selenius: Conceptualization, Statistical analyses and interpretation of results, Writing, Reviewing and Editing.

Helen Egerhag: Writing, Reviewing and Editing

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