INVESTIGATING VOCABULARY DEVELOPMENT IN GREEK EFL YOUNG LEARNERS

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Abstract
The aim of this paper is to report measures of receptive vocabulary size among Greek primary learners. Three measuring receptive vocabulary tools are used: (1) Greek X-Lex (Milton & Alexiou, 2010), a measure of orthographic vocabulary size in Greek, (2) English X-Lex, a measure of orthographic vocabulary size in English (Meara & Milton, 2003) and (3) Pic-lex (Alexiou, 2020), a picture-based test of vocabulary size. The scores from these tests are examined in relation to variables such as gender, age, and the number of mother tongues of the participants. The already standardized versions of X-Lex are compared to the newly introduced vocabulary assessment tool, Pic-lex, in order to examine its validity for further studies. 165 primary learners aged 6-9-year-olds participated in the study. Results indicate that Pic-lex scores correlate with the standardized tests, and this provides evidence of validity for the newly developed test. Gender does not appear to impact the scores testees obtain. However, testees’ age and the number of mother tongues do seem to play a role in vocabulary acquisition.

1. Introduction

The importance of vocabulary knowledge in language learning has become a subject of increasing interest to researchers (Alexiou et al., 2019). For some decades, vocabulary was not a subject of research interest and was thought to be of little concern in relation to learning. Milton (2009) gives three possible explanations for this. First, the dominance of structural and other approaches to language acquisition after the Second World War diverted attention from the vocabulary. Second, there was an entirely false assumption that vocabulary is of little importance because language can be used communicatively with only a small number of vocabulary items. Third, there was a belief that words can be learned implicitly, so teachers are advised to minimize explicit vocabulary teaching, and that this will benefit language
learning. More recently, however, vocabulary opinions have changed, and a large vocabulary is considered essential to vocabulary use and a crucial element of language learning. It becomes important, then, to understand the progress of vocabulary acquisition in young learners, and this is examined in this study.

Young learners differ widely from older learners since they lack meta-linguistic awareness as well as cognitive skills, which are characteristic of older learners (Alexiou, 2005). Moreover, Tseng and Schmitt (2008) have emphasized the effect of socio-cultural, linguistic, and cognitive factors on language learning. The cognitive development and learners’ age appear to affect their performance (Alexiou, 2009; Tseng & Schmitt, 2008). The present paper examines the effect of age, L1, and gender on young learners’ vocabulary size.

2. Vocabulary development in EFL young learners

When it comes to young learners, there is no clear model of instructing and developing vocabulary. The type of vocabulary to be learned and the teaching methods are usually selected by the educator or the school institution, and this can make the whole process of vocabulary development appear idiosyncratic. However, there are certain criteria which will need to be involved in selection. For instance, vocabulary might be chosen according to the learners’ needs (Alexiou & Konstantakis, 2009), frequency (Nation, 2001), or even thematically (Milton & Hopwood, in press). Additionally, the curriculum or materials designer will need to balance both the quantity and the quality of vocabulary selected for teaching (Cameron, 2001). Young learners usually first acquire concrete content words (Alexiou & Konstantakis, 2009; Cameron, 2001), while the appropriate strategies should be adjusted to their needs.

Little research has been conducted regarding the relationship between L1 vocabulary acquisition and EFL vocabulary development in the Greek context. Alexiou and Konstantakis (2009) examined five beginner-level course books for young learners and concluded that although these books included many high-frequency words from the 2,000 BNC word list, they varied greatly in which words were chosen. Infrequent words of English were probably under-represented. The
50/50 balance of frequent and infrequent vocabulary, which Milton (2009) notes in effective teaching materials was absent. The frequency bias appeared to inhibit the development of the large lexicon needed for communication. Alexiou and Konstantakis (2009) as well as Milton and Vassiliu (2000) point to the benefits of teaching a range of themes and topics to provide interest and motivation for learners. Konstantakis and Alexiou (2012) have examined course books used for EFL Greek young learners and associate them with levels of knowledge. The results suggest that course books do not provide enough vocabulary to achieve the target of the A1 or A2 level of proficiency which might be due to lack of time and overestimated goals.

A fully function lexicon is complex, and it appears that learners may set about the task of acquiring the different dimensions of words in different ways. Milton and Hopwood (in press) advocate that in order to grow vocabulary size, words should be taught explicitly. Research evidence is quite clear that the learners need to note the form of a new word and associate it to the meaning for learning to occur (Laufer & Hulstijn, 2001). For these words to be used fluently, however, then extensive language exposure and use seems to be effective where the development of automaticity appears to be implicitly acquired (Zhang & Milton, in press). This fits with the observations of Webb (2008) and Milton (2009) that receptive knowledge comes earlier than productive as it seems to be easier for EFL learners to read or listen than to speak or write (Alexiou et al., 2019).

This leads to the need to choose appropriate activities for learning. McKay (2006) suggests that activities should be appropriate for learners’ age as they have not developed meta-linguistically (cited in Mu-hsuan, 2014). Therefore, for young learners, the syllabus needs to include games, stories, songs, fun activities, cartoons which increase learners’ participation and vocabulary size since those activities derive from children’s fantasy world (Alexiou, 2005; McKay, 2006 cited in Mu-hsuan, 2014). Children are curious by nature, do not hesitate when they make mistakes, and they take risks, qualities that can promote successful language learning. Motivation is essential in learning, and thus a teacher should always try to catch learners’ attention, which is more challenging with young learners due to short attention
spans. In order to boost motivation, vocabulary items should be chosen based on learners’ needs, interests, and their everyday experiences.

3. Measuring vocabulary

Historically, measurements of vocabulary size have varied enormously with this variation driven by the researcher’s choices about what to count as a word, what to count as knowing a word, and how to test for this knowledge (Milton & Treffers-Daller, 2013). More recently, the testing methodology has become more standardized to produce estimates which are understandable and which help explain how words are learned. Thus, according to Nation and Waring (1997), educated native speakers know approximately 20,000 word families and learn through childhood and adolescence, about 1000 words a year. Milton and Treffers-Daller (2013) use a rather more demanding test of knowledge and suggest growth of 600-700 words per year in the early stages of learning, but still of the order of 2 to 3 words per day. This, in turn, suggests that children aged five before entering school will have a lexicon of about 4,000 to 5,000 word families, while college learners approximately 20,000 (Schmitt, 2000). However, the number of words acquired by younger native speakers is varied, and learners are not all identical in how much they seem to know (Alexiou & Milton, 2020; Milton & Treffers-Daller, 2013). These numbers make much more sense than some previous estimates where, for example, Diller (1978 cited in Milton & Treffers-Daller, 2013) referred to 20,000 words being learned annually by children in secondary education, while Miller and Gildea (1987 cited in Milton & Treffers-Daller, 2013) proposed 5,000 words per year are acquired by school learners. 3,000 words per year is another figure frequently attributed to young native speakers. The acquisition of a second language vocabulary appears to be largely untested in young learners, although lexical gains are likely to vary considerably according to the quantity and nature of the L2 input and the learner’s individual learning pace, learning style, or goals. It seems likely, however, that learning will frequently vary from that of native speakers.

Vocabulary acquisition in a second language is likely to vary, as Schmitt (2000) points out because the vocabulary size can be determined by the learners’ aims.
Nonetheless, teaching the most frequent 2,000 words is considered a priority because of the importance of these words to communication. These are not the only words that are needed, and substantial knowledge of less frequent words is also needed. Adolphs and Schmitt (2003) argue that learners of English need 2,000 to 3,000 of the most frequent words to discuss everyday matters. Laufer and Ravenhorst-Kalovski (2010) suggest 5,000 words are needed for relatively easy communication and 8,000 to 9,000 for the levels of fluency associated with study through English. For example, regarding the Dutch language, in order to reach academic fluency, the target of vocabulary taught reaches the 10,000 word families (Hazenberg & Hulstijn, 1996). It can be deduced then that acquiring vocabulary in a foreign language is definitely a demanding task.

Vocabulary size has been connected both to language skills and the level of language attainment. Milton (2009) also suggests that a larger vocabulary may be needed in written skills than in oral skills, where the most frequent words in a language tend to be used most frequently than in writing. There are normalized scores on vocabulary size tests available at almost all levels of the Common European Framework of Reference (CEFR, 2018/2020) from basic, A1, through to expert, C2 levels (Milton & Alexiou, 2009). There is now a new set of CEFR descriptors which include a pre-A1 level; however, the levels are not matched to vocabulary sizes although that would be useful, informative and practical (Alexiou & Stathopoulou, 2021). While vocabulary size proves to be a good predictor of language level, it is to be remembered that vocabulary size alone does not determine the success in each level of the exams. It is one factor, albeit an important one, in the range of knowledge and skill that leads to exam success.

Vocabulary tests can be categorized as either receptive or productive. Receptive vocabulary tests are generally more widely used, and Roghani and Milton (2017) suggest this is because it is methodologically more difficult to create a productive test that is both valid and reliable. They point out that the test-designer can control the choice of tests items in a receptive test, so a principled sample can allow estimates of vocabulary size, for example, to be drawn (for example, Meara & Buxton, 1987; Meara & Jones, 1990; Meara & Milton, 2003; Nation, 1990). In productive tests, however, the learners provide their own vocabulary, and an
uncontrolled sample of this kind cannot be used to estimate vocabulary size nearly so convincingly. The nature of the learners’ vocabulary has to be inferred from things like lexical profiles (as in Laufer & Nation, 1995).

3.1 The Vocabulary Levels Test (Nation, 1990)

The Vocabulary Levels Test (VLT) has been widely characterized as a standard tool (Eyckmans, 2004; Milton, 2009; Schmitt et al., 2001). It measures receptive vocabulary by matching a principled sample of words with their definitions in a complex, multiple-choice format. VLT examines words from four frequency bands at the 2,000, 3,000, 5,000, and 10,000 word levels (Eyckmans, 2004; Schmitt et al., 2001). The outcome is a score that acts as a good proxy for vocabulary size, although it is possible to convert this score into an estimate of vocabulary size. It became a standard tool because, at the time of its creation, it was a better designed and more reliable test of vocabulary size than others that were available for EFL learners. It is noted, however, that the test is susceptible to guesswork and is likely to overestimate (Kamimoto, 2008).

3.2 The Peabody Picture Vocabulary Test

The PPVT was first introduced by Dunn and Dunn (1965), but it has been revised (cited in Herndon, 2006). The test examines the receptive vocabulary of children, but it can also be used with adults. The testees are required to choose the correct picture among four black and white ones that describes the word they hear from the examiner (Herndon, 2006). The duration of the revised test is approximately 10 minutes, whereas previous editions lasted 25-30 minutes, which were long enough to bore learners (Dunn & Dunn, 1981). The third edition, PPVT-III, has been modernized by introducing more questions and new pictures (Reynolds & Fletcher-Janzen, 2002). Still, one of the disadvantages of the test is that the words chosen do not come from any known wordlist and, thus, it might not be valid (Dunn & Dunn, 1981). Additionally, the scores produced are not tied back to the learners’ vocabulary size (Alexiou & Milton, 2020). These reasons are important enough to emphasize the need for a new test for young learners so as to make reliable assumptions for their receptive vocabulary size.
3.3 X-Lex (Meara & Milton, 2003)

The X-Lex is a test for measuring receptive vocabulary and is used in this study both in English (Merara & Milton, 2003) and Greek versions (Milton and Alexiou, 2010). The testees are presented with a number of words, one at a time, some of which are real words, and some created to look like real words. The test includes 120 words, 20 of which come from each of the first five 1,000-word frequency bands, while the remaining 20 words are pseudo-words (Milton, 2009, pp. 73–74). The procedure is not demanding since the participants are required only to check which words they know. The results come from totalling Yes responses to real words and multiplying this by 50 to give an unadjusted vocabulary size estimate out of 5000. The Yes responses to pseudo-words are then totalled and multiplied by 250. This number is deducted from the unadjusted score to give an adjusted estimate of the size.

X-Lex is not time-consuming or demotivating and works well even with young learners. The pseudo-word element of the test allows adjustments to be made for guesswork and over-estimation. The decontextualised words mean the test is unaffected by the linguistic or cultural background of the test takers, and it has been widely used both as a placement indicator and as a measure of vocabulary size in research. The scores provide an estimate of vocabulary size out of the most frequent 5000 words, and Meara and Milton (2003) describe it as a levels test because the scores associate reliably with hierarchies of ability such as the CEFR.

To be more specific, Milton and Alexiou (2010) have designed a table for this association:

<table>
<thead>
<tr>
<th>CEFR level</th>
<th>X-Lex (5000 max)</th>
<th>English</th>
<th>French</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>&lt;1500</td>
<td></td>
<td>1160</td>
</tr>
<tr>
<td>A2</td>
<td>1500-2500</td>
<td></td>
<td>1650</td>
</tr>
<tr>
<td>B1</td>
<td>2750-3250</td>
<td></td>
<td>2422</td>
</tr>
<tr>
<td>B2</td>
<td>3250-3750</td>
<td></td>
<td>2630</td>
</tr>
<tr>
<td>C1</td>
<td>3750-4500</td>
<td></td>
<td>3212</td>
</tr>
<tr>
<td>C2</td>
<td>4500-5000</td>
<td></td>
<td>3525</td>
</tr>
</tbody>
</table>

Table 1: Vocabulary size and the CEFR (Milton & Alexiou, 2009)
The test has its limitations, of course, and Roghani and Milton (2017) argued that the form of the test is one of its drawbacks, as it does not cater for learners’ uncertainty, nor does it have the capacity to recognize partial knowledge. Learner responses can be open to confusion where learners misidentify a word from its spelling and misrepresent their knowledge. However, recognising a decontextualized word is a crucial skill for reading (Cameron, 2002), and this means the test will tap into an essential element of word knowledge. Nonetheless, Yes/No tests are considered both valid in correlating with other tests of vocabulary size (Anderson & Freebody, 1981) and highly reliable (David, 2008).

3.4 Greek X-Lex (Milton & Alexiou, 2010)

The English version of X-Lex has been the model for equivalent tests in a variety of other languages, including a Greek version (Milton & Alexiou, 2010). The Greek X-Lex is included in this study, and its scores are compared to both the English X-Lex and Pic-lex. The format and procedure are the same as Meara and Milton’s (2003) test, and the words derive from lemmatized frequency lists derived from the Hellenic National Corpus (Institute for Language and Speech Processing, 2019–2021) with 9 million words. These words are drawn from the cultural, sociological, and sports sections of the Greek newspaper Nea (Milton & Alexiou, 2010, p.311). Overall, Greek X-Lex has been found to connect vocabulary size with the CEFR levels, as the English test does, and as a result, it can be characterized as a valid tool for measuring vocabulary. However, X-Lex does not cater for the less frequent words, since younger learners get into daily contact with words that are not that frequent, and thus the test is unable to represent this aspect of learners’ knowledge.

3.5 Pic-lex (Alexiou, 2020)

Pic-lex is a test tool for measuring receptive vocabulary; it is intended for very young learners and assesses vocabulary size from picture cues. Learners are required to listen to a word individually and choose the picture described out of four. There are 100 items in the test, and these are taken on a principled basis from a recent frequency-based word list, including the 5,000 most frequent words (Alexiou &
Milton, 2020). However, in its updated version, Pic-lex also includes a test based on the 10,000 most frequent words (Alexiou, 2021) and can easily be converted into size estimation – allowing direct comparison with X-Lex. Both versions of the test are not demanding since learners can easily complete them without any time restrictions. The results are easily produced since the test is computer-delivered, and they are summed up automatically after the completion of the test. In principle, then, this test assesses knowledge of a sample of words equivalent to that in Meara and Milton’s X-Lex (2003), but the test construct is obviously rather different. Pic-lex is expected to estimate vocabulary size and tie it back to CEFR levels just like X-Lex does, even if the scores that emerge are different. However, it is designed to allow the scores obtained to be compared with X-Lex.

The particular test has been piloted and received positive reliability and validity scores (see Alexiou, 2021). It has many advantages, one of which is that it is child friendly as it lasts approximately 5 to 10 minutes. Learners are not overloaded with perplexing requirements, while the words are relevant to topics that children are familiar (e.g., dog, sea, and car). Words are not abstract, while they are also appropriate for learners with learning difficulties. Last but not least, these vocabulary items tackle learners’ cognitive knowledge in an interesting way due to the colorful pictures and its online version.

4. Research methodology

4.1 Aims and research questions

The aim of the particular study is to measure and further evaluate the receptive vocabulary size of Greek EFL learners in a primary school in Thessaloniki, Greece. By using three measuring tools (Greek X-Lex, English X-Lex, and Pic-lex) it is expected that the educators will gain insight into the lexical size and development of Greek primary learners of the 1st, 2nd, 3rd and 4th grades. The difference in the vocabulary size between Greek and English is measured along with the correlation between the new measuring tool Pic-lex (we are using here the version of 5000 words for direct comparisons) to the results of the already valuable X-Lex test (Meara & Milton, 2003), in order to establish the validity of Pic-lex.
From the present study, the research questions that come up can illuminate future studies by providing a new vocabulary measuring tool and suggesting further vocabulary learning implications. Consequently, the particular study will focus on the following research questions:

1. Are there any age differences in the vocabulary scores in the tests?
2. Are there gender differences between the scores in the tests?
3. What is the overlap between X-Lex and Pic-lex?
4. Does the number of mother tongues affect the scores in the tests?

4.2 Study participants
165 learners participated from the 1st, 2nd, 3rd and 4th grades, and the study took place in a state Greek primary school. It is a convenience sample (Robson, 2007) but thought likely to represent typical knowledge at this age (see Table 2). The age varies from 6 years old in the first grade to 9 years old approximately. There were 81 boys and 84 girls in the study. Learners take English classes for three hours per week using mostly the course book provided by the Ministry of Education and other materials like flashcards, videos, and songs to intrigue learners.

Table 2: Participants’ distribution per grade and gender

<table>
<thead>
<tr>
<th>Grade</th>
<th>total</th>
<th>boys</th>
<th>girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>34</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>2nd</td>
<td>44</td>
<td>24</td>
<td>20</td>
</tr>
<tr>
<td>3rd</td>
<td>45</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>4th</td>
<td>42</td>
<td>20</td>
<td>22</td>
</tr>
</tbody>
</table>

4.3 The procedure
Learners were asked to individually complete the X-Lex tests in pen-and-paper format. The learners ticked the words that they knew. For the older classes, the educator would read the words out loud both for the Greek and English X-Lex, whereas for the first and second graders, most of which were unable to read, the educators would take each student individually and read for them the words so that
they could respond with a Yes or a No. Consequently, the circumstances under which the test was conducted were not demanding and stressful for the learners. For the Pic-lex, learners moved to the Computer room, and after instruction, they matched what they heard with the appropriate image. They were also given headsets so that the quality of sound would not be altered. Children did not have any time limit and they could click on the image to make it bigger and thus make sure that they had made the right choice. The educator would also circle around them to cater for any problems that might come up.

Finally, for the data analysis, we used the program IBM Statistical Package for the Social Sciences (SPSS) (Version 25, 2020). Both descriptive and inferential statistics were employed to check whether there are any statistically significant results for the learners’ vocabulary size, while correlations were also calculated to associate the results of the standardized English X-Lex with the Pic-lex and establish the validity of the latter. The results of the study were related to the research questions in order to reach answers and conclusions.

5. Results and discussion

In this section, we present the results of the study in relation to the research questions and then discuss whether these findings confirm or reject previous literature claims. It should be clarified that although 165 participants took part in the study, 15 of them did not answer the Pic-Lex test because they were absent the day the data were collected. As a result they were excluded from the results because they had only answered the Greek and English X-Lex tests.

5.1 Research Question 1: Are there any age differences in the vocabulary scores in the tests?

As far as the age factor is concerned, an early start in language acquisition has been previously underlined (Lightbown & Spada, 2013; Meara, 1995). Wise et al. (2007) have suggested that there is a certain period in children during which they can acquire vocabulary rapidly. For Bornstein and Haynes (2008) this period is determinant for vocabulary acquisition and refers to ages between three and four years old for approximately four to six months. Nation and Waring (1997) have
suggested that children might learn 1000 words per year up to the point of maturity at, it is implied, about 20 years of age. It should also be expected that as children grow older, their vocabulary size will expand.

*Table 3: The age factor in Greek X-Lex, English X-Lex and Pic-lex*

<table>
<thead>
<tr>
<th>Test-age</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greek X-Lex</td>
<td>&gt;= 8</td>
<td>87</td>
<td>3195.98</td>
<td>1083.148</td>
</tr>
<tr>
<td></td>
<td>&lt; 8</td>
<td>63</td>
<td>2637.30</td>
<td>854.871</td>
</tr>
<tr>
<td>English X-Lex</td>
<td>&gt;= 8</td>
<td>87</td>
<td>1496.55</td>
<td>643.112</td>
</tr>
<tr>
<td></td>
<td>&lt; 8</td>
<td>63</td>
<td>589.68</td>
<td>510.152</td>
</tr>
<tr>
<td>Pic-lex</td>
<td>&gt;= 8</td>
<td>21</td>
<td>85.95</td>
<td>14.685</td>
</tr>
<tr>
<td></td>
<td>&lt; 8</td>
<td>34</td>
<td>67.74</td>
<td>16.144</td>
</tr>
</tbody>
</table>

The results presented in Table 3 show that the scores of the learners older than 8 years old are higher than those of the learners younger than 8, in all three tests and that the older learners’ outperformance was statistically significant in all cases, as shown by the T-test analyses. These results can be explained by the fact that the learners’ lexicon increases as they grow older and learn more vocabulary daily, both in Greek and English, which was expected.

Bearing in mind the X-Lex test has a ceiling of 5000 words, and that these scores are unlikely to represent the learners’ entire vocabulary knowledge, these results are broadly in line with the observations of Nation and Waring (1997) as well as Milton and Treffers-Daller (2013) that native speakers acquire something like 2 words a day, and something up to 1000 words per year.

In the English X-Lex, learners older than 8 years old reached almost double the score of the younger learners, a fact which can be explained since previous studies
have shown that older learners and especially adults outperform younger learners due to their better developed cognitive skills, and the more time and opportunity they have had for learning (Cenoz, 2003; García Lecumberri & Gallardo, 2003).

The Greek X-Lex scores are approximately twice the size of the English scores in the same test and this is explained because English is a foreign language, whereas Greek is their mother tongue. In this light, the scale of L2 learning is very impressive. To put this achievement in some kind of context, this is the level of vocabulary knowledge that foreign language learners in the UK would achieve only by the age of 17 or 18 and only if they specialized in learning a foreign language (David, 2008; Milton, 2009). The test results in Greek X-Lex in English X-Lex and Pic-lex are largely varied due to age. As statistically verified, it appears that as learners grow older, their vocabulary size dramatically increases.

5.2 Research Question 2: Are there gender differences between the scores in the tests?

Kimura (2006) has suggested that gender influences various abilities developed by learners, such as motor abilities, calculations, and verbal activities (cited in Piasecka, 2010, pp. 146–149). Females tend to begin speaking earlier than males with better articulation and more correct grammar. This implies that among the young learners in this study, that girls will tend to have richer vocabularies and will be more efficient with verbal activities, like spelling reading and tests (Kimura, 2006 cited in Piasecka, 2010). This idea is repeated by Gu (2002), who has also suggested that females can use strategies and techniques for vocabulary acquisition that differ from those used by males (Ahour & Abdi, 2015). However, there are studies that have concluded that both genders learn at the same pace as regards vocabulary acquisition (Riazi & Khodadadi, 2007; Soodmand Afshar, 2010).

The results in this study regarding gender differences are illustrated in Table 4 below.
Table 4: The gender factor in Greek X-Lex, English X-Lex and Pic-lex

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greek X-Lex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>76</td>
<td>3115.79</td>
<td>925.787</td>
<td>t=1.880, df=148, p=0.062</td>
</tr>
<tr>
<td>M</td>
<td>74</td>
<td>2802.70</td>
<td>1108.216</td>
<td></td>
</tr>
<tr>
<td>English X-Lex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>76</td>
<td>1089.47</td>
<td>744.953</td>
<td>t=-0.438, df=148, p=0.662</td>
</tr>
<tr>
<td>M</td>
<td>74</td>
<td>1142.57</td>
<td>740.496</td>
<td></td>
</tr>
<tr>
<td>Pic-lex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>25</td>
<td>76.12</td>
<td>14.842</td>
<td>t=0.538, df=53, p=0.593</td>
</tr>
<tr>
<td>M</td>
<td>30</td>
<td>73.50</td>
<td>20.207</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 shows that even though females did a little better than males in the Greek X-Lex and Pic-lex, and that the boys had higher scores in the English X-Lex, these differences are not statistically significant in all three tests. It can thus be concluded that gender is not necessarily a determinant factor for vocabulary size in Greek learners in this study which is in line with previous findings (for a review see Alexiou, 2016).

5.3 Research Question 3: What is the overlap between X-Lex and Pic-lex?

In order to examine the possible correlations between the three tests used in this study, a Pearson Correlation was employed. One of the main aims of the present study is to check the validity of the new measuring vocabulary tool for young learners, Pic-lex (Alexiou, 2020), by comparing it to the already standardized measuring tool X-Lex (Meara & Milton, 2003). A good, positive correlation will support the contention that Pic-lex is working well as a test of vocabulary size.
Table 5: Correlations between Greek X-Lex, English X-Lex and Pic-lex

<table>
<thead>
<tr>
<th></th>
<th>Greek X-Lex</th>
<th>English X-Lex</th>
<th>Pic-lex</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pearson Correlation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>150</td>
<td>150</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>.343**</td>
<td>.000</td>
<td>.396*</td>
</tr>
<tr>
<td></td>
<td>.000</td>
<td>150</td>
<td>.011</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>.662**</td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

The results confirm the idea that Pic-lex works, as it was designed to do, as a test of vocabulary size. All three tests in this study correlate with one another. As Table 5 shows, there is a low correlation between Greek X-Lex and the other two tests; however, there is a high correlation between the Pic-lex and the English X-Lex (p =0.662**). This finding is the most important one since it helps to demonstrate the validity of Pic-lex by performing comparably to the already standardized X-Lex. In other words, both tests can be employed for measuring receptive vocabulary in young learners and provide meaningful results. Since X-Lex can be employed to indicate learners’ level of proficiency in English (Milton & Alexiou, 2010), Pic-lex can also point to the level of proficiency. While Pic-lex scores have not yet been linked to hierarchies of level such as the CEFR, this is something that future research might usefully create, thus producing a table analogous to that in Milton and Alexiou (2010) with the scores of Pic-lex.

5.4 Research Question 4: Does the number of mother tongues affect the scores in the tests?

Previous research has shown that bilinguals do not have exactly the same knowledge or performance in either language as monolinguals since their linguistic knowledge is
divided into two languages (Thordardottir, 2011). While both monolingual and bilingual children follow the same stages of vocabulary acquisition (Patterson, 1998; Pearson & Fernández, 1994 cited in Thordardottir, 2011), it can be concluded that the size of vocabulary in pre-school bilinguals is generally smaller than that of the monolinguals (ibid). However, when measuring children’s total vocabulary, the size of bilinguals tends to be larger than that of monolinguals (Pearson et al., 1993 cited in Thordardottir, 2011). The results of the tests, where scores are divided by the number of mother-tongue languages, are shown in Table 6.

Table 6: The number of Mother-Tongue factor in Greek X-Lex, English X-Lex and Pic-lex

<table>
<thead>
<tr>
<th>Test-languages</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greek X-Lex</td>
<td>1</td>
<td>135</td>
<td>3035.19</td>
<td>987.895</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>15</td>
<td>2296.67</td>
<td>1179.356</td>
</tr>
<tr>
<td>English X-Lex</td>
<td>1</td>
<td>135</td>
<td>1118.15</td>
<td>738.989</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>15</td>
<td>1093.33</td>
<td>782.365</td>
</tr>
<tr>
<td>Pic-lex</td>
<td>1</td>
<td>51</td>
<td>74.86</td>
<td>17.217</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>72.50</td>
<td>28.160</td>
</tr>
</tbody>
</table>

As shown in Table 6, the results from Greek X-Lex reveal that in Greek, a mother-tongue for all learners in the study, monolingual learners have a vocabulary size advantage over the learners with more than one mother tongue and that this difference is statistically significant. On the other hand, as also shown in the same Table, the results of the English X-Lex and the Pic-lex reveal that this difference disappears in the foreign language. However, although no statistically significant difference emerged between the groups in the latter two tests, further studies are needed to investigate this issue.
6. Conclusion

In conclusion, this study explores the vocabulary development of young school learners in their mother tongue, Greek and in EFL in Greece. For the purpose of measuring primary learners’ vocabulary, three measuring tools were employed, X-Lex in L1 and EFL and Pic-lex in EFL. The results of the research suggest that gender does not seem to significantly affect vocabulary size as opposed to age. The learners develop larger lexicons as they grow older. Bilingualism was found to affect learners’ vocabulary size in their mother tongue, but, in this study, this effect does not appear to be a factor that influences vocabulary learning in the foreign language. One of the most important findings for vocabulary research is the fact that this study offers evidence of the validity and usefulness of the newly designed measuring tool, namely Pic-lex.

The current study is the first one to scrutinize the validity of Pic-lex and it is limited to one school. Our results may be confirmed by future studies employing the current investigation with larger samples preferably in other learning environments and with learners from other language backgrounds using Pic-lex to measure young learners’ receptive vocabulary.

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References


