

Screening Reading Abilities: A Comparison Between Engineering, Education, Health and Psychology in Portuguese College Students*

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A recent study indicated alarmingly low results in reading competencies of Portuguese engineering students. This paper intends to evaluate if this tendency is restricted to engineering studies or if it is also present in other scientific domains. To this end, two studies were conducted using a reading screening test. In the first study, 168 students from Engineering, Health, Psychology and Education participated in an unconstrained time administration of the test. In the second study, the same test was administered in a time constrained mode to 153 students from the same scientific areas.

It is concluded that the low results obtained for engineering students are also detected in other scientific domains. A comparison between Engineering and other domains students show slight differences, although not reaching statistical significance. These results emphasize the importance for screening tests able to quickly and economically assess college student's reading ability. This study proposes a low cost, low time consuming tool for evaluation of reading competences, along with normative results for Portuguese speaking college population.

Keywords: engineering education; college education; reading abilities; non-technical skills; dyslexia

1. Introduction

Traditionally, literacy related studies have highlighted differences between adults with different levels of education, as more educated adults exhibit higher literacy levels than less educated adults. College students or college graduates are therefore expected to be an “island” between the adult population, as they score higher on literacy measures. At the beginning of the 21st century a large scale study conducted in the USA reported dissonant results regarding college students reading skills, as this population performed poorly in literacy measures. The National Assessment of Adult Literacy [NAAL] [1] revealed that within one decade (1992 to 2003) there was a significant decline on the percentage of proficient literacy among adults with college studies.

In agreement with these results many Engineering freshmen students find English to be their most difficult course. This may in part be due to poor high school preparation, and in other, to negative attitudes toward the English course, for being remote and separate from their fields of study [2]. Nonetheless, good reading, writing and spelling abilities are crucial for students not only along the university but also later on as professionals [3–5].

A recent study conducted by [6] also revealed unenthusiastic results regarding Portuguese engi-

neering college students reading abilities. In that study Sucena et al. compared college students and 4th graders reading abilities, concluding that ca. 20% of the college students results overlapped with 4th graders results. Although the interpretation of these results must take into consideration that some of these college poor readers may be dyslexic, it is not reasonable to expect that all of those 20% poor readers are dyslexic. In fact, since in the general population developmental dyslexia is estimated to affect between 3% and 15% of the population, depending on the assessment method [7–10], it is expectable that this percentage is lower among the college students population.

Developmental dyslexia is a reading disorder with neurobiological origin. It is characterized by difficulties in learning to read despite normal intelligence and the absence of general learning disorder or sensory deficits that could explain the reading difficulties. It is the most common developmental disability, affecting over 80% of those identified as learning disabled [11, 12]. There are different individual trajectories in what regards reading acquisition. Whereas some individuals are severely affected by the reading difficulties and continue struggling in spite of remediation intervention [13], other dyslexics reveal significant increments in the rate of reading growth, as the outcome of early remediation intervention [14]. Within this last group, there is a subgroup that eventually becomes capable of sophisticated reading, thus being able to success-

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fully attend and conclude college level studies [15, 16]. Research also documents that these same well succeeded college students still present some dyslexia symptoms, such as slower nonword reading [15]. It is important to notice that a significant part of dyslexic students, due to the severity of the symptoms and/or the lack of remediation, could not reach college. Consequently, it is reasonable to expect that dyslexic students constitute a smaller percentage than the original 3 to 15%.

Although alarming, the results of the college students reading competence in [6] might be specific to engineering students as no other college students were assessed. In fact, if on one hand poor reading competence does not match with successful college students—the mechanical engineering students assessed were studying on a top college University in Portugal, enrolled in a master degree with high mark admission—on the other hand some could argue that these students may be somehow “protected” from reading related activities as both in high school and college the major scientific focus are mathematics and physics.

Also to be taken into consideration is the gender imbalance between the students assessed in [6]. In fact, as is usual in engineering courses, the number of males was higher, specifically more than four times higher (15 females, 69 males). It is important to bear in mind that research has long established that reading disabilities are significantly more prevalent across males [17] with the disproportion being greater when more severe dyslexia forms are assessed [18]. Therefore, assessing a group of college students with such a disproportionate majority of male students may be biasing the percentage of students with poor reading competencies.

Taken together, the fact that [6] assessed only engineering students and that most of them were male, is reason enough to replicate the study without these potentially interfering variables. Finally, there is yet another aspect that deserves further research regarding the instrument adopted to assess the reading competence. [6] adopted the TIL-Test of Reading Age, a reading age test for children developed in European Portuguese [19] and later adapted to Brazilian Portuguese [20]. TIL is constituted by 36 incomplete sentences that should be completed with one out of five options. The test is to be completed within 5 minutes, ensuring that children are seriated, as only 7% of the children attain top results [19] within that time limit. Normative results exist for children attending 2nd, 3rd, 4th and 5th grades. However, there aren't normative results for college students, nor is there any reading assessment protocol with normative results for Portuguese college students, which constitutes a severe handicap regarding reading related disabili-

ties diagnosis. In fact, although dyslexia is acknowledged by higher education institutions in Portugal, there is no consensual assessment protocol to diagnose this condition. It is also important to highlight that some dyslexic students are not diagnosed until they enter higher education [21, 22], which emphasizes the lack for a reading test with reference values for Portuguese speaking college students. One of the goals of this work is to fill that gap.

In order to assess college students reading abilities with TIL, [6] administered it to 84 college engineering students under unconstrained timing, asking participants to write down the time needed to complete all 36 sentences (a clock was displayed on the wall of the class room). The expectation was that college students would be able to complete TIL within significantly less time than 4th graders. As previously mentioned, this was not the case for ca. 20% of the students that needed more than 4 minutes to complete the test.

The adoption of TIL to assess college students was based on three main factors: (i) it requires decoding skills, the most affected component in developmental dyslexia [23–27] (ii) it requires both fluency and comprehension—a meta-analysis conducted by [23] revealed that reading comprehension tests that required silent reading and were time constrained had the strongest association with the decoding skills. Indeed, most college students with developmental dyslexia have a large reading experience, and may have compensated for their reading difficulties at the expense of fluency [12, 28, 29], (iii) it does not require significant time or financial investment for both participants and researchers.

In the present study we validate the time limit results obtained in [6] with balanced gender and scientific courses. Also, reading competence reference values for Portuguese college students are proposed for a time constrained administration of TIL. The present study is thus an extension of the one published in [6] by administering the TIL test to a wider spectrum of students, belonging to four different scientific domains: Education, Psychology, Health and Engineering, in a total of ca. 300 students. This work comprehends two studies. In the first one, the TIL test was administered without any time limit, similarly to what was done in [6]. In the second study, and based on an analysis of the results obtained in study 1 and in [6], the TIL test was administered with a fixed time constraint. In summary, three major goals were pursued in this work: first, and as previously stated, the confirmation of the conclusions proposed in [6] regarding the time limit for the administration of the reading assessment test for a larger sample of students and with different scientific backgrounds. Second, a

comparison between the results obtained by Engineering students and students from different areas, so that it is possible to detect if the unenthusiastic results obtained in [6] are specific to Engineering students or if it is a more general trend of Portuguese college students. Third, to gather normative results so that the corresponding percentile ranks may be applied for diagnosis in future studies and also as a reading test for foreign students.

This paper is organized as follows: next section presents the method followed in this work, specifically an overview of the participants profile, along with a short description of the materials used and the procedure followed. Section 3 presents the results obtained and Section 4 a discussion based on those results. Finally, Section 5 draws the main conclusions obtained and presents several suggestions for future developments.

2. Method

2.1 Participants

A total of 306 college students were assessed, following an appropriate informed consent procedure.

Table 1 and Table 2 describes the number and gender of participants in each scientific area, for study 1 and study 2 respectively. A total of 168 students participated in study 1 (54% females) and 153 students in study 2 (61% females). Both the gender distribution and scientific areas considered are representative of Portuguese college students [30].

Engineering students considered in this work came from the Mechanical Engineering Master Degree at Faculty of Engineering of the University of Porto (FEUP). Psychology and Education students came from University of Minho. Finally, Health students come from Polytechnic Institute of Porto and include two different degrees: Cardiopneumology (Health-C) and Radiology students (Health-R).

Fig. 1 presents a graph showing the classifications obtained by the last student to be admitted (with a maximum of 200 points) for the four scientific areas considered. Data presented in Fig. 1 regards the period 2008–2013, for the first admittance phase, and includes pre and post Bologna degrees.

Engineering and Health students have the highest grades, followed by Psychology and Education students. In fact, FEUP is one of the top Mechanical Engineering degrees in Portugal, attracting not only a high number of students per year but also, in recent years, students with some of the highest admission grades [6]. The Mechanical Engineering Master Degree at FEUP comprehends the 1st and 2nd Bologna cycles organized in a back to back way: the first three years correspond to the Bologna 1st cycle and the last two years correspond to Bologna 2nd cycle. The first seven semesters are common to all students and in the last three semesters students have to choose one of the following five specialization areas: (1) fluid and energy systems, (2) materials and manufacturing processes, (3) industrial management, (4) applied and structural mechanics or (5) automation. Students participating in this study were tested during the Control System course, which is a fourth year course in the Master degree.

The Psychology Master at the University of Minho comprehends the 1st and 2nd Bologna cycles organized in a back to back way: the first three years correspond to the Bologna 1st cycle and the last two years correspond to Bologna 2nd cycle. The first four years are common to all students. In the 5th year students have to perform an internship and a thesis.

The Cardiopneumology and Radiology degrees at ESTSP comprehend the 1st Bologna cycle, organized along four years. The first three years are devoted to lectures and tutorial classes and the fourth year is devoted to clinical education in health establishments. Students participating in

Table 1. Number and gender of participants in study 1

Engineering		Health		Psychology		Education	
Male	Female	Male	Female	Male	Female	Male	Female
51	3	15	22	10	30	1	36
Total: 54		Total: 37		Total: 40		Total: 37	

Table 2. Number and gender of participants in study 2

Engineering		Health		Psychology		Education	
Male	Female	Male	Female	Male	Female	Male	Female
27	13	17	19	7	31	3	31
Total: 45		Total: 36		Total: 38		Total: 34	

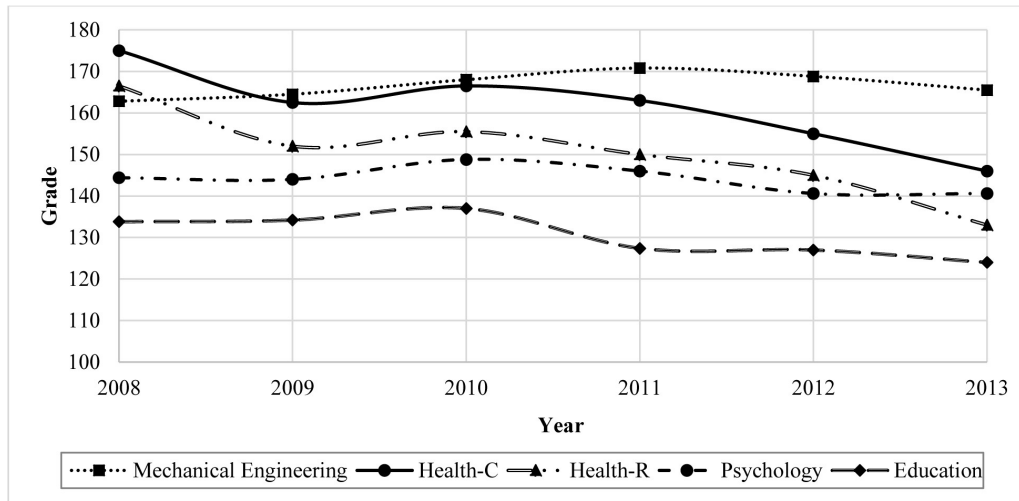


Fig. 1. Evolution of the admission grades in the different scientific areas considered in this study: grade of the last student admitted from 2008/09 to 2013/14.

this study were tested when attending the second year.

The Basic Education degree at Instituto da Educação da Universidade do Minho comprehends the 1st Bologna cycle, organized along three years. These three years are devoted to lectures and tutorial classes. After this 1st cycle, the students generally choose a 2nd cycle of teacher education. Students participating in this study were tested when attending the second year.

2.2 Materials

The TIL test has its roots in an original test developed in France named Lobrot L3 [31], adapted to Portuguese by Sucena et al. in [19]. The normative data obtained in that study was determined after administration of TIL to 614 Portuguese native speakers, attending the second ($n = 170$), third ($n = 186$), fourth ($n = 173$), and fifth ($n = 85$) grades for the first time [19]. The TIL test entails not only basic comprehension skills but also accurate and fluent decoding. The test comprises a set of 36 sentences with a final missing word. Given a group of five alternatives, the student is asked to choose the word that is a valid completion within a time limit of 5 minutes. Among each five-word set there are four distractors, each of a different type: no

resemblance to the target word, a phonological, visual or semantic resemblance, pseudorandomly positioned in the alternatives set. A right answer is therefore expected to be derived from an accurate decoding of the options. The normative data of TIL is given as percentiles for children between the 2nd and the 5th grades. Two situations may occur for an answer to be considered incorrect: either an incorrect choice is made by the student or, due to time constraints, an answer is not provided.

An interesting point about the TIL test for the present study lies on the fact that it was initially aimed for children aged between 8 and 11 years old and therefore it demands only basic comprehension skills.

In order to illustrate the simplicity of the test, Fig. 2 shows one of the 36 sentences along with its phonetic transcription (Unibet) and English translation. This specific example includes two types of distractors: (i) words phonologically similar to the target word *patas* [paws]—*peras* [pears] and *paws* [patas] share phonological features, as can be confirmed by the phonetic transcription—and (ii) words semantically related in the context of the sentence—*bocas* [mouths] and *orelhas* [ears] are related, in the sentence, to the expression *os cães têm* [dogs have]). In order to accurately complete the

Todos os cães têm quatro (bocas, patas, pinças, peras, orelhas).

[All dogs have four (mouths, paws, tweezers, pears, ears)]

Choices (in Portuguese)	bocas	patas	pinças	peras	orelhas
Choices (Unibet phonetic transcription)	[/bokAS /]	[/patAS/]	[/p3sAS/]	[/perAS/]	[/urALAS/]
Choices (in English)	[mouths]	[paws]	[tweezers]	[pears]	[ears]

Fig. 2. Example sentence of TIL (in Portuguese), distractors and target word. The example also includes the phonetic transcription (Unibet) and English translation.

sentence, the student is required to decode each word and extract its meaning, after which the overall meaning should be inferred, so that the correct choice between the five possibilities is made.

2.3 Procedure

2.3.1 Study 1—Time unconstrained TIL administration

A total of 168 college students (91 females) were asked to complete TIL without time constraints. The test was administered after an ordinary class. Previous instructions were given to participants: they would be asked to complete sentences with the correct word from a set of five possibilities, and then underline the correct option. One exemplifying sentence, along with corrective feedback, was also verbally given to participants. They were then asked to turn the page and complete silently and individually all the sentences as fast and accurately as possible. Students were asked to write down the time (minutes and seconds) they spent to complete the test. At the beginning of the task the verbal instruction “Begin” was said. A chronometer displayed in a data show guaranteed a common time base for all students.

2.4 Study 2—Time constrained TIL administration

As described in the Participants section, a second group of college students was assessed in this study. In this group, participants were also explained they would be asked to complete sentences with the correct word from a set of five possibilities, underlining the correct option. Again, one example of a training sentence was verbally provided to participants, with corrective feedback, after which they were asked to turn the page and complete silently and individually all the sentences as fast and accurately as possible. The verbal instruction “Begin”

was given at the onset of the task (and the chronometer started) and the verbal instruction “End” was given after 2’30”.

3. Results

3.1 Study 1 results

As previously presented, study 1 aimed to determine if the time limit for TIL administration obtained in [6] is only valid for Engineering students or if it is also applicable to a wider college population. First of all, it should be underlined that similarly to what happened in [6], the majority of students was able to complete the TIL test with nearly 100% of correct answers, as presented in Fig. 3. Also in agreement with the results for Engineering students alone, no correlation exists between the percentage of correct answers and the time needed for completion, as can be inferred from the horizontal slope of the trend line fit to the results of Fig. 3.

The histogram of the results per scientific area are presented in Fig. 4 and the average results per gender and scientific domain are presented in Table 3.

As presented in Table 3, mean results range from 3’10” to 3’28” and standard deviation results are uniform, spanning from 39” to 42”. These results thus indicate that Engineering students performance is in line with the performance of the remaining students. In order to check this conclusion, it was determined whether significant differences between gender and scientific background exist. In order to do so, an Anova was run to test the null hypothesis for sex and scientific background (respectively (i) male and female college students and (ii) engineering, health, education and psychology) to show that results are drawn from populations with the same mean values [32]. In fact, this test gives a p value of $p = 0.2266$ for the scientific

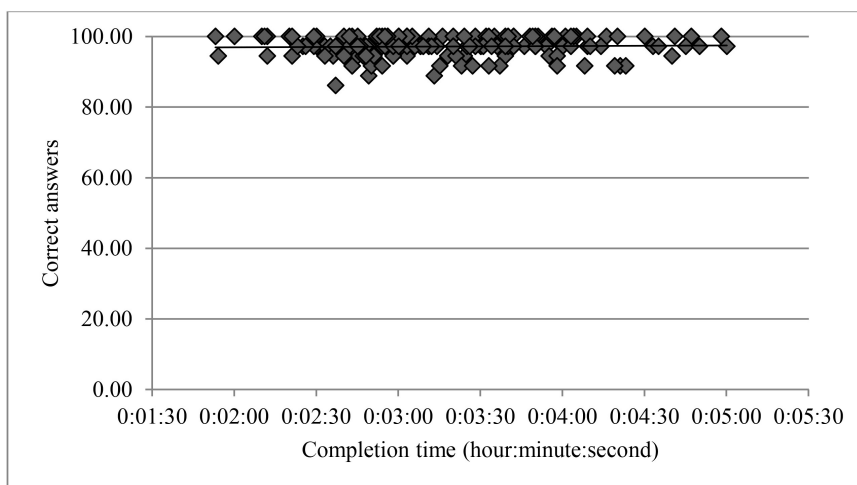


Fig. 3. Study 1 results: percentage of correct answers versus completion time of TIL test.

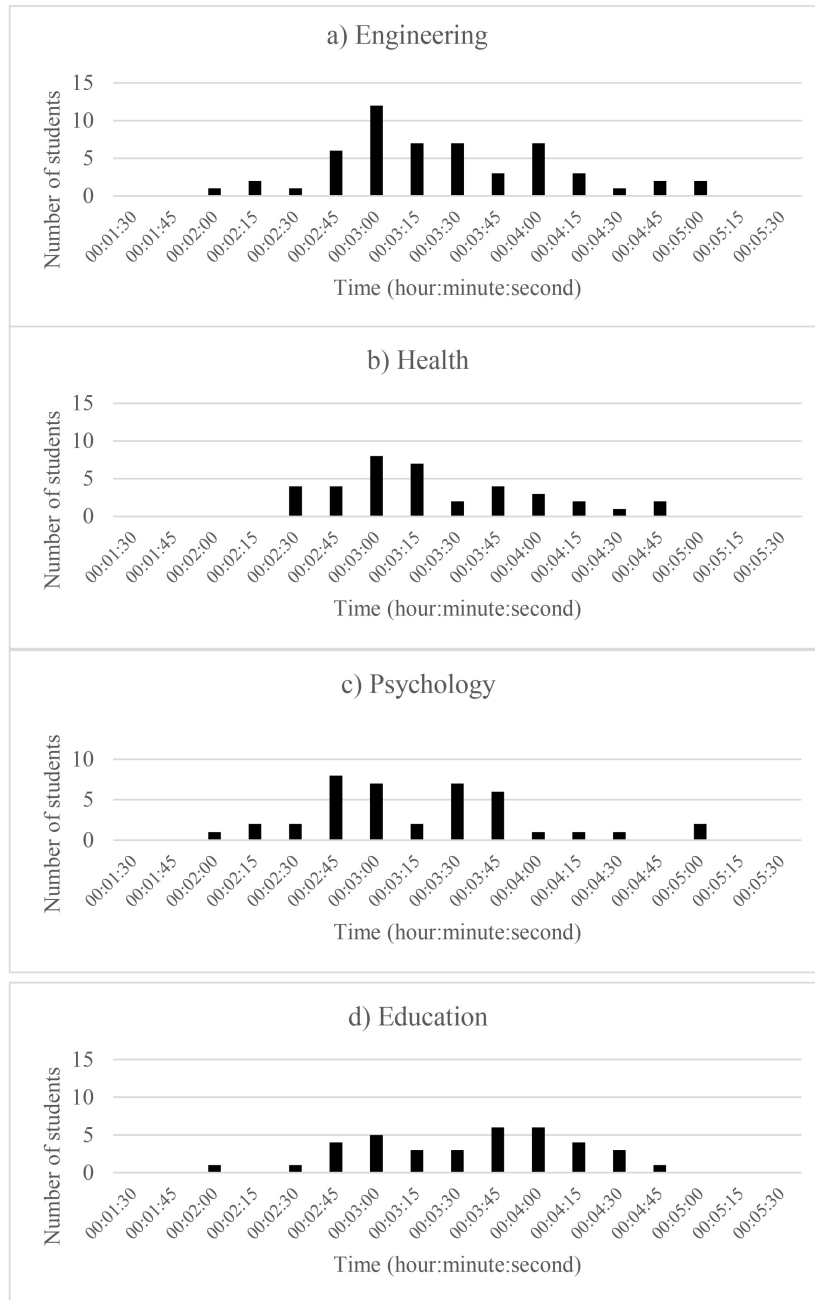


Fig. 4. Study 1 results: histogram of the number of students for a given conclusion time for each scientific area.

Table 3. Mean (μ) and standard deviation (σ) time results for different scientific domains and gender (M/F/All) in study 1

	Engineering			Health			Psychology			Education		
	M	F	All	M	F	All	M	F	All	M	F	All
μ	0:03:18	0:03:09	0:03:18	0:03:21	0:03:09	0:03:14	0:03:08	0:03:11	0:03:10	0:02:54	0:03:29	0:03:28
σ	0:00:42	0:00:36	0:00:42	0:00:35	0:00:38	0:00:37	0:00:34	0:00:43	0:00:41	—*	0:00:39	0:00:39

* Only one male participated.

background effect and $p = 0.643$ for the gender effect. This means that there isn't sufficient statistical evidence that the samples have not been drawn from the same population.

The absence of significant differences in performance between gender is in line with prior studies with college students [33, 34]. In result of the absence of significant statistical differences between gender

and scientific background, data from different scientific domains and both genders will be grouped in the remaining of this section, unless otherwise stated. Fig. 5 presents two plots with the grouped results. Fig. 5 (a) presents the histogram of the number of students for a given conclusion time and Fig. 5 (b) the accumulated percentage of students for a given completion time. Fig. 5 shows that all college students were capable to complete the TIL test within five minutes, similarly to what had been observed for Engineering students in [6]. The analysis of Fig. 5 also shows that a significant number of students (28, corresponding to 17%) takes 4 minutes or more to complete the test. This means that, similarly to what was found in [6], there is a significant number of college students who might reveal dysfluent reading.

Finally, this study confirms the 2'30" time limit obtained in [6]. This time limit maintains the origi-

nal level of discrimination, enabling only a few participants to attain ceiling results (ca. 7% within the children, ca. 8.5 % within the college population). Consequently, the 2'30" time limit is applicable to college students in general and not only to Engineering students. It will thus be adopted in study 2, presented next.

3.2 Study 2 results

Given the results obtained in the previous study, TIL was administered in this second study with a fixed time limit of 2'30". Results per gender and per scientific domain are presented in Table 4. Both average and standard deviation of correctly completed sentences are uniform, ranging from 28.8 to 30.6, and from 3.9 to 4.2, respectively.

Once again, the first step was to conduct a univariate Anova with two factors (gender and scientific background) to confirm whether there

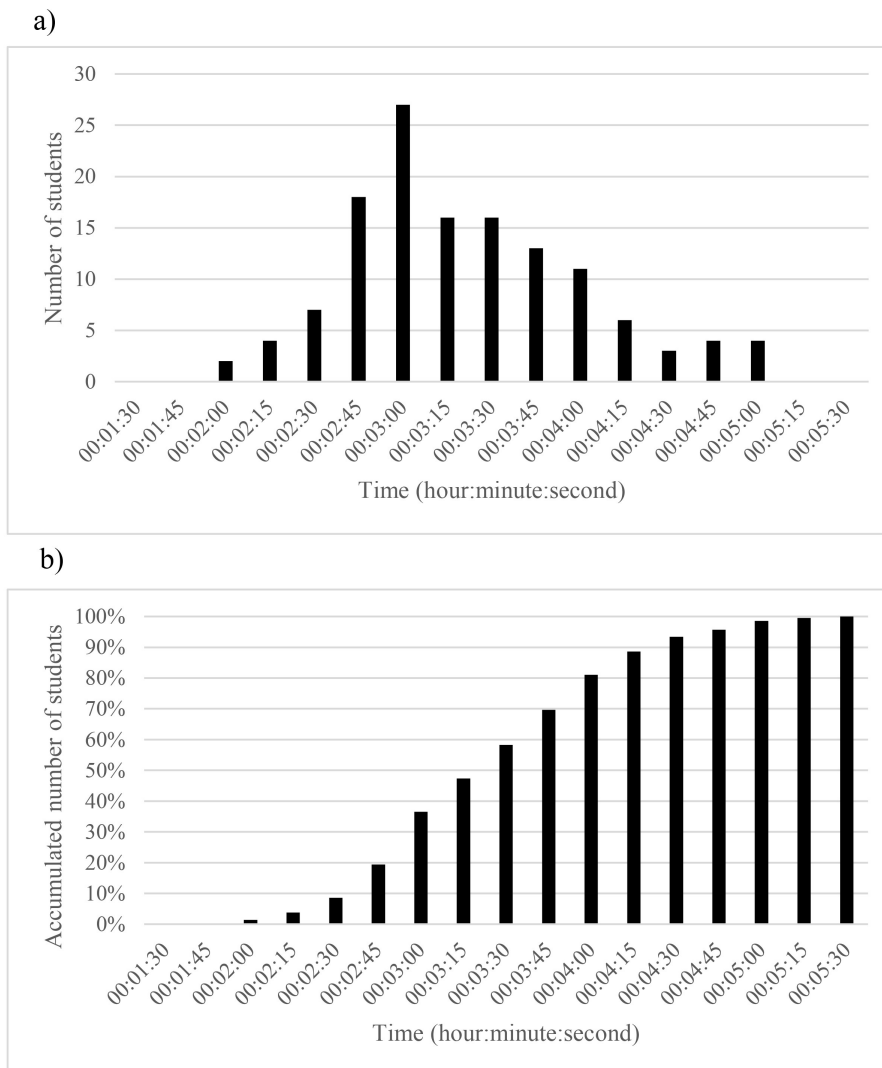
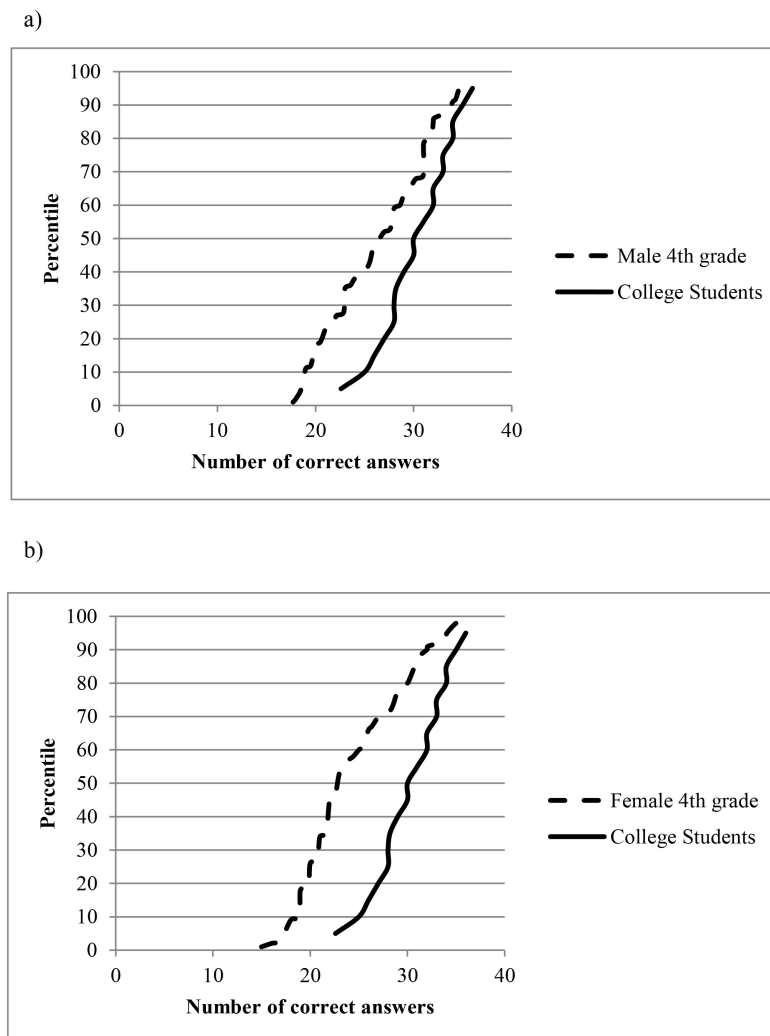


Fig. 5. Study 1 grouped results: (a) histogram of the number of students for a given conclusion time and (b) the accumulated percentage of students for a given completion time.

Table 4. Mean (μ) and standard deviation (σ) of correct answers for different scientific domains in study 2

	Engineering		Health		Psychology		Education	
	M	F	M	F	M	F	M	F
μ	29.3	32.1	27.8	29.8	33.0	29.6	33.3	30.4
σ	4.1	3.2	4.1	3.5	3.5	4.1	1.2	4.1

**Fig. 6.** Percentile versus number of correct answers: college students and 4th graders for male (a) and female (b) students.

were differences between the number of correct answers for (i) feminine and masculine students and (ii) between the four scientific backgrounds. Results indicated no significant differences (the p value is, respectively, $p = 0.2613$, $p = 0.524$)

A plot of the number of correct answers versus percentile is shown in Fig. 6. The same figure also includes, for comparison purposes, the 4th graders results (for both genders). College students have a better performance since for the same percentile more correct answers are achieved. This result reflects the fact that college students reading abilities are expected to be more uniform than those of 4th graders since as readers acquire more

reading experience, both orthographic lexicon and decoding skills develop and contribute to a stronger fluency.

4. Discussion

Study 1 was conducted to validate if the time limit found in [6] was the same when using a sample of college students with different scientific backgrounds. In an unconstrained time limit mode, all college students were capable of accurately completing TIL within 5 minutes—the time limit adopted with children. The mode was 3' (16% of the students); the minimum time needed was 2' (0.01%)

and the maximum was 5' (0.02%). These results are in line with what would be expected from skilled readers with a high reading experience, that are typically fluent readers in result of well-developed decoding and lexical strategies. It is important to emphasize that since all words in TIL are familiar, when a skilled reader (the case for college students) completes the test, automatic word recognition is expected to be used. The same automatic word recognition is not to be expected from less skilled readers, such as 4th graders, as they are still developing the orthographic lexicon.

Another important result from study 1 is the percentage of college students who needed 4' or more to complete the test. Study 1 shows that 17% of college students present results that overlap 4th graders, as had already been encountered in [6]. This result might be enough to raise serious concerns regarding college students reading abilities, which are expected to be far more developed than those of 4th graders. This expectation may be justified by the inspection of the normative results of reading comprehension measures or reading fluency. In fact, these results invariably include a subsection for college students as their reading results are more accurate and faster than those obtained by less educated adults and more so from 4th graders (e.g., [37, 38]). Dysfluent college readers should be identified so that appropriate compensatory strategies may be developed such as extra time for exams or additional study materials apart from printed bibliography. Indeed, dysfluency is a key symptom reported by dyslexic college students, as manifested by note taking while listening and watching [29] or lecturers talking too fast or moving the power point presentation onwards before the student could fully understand the information [39]. As far as the authors' knowledge goes, up until this study there wasn't any reading measure suited for Portuguese speaking college students.

A point worth noting is the fact that the reading skills of college students may not be necessarily homogeneous. In fact, it is known that in the USA, for instance, a highly uneven distribution may be found between the reading abilities of community colleges and bachelor or graduate students [1, 40]. This fact must however be analyzed with caution since the rules of admission in community institutions are less demanding than the ones required for those conceding graduate and bachelor degrees. In our study participants were balanced not only in terms of scientific background but also in terms of the admission mark, ranging from 12.5 to 16.5 out of 20 (respectively Education and Engineering graduations). Our results indeed revealed that Education students (those with the lowest admission mark) needed more time than any

of the other colleagues in the remaining courses to complete the 36 sentences. Although not reaching statistical significance, this result should be considered and further investigated in future studies for two reasons: (i) there seems to be a relation between admission mark and reading abilities and (ii), most importantly, education students will in the near future teach young children to read and spell.

Another important fact is that dysfluent readers did not exclusively arise from any of the college courses. Instead, for all the scientific domains considered there was a non-negligible percentage of students needing 4' or more to complete the test. This result not only confirms a high percentage of college students with poor reading skills but also highlights the fact that these difficulties are not specific to any given scientific domain.

It is also worth mentioning that there was no correlation between accuracy and time needed to complete TIL (cf. Figure 6), with ceiling results obtained by all participants, with a time span between 2' and 5'. The result that needs to be stressed is thus that a non-negligible percentage of college students lack reading fluency. This necessarily increases the demand in any reading related tasks, thus requiring an extra effort in comparison to the remaining (fluent) colleagues. Also, this result emphasizes the need for an appropriate screening test that allows the identification of poor reading students among the college population.

In result of (i) the ceiling effect obtained when applying the 5' limit to the college students population, and (ii) the absence of correlation between time needed to complete TIL and the number of sentences correctly completed, it was necessary to establish a more restricted time limit. This new time limit ensures TIL will discriminate different reading levels across college students. The time limit adopted leads to a level of discrimination comparable to the one defined for 4th graders. In fact, only 7% of 4th graders were capable of ceiling results ($\geq 90\%$) within the 5' time limit (cf. [19]); similarly, only 8.5% of the college students attained ceiling results within the 2'30" time limit.

Study 2 was intended to establish TIL normative results for college students, for which participants were asked to complete the test within a 2'30" time limit. Results did not significantly vary according to gender nor between scientific backgrounds, confirming the tendency already observed in study 1.

Normative results were therefore computed based on all college students with no regard to gender or scientific domain. The publication of normative results for TIL allows a low cost, low time consuming tool for evaluation of reading competences among college students. This means that a general reading screening becomes available

for the Portuguese college system to identify and help students who are struggling with reading related tasks, and to define those in need of a more thorough assessment. A quick reading screener may also allow the Portuguese reading assessment of Erasmus students. In fact, although English classes are available in Portuguese universities, there is still a majority of classes conducted in Portuguese, usually accompanied with written slide notes. In order to follow these classes, foreign students must be fluent readers in Portuguese, for which TIL could be an appropriate measure, with a cut point on or above the percentile 30. Finally a quick reading screener may diminish a still living myth regarding dyslexia and reading related difficulties, shared by both educators and dyslexic people, that consists on judging reading difficulties to be associated not with dyslexia but instead as a result of laziness [36]. This myth can be weakened if the student sees his difficulties confirmed by a clinical assessment, along with a quantitative result contrasting his reading performance against reference values, for which we hope to contribute with the results for Portuguese college students.

5. Conclusions

There has been very little investment in studies regarding the reading abilities of Portuguese college students. This study replicates recent results indicating that ca. 20% of Portuguese college students are dysfluent readers. These results are obtained using a large sample of students from different scientific domains. No significant statistical differences between the reading abilities of Engineering, Education, Health and Psychology students were found. Along with these results, up until the publication of the present study, the Portuguese reading assessment scenario lacked a reading assessment protocol with normative results for Portuguese college students. In fact, although dyslexia is acknowledged by higher education institutions in Portugal, there is no consensual assessment protocol to diagnose this condition. In the present study, we validated a time limit for a screening reading test (TIL), based on reference values with balanced gender and scientific domains. Also, reading competence reference values for Portuguese college students are proposed for a time constrained administration of TIL.

We hope the present study will be a contribution for reading assessment and intervention among Portuguese college students, affecting not only the educational and clinical communities but also research.

In future studies, it is crucial to extend the computation of normative results for middle and high school students on what regards reading abil-

ities, as no reading test with reference values exists for those Portuguese speaking students. Also, after having estimated the percentage of students affected by reading difficulties, the next step in research must be to try to understand what may be improved in the educational system in order to reduce its magnitude in the near future.

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