# How to deal with students' writing problems? Process-oriented writing support with the digital Writing Aid Dutch

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## Abstract

Students at universities and colleges in Belgium as well as abroad often experience difficulties with writing (academic) texts in their native language. Several needs analyses have pointed out that the most frequent writing problems in Dutch are text structure and cohesion, academic style and, to a lesser extent, spelling. Despite many interventions such as extra writing classes or workshops, the transfer between theory and practice often remains problematic. From students' and teachers' perspective there is a strong need for effective and process-oriented support. This presentation focuses on the digital Writing Aid Dutch, which makes students aware of typical areas of concern in their texts and provides them with individualized feedback. Writing Aid Dutch is not based on NLP techniques but makes extensive use of databases and analyzes texts using complex queries and string matching techniques. Two effect analyses and user experience studies have revealed that texts improve significantly on use of passives and vague words and on structure and cohesion. Writing Aid Dutch stimulates students' self-learning process and students perceive it as a very relevant tool. Throughout the design process of the writing aid user-friendliness has been inquired about as well.

## 1 Introduction

Students at Flemish universities and colleges often have difficulties with writing, irrespective of the educational field they are in (Berckmoes and Rombouts, 2009; Berckmoes et al., 2010; De Wachter and Heeren, 2011; Peters and Van Houtven, 2010). A needs analysis in which different sources and methods were triangulated and that was carried out among first year students of KU Leuven (Belgium) revealed that the most frequent writing problems of students are situated on the level of (1) text structure and cohesion, (2) style and, to a lesser extent, (3) spelling (De Wachter & Heeren, 2011). The results of this needs analysis are strikingly similar to those of previously conducted studies in Flanders. Despite several interventions, such as writing classes or extra workshops, the transfer between theory and the actual writing assignment remains difficult for many students. This is not only frustrating for students but also for teachers, who often have to correct the same mistakes again and again.

In this paper, the online Writing Aid Dutch is presented, which responds to the strong need for effective writing support for native speakers of Dutch. Its aim is to offer all students of KU Leuven Association (a total number of more than 102.000 students) process-oriented and individualized writing support and to shift the correction workload of teachers and assistants from repeating and superficial mistakes to more important aspects of the text, so that more useful feedback can be given. Writing Aid Dutch guides students through their writing process by making them aware of the most frequent writing problems in their texts situated on the level of text structure, style and spelling. It does not correct and 'judge' students' writing mistakes, but marks potential problem fields and provides students with balanced and concise feedback, tips, examples and links to informative websites. That way, students' self-learning processes, autonomy and responsibility are encouraged.





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For Dutch, very few writing tools have been developed, most of them being commercialized ('WoDy'/Sensotec©), not elaborated enough (Language Tool Dutch/Naber, 2014) or not attuned to the target audience ('Klinkende Taal'/Gridline©). The development of Writing Aid Dutch fits in with an international trend of responding to students' writing problems by means of electronic writing assistance systems. More specifically, it corresponds to the attention shift from product assessment to process-oriented support (Dale and Kilgarriff, 2011; Fontana et al, 2006; Gikandi et al., 2011). Also writing assistance systems such as Amadeus (Fontana et al., 2006) or Helping Our Own (Dale and Kilgarriff, 2011) are specifically being developed to assist students throughout their writing process.

## 2 Writing Aid Dutch

### 2.1 Interface

The interface of Writing Aid Dutch is simple and user-friendly: after students have copy-pasted or keyed in their text in the input field, they can click on three coloured buttons that each represent one of three problem areas: (1) text structure and cohesion, (2) style and (3) spelling. Each button is subdivided into separate buttons that represent specific textual elements corresponding to the general level. In the first level, the student can check use of reference words, use of structure words, most frequent words of the text, recurring sentence patterns, sentence length and paragraph length. More general statistics concerning text structure and cohesion, viz. the total number of words, sentences and paragraphs of the text are given as well. Lastly, the readability index (or complexity index) of the text is calculated. In the style level, passives, nominalizations, personal language use, long-winded constructions, informal and subjective words, formal and archaic words, vague words and word combinations can be checked. The last level on which students can check their text is spelling, where typing mistakes, wrongly spelled words and abbreviations are marked by a spell-checker. When students click on one of these separate buttons, the specific element becomes marked in the text.

### 2.2 Underlying system and techniques

Writing Aid Dutch does not make us of NLP techniques but uses databases and mostly string and pattern matching to analyze texts in a detailed and accurate way. For some metrics, however, other techniques are used. For sentence and paragraph length in the level of text structure and cohesion, for example, a minimal and maximal boundary is set. The readability index that is calculated in the same level is partly based on the Flesch-Douma index, the readability formula based on Flesch (1948) but adapted to Dutch. Despite a number of objections, such as the idea that long sentences are not always more complex than shorter ones (Jansen and Lentz, 2008), this formula has proven to be a reliable predictor of a text's readability and complexity. However, to make the formula even more accurate we have added word frequency, seeing that words that are highly frequent are more understandable than infrequent words.

The implementation of the spell-checker has been (and still is) a labour-intensive work. It is based on a word list containing over eight hundred thousand headwords supplied with linguistic information such as word class, article, plural form, past form, participle etc. The spell-checker functions in various steps and conditions and a word will become marked only when it has not been recognized after these selection criteria are met. One of these criteria, for example, takes into account context in order to check whether the word is part of a word group that has not been recognized as a fixed expression. Concretely, the context is limited to a span of four words left and right. The spell-checker is designed in a way that it is partly self-supportive. Unrecognized words automatically appear in a separate database, so that they can be checked and if necessary added manually to the word list.

## 3 Comparison to other existing systems

The concern of students' poor writing skills is not confined to Belgium alone but is shared internationally and has already resulted in many digital aids and tools offering writing support for students (Dugan and Polanski, 2006; Graham and Perin, 2007; Gray et al., 2005; Taylor and Paine, 1993). Desktop applications such as SWAN (Scientific Writing AssistaNt, Kinnunen et al., 2012) or web applications such as the Language Tool Style and Grammar Checker (Naber, 2014) or Spell Check Plus (Nadashi and Sinclair, 2014) offer writing assistance to students who write at an L2 level or in their

native language. Unlike these systems, Writing Aid Dutch is not NLP based. Such writing systems do not always guarantee a better text analysis as the accuracy of the suggested feedback or corrections often remains unsatisfactory. Moreover, these systems are rather time-consuming as students have to pass several 'stages' before receiving any feedback on their text. Students are often also provided with an overwhelming amount of information, which makes that they lose sight of the relevant feedback and of lose responsibility towards their text. Lastly, many writing aids do not focus on the writing process itself but rather on the product and do not encourage students' writing skills development, suggesting corrections immediately (Napolitano and Stent, 2009).

## 4 Impact: effect analyses and user experience studies

The effectiveness of the writing aid has been investigated, on the one hand, in a one-group design study among higher education students of KU Leuven and two partner institutions (n = 34). Despite the fact that such a design has limited minimal internal validity and almost no external validity (Sytsma, 2002), we have chosen for this design because of the restricted research scope of the project. Through triangulation of different research methods, however, the validity issue has to a certain extent been resolved. The 34 students participating in the experiment were asked to rewrite their own writing product with Writing Aid Dutch. This has resulted in 68 texts: 34 texts written without the writing aid (version 1) and 34 texts written with it (version 2). Before and after students rewrote their text with Writing Aid Dutch, they filled in a questionnaire that inquired about their writing difficulties and whether they gained insight into their text after using the writing aid. After the experiment, a focus interview was held in which these issues were discussed further.

The effectiveness of Writing Aid Dutch has, on the other hand, also been investigated among 79 final-year students of secondary education. In this investigation, different methods have also been triangulated as well: texts written with and without Writing Aid Dutch have been analysed and students and teachers have been questioned in questionnaires and focus interviews respectively (Wyers, 2014). As such, the empirical data in both effect studies have been completed with judgmental data (Leakey, 2011). Our first research question was whether use of Writing Aid Dutch leads to qualitatively better texts in the short term. Second, we wanted to evaluate students' perception of their learning process.

Because of the small total number of students participating in both experiments and the limited one-group design, only indications rather than generalisable results can be given. Higher education students improve significantly for use of passives and vague words when Writing Aid Dutch is used. Secondary school students improve especially on the level of structure and cohesion, more specifically for sentence and paragraph length and recurring patterns and words. In both investigations, students highly appreciated Writing Aid Dutch and considered it very relevant for their field of education. They also indicated that Writing Aid Dutch gave them insight into their own text and stimulated them to reflect on their own writing process.

During the development of the writing aid, user experiences from 50 students of different KU Leuven Association institutions were gathered as well in an online questionnaire. These experiences enabled us to review and adapt the writing aid throughout its development. The results were also very positive: all students would recommend the writing aid to their fellow students. From the three levels, they found text structure and cohesion the most useful, followed by style and then spelling.

## 5 Conclusion

Writing Aid Dutch responds to a strong need for effective, process-oriented writing support in Dutch. More specifically it offers help in the domains that students have problems with most. The writing aid aims at offering students insight into their text and at stimulating their self-learning process, autonomy and responsibility. From a computational point of view, it has been demonstrated that a system based on string and pattern matching techniques and a lot of data can be correct, fast and detailed. Moreover, Writing Aid Dutch is a durable and partly self-supportive web application that can be adapted at any time. For now, only students of KU Leuven Association have access to the writing aid. However, collaborations with publishers or the Dutch Language Union are not excluded and will make the tool possibly available for a larger audience.

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