

Academic Writing Assistant – Effective and Process-oriented Writing Support

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Introduction

Language proficiency in general and writing skills in particular are important in today's knowledge-based and communicative society (Graham & Perin 2007: 3; Rogers & Graham 2008: 879; De Smet et al. 2012: 2107; Graham et al. 2013: 3). In education, research has shown that advanced language proficiency is a guarantee for learning and can to a certain extent be a predictor of academic achievement (McNamara 1996; van Dyk 2010). Of the different language skills, writing skills are often perceived as the most complex ones because of the cognitive and metacognitive processes involved (Hayes & Flower 1980; De Smet et al. 2012: 1). These processes result in a cognitive (over)load that may influence writing quality. However, by effectively using writing strategies such as planning, structuring and revising, writers can decrease their mental effort and enhance their writing quality (Hayes & Flower 1980; Kellogg 1987: 269; De Smet et al. 2012: 1; Wischgoll 2016: 1–2).

In this paper, we will present the online tool Academic Writing Assistant (AWA) for Dutch developed at the KU Leuven (Belgium) that can be used by L1 students in consecutive revising phases of their texts. Current work includes an L2 writing assistant for English, Dutch as a foreign language and Afrikaans. Where relevant, these tools will also be referred to. In the first part of this article, we will describe the context and underlying causes for developing AWA, together with the strong needs it responds to. Then, general features of writing assistant systems as well as the specific choices made during the development of AWA will be described. In the third part we will discuss current use, the user experience survey and effectivity of AWA, followed by the conclusion.

Context

Many students at Belgian universities and colleges experience difficulties with writing, irrespective of their field of study (Berckmoes & Rombouts 2009; Berckmoes et al. 2010; De Wachter & Heeren 2011; Peters & Van Houtven 2010). A needs analysis carried out among first year L1 students of KU Leuven revealed that they most frequently have problems with (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 as well as abroad (Berckmoes & Rombouts 2009; Berckmoes et al. 2010; Dugan & Polanski 2006; Gray et al. 2005; Napolitano & Stent 2009). De-

spite several interventions like writing classes or extra workshops, the transfer between theory and the actual writing assignment remains difficult for many students. Some of those more “remedial” writing courses are still often separated from content and are mainly focused on technical writing issues such as grammar or spelling. As addressing these issues does not automatically stimulate students’ writing development, it is necessary to move away from this deficit approach. Rather, embedded and process-oriented approaches are advocated (Wingate 2012).

In this context AWA has been developed with a specific two-sided aim. On the one hand, AWA responds to the strong need for individualized, continuous and process-oriented writing support for all students of KU Leuven Association (a total number of more than 102.000 students) who have to write essays, papers or other academic text genres and face the difficulties going with that. More specifically, AWA is employable in different revising phases of the writing process, contrary to tools that are focused more on the planning phase of writing such as Article Writing Tool© or SWAN (Scientific Writing Assistant, Kinnunen et al. 2012). Very few writing assistance tools have been developed for Dutch, most of them being commercialized (“WoDy”/Sensotec©), not elaborated enough (Language Tool Dutch/Naber 2014) or not attuned to the specific target audience (“Klinkende Taal”/Gridline©). On the other hand, AWA aims to reduce the number of tutors’ corrections of more superficial mistakes, in order for them to be able to focus more on structure and cohesion and the overall academic style of a text.

Features

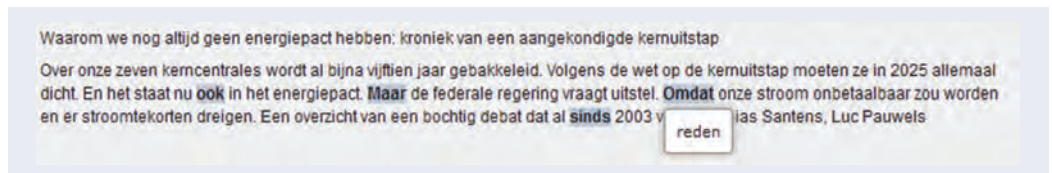
As already mentioned, concerns about students’ writing skills are shared internationally and have resulted in the development of many writing assistance systems. These writing assistants can be broadly classified into four categories: (1) Intelligent Tutoring Systems (ITS) as Writing Pal (Roscoe et al. 2014) that are mainly focused on strategy instruction, (2) Automated Writing Evaluation (AWE) systems like Criterion (Burstein et al. 2004) that provide automated scoring and evaluation of a text, (3) Essay Scoring (ES) systems such as Turnitin© and (4) Interactive Web Platforms (IWP) such as Thesis Writer© that are web-based environments offering pedagogical scaffolding. However, these categories still fail to grasp the diversity and complexity of specific writing assistance systems. Additional features can be used to differentiate between them in a more detailed way, for example the specific orientation (e. g. on “end product” or “writing process”), the type of feedback (direct or indirect), the text level focus, the used technology and instructional strategies. In what follows the choices that were made during the development of AWA are discussed.

AWA is specifically developed to assist writers during their writing process and therefore fits in with the general shift from product assessment to process-oriented support (Dale and Kilgariff 2011; Fontana et al. 2006; Gikandi et al. 2011). Other process-oriented

writing assistance systems are Amadeus (Fontana et al. 2006) or Helping Our Own (Dale and Kilgarriff 2011). The feedback generated in certain tools is, however, often rather directive. AWA, meanwhile, does not correct or evaluate students' end product but points out possible mistakes on the level of structure and cohesion, style and spelling and helps students revise their text. However, the words highlighted in the texts are not necessarily problem fields, for example in the case of use of structure words (e. g. "in the first place", "nonetheless", "because"). AWA marks these structure words in students' texts, in order for them to see if they use any and if they use them in a correct way. In small pop-up screens, the meaning aspect of each highlighted structure word is shown, as shown in figure 1:

Figure 1

Marking of structure words with meaning aspect in pop-up screen



Rather than quantitative feedback in the form of statistic figures or percentages, students then receive qualitative non-directive feedback consisting of information, tips, examples and links to specialized websites, as shown in figure 2 below in the case of structure words. Next to general and concise information about structuring a text by means of structure words, students are provided with a list of frequent structure words with their corresponding meaning aspect.

The learning profit of process-oriented feedback instead of product evaluation feedback has already been proven (Sorensen/Takle 2005 in Gikandi et al. 2011; Wiliam et al. 2004), especially with regard to skills training. By using AWA, students also monitor their own learning process while they are still involved in the current learning activity, which is crucial for effectively adapting their cognitive strategies and as a result produce better texts (Wischgoll 2016: 5). Moreover, by not judging or correcting the text, AWA not only encourages students' internal feedback, but also their autonomy and responsibility, which is beneficial to the development of motivation and stimulates learning as well (Wang & Peveryly 1986: 353 and Little 1994: 431 in Boud 1988: 4-6).

Figure 2
Feedback provided in AWA for use of structure words in the text

● Signaalwoorden (*omdat, daardoor, wegens...*) en structuurwoorden (*ten eerste, ten tweede, enerzijds en anderzijds...*) verduidelijken de **structuur** en de **onderlinge samenhang** in je tekst.

● Ze drukken ook een bepaald **betekenisverband** tussen je zinnen uit, zoals 'oorzaak' (*omdat*) of 'gevolg' (*daardoor*).

De schrijfhulp geeft het betekenisverband van de gemarkeerde signaal- en structuurwoorden in de tekst. Op die manier kun je per aangeduid signaalwoord nagaan of het betekenisverband dat erdoor wordt uitgedrukt ook echt overeenkomt met wat je wilt uitdrukken. **Let wel:** het kan zijn dat sommige woorden zijn gemarkeerd, hoewel ze in de gebruikte context geen signaal- of structuurwoord zijn.

Voor een lijst met signaal- en structuurwoorden, [klik hier](#). De lijst kan je inspiratie geven om eens af te wisselen tussen je signaalwoorden.

Betekenisverband	Structuur-/signaalwoord
Opsomming	En, ook, voorts, daarnaast, bovendien, niet alleen...maar ook, zowel...als, noch...noch, daar komt nog bij dat, voorerst, ten eerste (op de eerste plaats), ten tweede, ten derde, ten slotte (= tenslotte), ...
Tegenstelling	Maar, echter, doch, toch, daarentegen, integendeel, evenwel, enerzijds...anderzijds, aan de ene kant...aan de andere kant, in tegenstelling tot, desondanks, daar staat tegenover, niettemin, of...of, ...
Reden	Want, aangezien, omdat, immers, namelijk, derhalve, daarom, vanwege, ...
Oorzaak-gevolg	Doordat, daardoor, waardoor, hierdoor, met als gevolg, ten gevolge van, dit is te danken/wijten aan, de oorzaak hiervan is, bijgevolg, dan ook, ...
Doel-middel	Opdat, om, daartoe, met de bedoeling, waarmee, door middel van, met (be)hulp van, ...
Uitleg, verklaring	Bijvoorbeeld, dat houdt in, dat wil zeggen, preciezer geformuleerd, zo, met andere woorden, ter illustratie, ...
Voorbeeld	Bijvoorbeeld, ter illustratie, zo, zoals, stel, neem, ...
Voorwaarde en beperking	Als, indien, wanneer, op voorwaarde dat, tenzij, mits, hoewel, ondanks (het feit dat), weliswaar, tenzij, ofschoon, ...
Vergelijking	Als of, evenals, eveneens, evenzeer, op dezelfde wijze, zoals ook, hetzelfde is het geval, in vergelijking met, net als, vergelijk, ...
Samenvatting en besluit	Samenvattend, kortom, om kort te gaan, dus, concluderend, de slotsom is, dat betekent, ...

Bron:
 - De Wachter, L. en Van Soom, C. (2008). Academisch schrijven. Een praktische gids. Acco, Leuven.
 - https://ilk.leuven.be/practise/tekstopbouw_micro.php?pagevar=1

AWA does not analyse the content of the text, for example by using Latent Semantic Analysis techniques, but focuses only on textual elements. One of the reasons for this is because AWA has been developed for students who have to master several academic genres in different research domains. A preferred funnel-shaped order of the textual elements in which students should revise their text is implied (see image 3): the first component relates to the macro level of the text and focuses on higher order concerns like text structure and cohesion. The second and third component draw attention to the micro level of the text and on lower order concerns such as academic style, vocabulary and spelling. This order is crucial for a better understanding and a more efficient revision of one's own text seeing that knowledge of text structure first and foremost stimulates the generation of new text (Wischgoll 2016: 4). This is different for writing aids developed for L2 learners, such as AWA English and the writing aid Dutch for foreigners. On the one hand, compared to native speakers, L2 learners often still invest more time in mastering lower con-

cern orders such as grammar and spelling before shifting their attention to the higher order concerns. From a technical point of view on the other hand, text analysis is dependent on the degree of correctness of the used words. Because of these two reasons, spelling is the first level on which users can check their text in AWA English and the writing aid Dutch for foreigners.

Of the four categories described above, AWA can be strongly linked to that of Interactive Web Platforms (IWP). As opposed to AWE and ITS systems that use NLP techniques such as parsers for detailed text analysis, the technology used in AWA is list-based pattern matching with word lists as back end data. Because of its easy online accessibility, AWA is currently used as a stand-alone and self-directed tool. Some students are provided with in-class instruction as well, where writing strategies, different academic text genres and academic language proficiency in general are taught.

Design

AWA consists of two main components: text control and text enrichment. In the first component, students can copy-paste or key in their text and click on three coloured buttons that each represent one of the three treated problem areas: (1) text structure and cohesion, (2) style and (3) spelling (see image 3). Each button is in its turn subdivided into smaller buttons that represent specific textual elements corresponding to the general level (see image 4). In the first level, students 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 about text structure and cohesion, namely the total number of words, sentences and paragraphs of the text and the readability index (or complexity index) of the text are calculated as well. The second button “style” distinguishes between use of passives, nominalizations, personal language use, long-winded constructions, informal and subjective words, formal and archaic words, vague words and word combinations. The last button is “spelling” and clicking on this button students can check typing mistakes, wrongly spelled words and abbreviations in their text. For each button, the specific elements are marked in the text and provided with feedback (see images 1 and 2). Sometimes, extra information concerning the marked words, such as meaning aspect for structure words (see image 1) or alternatives for informal words, are given in small pop-up screens.

Figure 3
The three buttons “Structure and cohesion”, “Style” and “Spelling” in the component “Text Control”

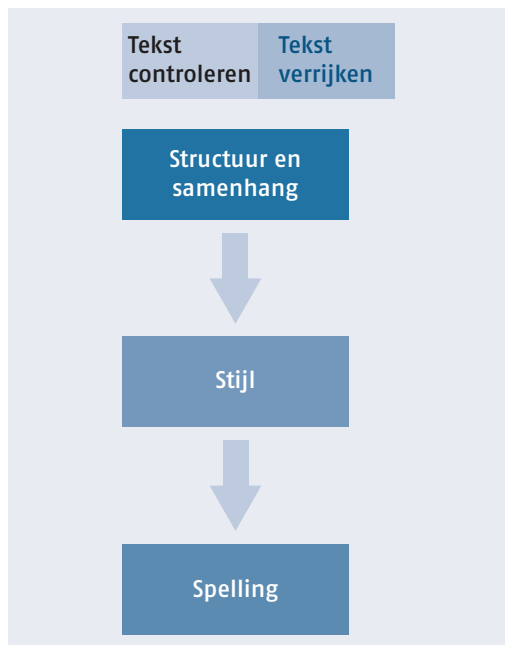


Figure 4
Subdivisions in first button “Structure and cohesion”



In the second component, “text enrichment”, students can look up the meaning of specific words, search academic alternatives for words in their text, look for specific collocations and consult Google News and Google Scholar for extra contexts of certain words.

Current use and effectivity

In 2017, AWA has already been used by more than 25 400 students of KU Leuven Association, who differ in age as well as study field. Using AWA is not strictly obligatory but is always strongly advised by tutors in lectures, seminars and workshops at different faculties.

The effectivity of AWA Dutch and English has been investigated in three small-scale effect analyses, set up in a one-group-design with no control group. The two research questions addressed in these studies were (1) whether use of AWA leads to improvements in students’ texts on the level of structure and coherence, style and spelling in the short term and (2) how students perceive their self-learning process. The first study researched these questions among university and college students of KU Leuven Association (n = 34). The second and third study investigated effectiveness among final-year students of secondary education, respectively of AWA Dutch among 79 students (Wyers 2014) and of AWA

English among 29 students (Vandroogenbroeck 2016). In all three studies students were asked to revise their own text with AWA and to fill in questionnaires that enquired about their writing difficulties and the possible insight they gained by using AWA. Additional focus interviews provided more detailed information about their writing experiences and self-learning process.

Because of the small total number of students participating in those three experiments and the limited one-group designs, only indications rather than generalizable results can be given. Higher education students' texts improved significantly in the use of passives and vague words using AWA, meaning that they used less passive constructions and less vague words. Secondary school students advanced especially on the level of structure and cohesion, more specifically for sentence and paragraph length and recurring patterns and words, and for AWA English also on the level of style, in particular for the use of informal words. In all three investigations, students indicated that AWA gave them insight into their own writing process and text and stimulated them to reflect on their writing process. They highly appreciated the tool as well and considered it very relevant, especially the level of structure and cohesion.

The effect analyses investigated user experience and effectiveness of AWA in the short term and on the basis of one version of students' text. However, as stated before, AWA is developed to support students during their writing process and more specifically during different revisions of their texts. Based on our experience and on user statistics it appears that students, after they have already written some pages, repeatedly use AWA when writing a text. Although this has not yet been investigated, we may presume that students will generate better texts on the long term seeing that AWA stimulates students' self-learning and self-regulation processes while still being involved in the current learning activity (Wischgoll 2016: 4). Nonetheless, future work may include researching this assumption in a more validly designed effect study.

Conclusion

Strategy-oriented writing support positively influences students' writing skills, enhancing writing quality and stimulating students' self-regulation and self-learning processes. Many writing assistance systems focusing on several strategies such as planning, structuring or revising have already been developed in order to support students' writing skills. Academic Writing Assistant responds to the profound need for process-oriented writing support for students of KU Leuven Association who have to write different academic text genres in several research domains and is employable in different revision phases of the writing process. It highlights possible problem fields in continuous versions of a text and provides non-directive and process-oriented feedback on structure and cohesion, style and spelling. Effect studies, though small-scale, indicated that using AWA leads to im-

provements in students' text, especially on the level of style and structure and cohesion, and improves students' self-regulation and self-learning process.

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