

Introduction to the Special Issue on Technology-Based Writing Instruction: A Collection of Effective Tools

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Abstract: This article introduces a Special Issue that gathers a collection of effective tools to promote the teaching and learning of writing in school-aged and university students, across varied contexts. The authors present the theoretical rationale and technical specificities of writing tools aimed at enhancing writing processes (e.g., spelling, revising) and/or at providing writers with automated feedback to improve the implementation of those processes. The tools are described in detail, along with empirical data on their effectiveness in improving one or more aspects of writing. All articles conclude by indicating future directions for further developing and evaluating the tools. This Special Issue represents an important contribution to the field of technology-based writing instruction, in a moment in which online teaching and learning tools have shifted from being an instructional asset to a necessity. We hope that in the future the validation of each tool can be expanded by reaching out to different populations and cultural contexts.

Keywords: writing, technology-based instruction, online tools, effectiveness evidence, technology-enhanced learning



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In the last years, there has been a fast and impressive increase in the development of technology in the field of writing. While some of these tools are dedicated to the fine-grained assessment of written composition in real real-time (Lindgren & Sullivan, 2019; Sullivan & Lindgren, 2006), others are specifically aimed at helping writers to develop and enact writing processes underlying good writing (Little, Clark, Tani, & Conner, 2018; Strobl et al., 2019), including the correct spelling of words, the generation and organization of ideas, the selection of appropriate words or phrases according to a particular genre, or the revision of mechanical (e.g., spelling) or substantive (e.g., rhetorical) aspects of composition (for a review of these processes see Graham, 2018). In addition to supporting the teaching and learning of writing by facilitating the enactment of specific writing processes, technology-based instructional tools can also support writing by providing writers with automated (and sometimes immediate) feedback targeting the process and output of implementing those same writing processes (Wilson & Roscoe, 2020) as well as by enhancing the motivation of writers, particularly younger ones, to be engaged in writing and persist in the acquisition of such a complex skill (Berninger, Nagy, Tanimoto, & Thompson, 2015).

There are more and more tools being developed and tested as aids to those interested in fostering the teaching of writing. However, in the current pandemic situation we are living in, the importance of these tools has never been higher. In many countries, almost from one day to the other, school and university teachers worldwide were confronted with the need to teach their students via online methods; not as a complement to traditional teaching conducted in the classroom, but as the unique means of teaching through the computer, a tablet, or even a smartphone. This sudden and unexpected situation showed us that available tools could represent a great asset to promote the teaching and learning of writing and called our attention to the need to have empirical evidence on their effectiveness. Critically, it also highlighted the importance of disseminating these evidence-based tools, so they can be gathered into a repository at the service of institutions, teachers, and students' teaching and learning needs.

Prior empirical studies and systematic/meta-analytic reviews have been conducted and concluded that several online tools have a positive impact on one or more process or outcome variables indicative of better writing (e.g., Little, et al., 2018; Strobl et al., 2019). Notwithstanding the importance of these prior works, their focus on showing the tools' effectiveness – allied with journals' space constrains or word limits – results in very brief descriptions of how the tools work. Typically, readers are advised to consult instructional manuals for further information on the tools, which tend to be extremely technical. Clearly, there is a need for providing scientific and educational communities with empirical studies testing the benefits of online writing teaching tools with a serious concern for providing a detailed view of the functionalities of the tools. After all, those are the functions contributing to

the observed improvements. This was the main aim of the current Special Issue, where readers can find a collection of writing tools to promote writing in school-aged and university students, across varied contexts. The authors present the theoretical rationale and technical specificities of the tools, which are described in detail. Empirical studies reporting on the effects of the tools on writing are then described, followed by indications for future developments concerning the tool under analysis and, ultimately, the field of technology-based writing instruction.

Overview of the contributions to the Special Issue

This collection starts with two papers presenting tools for people struggling with literacy-related processes. *Carvalhais, Limpo, Richardson, and Castro* presented the Portuguese GraphoGame and examined its effects on second graders struggling to read. The authors described the development and validation process of the Fluent Portuguese Version, aimed at developing fast and effortless reading. Second graders struggling to read were distributed by two groups matched on gender, reading skills, and cognitive ability, who used either the GraphoGame Fluent or the GraphoGame Math for 12 weeks. Findings confirmed the effectiveness of the Portuguese GraphoGame to improve struggling readers' phonological awareness and spelling skills. Given the well-established importance of these skills to early text production, this tool can be a great assistance for teachers to help their struggling students and prevent their arrested writing development due to difficulties in foundational writing abilities.

In the second article of this Special Issue, *O'Rourke, Connelly, Barnett, and Afonso* explored the role of MS Word's spellcheck to help undergraduate students with dyslexia in a British university. Individuals with dyslexia struggle with spelling when composing and exhibit difficulties in revising spelling errors. Spellcheck, a currently pervasive technological writing tool, can be of great help to those individuals, mainly in university contexts, where there is no room for explicit spelling instruction and systematic practice. O'Rourke et al. compare the effects of producing text with and without the help of spellcheck among undergraduates diagnosed with dyslexia. Authors found that, though having no discernable impact on the quality of the texts produced, spellcheck did help students with dyslexia to produce texts free of spelling errors. Allowing undergraduates with dyslexia to use word processing tools with the spellcheck active can be of great help for these students, mainly in testing situations.

The next two papers of the Special Issue presented technological tools to support typically developing writers in middle and high school. *Palermo and Wilson* described an automated writing evaluation system, called MI Write, which was integrated into two approaches to writing instruction delivered to American students in Grades 6 to 8. MI Write is a web-based interactive learning environment that allows productive interactions within the classroom and provides students with

automated feedback. This tool was tested in a mixed-methods study, in which MI Write was integrated either into traditional or strategy-based writing instruction delivered for eight weeks. Findings revealed the huge potential of MI Write as a component of writing instruction, with observed increases in several measures of writing performance over time. The reported experiences with and perceptions of the system provided by both teachers and students were also very promising, among which a framework for deliberate practice emerged.

The subsequent article continued to show the advantages of using technology-based writing tools with school-aged students. *Vandermeulen, Leijten, and Van Waes* described a new function of Inputlog for writing process feedback, which was tested in a sample of Dutch students in Grade 10. This function provides a report (set by default or customized by tutors) with objective data on specific process variables (e.g., pauses) based on previous research and the target population. The report is then integrated into a feedback flow to help students understand the results and use them to improve. This is one of the few studies showing the advantages of bringing keystroke logging to the classroom. Authors provide clear indications of how to integrate process data - typically restricted to research settings - in pedagogical settings.

The last set of articles included in the Special Issue focused on technology-based writing instruction with undergraduate or postgraduate students. During the past years, there has been a particularly prolific development of tools to help this population deal with the many writing demands they face at the university. *Knight et al.* presented a tool for formative feedback on academic writing called AcaWriter, used by undergraduate and post-graduate students attending a University (in Australia). Specifically, AcaWriter provides feedback on rhetorical moves. Though containing two primary genre feedback modes (analytical and reflexive), it does support customization of new feedback genres. In their paper, the authors illustrate how the AcaWriter can be used while producing academic writing and show evidence of its effectiveness in improving qualitative aspects of writing among undergraduate students from varying contexts (Law, Accounting, Pharmacy) as well as doctoral students.

In the next paper, *Cotos, Huffman, and Link* described the Research Writing Tutor (RWT) aimed to support research article writing and examined its impact on the revising behavior of graduate students. RWT provides immediate rhetorical feedback and conceptual scaffolding, targeting macro levels (moves and steps) using color-coded or graphical/numerical forms, as well as micro levels, in the form of sentence-based prompts. In this article, the authors examined the impact of the RWT's feedback and scaffolding features on writers' revising behavior. Writers' interactions with the tool and its features were found to impact the local and global modifications made by students, with an indication of transfer to the production of rhetorically appropriate writing.

Luna, Villalón, Mateos, and Martín designed and evaluated virtual training to enhance argumentative writing that was delivered to Spanish undergraduates. The online training included an instructional package to support the writing of argumentative synthesis from sources. The instruction was built on the Moodle platform along with other common online tools (websites, Google forms, YouTube, and Padlet). Also, the instructional package included videos and links, and provided automated feedback on students' responses. In comparison to a group that did not receive online training, those who did wrote better-structured texts, took more arguments from the opposing perspective into account, and achieved a higher level of integration. This instructional package seems a particularly promising and user-friendly support for undergraduates, with great potential to be included within larger, multicomponent interventions.

Finally, *Benetos and Bétrancourt* present the Computer-Supported Argumentative Writer (C-SAW) designed to scaffold writing processes, which was tested with undergraduates from a Swiss French-language university. C-SAW was specifically developed to scaffold the process of producing argumentative writing by providing writers with knowledge about argumentation, cognitive aids, and mechanisms to facilitate self-regulation, grounded on multiple modes of representation. The effectiveness of the tool was tested by comparing a group of undergraduates using C-SAW with another group using a standard word processor. The authors found that C-SAW helped students to produce more elaborate arguments than their peers. To further explore the potential of the tool to support written argumentation, Benetos and Bétrancourt propose the inclusion of C-SAW into broader pedagogical approaches, following the same instructional principles.

Concluding Remarks

Overall, the papers gathered in this Special Issue provide a detailed account of several effective tools to improve different aspects of writing in school and university students, with and without disabilities, across different cultural contexts (viz., Australia, Belgium, Spain, Portugal, Switzerland, the United States, and the United Kingdom). We hope this collection of articles will motivate further research into the development of evidence-based digital tools to promote writing, including their cross-cultural validation. Indeed, we expect that the detailed descriptions of the tools here presented may stimulate researchers to get in touch with their peers with the goal of translating and validating these already developed tools to different populations and cultural contexts.

Mainly in current times, where the value of online teaching is universally recognized, writing instruction worldwide can benefit from all the evidence-based tools available (surely not restricted to those here presented). It should, however, be noted that, as evident in all papers of the current collection, available tools may be a key part of writing instruction. Still, for effectiveness optimization, these need

to be embedded into larger pedagogical approaches, which inevitably are at the root of the best teaching practices needed to develop such a complex skill as writing.

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References

- Berninger, V. W., Nagy, W. E., Tanimoto, S., & Thompson, R. (2015). Computer instruction in handwriting, spelling, and composing for students with specific learning disabilities in grades 4-9. *Computers & Education, 81*(154-168). doi:10.1016/j.compedu.2014.10.005
- Graham, S. (2018). A revised writer(s)-within-community model of writing. *Educational Psychologist, 11*, 258-279. doi:10.1080/00461520.2018.1481406
- Lindgren, E., & Sullivan, K. (2019). *Observing writing: Insights from keystroke logging and handwriting*. Leiden, The Netherlands: Brill.
- Little, C. W., Clark, J. C., Tani, N. E., & Conner, C. M. (2018). Improving writing skills through technology-based instruction: A meta-analysis. *Review of Education: An international Journal of Major Studies in Education, 6*, 183-201. doi:10.1002/rev3.3114
- Strobl, C., Ailhaud, E., Benetos, K., Devitt, A., Kruse, O., Proske, A., & Rapp, C. (2019). Digital support for academic writing: A review of technologies and pedagogies. *Computers & Education, 131*, 33-48. doi:10.1016/j.compedu.2018.12.005
- Sullivan, K., & Lindgren, E. (Eds.). (2006). *Computer keystroke logging and writing*. Amsterdam: Elsevier.
- Wilson, J., & Roscoe, R. D. (2020). Automated writing evaluation and feedback: Multiple metrics of efficacy. *Journal of Educational Computing Research, 58*, 87-1125. doi:10.1177/0735633119830764

In this Special Issue:

Technology-Based Writing Instruction: A Collection of Effective Tools

Guest editors | Teresa Limpo, Andreia Nunes and António Coelho

- Benetos, K., & Bétrancourt, M. (2020). Digital authoring support for argumentative writing: What does it change? *Journal of Writing Research* 12(1), 263-290. <https://doi.org/10.17239/jowr-2020.12.01.09>
- Carvalhais, L., Limpo, L., Richardson, U., & Castro, S.L. (2020). Effects of the Portuguese GraphoGame on reading, spelling, and phonological awareness in second graders struggling to read. *Journal of Writing Research* 12(1), 9-34. <https://doi.org/10.17239/jowr-2020.12.01.02>
- Cotos, E., Huffman, S., & Link, S. (2020). Understanding graduate writers' interaction with and impact of the Research Writing Tutor during revision. *Journal of Writing Research* 12(1), 187-232. <https://doi.org/10.17239/jowr-2020.12.01.07>
- Knight, S., Shibani, A., Abel, S., Gibson, Ryan, P., Sutton, N., Wight, R., Lucas, S., Sándor, Á., Kitto, K., Liu, M., Vijay Mogarkar, R., & Buckingham-Shum, S.J. (2020). AcaWriter: A learning analytics tool for formative feedback on academic writing. *Journal of Writing Research* 12(1), 141-186. <https://doi.org/10.17239/jowr-2020.12.01.06>
- Luna, M., Villalón, R., Mateos, M., & Martin, E. (2020). Improving university argumentative writing through online training. *Journal of Writing Research* 12(1), 233-262. <https://doi.org/10.17239/jowr-2020.12.01.08>
- O'Rourke, L., Connelly, V., Barnett, A., & Afonso, O. (2020). Spellcheck has a positive impact on spelling accuracy and might improve lexical diversity in essays written by students with dyslexia. *Journal of Writing Research* 12(1), 35-61. <https://doi.org/10.17239/jowr-2020.12.01.03>
- Palermo, C., & Wilson, J. (2020). Implementing automated writing evaluation in different instructional contexts: A mixed-methods study. *Journal of Writing Research* 12(1), 63-108. <https://doi.org/10.17239/jowr-2020.12.01.04>
- Vandermeulen, N., Leijten, M., & Van Waes, L. (2020). Reporting writing process feedback in the classroom: Using keystroke logging data to reflect on writing processes. *Journal of Writing Research* 12(1), 109-140. <https://doi.org/10.17239/jowr-2020.12.01.05>