Thesis Writer (TW) - an Intelligent Tutoring System for Writing Instruction and its Study

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Academic writing poses manifold challenges to students, instructors and institutions. High labor costs, increasing student numbers and the so-called Bologna reform in Europe (which reduced the period until undergraduate students submit their first thesis, so less time for training writing skills) all pose a threat to students' progress in the area of academic writing. Consequently, the question arose if, and to what extent, academic writing and its instruction can be supported through a scalable technological solution. With Thesis Writer (TW), a domain-specific, technology-supported learning environment for scaffolding academic writing, combined with an online editor optimized for producing academic text was implemented (Rapp, Kruse, Erlemann, & Ott, 2015). TW supports the learning of academic writing, provides instructions for many open questions during text production, supports students' formulation processes with linguistic tools, and offers opportunities for collaboration and coordination among learners and instructors. In line with the recommendations of Graham and Perin (2007) for effective writing instruction strategies, TW supports students in particular with: (1) orientation, planning and focusing; (2) proposal writing; (3) text production by tutorials and new linguistic tools including a phrasebank, examples, and linguistic support from a large integrated open-source, discipline-specific corpus analysis tool, and (4) collaboration and coordination between student and HE institution (tutors, instructors, study program directors). TW offers different functionality to existing tools, namely automated scoring and feedback tools (Allen, Jacovina, & McNamara, 2015), and is designed for a different genre, namely the IMRD (Introduction, Methods, Results and Discussion) scheme (Swales, 1990/2004). In a recent first largescale test run, TW was evaluated using a mixed-methods explanatory sequential design (Plano Clark & Ivankova, 2016) on a course for 300 business administration students in five parallel classes. Data was collected via questionnaire and focus groups. Results reported were encouraging to highly encouraging.

Recently, a tracking function was implemented in TW: All user entries (text) and the interaction with the system are logged and timestamped. This allows for the research of support functions provided by TW, as outlined above, how they are used, and even more interesting, what happens afterwards. Therefore, it is e.g. possible to study if users typed text after using an aid provided or, if they sought other help instead etc. A currently implemented "replay-function", based on the timestamped data logs (user-system interaction, including text produced in the editor), will allow for displaying as if recorded by a screen recorder; however, circumventing problems when utilizing screen recording as reported by Tang, Liu, Muller, Lin, and Drews (2006). Therefore, TW will, unobtrusively, allow for research of the following aspects: (1) Usage of TW as an Intelligent Tutoring System; (2) Usage and effect of the aids provided. The effect of the aids can be assessed via corpus analysis, e.g. we can analyze to what extent phrases provided by the phrasebank are incorporated in the text; (3) TW allows for real-time collaboration, similar to Google Docs, for instance in teamwork assignments. Here it is possible to analyze interaction among users and the system; and (4) Analyze the text production itself, e.g. time spent on certain sections, revisions processes etc. The described data collection functions allows, firstly, for the in-depth study of writing processes of single users and groups (data collection can be confined to groups e.g. classes). Secondly, TW allows for comparison among different users (e.g. social science users in comparison to natural science users, or undergraduate compared to postgraduate level) and, given that TW is available in both German and English languages, also between L1 and L2 writers.

In a first test run of the tracking function, TW generated 100,000 data points in a two day period. A massive amount of data was generated, and strategies for analyzing it have to be designed and formulated. Although many issues have still to be faced with TW, in the future, there exists the potential to analyze such volumes of data in real-time, allowing for the realization of a more adaptive system with regard to user requirements.

REFERENCES

Allen, L. K., Jacovina, M. E., & McNamara, D. S. (2015). Computer-based writing instruction. In C. A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 316-329). New York: The Guildford Press.

Graham, S., & Perin, D. (2007). A Meta-Analysis of Writing Instruction for Adolescent Students. *Journal of Educational Psychology, 99*(3), 445-476.

Plano Clark, V. L., & Ivankova, N. V. (2016). *Mixed methods research : A guide to the field* (Vol. 3, SAGE mixed methods research series). Los Angeles: SAGE.

Rapp, C., Kruse, O., Erlemann, J., & Ott, J. (2015). Thesis Writer – A System for Supporting Academic Writing. In *Proceedings of the 18th ACM Conference Companion on Computer Supported Cooperative Work & Social Computing (CSCW2015 Companion)* (pp. 57-60). ACM, New York, NY, DOI 10.1145/2685553.2702687.

Swales, J. M. (1990). *Genre analysis: English in academic and research settings* (Cambridge applied linguistics series). Cambridge: Cambridge University Press.

Swales, J. M. (2004). *Research genres: Explorations and applications* (Cambridge applied linguistics series). Cambridge: Cambridge University Press.

Tang, J. C., Liu, S. B., Muller, M., Lin, J., & Drews, C. (2006). Unobtrusive but invasive: using screen recording to collect field data on computer-mediated interaction. In proceedings of the *20th anniversary ACM conference on Computer supported cooperative work* (pp. 479-482). Banff: ACM.