

A Novel Writing Analytics Approach to Study Multiple Information Sources Integration by Students

Yoram M Kalman*, Ester Adam, Ina Blau

The Open University of Israel

yoramka@openu.ac.il, adamf@gedu.openu.ac.il, inabl@openu.ac.il

ABSTRACT: This poster describes a work in progress (WIP) research project that will explore the way students merge and summarize multiple information sources. The experiment examines the effect of merging digital versus analog texts on the digital writing process, the quality of the written outcomes, and the level of plagiarism in summaries written by students. The project incorporates a novel writing analytics approach that uses a logger which tracks not only keystrokes and timestamps, but also their impact on the evolving text, allowing an in-depth analysis of writing and editing processes. The study contributes to the writing analytics literature by improving our understanding of multiple information source integration and of plagiarism in student writing, as well as by offering a novel method to track and analyze computer-based writing processes.

Keywords: writing analytics, text integration, logger, plagiarism

1 MERGING AND SUMMARIZING MULTIPLE INFORMATION SOURCES

One of the top skills required by participants in the knowledge economy is that of reading multiple information sources and creating a new document that integrates these information sources in a coherent and effective manner (Barzilai, Zohar, & Mor-Hagani, 2018). A study of this skill intersects with several research themes related to reading and writing, including research on the differences between reading from paper versus from digital sources (e.g. Fortunati & Vincent, 2014; Mangen, Walgermo, & Brønnick, 2013), research on the cognitive and metacognitive processes that are associated with these integration tasks (Barzilai & Zohar, 2012), research on writing processes and their evaluation (e.g. Shibani, Knight, & Shum, 2018), and research on academic integrity in the use of information sources (e.g. Blau & Eshet-Alkalai, 2017).

2 RESEARCH QUESTIONS

The study described in this WIP poster is an experiment that requires participants to merge and summarize three texts into a single coherent digital text. The study explores three research questions:

- a. Are there differences between the processes of creating a summary document from digital sources versus paper-based information sources?
- b. Are there differences between the quality of outcomes - a summary document from digital sources versus paper-based information sources?

- c. Is there a difference in the extent of plagiarism between creating a summary document from digital sources versus paper-based information sources?

3 EDIT-TRACKING KEYSTROKE LOGGER

A unique keystroke logger is currently under development in order to study the writing process of the participants in the study. Like a regular keystroke logger, this logger tracks every keystroke performed by users as they type within an HTML window. Furthermore, with each keystroke (both down-stroke and up-stroke) the logger also records the text that is in the HTML window when the keystroke occurred. These timestamped records are then exported in a json file which contains a highly detailed record of the writing process. This json file is then analyzed using scripts that identify the various writing and editing activities performed by the users.

4 THE EXPERIMENT

In the experiment, sixty participants will be recruited and randomly assigned into two groups. Both groups will be asked to merge and summarize three identical texts, either digital (group A) or paper based (group B). Both groups will perform the merging using the logger described in section 3 above. The three RQs will be explored by analyzing the writing process as well as the resultant text written by the participants. This novel writing analytics approach contributes to our understanding of multiple information source integration, of digital versus paper-based reading and writing, and of student plagiarism. It also presents a novel method for tracking and analyzing computer-based writing processes.

REFERENCES

- Barzilai, S., & Zohar, A. (2012). Epistemic Thinking in Action: Evaluating and Integrating Online Sources. *Cognition and Instruction, 30*(1), 39–85. <https://doi.org/10.1080/07370008.2011.636495>
- Barzilai, S., Zohar, A. R., & Mor-Hagani, S. (2018). Promoting Integration of Multiple Texts: a Review of Instructional Approaches and Practices. *Educational Psychology Review, 30*(3), 973–999. <https://doi.org/10.1007/s10648-018-9436-8>
- Blau, I., & Eshet-Alkalai, Y. (2017). The ethical dissonance in digital and non-digital learning environments: Does technology promotes cheating among middle school students? *Computers in Human Behavior, 73*, 629–637. <https://doi.org/10.1016/j.chb.2017.03.074>
- Fortunati, L., & Vincent, J. (2014). Sociological insights on the comparison of writing/reading on paper with writing/reading digitally. *Telematics and Informatics, 31*(1), 39–51. <https://doi.org/10.1016/j.tele.2013.02.005>
- Mangen, A., Walgermo, B. R., & Brønneck, K. (2013). Reading linear texts on paper versus computer screen: Effects on reading comprehension. *International Journal of Educational Research, 58*, 61–68. <https://doi.org/10.1016/j.ijer.2012.12.002>
- Shibani, A., Knight, S., & Shum, S. B. (2018). Understanding Revisions in Student Writing Through Revision Graphs. In *International Conference on Artificial Intelligence in Education* (pp. 332–336). Springer.