IOWA STATE UNIVERSITY

Zürcher Hochschule für Angewandte Wissenschaften

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New Tools for Writers and New Tools for Researchers

From tool development to writing analytics and back: Using data to explore pedagogical impacts and create the next generation of writing tools

5th International Conference on Writing Analytics

1/11/2018

St. Petersburg, Florida



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Thematic overview

- Which data are or should be collected by leveraging writing tools' affordances?
- How and for which purposes could such data be analyzed in order to improve/augment existing tools (and perhaps design new tools?
- What pedagogically-relevant research questions could be answered using tool-generated data?

Interdisciplinary collaborations

- Writing scholars (theory and research)
- Writing teachers (practical implementation)
- Writing tool developers (affordances)
- Experts in computational linguistics (NLP/AI)
- Experts in corpus linguistics (linguistic analysis)
- Experts in educational measurement (assessment & validation)
- Experts in text engineering and computer science (robust, maintainable data processing & analysis workflow)
- Experts in learning sciences (learning processes & skill development)
- Experts in human-computer interaction (user behaviors)
- Other

Common frame of reference for writing tools

- Design, study, and use of writing tools approached from different angles in different fields
- Interdisciplinary collaborations require shared understanding
- For a cohesive interdisciplinary research agenda with potential pedagogical impacts, there has to be a systematic frame of reference

How do we define and categorize writing tools?

European Literacy Network Working Group 3 on Literacy Technology

Emilie Ailhaud, Kalliopi Benetos, Ann Devitt, Otto Kruse, Antje Proske, Christian Rapp, Carola Strobl

www.is1401eln.eu

More than 85 writing tools reviewed

- General rubrics
- Type of technology
- Functions
- Pedagogical focus

General rubrics

- Languages (L1/L2)
- Target public (e.g. undergraduate)
- Basic category (e.g. AWE – Automated Writing Evaluation, AS - Automated Scoring , ITS – Intelligent Tutoring Systems, IWP – Interactive Web Platform)
- Genre and domain
- Subtasks (e.g. drafting, editing), text level focus (e.g. macro), targeted skills (e.g. procedural), instructional practice (e.g. explicit teaching, process writing approach), setting (e.g. self-directed), adaptability
- Technology and policy
- Type of feedback, source (e.g. computer), focus (e.g. product), specificity, timing, provision…

Type of technology

- **Automated Writing Evaluation** (AWE): Natural Language Processing (NLP), e.g. Writing Aid Dutch
- **Intelligent Tutoring Systems** (ITS): connection of NLP Algorithms with Tutorials, e.g. Writing Pal
- **Genre-based instructional systems**: support at the level of structure and genre, e.g. SCRIBO, WRiSE
- **Technology assisted peer feedback**: reciprocal support, e.g. SWoRD
- **Corpus-informed**: real-time corpus queries through concordancers and search, e.g. Yoon (2014)
- **Computer-structured argumentation**: create arguments and understand basic issues of argumentation, z.B. Benetos & Betrancourt (2015)

Functions

- Idea generation, focusing, delineating topic
- Drafting and prewriting
- Planning
- Formulating and linguistic support
- Creating a structure and organize paper
- Revision
- Feedback
- Cooperative writing /collaborative work
- Argumentation & argument structure
- Reading/ summarizing
- Genre instruction and organized templates
- Organization of writing process
- Reflection and log book / working diary
- Communication with supervisor and institution/ community
- Layout functions and graphic support

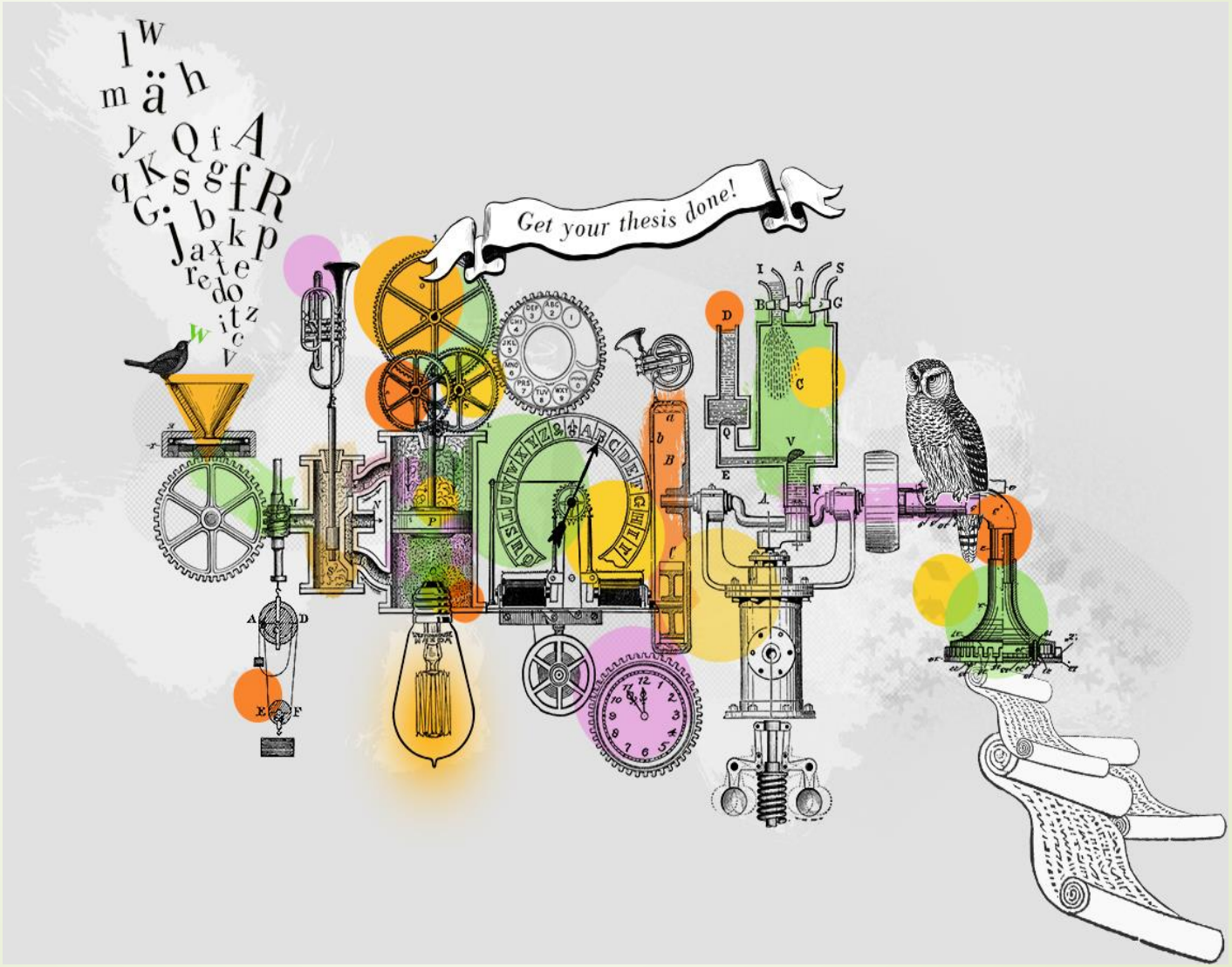
Pedagogical focus

- **Stage of writing process:** idea generation, planning, formulation, revision
- **Genre:** essay, seminar paper, research article
- **Situation:** in class writing, seminar, thesis, exams, research project, cooperative writing
- **Institutional setting**: high school, college, university, professional contexts
- **Domain**: academic, personal, religious, literature, poetry, business
- **Thought processes:** reading, argumentation, exploration, reflection, synthesizing knowledge, creativity
- **Level / proficiency:** novice, trainee, advanced, thesis writing, specialization, expert writing

- Have you developed or used a writing tool?
- Which category would you say that tool pertains to?
- Issues?
- Suggestions for a common frame of reference?

Demo and brief description of 2 writing tools

Thesis Writer (TW). www.thesiswriter.eu



Thesis Writer (TW)

- Created to support degree programs with large numbers of theses to be written (BA and MA level)
- Cloud-based, SaaS (Software as a Service), personal writing environment
- Word processor with various new support functions added
- Bilingual German and English (more languages to be added)
- Basic Functions: Providing orientation, organizing writing process, genre insruction, tools for communication and feedback
- Current state: Working prototype, accessible to all members of our university
- Future: Funding for two more years of development to complete TW

Research Writing Tutor (RWT)

Research Writing Tutor (RWT)

- Web-based, personal writing environment
- Genre-based AWE (research article)
- Corpus-based (30 disciplines)
- Automated analysis of genre conventions in student drafts
- Comparison of drafts with corpus of published articles
- Individualized, instant, genre-based, discipline-specific, formative feedback
- English only
- Available at ISU; public version in development

Data recorded by

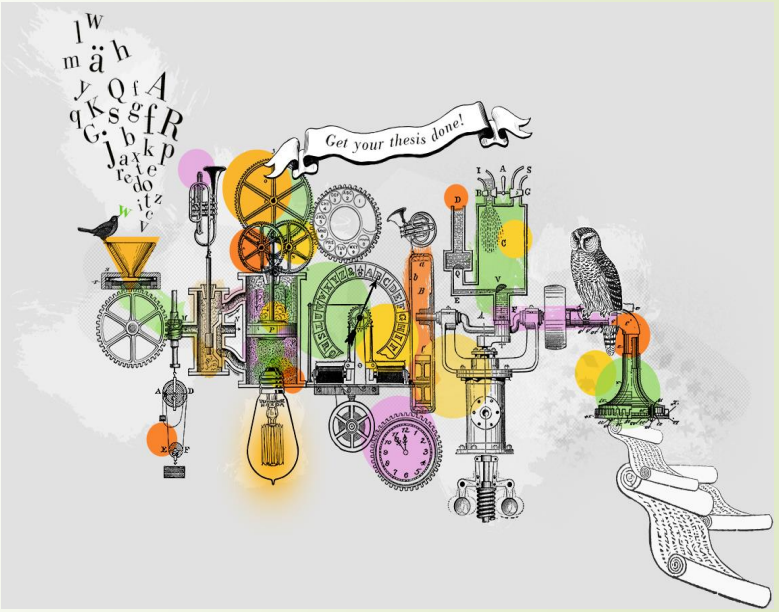
Thesis Writer

and

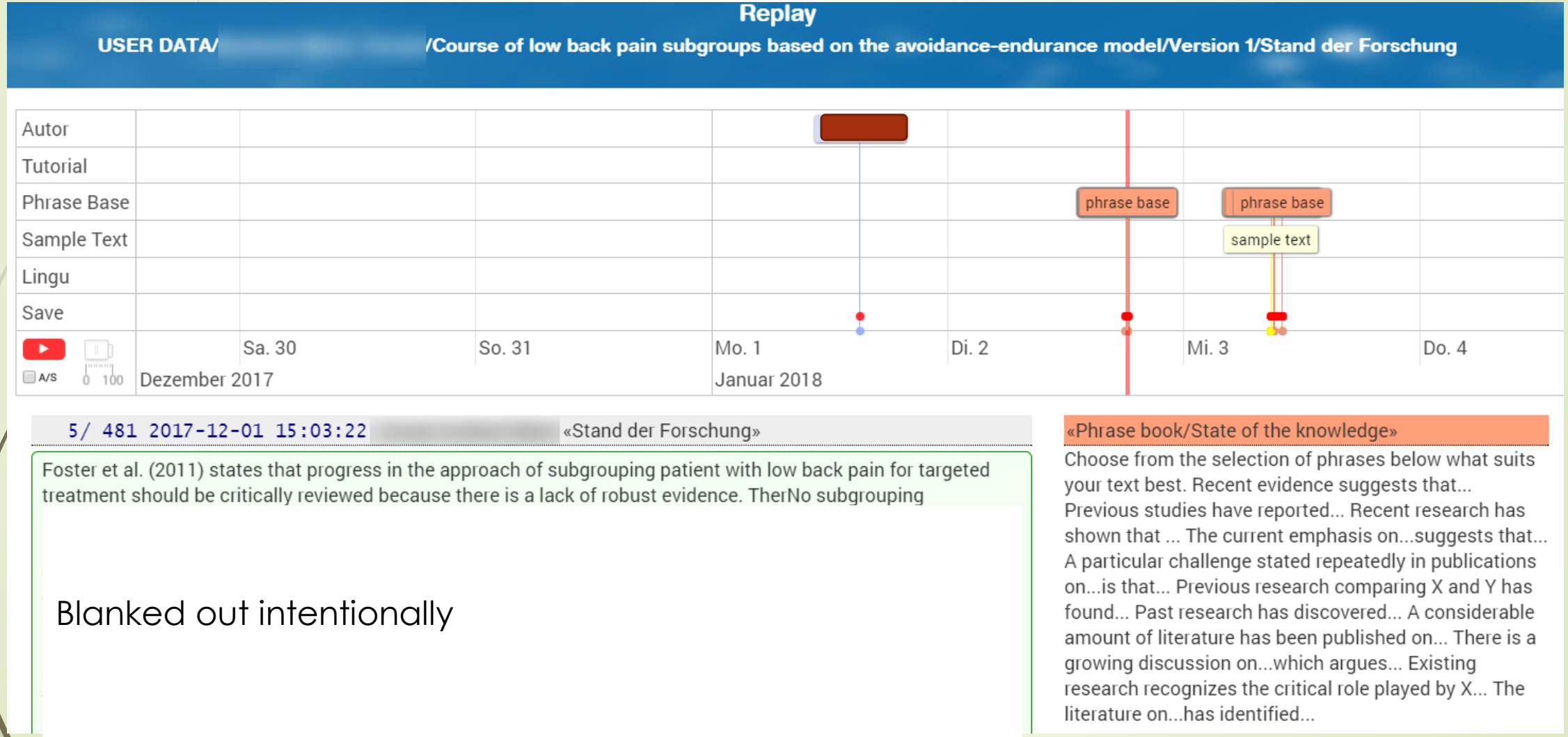
Research Writing Tutor

Types of data recorded by TW

- User identification & sessions
- Login & user navigation
- Creation and changes in projects
- Usage of proposal Wizard/ - editor
- Text production
- Usage of support functions
- Sharing & collaboration on projects



Replay Function Demo



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Types of data recorded by RWT

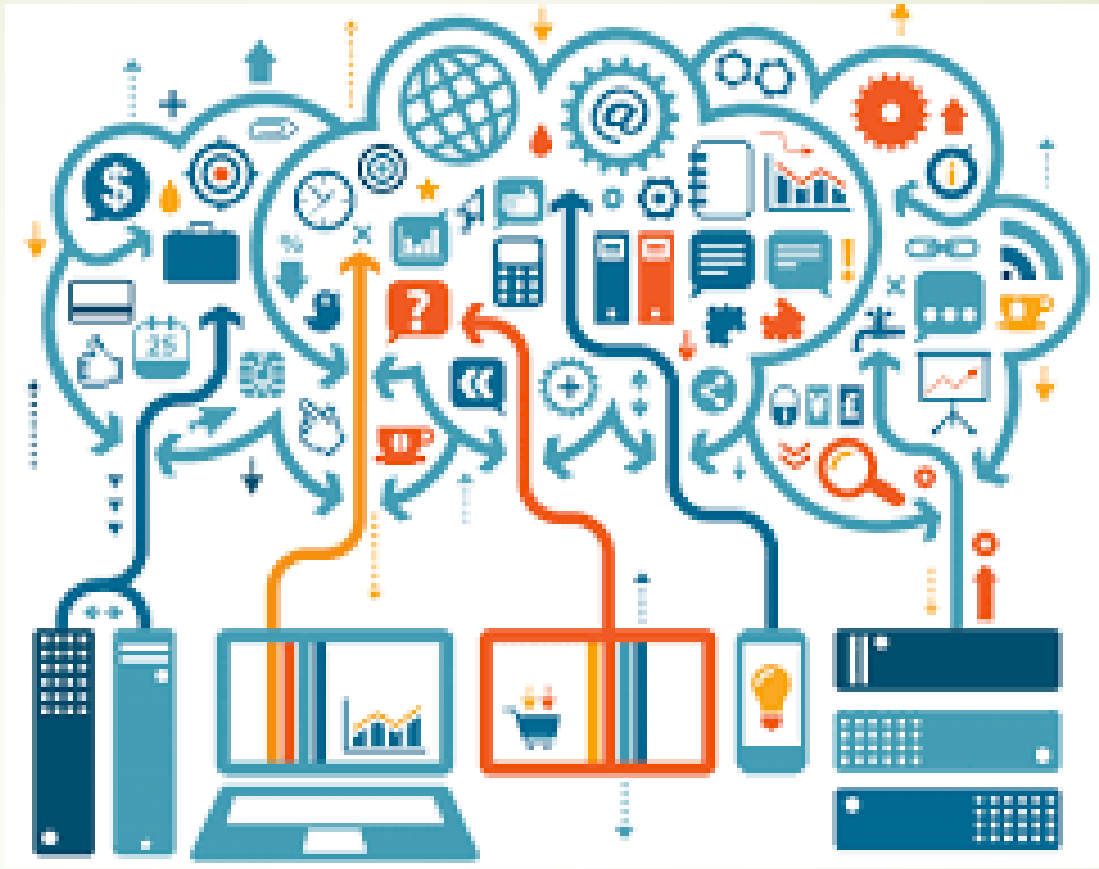
- Demographics (L1, discipline, status, course)
- Interaction logs (clicks & hovers)
  - Move & step level feedback
  - Sentence and section level feedback
  - Scaffolding features
  - ‘Thumbs’
- Student drafts
  - Texts & automated analysis
  - Number of submissions
  - Time of submission
- Revision notes

Example of automated analysis & note-taking

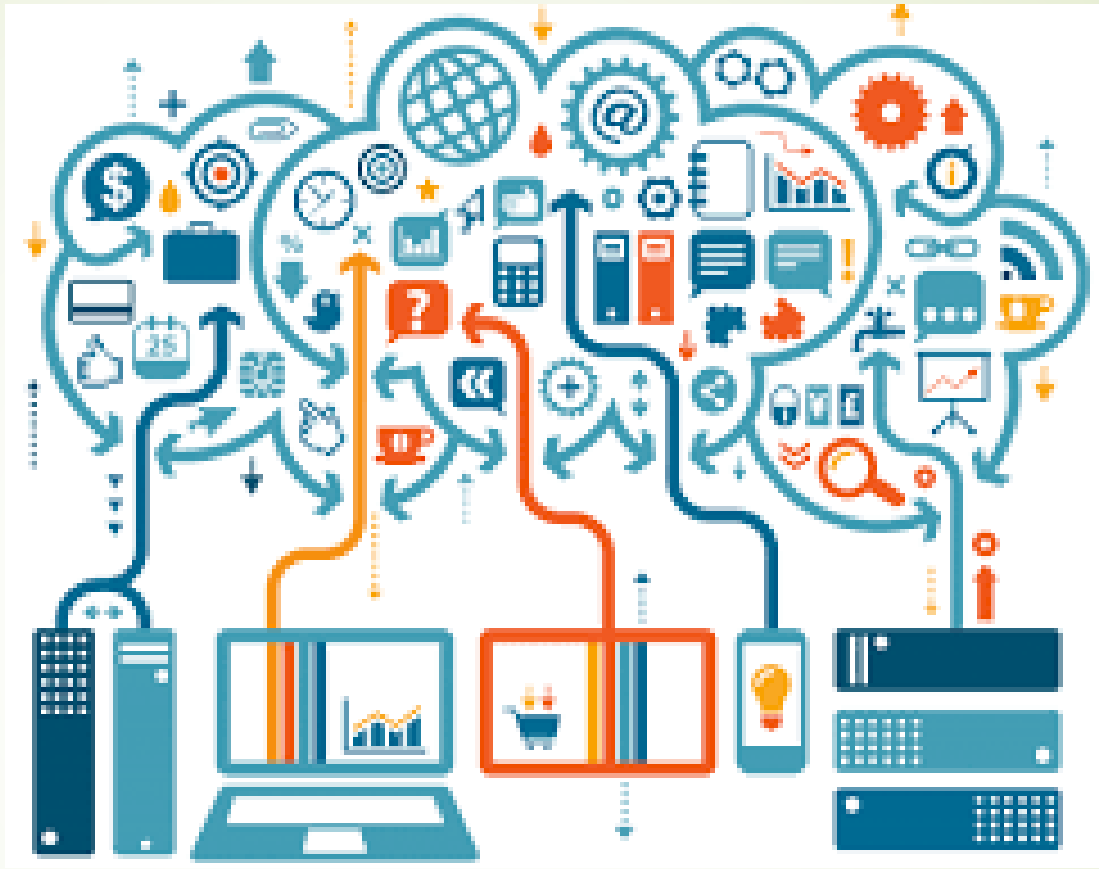
period, individuals are assessing what they want in a long-term romantic partner including figuring out acceptable and unacceptable traits and behaviors, such as intimate partner violence (Arnett 2000; Fincham and Cui 2011; Halpern-Meekin et al. 2013).*[You are likely providing general background.]* ***(Yes.)***However, little is known about the continuity of such relationships across time.*[You are likely indicating a gap.]* ***(True.)***For example, while we know that the mean rates of intimate partner violence tend to decrease over time in the general population, we know less about the continuity of violence across relationships.*[You are likely announcing principle outcomes.]* ***(I'm still talking about the gap here. Maybe I should say "it is known" instead of "we"...)***That is, the literature has focused on changes in violent behaviors occurring within a single romantic relationship over time rather than patterns of intimate partner violence for individuals in sequential relationships (i.e., across different partners).*[You are likely providing general background.]* ***(Partly. Maybe I should put the lack of research investigating patterns first to keep the gap idea flow.)***Such work can provide important insight into intraindividual stability in intimate partner violence (Shortt et al. 2012).*[You are likely reviewing previous research.]* ***(Fine.)***It may be that individuals have continuity in intimate partner violence due to self-selection; individual factors that lead to assortative partnering.*[You are likely proposing general hypotheses.]* ***(Yes.)***Adolescents and adults tend to select partners who are similar to themselves in terms of substance use and antisocial behavior, both of which are predictive of intimate partner violence (Kim and

Building on interdisciplinary perspectives: RQs and research

Data, analysis, theory, practice



- Which data are or should be collected by leveraging writing tools' affordances?



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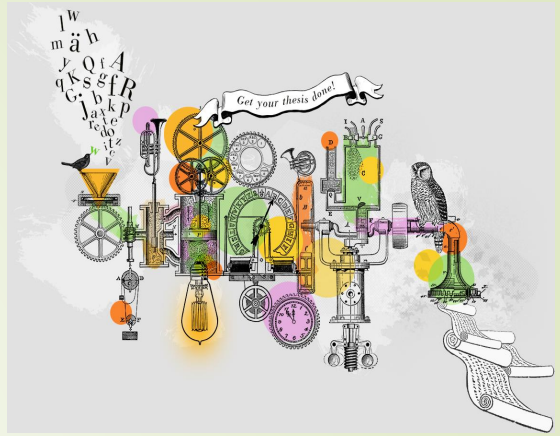
Examples of potential RQs for research with TW



- Usage: When, where, why, why not?
- Effects: On learning, practice, and product (text quality)
- User variables: Different patterns of usage depending on groups, levels of education, disciplines etc.
- Usability and functionality: How users solve problems with TW and use tools
- Understanding: genres, writing process, and feedback
- Implementation: Acceptance by institutional users, barriers to technology integration, unattended consequences
- L1/L2: Different ways of using TW

RQs investigated in research with RWT

- Do DDL learning events enabled by RWT contribute to genre awareness? How? Do DDL learning events enabled by RWT contribute to improvement in genre writing quality? How?
- How do novice writers interact with multi-level rhetorical feedback and scaffolding during revision? In what ways may such interaction create conditions for enhanced metacognitive processes during revision? Does such interaction create conditions for genre appropriate text modifications?
- What is the nature of interactional modifications with RWT? How useful and appropriate is RWT feedback for targeted learners?

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  modifications?
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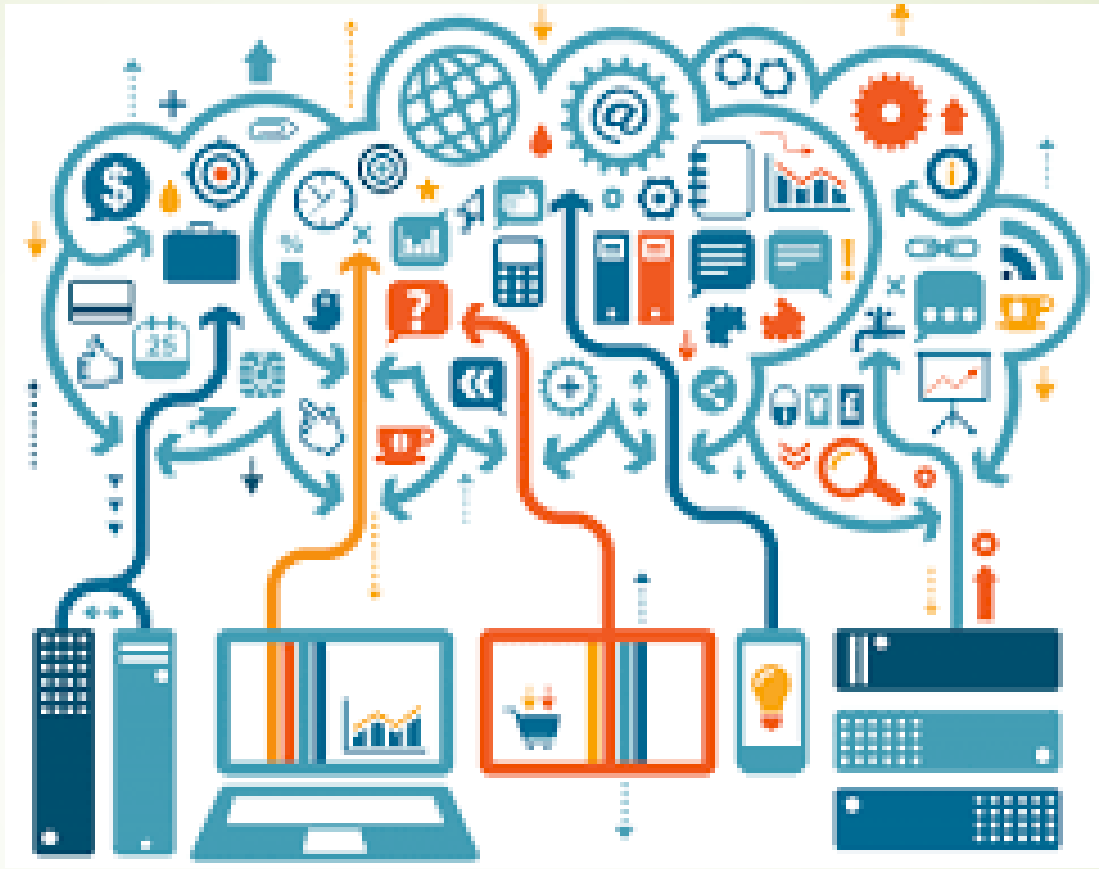
Examined whether and how direct corpus uses afforded by RWT impact novice native and non-native writers' genre learning and writing improvement

Investigated the usefulness of RWT's affordances in the revision process and impact on genre writing

Investigated RWT's learner fit quality



- What pedagogically-relevant research questions could be answered using tool-generated data?

Open discussion

- Which areas could members of the audience research collaboratively in the near future? Connect now!
- What skeptical ideas and constructive criticisms would need to be addressed?
- What does this mean for future tool development?
- How to devise a writing analytics research agenda to inform effective pedagogical practice?

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