Interactive Writing Analytics

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Weak prior knowledge is a major obstacle learners face when they search for and analyze new information to solve information problems. [2] notes experts often reformulate information problems but novices struggle. Software we are developing helps in this process by using ambient data learners produce as they draft essays to recommend sources based on content included in the draft. [3] described the learning analytics process as capturing and reporting data, predicting, acting on predictions and refining reports. Our tool reflects most of these processes: It extracts key terms from resources an instructor assembles and uploads, and continuously scans a learner's evolving essay for terms (capturing data). Based on a graph representation of terms, it recommends resources that focus on information the learner uses in the essay (deployment of action) and recommends sources for extending knowledge (report). Thus, the system tailors information search, organization and use of information relative to the learner's trajectory of growing knowledge. Learning analytics reports our tool generates are scaffolds designed to help learners more effectively solve their information problem by providing substantive guidance to support motivation and cognition that builds toward mastery of the topic's domain [1].

As a learner drafts an essay using the essay tool, the system in real time identifies terms the learner uses and recommends reading resources previously uploaded by the instructor that focus on those terms.

System Components (Figure 1)*:* (a) Essay tool for drafting essay. (b) Terms checklist in the sidebar. (c) List of articles the system recommends. (d) List of paragraphs containing selected terms in a selected article. Until the learner requests it, (d) is hidden and (c) expands to take its space.

Context: Instructor uploads resource articles. The system extracts terms from the reading corpus based on graph centrality measures.

LEARNER: Writes in essay tool (a) → SYSTEM *top of sidebar*: adds new terms learner mentions to checklist (b).

LEARNER: Selects one or more terms in checklist (b) → SYSTEM *bottom of side panel*: populates reading resources with article links containing selected terms (c).

LEARNER: Clicks on an article → SYSTEM *side panel*: clicked article is bolded (c). Panel (d) expands to show paragraphs in the clicked article that contain selected terms.

The system we propose scaffolds the learner's search for information and understanding of terms' interrelations by articulating terms the learner is working on in the draft, with resources compiled by an expert (the instructor). This reduces the learner's cognitive load by eliminating excessive switching between writing and searching. Also, without appropriate prior knowledge, the learner likely struggles to identify useful terms to search and to filter useful resources from less useful ones. Our system provides learners with on-demand support while writing, plus a reading list of validated resources that prompts the learner to analyze the relationships among terms they are using in their writing.
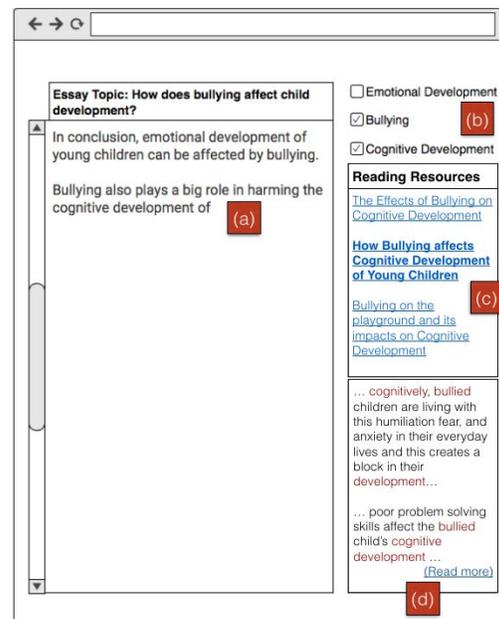
Figure 1: Writing tool and analytics

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