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DIP: Connecting Idea Threads Across Communities for Sustained Knowledge Building

Classroom innovations to cultivate creative work need to engage students in sustained inquiry and progressive discourse by which ideas are continually developed and refined, giving rise to higher-level goals. Fostering sustained inquiry within each community requires a larger social infrastructure that connects the communities into a shared field. This project will test multilevel designs to foster sustained, progressive discourse over time across a network of communities that co-advances a shared base of knowledge, supporting progressive idea improvement in each community. Our recent EXP project created Idea Thread Mapper (ITM) that helps to make collective progress in online discourse visible for reflection and accessible across communities. This new project will expand ITM to provide automated support for students to review idea threads (lines of inquiry) emerged from their ongoing discourse and selectively publish productive idea threads to a cross-community networking platform: Connecting Idea Threads of Youth (CITY). Through design-based studies to be conducted in a network of elementary classrooms studying core scientific topics, we will test a set of pedagogical designs enabled by CITY. The designs will help students to kick off their inquiry by “importing” a set of productive idea threads from previous classrooms, as inquiry starters; to co-review idea threads emerged from their discourse as the inquiry proceeds; to access relevant ideas from other communities, as resource to enrich and catalyze knowledge-building discourse; and to engage in live interaction with international partnering classrooms to investigate problems of common interest (e.g. climate change). Data sources include pre- and post-tests, reflective essays, online discourse, idea threads and related interactions recorded in CITY, classroom videos, and interviews. Student advancement of collective knowledge will be assessed through automated analysis to trace idea contributions within and across the evolving idea threads; content analysis of online discourse focusing on progressive questions and ideas; content analysis of student reflective essays; and social network analysis of who, both individual and community, has viewed and built on/adopted whose ideas. Tracing idea threads and related terms used within each community and across CITY will help elaborate multilevel interactions essential to sustained knowledge building.

Intellectual merit: Enabling sustained, progressive inquiry over time across social levels and communities represents a significant challenge. This research will create CITY as a macro-level online platform for cross-community knowledge building that integrates automated analyses. Instead of single-layer sharing of raw online discussions between different communities, CITY-based designs and studies will elaborate a multilevel emergence approach: Members of each community engage in focused inquiry and contribute to their community's discourse space. As progress is made, they identify major threads of ideas addressing various focal problems, each involving a group of members that is pre-organized or opportunistically formed. Reviewing and clustering and re-conceptualizing the diverse idea threads, as a community, helps to define/redefine the community's goals and diffuse knowledge advances. Productive idea threads are further published to CITY for cross-community sharing and build-on. Analyses of the multilevel interactions will produce conceptual insights and design knowledge needed to foster sustained knowledge building across social levels.

Broader impact: To prepare students for careers in a knowledge-based society, schools need to cultivate collaborative inquiry-based practices by which knowledge-creating communities (R&D teams and networks) expand our society's knowledge. Students need to engage in sustained inquiry and discourse by which ideas are continually developed, refined, and built upon. This sustained, progressive trajectory of inquiry is rare in classrooms, but it is achievable. This project will create technological infrastructures (CITY) and designs to support such sustained trajectory of inquiry in each community and further extend it to an international network of classrooms that co-investigates problems of global importance. CITY will be open source and support interoperation. CITY's growing database of idea threads, each with progressive questions and ideas, will become a helpful resource for new teachers to understand and facilitate students' disciplinary thinking and for diverse students to apprentice into collaborative knowledge building practices that are essential to 21st century careers.