Using Temporal Analytics to Track Idea Growth and Obsolescence in a Knowledge Community and Inquiry Approach to Elementary Astronomy

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Introduction

In this practitioner presentation, we propose a possible application for the use of temporal analytics in an elementary science classroom that has adopted a *Knowledge Community and Inquiry* approach [1, 2] to a 9-week curriculum unit on astronomy. We describe a multi-phase curricular script that includes activities conducted using an online note-writing platform called “Common Knowledge” [3]. In highlighting the transient nature of students’ notes as they progress from one phase of inquiry to the next, we suggest that temporal analytic tools would be beneficial in tracing the uptake and/or obsolescence of students’ ideas within a knowledge community. Design considerations related to the granularity of student interactions in a knowledge community (e.g. individuals, small groups, whole class) are also presented.

Research Context and Participants

We conducted a 9-week curriculum intervention in two grade 5/6 classrooms (n=46) at a local elementary school. Students investigated topics related to astronomy using a collective inquiry model called *Knowledge Community and Inquiry* (KCI) [1, 2]. Recent KCI research has sought to move beyond the realm of computer-based learning environments by leveraging advances in ubiquitous computing, situated within physical classroom spaces, to support new forms of collaborative interaction. For example, large displays, often ambient in function (i.e., passively present “in case” participants can make use of them), serve to reflect the state of progress within the community, including emergent themes, patterns or gaps in knowledge that remain to be addressed. These tools and materials complement the pedagogical aspects of the curriculum, providing a source of productive feedback and support to students and teachers as they engage in collective inquiry.

Conceptualization of Temporality

The enactment of this 9-week astronomy curriculum took place over three distinct phases: The “Brainstorm Phase,” the “Proposal Phase,” and the “Investigation Phase” [4]. An important temporal aspect of this design concerns the ways that the ideas that students generated in the brainstorm phase were carried forward in time through the subsequent phases of inquiry. Exploring and understanding the patterns by which ideas ‘grew’ or were rendered obsolete as students progressed through each inquiry phase is something that would serve to inform both practitioners and researchers in future iterations of KCI curricula.

Burning Question 1: How can we capture and aggregate student ideas in such a way that fosters a sense of *community progress* and serves the targeted learning goals?

Burning Question 2: What analytic information does the teacher need, and when, to help guide the progression of inquiry?

Granularity of Analysis

The efforts of a knowledge community require analyses that consider individual (I), small group (G) and whole class (C) contributions. Therefore, of additional importance to this work is the notion of *orchestrational planes* [5], which refers to the ideas and activities that are contributed at each IGC level. Because information generated from each orchestrational plane influences the activities, materials, and interactions that occur in another, it will be important to consider the design of analytic supports that facilitate these transitions.

Burning Question 3: How do transitions between individual, small group, and whole class activities allow for dissemination and growth of ideas within a knowledge community?

Challenges and Barriers to Implementing LA

The ability to capture and transcribe clear audio/video data within a classroom of 20+ kids over a 9-week period is prohibitive in terms of time and equipment needed. While the content that students contributed to the CK database over each inquiry phase represents good *outcome* data, it is difficult to capture and code the collaborative *process* data that occurs surrounding this content.

REFERENCES

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