LEARNING ANALYTICS TO SUPPORT STUDENT IN THE CONTEXT OF MATHEMATICAL INQUIRY

Michal Yerushalmy
University of Haifa, Israel

Research offers evidence that interactive technology designed purposefully to foster links among information acts as an important tool for supporting guided inquiry. Schwartz (1989) describes the genre of such exploratory environments, where students can reflect and probe on their own understanding of a domain to be an "intellectual mirror". As students try out examples, view patterns, generalize and conjecture, they can reflect on their actions through what can be seen in the mirror. Teachers guide students by offering tasks and by providing new voices and ideas that introduce conflict, disagreements, and disequilibrium that can create awareness of new mathematical knowledge. Within this context, could there be a role for automated analysis of the mathematics in students' work by analyzing and offering new voices and ideas for learning in the form of learning analytics?

Learning analytics are traditionally viewed as collecting, measuring, analyzing and reporting data about learners and their context, to teachers. The many aspects that the data consists of are usually non content specific, thus can address aspects related to the learner across many contexts for purposes of understanding and optimizing learning. To directly support students, recently researchers have studied how technology might provide feedback -- mainly verification information to students' work on close items (Rochelle, Feng, Murphy & Mason, 2016) which might be described as content specific elaborated feedback. In order for technology to be part of elaborated feedback interactions (Carless, Bridges, Chan & Glofcheski, 2017) within mathematical inquiry, we develop the STEP platform where tasks that are based on interactive diagrams designed to require submissions in the form of self-constructed example-spaces (Olsher, Yerushalmy & Chazan 2016). The focus of this talk is the challenge of understanding how topic-specific learning analytics, provided to the student, might facilitate the student's inquiry.

We explore what information might be produced through automatic analysis of a student's work and how it might be communicated to the students. To present the "what", I will demonstrate and discuss the art and craft of assessment activity and tasks. The "how" part discusses how online reflection that includes information in words, that goes beyond mirroring a student's actions through linked information and includes the "mirror's voice" on the subject matter, might support student learning. I ask: what are the design principles of content specific feedback that could facilitate self-reflective discourse stimulated by currently unfamiliar use of words in the elaborated feedback. This talk's analysis of learner's engagements with different modes and aspects of automatically provided content specific analytics, is intended to stimulate discussion of the roles of automatic feedback being routinely part of the mathematical inquiry classroom.

References

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