Curriculum-based lexical analysis for informing pedagogical decision-making, scaffolding and assessment processes

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(1) The issue/problem

Automatic but reliable generation of data regarding students' work in Knowledge Forum (KF) is a growing expectation. In the Quebec Networked Schools (QNS) initiative, coordinators, pedagogical advisors, teachers, and school administrators have wanted to link students' work on KF with the requirements of the curriculum. Surpassing the curriculum is seen as a second-level goal.

In an attempt to provide data informing how students make use of notions and concepts that the curriculum is putting forward, we are designing a set of lexical tools derived from primary and secondary school curricula.

(2) Major goals: what do you hope to achieve/accomplish?

1) To assist teachers that have to demonstrate that students are working on aspects of the curriculum.
2) To inform teacher decision-making regarding students' work on KF.
3) To inform students on the notions and concepts they did not use regarding a specific "universe".
4) To inform pedagogical facilitators' scaffolding when they work with teachers.

(3) How the research addresses the issue/problem

Our technological development added a lexical analysis capability to the current Word Cloud analytic tool of KF 6.

So far, we have created lexicons for the following subject matters: Science and Technology (n=677), Social Universe (n=531) and Ethics (n=1020), one lexicon for each of their subdivision, covering both primary and secondary school curricula. To this end, we designed a file (data format) to carry Quebec curriculum data according to our needs, but one that could scale to other curricula around the world.

We analyzed, on a yearly basis, the textual content of all students' contributions over the last three school years (September 2014 to April 2017), a corpus of about 56,000 contributions.

(4) Advances—what has been learned to-date

Over the last three school years, 72% of the Science and technology (ST), 66% of the Social studies (SS), and 49% of Ethics curricular concepts for primary school have been found in the QNS knowledge building discourse. The generated word clouds and expression occurrence statistics facilitate the identification of the most discussed notions and concepts by the learners such as "food, animals, earth, wood, day, color, influence, production and robots" for ST and "time, animals, holiday, wood, population, religion and power" for SS.

Inversely, this analysis also put the light on less and non-discussed notions and concepts. This information, interpreted in a positive way, is meant to inform QNS facilitators, pedagogical advisors and teachers aiming at students' deeper understanding of a theme, a question or a problem while covering, if not surpassing the curriculum.

When linked to learning goals and used in assessment tools, at both individual and collective level, the discussed and non-discussed elements of curricular lexicons are meant to inform pedagogical decision-making.

(5) Next steps

- Refine lexicons;
- Develop a feature that would allow a student or a group, including the teacher, to associate lexicons to periods of time;
- Study the uses of these tools in relation to knowledge building practices.