Mobilizing Critical & Altruistic Science Education

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Overview. Research described here was meant to explore factors that may work in some unison to encourage and enable more science educators to educate students about influences of powerful people (e.g., financiers) and groups (e.g., corporations, governments, trade organizations, think tanks, etc.) on fields of science and technology (etcetera) that appear to be severely compromising wellbeing of individuals, societies and environments - such as in terms of devastating climate disruption and species losses - and to develop and implement socio-political actions to address harms they perceive in such cases. Gradually, since 2006, the 'STEPWISE' (www.stepwiser.ca) pedagogical framework in Figure 1 has enabled many students to achieve outcomes like those above - such as to produce a more socially just and ecologically sustainable shampoo. Many teachers seem to struggle, however, to promote such action-oriented science education - with successes being largely confined to relatively rare cases in which several entities - e.g., local curricula; administrators; colleagues; resources; and, teacher perspectives - co-support each other.

Research Context and Methods. To better understand roles of networks of co-supporting entities (*dispositifs* [Foucault, 2008]) in mobilization of relatively non-traditional educational approaches like STEPWISE, we conducted a comparative case study of science teachers' promotion of research-informed and negotiated action ('RiNA') projects (Figure 1) in two suburban secondary schools within the same school district. In both cases, teachers were assisted by the same instructional coach (a school district employee) who also encouraged some students to write reports of their projects for the non-refereed journal, *JASTE* (bit.ly/2JGIgtf). Qualitative data, including samples of teachers' pedagogical materials, students' action project reports, actor-network maps of possible dispositifs influencing project implementation, and interviews of teachers and students were analyzed using constructivism-informed constant comparative methods (Charmaz, 2014).

Results and Discussion. Students in both schools studied here did generate research-informed and negotiated actions to address harms they perceived in relationships among fields of science and technology and societies and environments (STSE). Teachers' 'successes' in promoting such projects were not overly surprising - given, for example, their enthusiasm for student actions on controversies linked to science and technology, alignment of local curricula with RiNA projects, at least tacit support from administrators and colleagues, mentoring from a local 'curriculum coach' who had implemented STEPWISE in his past teaching, and availability of relevant sample teaching/learning resources.

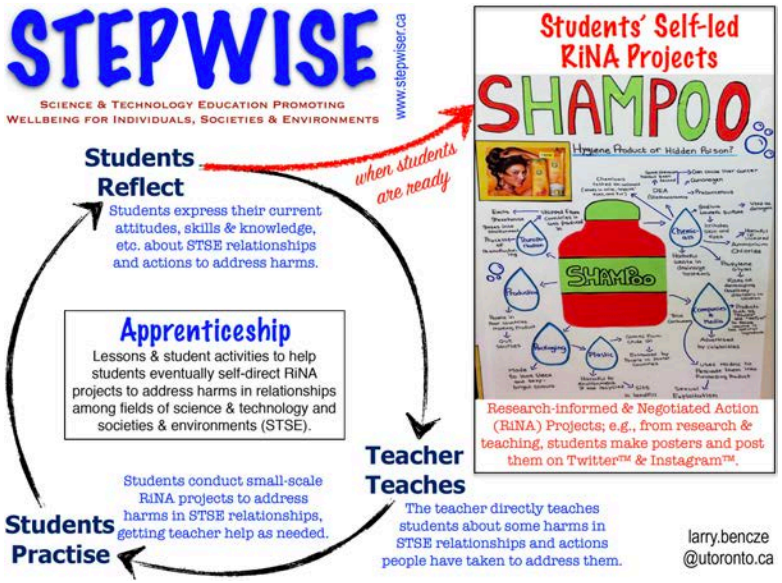

Figure 1: STEPWISE Pedagogical Schema.

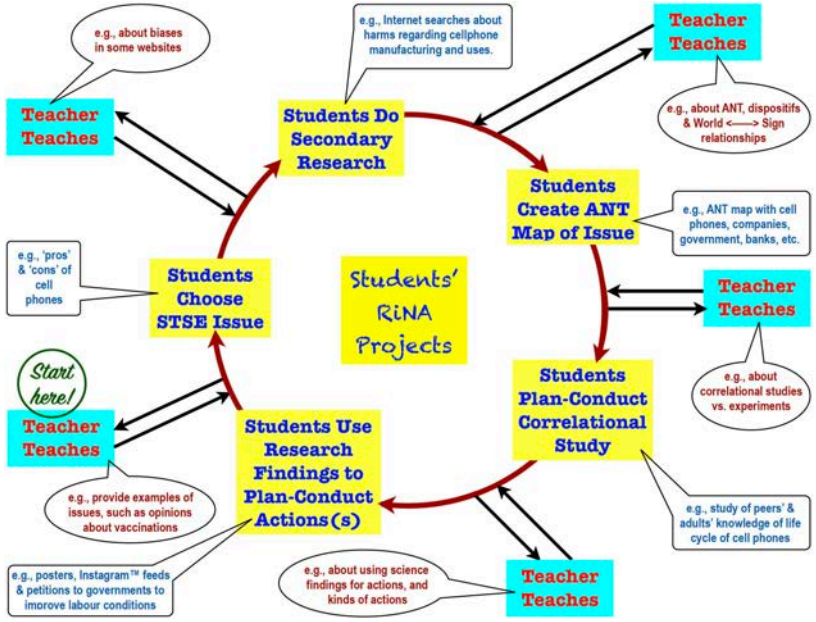

Figure 2: Using RiNA Projects for Inquiry-based Learning.

Although student RiNA projects in both schools were broadly similar, including in their tendencies to use educational actions like videos, brochures and posters, research and, to some extent, actions were much more 'networked' (i.e., accommodating actor-network theory) in school 'B' than in school 'A.'

In light of *actor-network theory* (ANT) (Latour, 2005), which posits many unpredictable relationships, it is difficult to determine reasons for such differences in the two contexts (dispositifs). However, while both teachers did not generally use pedagogical schema in Figure 1 to promote RiNA projects, opting to integrate them as forms of inquiry-based learning (IBL) (see Figure 2), the nature of teachers' choices for the "Teacher Teaches" phases were quite different in the two contexts. Teachers in school 'A' tended to use *reactive* approaches - such as asking small student groups different procedural questions - while the teacher in school 'B' used more *proactive* approaches, choosing to teach all students about such concepts as: ANT, dispositifs and semiotics associated with consumerism. While reasons for these differences are complex, the highly 'experimental' approach of the school 'B' teacher seemed significant.

Summary and Conclusions. Although it may be encouraging that teachers can promote critical RiNA projects, doing so via possibly discriminatory IBL seems problematic (Bencze & Alsop, 2009). Nevertheless, perhaps in pro-capitalist science education contexts this is *pragmatic*. Some teachers, however, appear able to innovate IBL - as *bricoleurs* - to optimize critical and activist goals.

References

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