IMAGINGSoTL

Catalyzing Conversations: Motivation for and Lessons Learned While Developing Critical Thinking Skills in the Post-Truth Era

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ABSTRACT

The scholarship of teaching and learning (SoTL) is uniquely poised to address one of the greatest challenges in the "post-truth era" by catalyzing conversations that promote the effective development of critical thinking skills necessary for identifying and avoiding conspiracy theories. An interdisciplinary team designed curriculum-based case studies, modules, and activities for kindergarten to Grade 12 (K–12) classes to promote vaccine safety. This reflective paper describes this program design, our team's motivation for this study, and the lessons we learned. Three outcomes include i) that our team was motivated by the desire to contribute to the safe navigation through the COVID-19 pandemic, ii) that the research assistants articulated their own emerging professional identities as partners on our team, and iii) that we all learned from the other associated disciplines. Lessons learned from developing this Building Resistance to Vaccine Misinformation (BVRM) program and future related research are steps in the right direction to prepare for the next pandemic.

Keywords: critical thinking, misinformation, Students as Partners (SaP), motivation, lessons learned

We're not just fighting an epidemic; we are fighting an infodemic.

—Dr. Tedros Adhanom Ghebreyesus, Director of the World Health Organization

INTRODUCTION

The scholarship of teaching and learning (SoTL) is uniquely poised to catalyze conversations that promote the effective development of the critical thinking (CT) skills necessary for identifying and avoiding misinformation, disinformation, and conspiracy theories in the "post-truth era." Misinformation is false information presented as fact, while disinformation is when that misinformation is deliberately spread to influence public opinion (Gebel, 2021). One example is disinformation spread regarding the safety of vaccines, sometimes by individuals hoping to benefit financially. In today's "post-truth era," multidisciplinary approaches are needed to protect accurate information, such as in the program planning presented here.

Over the last dozen years, critical thinking has received a great deal of attention from SoTL scholars (e.g. Wang, 2017; Heft & Scharff, 2017; Mulnix, 2012), with significant debate about the definition, research on how best to teach critical thinking, and various assessment strategies to illustrate the development of CT skills. Lewis and Smith (1993) described higher-order thinking as an overarching concept that includes problem solving as well as critical and creative thinking, while Bailin et al. (1999) suggested that problem solving could be visualized as an arena where both creative and critical thinking occur. Paul and Elder (2008) defined creative thinking as a process of creating and critical thinking as a process of evaluating. They suggested that, although these can be separated artificially, in a practical setting they are interwoven.

In this article, we outline the design of our Building Resistance to Vaccine Misinformation (BRVM) program, which was developed to improve critical thinking about vaccines. We also report the motivation, learning experiences, and observations of our team throughout the development of this interdisciplinary BRVM program. Our team consists of professors in the disciplines of science, science education, teacher education, and public health nursing, an undergraduate student in teacher education, a recent graduate from biology, and a recent graduate from nursing. Our work aligns with SoTL because the undergraduate research assistants are co-authors for this paper. These research assistants are full research partners for this program, and we are reporting on our shared experience while developing the BRVM program.

CHALLENG BACKGROUND

Harnad (1991) defined four stages of knowledge production with the invention of i) the Internet (started in the late 1960s), ii) printing (over 500 years), iii) writing (several

thousands of years), and iv) language (several thousands of years by linguistic definition). Between the 1970s and 1990s, the impact of the Internet was not significant; however, by 2004, Keyes had coined the term "post-truth era" to label the deception that had permeated all levels of contemporary life.

The COVID-19 pandemic has demonstrated the need for a well-informed populace that recognizes science as a public good and understands the value of public health measures. Despite being one of the first countries to begin a mass vaccination campaign, the United States, with more than 700,000 COVID deaths by the end of September 2021 (Johns Hopkins University & Medicine, 2021), illustrates what happens when politics interfere in the response to a pandemic. While Canada has achieved greater vaccination rates and adherence to public health guidelines, as well as observing a lower fatality rate than the United States, multiple anti-mask and anti-vaccination protests occurred in Alberta (Graveland, 2021; Rieger, 2021). The fourth wave during fall 2021 in Alberta was driven by the Delta variant, with 90% of cases in the non-vaccinated (Pelly, 2021). On September 26, 2021, the number of active COVID cases in Alberta was over 20,000, which was more than the other three largest provinces combined. At that time, BC, Ontario, and Quebec had a total of just less than 19,000 cases (COVID-19 Canada).

The 2018 3M survey revealed that science skepticism across Canada increased during the previous year from 25% to 33%. Forty-four percent of respondents believed that scientists are elitist while 30% believed science only when the findings aligned with their personal beliefs, which suggests a lack of understanding of the scientific process (Webb, 2019). The scientific method does not include believing science that only aligns with personal beliefs. Skepticism, perception of scientific elitism, and disregard for science on the basis of personal beliefs have contributed to the present-day "infodemic" (Ghebreyesus, 2020, as cited in Barzilai & Chinn, 2020, p.107). Allchin (2021) defined "science con artists" as those who manipulate these tendencies towards skepticism using style to appear more trustworthy than the actual relevant scientific experts (p. 11). Science con artists also disguise their conspiracy theories through the use of intimidating jargon, exploitation of social emotions, manufacturing doubt, and flooding all media. Allchin pointed out that those who speak out against vaccines use these strategies to encourage the skeptical population to trust the "wrong science," described as the "infodemic" by Ghebreyesus. Höttecke and Allchin (2020) outlined that critical thinking about media literacy with communication and social practices that develop credibility and trust are now needed for "whole science" education.

POSSIBLE SOLUTIONS

Education, as studied through SoTL, is an essential component for identifying misinformation (Barzilai & Chinn, 2020; Hopf et al., 2019). We are not aware of many widely available education methods that humanize scientists or engages children with hands-on, place- and curriculum-based citizen-science projects, all while guiding the development of CT skills. One strategy that has been tried is the intervention by Andı and Akesson (2021) that used a "social norm-based nudge" to inform online participants about false information

in articles. As a result of identifying this false information, 46% of participants were "nudged" to not share that article. One strategy for nudging immunity against misinformation is using components of a conspiracy theory that are false and demonstrating why they are wrong. This method helps to build resistance, or to "inoculate," by breaking down individual components against the overall conspiracy theory. For example, van den Linden and Roozenbeek (2019) developed "Bad News," an online browser game that inoculates participants against fake news by having the participants act as tycoons using six common misinformation strategies to gain as many followers as possible. Nearly 15,000 participants, representing various educational levels, political ideologies, and ages, significantly downgraded the reliability of fake headlines after playing the game (Roozenbeek et al., 2020; van den Linden & Roozenbeek, 2019).

While we have started the conversation to pilot "Bad News" in Canadian classrooms, we concur with Roozenbeek et al.'s (2020) suggestion that such inoculation interventions need to be combined with other approaches to support the evaluation of fake versus authentic information (Nygren et al., 2019), sound civic reasoning (McGrew, 2020), and critical thinking (Lutzke et al., 2019). Here we propose that our Community Science Liaison (CSL) program is an effective strategy that will guide the CT skills necessary to win the battle against misinformation, engage kindergarten to Grade 12 (K–12) students in science, and make scientists more approachable.

STUDENTS AS PARTNERS AND MOTIVATION FOR SOTL RESEARCH

Felton (2013) first stated that "good practice requires that inquiry into learning be conducted in partnership with students" (p. 123). Healey et al. (2014) outlined the framework for partnership, and by 2017, the first volume of the *International Journal for Students as Partners* was published. Healey et al.'s 2014 model starts with an outer ring that emphasizes the importance of treating students as partners to encourage their engagement. Inside this ring, four overlapping circles include i) learning, teaching, and assessment, ii) subject-based research and inquiry, iii) scholarship of teaching and learning, and iv) curriculum design and pedagogic consultancy (p. 25). Broadly, full partnership may not be possible in all SoTL projects, but partnership develops a more authentic co-inquiry and offers true collaborative opportunities to understanding student learning while critically reflecting on assumptions about teaching and learning (Healey et al., 2014; Felton, 2013).

The BRVM program uses curriculum-based modules, activities, and case studies to develop the CT skills in K–12 classrooms necessary for students to identify and avoid misinformation, disinformation, and conspiracy theories promoted by anti-vaccine groups such as the "Disinformation Dozen." These twelve individuals actively use disinformation to promote fear about vaccines to benefit themselves financially through the promotion of their never-proven, never-trialed alternative treatments, workshops, videos, and books (Center for Countering Digital Hate, 2021). One significant benefit of the BRVM team being comprised of people from numerous disciplines was the complimentary skill set that each

member brought to the table and the interdisciplinary learning that we all engaged in. The reciprocal learning in SoTL, particularly with students as partners, is reflected in our experiences of learning from each other and underscores the benefits of SoTL research. The BRVM interdisciplinary approach is required to dismantle the charismatic approach by groups such as the "Disinformation Dozen," which employ strategies that guide skeptics to the "wrong science" (Allchin, 2020), resulting in an "infodemic" (Ghebreyesus, 2020, as cited in Barzilai & Chinn, 2022, p. 107).

While providing a literature review that examined the motivation for SoTL research, Happel and Song (2020) noted a lack of literature that describes faculty motivations for starting and continuing with SoTL research. Here we examine the personal motivation factors for community engagement described by Wade and Demb (2009). In their analysis of 28 survey responses with follow-up interviews, Happel and Song (2020) noted that SoTL experts more commonly stated that they were motivated by their scholarship contributions along with their passion for teaching. SoTL novices usually expressed their desire to learn new analytical tools and research skills. These findings were slightly different from the findings of Acai et al. (2017), who determined that graduate student motivations for SoTL research included publications, gaining research experience, and financial support, while faculty reported both intrinsic aspects of motivation, such as partnership, and extrinsic motivators of "academic currency" for funding and promotion, additional human resources, and publications. Our findings regarding motivation for participating in the BRVM study differ from these more traditional SoTL studies in part because our team members were motivated by the desire to do something positive to help humanity safely navigate the COVID-19 pandemic.

METHODS AND PROGRAM DESIGN

This reflective paper outlines the collaborative effort of the eight co-authors, using SoTL literature to form the foundation of the strategies that describe the design of the Community Science Liaison (CSL) and BRVM programs, which have been constructed to promote the development of CT skills to combat misinformation. The quotations provided below summarize written responses from the co-authors as a reflective first step with further evaluative work planned to assess the impacts of the BRVM program, which will require ethics clearance. In the following sections, we describe our motivation, lessons learned, and observations while our team designed the BVRM components over the past year.

Community Science Liaison Program

The CSL program (Boggs et al., 2021) is designed to transform Canadian science, technology, engineering, and mathematics (STEM) outreach practices by guiding long-term and two-way relationships between K–12 schools and scientists. Educating entire communities can be achieved by educating K–12 children (Flowers, 2010). Community Science Liaisons (CSLs), most of whom are teachers, are being recruited from Canadian communities. These CSLs connect scientists working in the region with K–12 schools in the

respective communities. Scientists provide mentorship and guidance in the development and delivery of place- and curriculum-based citizen-science research projects, while the CSLs provide connections with the communities, curriculum expertise, and age-appropriate delivery. The first CSL training workshop was held at a scientific conference in Nanaimo, in April 2022, and future CSL training workshops will be held during annual CSL conferences. Connections created during these workshops are critical for building trust and respect between the CSLs and scientists who do not normally interact. Scientific lecture tours will develop two-way authentic relationships with school groups, starting in the classrooms as the scientists learn about the school group citizen-science projects before they deliver general interest talks to the school and community.

Such experiences are empowering and engaging for children as they contribute towards improved understanding of the science in their backyards, while the children's energy and enthusiasm rejuvenates the scientists' passion for their disciplines. Teachers value these programs because they provide positive experiential learning opportunities that link the curriculum to the real world.

Building Resistance to Vaccine Misinformation (BRVM): CSL Citizen-Science Project

The BRVM program was designed in response to a call for proposals from the National Science and Engineering Research Council of Canada (NSERC) PromoScience programs, in early 2021, for scientific outreach and education programs that promote vaccine safety. This call for proposals was released when the federal government recognized the need to promote vaccine safety in response to the growing anti-vaccine movement. An interdisciplinary approach to this challenge was needed due to the complexity of vaccine hesitancy and anti-vaccination sentiment. We built a team of professors from the Education, Science, Science Communicators, and Public Health Nursing programs. We also hired three research assistants (Neild, now a fourth-year student in Education; Cuncannon, a recent graduate from Nursing; and Lazar, a recent graduate from Biology).

This BRVM program will involve "inoculating" school-aged children across western Canada to reduce vaccine hesitancy and build resistance to "anti-vaccine" mindsets. In math classes, students may explore communicable disease spread and appraise the benefits and risks associated with vaccine-preventable diseases compared to vaccines. For example, they may compare the risk of thrombosis (blood clots) in the general population, in those who contract the SARS-CoV-2 virus, and in those who are vaccinated and subsequently develop vaccine-induced immune thrombotic thrombocytopenia (Pai et al., 2021). In humanities classes, activities may range from exploring media and information literacy to the differential distribution and experience of health. In science classes, students may explore the science of vaccines and public health achievements. In addition, activities may span classes, such as case studies that explore ethics and conflicts of interest, scientific rigor and integrity, and study design. Our teams are examining social media platforms for vaccine misinformation, which can then be broken down into age-appropriate small bits to examine in the classrooms. Using these small bits ("inoculation"), students will be guided to identify

reliable sources of information versus non-reliable sources that promote misinformation, thereby developing a critical awareness of misinformation.

Our BRVM team met weekly to brainstorm and develop materials for K–12 classrooms. Lazar, the biology research assistant, used his artistic talents to design the BRVM logo. Cuncannon, the nursing research assistant, developed a case study from the retracted Wakefield study that had falsely suggested an association between the measles vaccine and autism. Much of the modern anti-vaccination movement stems from the Wakefield study, and limited awareness exists of Wakefield's scientific misconduct (Godlee et al., 2011). One of the most powerful and important voices on our team turned out to be Neild, a fourth-year education student, who does not have a scientific background. He provided our team with a reality check for our messaging and recruited some of his education cohort to help beta test the vaccine game that could be used in elementary health or gym classes. Neild also contributed his understanding of the Alberta elementary and junior high school curriculum to identify entry points for the modules, activities, and case studies into courses such as Social Studies. Engaging in this process helped us to identify significant gaps in the Albertan/Canadian curriculum regarding vaccines, which are only taught in Grade 5 (or 6) Health and Grade 12 Biology. Neild designed term projects that could be adapted for multiple grades that bridge between math, science, and social studies.

Effectiveness of the CSL approach: Whitehorse Grade 11 Experiential Science Program

In programs independent of CSL/BRVM programs, children are recognized as excellent advocates in their communities for programs ranging from anti-smoking campaigns (Schuck et al., 2013) to environmental awareness (Aguilar-Jurado et al., 2019). Place- and curriculum-based citizen-science projects were demonstrated by the Grade 11 Experiential Science Program, implemented in Whitehorse, Yukon, to be effective at engaging high school students in STEM disciplines. Longitudinal tracking of students from this program demonstrated this engagement through 100% graduation and 60% pursuing post-secondary STEM careers (O'Connor & Sharp, 2013). The CSL program is expanding on the success of this Grade 11 Experiential Science program by including other grades and communities across western Canada. The CSL structure itself is designed to facilitate scientists' connections with communities so that scientists do not need to invest their own time and funds to establish these relationships. These connections will work towards humanizing scientists, which will break down the impression that scientists are elitists while making these scientists household names. "Inoculation" techniques in K–12 classes will help the youth become the leaders of tomorrow in the battle against "fake news," misinformation, and conspiracy theories. These techniques should also work towards breaking down anti-vaccination conspiracy theories, which will be assessed once ethics clearance is granted.

DISCUSSION

In this section, we explore the themes that represent aspects of this project, including personal motivation, education value, and professional development. Quotations presented here are from the eight co-authors of this paper and describe our experiences during the design of the BRVM program. Our team includes undergraduate students and recent graduates as full partners in the research and development process as per the good SoTL practices suggested by Felten (2013).

Personal Motivation

A common motivation throughout our team was the desire to promote accuracy and truth over disinformation and conspiracy theories to benefit society. Boggs (geology professor, scientific outreach) coordinated the BRVM program because of a desire to promote truth over disinformation and conspiracy theories emerging from the COVID-19 pandemic. Dolphin (geoscience education professor) commented, "I thought it would be important to use my knowledge of teaching and learning in a different venue than I usually do for the purpose of a more immediate impact on society." O'Connor (science-based education professor) stated that he was "alarmed with recent political climate and campaigns of misinformation seen in both US and Canada." Neild (fourth-year student teacher with a social science minor) stated,

> The situation that the world was in, especially Alberta and Canada, showed me how important this project is and will be. I was also excited about the concept of working with a variety of people from different backgrounds and the challenge of seeing this issue from a variety of perspectives.

The public health nursing team members emphasized the importance of bridging between nursing and education because of the value of health education in health promotion. Fleming (nursing instructor) stated that "this project was important to me as misinformation in the age of the Internet has played a significant role in creating vaccine hesitancy and aversion." Cuncannon (recent nursing graduate) provided,

> Science education programs that promote the safety and effectiveness of vaccines are timely given the COVID-19 pandemic and the rise in vaccine misinformation; however, these programs have continual relevance. Although infectious diseases have afflicted humankind for millennia, advancements in public health, such as vaccination, have dramatically reduced transmission as well as the associated mortality and morbidity of these diseases.

Dosani, a professor in the School of Nursing and Midwifery, indicated,

> This initiative is important because it enables us to target our interventions upstream. This way, we can target the issue of combatting misinformation before students begin to internalize it. The importance of vaccination can certainly be taught effectively in the K–12 curriculum, and one unanticipated

> outcome could be discussions carrying over into the home environment where children could actually then "teach" this information to their parents. This form of knowledge translation could be very powerful indeed.

Other team members' motivations followed similar themes. Our science education professor (O'Connor) was motivated due to being "concerned by the increase of misinformation and perception by many in the public of what is 'truth,' 'facts,' 'news.' As educators, we need to teach the young to question and be informed when making choices/decisions/claims." This comment speaks to one of the major motivations behind the entire CSL program. The fourth-year education student (Neild) spoke from a position that likely represents many education students:

> As an educator, I genuinely want to believe that education can create positive social change. Hopefully, with the eventual data from this project, we can prove this as a tool against vaccine misinformation and as a way to stop misinformation or create positive change.

Professional Identities

One unexpected outcome from this study was the expression of emerging professional identities from the partner research assistants. Cunannon, the recent graduate from the Nursing program, also voiced concern about the need to protect the public health care system:

> My personal motivation to be part of this project is largely to protect our health care systems as well as the communities that I am part of. Canada's modern health care systems have had to contend with significant human resource and capacity pressures like never before during each successive wave of the COVID-19 pandemic. COVID-19 vaccines have been shown to be strongly protective against severe outcomes of COVID-19, and therefore reduce the likelihood of hospitalization, disability, and death. By promoting the science of vaccines, we can contribute to reducing some of the pressures on our health care systems, and ensure that day-to-day health care services remain available with at least baseline capacity.

Reflections on emerging professional identity were also expressed by the recent graduate from the Biology program (Lazar) when he stated,

> My personal motivation is to make connections and expand ways to communicate science in an effective form to kids and the general public, including science around the immune system…. We need more individuals who are actively engaged in scientific issues and communicating said issues to the public in ways that are tangible for them, as opposed to only communicating said science to other scientists. It has really motivated me to continue my studies in communication.

Lazar has recently started his Masters of Science in Biomedical Communications at the University of Toronto.

The geoscience communicator (Dolphin) described components of critical thinking, along with his professional identity, when commenting on his motivation: "Helping people to learn, especially to understand better the process of learning, so they can be critical of the media they consume and be able to judge the credibility of (especially) scientific claims." While unexpected, Dolphin's comment illustrates the connections between our collective motivation for the BRVM program and our collective professional identities as educators across multiple disciplines.

Lessons Learned and Educational Value

Here our team describes the fascinating learning opportunities "outside our wheelhouses" (Dolpin) presented when working with an interdisciplinary team (O'Connor). We remain shocked by the ugly side of society exposed by discussions about the COVID-19 vaccines (Cuncannon, Neild) while the COVID-19 pandemic has emphasized social inequities (Dosani). Dosani provides a positive outlook for educators where the COVID-19 pandemic is an opportunity to encourage students to become more global citizens. Cuncannon (recent nursing graduate) expressed concerns that were common to most in our team:

> Prior to the availability of COVID-19 vaccines, I had envisioned vaccines as being, in many ways, the eminent key to public and population health efforts. Reality has diverged from that considerably. Over the past year in particular, I have been surprised by how divisive and polarized rhetoric regarding the COVID-19 vaccines and vaccination in general have become. I had not anticipated the significance of factors such as behaviour change, health perception, and misinformation and disinformation.

Fleming (nursing instructor) steered the dialogue back to the proposed benefits of this CSL/BRVM programs:

> Encouraging students to pursue STEM education at an early age is important as the Internet has created too many opportunities for people to misinterpret information that they find or put their faith in untrustworthy information. Parents commonly ask their children "what did you learn today," and this is an opportunity for factual information to be shared.

The educators spoke to the importance of education (e.g. CSL/BRVM programs) as well as appropriate dialogue and collaboration. As O'Connor stated,

> [We] have seen an ugly side of society while some people have been exposed with "right wing" and uncompromising positions. There is no room for debate or consideration of other opinions (or most importantly facts/science). There is a deep mistrust with government/science/professionals in Alberta but also in society. I am careful to not generalize but some are not educated and therefore to combat that we must educate more to be "critical" and truly explore issues and learn how to find answers that are grounded in science. We have let some (those who benefit from the divide and misinformation) to make science seen as a "negative" and/or "other" field. We need to change

> that and expose the misinformation for what it is, … [which is] to benefit others seeking power, influence, and wealth.

Neild provided an insightful observation about how to deal with scientifically skeptical people, which can be applied across multiple topics. He explained,

> [I have] also built an appreciation for not having to argue with everyone when they disagree as I know it's not an effective tactic. The idea of showing them why vaccines are effective rather than trying to challenge them on everything and how they need to make up their own mind let me let go of the constant urge to argue with dissenting opinions.

Neild also mentioned that he felt the main benefit of the BRVM program "is proof that these methods will work and the development of methods for experts to communicate with educators and students." The development of resources for teachers is always helpful, and teachers having easy ways to incorporate this learning into their lessons will mean that this information can be shared with more people in various communities and different situations.

Cuncannon voiced his concerns about "global health disparities and inequities." As he explained, "Many nations in the global South have been left to contend with disproportionate burdens of the COVID-19 pandemic in terms of resource-poor health care and public health systems as well as inequitable access to COVID-19 vaccines." Dosani also pointed out the benefits of encouraging students to become global citizens:

> Bringing light to the inequities we observe in this way (i.e., with students in K–12) can help foster a sense of global citizenship. COVID-19 has certainly highlighted the inequities observed not only within communities that have been rendered vulnerable or marginalized by social structures in the Canadian context but also across the globe. Initiating these types of discussions within the school system not only allows for reflections on relative positions of power, privilege, and oppression for some but may also empower others to take action to decrease inequities they are observing locally, nationally, and globally.

Neild (fourth-year education) mentioned his personal learning:

> I have learned a lot about the history of disease and vaccinations and how people in different fields work and function. Getting to see scientists and nurses and their various ways of thinking gave me insights into how we need to be able to reach out to more people.

Dolphin (geoscience education professor) also described his personal learning:

> This topic is well outside of my wheelhouse. The biology of the problem has been a new experience for me and has given me the opportunity to transfer my knowledge into a domain that I am not familiar with, as well as pull some information from this new domain into my own.

Boggs and O'Connor agreed that the interdisciplinary nature of our team was a powerful combination, with O'Connor stating,

> I was thoroughly impressed with the students who were involved with the program and amazed at the interdisciplinary representation demonstrated by the three students' backgrounds and how they were able to collaborate effectively together, build on their strengths, and create knowledge that is more powerful together. Their contributions were often synergistic, yielding more learning than the sum of their individual expertise subjects.

Summary: Applications to SoTL

Guiding the development and assessment of critical thinking skills is a significant focus within the SoTL community. In today's "post-truth era," interdisciplinary approaches are critical for building immunity against misinformation, disinformation, and conspiracy theories in both the SoTL-university classrooms and the discipline-based K–12 classrooms. We described program design, our team's motivation for this study, and lessons learned as we developed the CSL and BRVM programs. Our work involves undergraduate students and recent graduates on their way to graduate programs as research partners and co-authors on this paper. We believe that taking an interdisciplinary approach with students as partners will be successful at inoculating K–12 and university students against vaccine misinformation. As far as we know, there have been no previous peer-reviewed SoTL studies examining the relationship between critical thinking, misinformation, disinformation, and conspiracy theories around vaccinations. This paper lays the foundation for future studies in this area.

Our team reported that participating in these interdisciplinary research initiatives provided powerful learning experiences with our student partners reporting components of developing personal professional identities. No one mentioned increased publications as motivation factors for their participation in the BRVM program, which is one common motivation factor reported by both senior and novice SoTL researchers (e.g., Hepel & Song, 2020; Acai et al., 2017). It should be noted that, even though our team did not state that publications were our motivation for this research project, this paper does represent one publication, and we have plans for future publications. Our team was motivated by the desire to help Albertans and other Canadians navigate safely through COVID-19 pandemic and to work towards winning the battle against misinformation. This speaks strongly about the engaging nature of student participation in research projects as partners, illustrating the importance of the outer ring in Healey et al.'s (2014) conceptual model for student partners.

CONCLUSIONS

The SoTL community is uniquely poised to catalyze conversations around the importance of critical thinking skills in the "post-truth" era. An interdisciplinary approach is needed to win the battle against misinformation, disinformation, and conspiracy theories. We hope that the CSL and BRVM programs will prove to be successful at building the CT skills necessary to identify and avoid conspiracy theories, disinformation, and misinformation. Our research

assistant from the Education program illustrated the importance of including non-scientists in programs such as BRVM to provide a reality check for science communications to non-scientists.

While the focus of the BRVM program is to guide the development of the CT skills necessary for identifying and avoiding misinformation, disinformation, and conspiracy theories in K–12 students, three additional outcomes include the following: i) our team was motivated by the desire to contribute to the safe navigation through the COVID-19 pandemic, ii) the research assistants articulated their own emerging professional identities as partners on our team, and iii) we all learned from the other disciplines. We believe that interdisciplinary teams such as ours have the potential to build on individual strengths to create knowledge and learning that is greater than the sum of the individual expertise.

Today, we continue to navigate the COVID-19 pandemic and have likely not yet seen the last COVID-19 wave. We should also be learning from our experiences with this pandemic to prepare for future pandemics. Lessons learned from developing the CSL and BRVM programs and the resultant research that will follow are steps in the right direction.

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