The 2019 AERA theme is Leveraging Education Research in a Post-Truth Era: Multimodal Narratives to Democratize Evidence. How can such leveraging of educational research contribute to the democratization of evidence and to educational change?

While the goal to “democratize” evidence and change sounds enticing and promising as it carries with it, among other meanings, the connotation of popularity and multiplicity, it is not—and should not be considered—a panacea for the ailments of educational systems worldwide. For when we speak about democratization of evidence, we may also be implying that governments and other funding organizations support only specific types of research and privilege specific types of evidence. While privileging certain types of evidence over others may be the case in some political and geographical contexts, and is worthy of our concern, I argue there is another, equally important, problem related to democratization that many researchers are facing. Educational-related scientific evidence is growing at a much faster pace than our capacity to use this evidence. And yet, as I discuss later, current technology provides opportunities to bridge this gap.

Indeed, we see a number of lags in current practice that are a direct result of this growing gap. Anyone who looks closely at the development of schooling and education starting, say, in the 1950s may most probably identify some features that are no longer widespread. Some of these features turn our attention to changes in the design and architecture of schools, the layout of classrooms, teacher-student and student-student interaction patterns, and teacher-education programs—to mention just a few. I use the mid-twentieth century as an entry point for the larger conversation regarding this lag because that is when, many will probably agree, the harbinger of...
technological and digital developments began to take an integral part in everyday life and, by extension, in teaching and learning. If, in the past, considerations of arrangement, proximity, and distance among schools were the determining factors in explaining differences in allocations of resources, today such reasoning is gradually becoming less prevalent thanks to the affordances of technology and digital tools. Such tools help align changes in pedagogies with the purpose of schooling and education and, in turn, democratize learning.

The democratization of evidence in educational research may tectonically push educational systems forward by helping us go beyond the dichotomous categorization of research into either quantitative or qualitative that focuses stronger attention to methods rather than to a shift in practice. To suggest a mechanical framework for such change, I use the term *border crossing* from complexity theory, which references the sharing of evidence from different disciplinary perspectives and cultural contexts. *Border crossing* frames interactions between and among educational stakeholders as the very mechanism through which democratization of evidence and educational change can be more efficiently—and potentially more effectively—move schooling forward.

Given your focus on identity in mathematics and the intersection point of technology, creativity, and STEM, what would be some of the major lessons the field of Educational Change can learn from your work and experience?

When we think of learners’ identity as users and doers of mathematics, we—more often than not—tend to think in terms such as “ability,” “motivation,” and “attitude.” However, if we understand identity work as a process rather than a product, as many scholars indeed suggest, we can operationalize it through dynamic models. One such model is offered by Roz Ivanič (1998) in the field of academic writing, who suggests the constructs of autobiographical identity, discoursal identity, authorial identity, and socioculturally available identities to explore identity. Each of these constructs comprises a distinct dimension, but collectively, they offer a unified, multidirectional framework to understanding how identity develops.

In my work (see for example, Fellus, 2019), I import Ivanič’s (1998) model to suggest that learners’ mathematics-related identities are developed in and through their:

- **Autobiographical identity**, which refers to their mathematics-related experiences and the interpretations of these experiences; their
- **Discoursal identity**, which refers to the way individuals are spoken to and about as learners of mathematics; their
- **Authorial identity**, which refers to how individuals appropriate and make their own knowledge in and about mathematics; their
Socioculturally available identities, which refer to identities that learners can recruit and align with.

I and my co-author Florence Glanfield (Fellus & Glanfield, 2019) use the acronym ADAS to reference these four dimensions and to demonstrate one’s becoming a mathematician and a mathematics educator. As an extension of this multimodal framework of understanding identity, I examine together with my co-author Dr. Yaniv Biton the intersection point of technology, creativity, and authorship (Fellus & Biton, 2018). This intersection point is becoming increasingly relevant for educational change in mathematics education especially today as technology (for example, augmented reality used in mathematics classes) makes knowledge, and in turn, creativity and ownership over concepts and ideas far more available and accessible than ever before.

Some major lessons the field of Educational Change can learn from this work focus on changes in the use of technology, pedagogy, and content knowledge (TPACK) within mathematics education (see for example, Biton, Fellus, & Hershkovitz, 2016). Understanding learners’ mathematics-related identity within the framework of ADAS can allow teachers to wisely guide leaners’ budding mathematics identity. Epistemologically speaking, careful consideration of ADAS and TPACK can allow for stronger trends of and for change.

Your work on new forms of virtual schools and STEM instruction (e.g., physics and math) shows how new modalities of learning may serve to motivate students who previously may not have enrolled in advanced level courses to enroll and thrive. How might these findings contribute to change in policy/practice?

There is growing evidence that point to the affordances—and challenges—of learning in fully online environments. Indeed, one of the advantages of courses offered through a virtual high school (VHS) is that it allows students who have limited physical access to advanced-level mathematics or science to take these courses on a digital platform and to benefit from the expertise of external teachers and from the course-embedded digital tools. Learning advanced-level mathematics and science through a virtual high school regardless to geographical proximity to the school truly democratizes education. One of my recent publications is a co-authored book chapter (Biton, Fellus, Raviv, Feilchenfeld, & Koichu, 2018) that showcases how new, technology-based modalities of learning in one VHS serve to address issues of accessibility to learning.

The VHS we showcase offers support not only to the high school students enrolled in
the courses in the form of tutors who are university students majoring in science- and mathematics-related fields but also to the tutors in the form of teacher-tutor and tutor-tutor communities of practices that are forged in the VHS (see Biton & Fellus, 2018).

These and other findings can inform VHS-related policy and practice in a few ways that include continual development of (a) content, structure, and design of the mathematics and science courses in virtual schools;
(b) support systems provided to the high school students enrolled in the VHS courses;
(c) platforms and infrastructure that sustain communities of practice among the VHS teachers and tutors.
Carefully considering these three elements of quality digital learning implementation will allow them to receive equal footing when drafting and introducing new policies and practices.

Educational Change expects those engaged in and with schools, schooling, and school systems to spearhead deep and often difficult transformation. How might those in the field of Educational Change best support these individuals and groups through these processes?

The field can best support schools by helping them to identify shared visions, demystify myths, and create communities of practice to make these visions a reality. But such efforts take long processes of understanding what it is we really want to see in place. I would like to begin by slightly paraphrasing Lakoff and Johnson’s (1980) classic notion on metaphors we live by and say that, In most of the things we do in our schooling and education, we simply think and act more or less automatically along our concepts that structure what we perceive, how we get around in the world, and how we relate to other people (see p. 3). When we—scholars, parents, and other stakeholders—consider the nomenclature of anything to do with schools, schooling, and school systems, we can better examine the conceptual frameworks that cushion policies and practices and thus better understand and change our practice.

“The field can best support schools by helping them to identify shared visions, demystify myths, and create communities of practice to make these visions a reality”

Consider, for example the term training, which is associated with repetition. Many education scholars will attest to the incompatibility of the meaning of this term with the overarching purpose of schooling and education. Given that the very work of schooling is done through interaction and education is not—and should not be—treated as a production line. The decreasing use of the word training to describe education programs is an example of transformation in how schooling and education is conceptualized.
Processes of identifying shared visions among all stakeholders involve making invisible meanings of the concepts used visible. Such conversations will shed much
needed light on the artificial separation in school curricula between arts and mathematics has informed many policies and practices that group students by who is deemed to be good in mathematics and who is deemed to be good in arts. Changing these practices entails continuous work of ever-growing communities of practice that demystify myths about the disconnect between mathematics and arts, or mathematics and language and hopefully introduce new policies and practices in the teaching and learning of arts and language arts through mathematics and vice versa.

Where do you perceive the field of Educational Change is going? What excites you about Educational Change now and in the future?

For me, educational change is a field heading toward being recognized as the central and continuing task of educational systems. What excites me about educational change now is the continual feed of new ways of teaching and learning that evidence-based policies and curricula produce and the scaling up of much needed equitable educational change. In the future, I believe educational systems will be structured in the form of flipped classrooms where learning takes place in the afterschool hours and knowledge is refined during school hours as students work together on problem-based projects.

Ivan Illich’s vision of students coming together to work on topics that interest them (Illich, 1970) will bring education closer to the real meaning of the word curriculum, which etymologically means to run. That is, educational change in the future, as I see it, will focus on structural and organizational implications of new ways of teaching and learning where students themselves engage in bricolaging their own curriculum under the wise guidance of their teachers.

References


multidirectional dimensions. Symposium conducted at the Annual Meeting of the American Educational Research Association (AERA), Toronto, ON.


OSNAT FELLUS

Osnat Fellus has recently completed her Ph.D. in Education with a focus on Teaching, Learning, and Evaluation from the University of Ottawa. Her Ph.D. work centers around theories of identity in mathematics education and learning English as an additional language.

Dr. Fellus was the Head of English for Academic Purposes at Talpiot College of Education where she was also a teacher educator teaching courses in classroom discourse, research methods, and statistics.

She has recently co-authored *One is Not Born a Mathematician: In Conversation with Vasily Davydov* in a special issue of the *International Journal for Mathematics Teaching and Learning* where she discusses, together with her co-author Dr. Yaniv Biton, issues pertaining to what it means to teach using the Vygotskian lens.

Dr. Fellus can be contacted at olga.fellus@uottawa.ca