

ABOUT TIME

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Estar contigo or no estar contigo es la medida de mi tiempo. (Borges, 1975, p. 10)

With their question, “Can didactics say how to teach?” Gascón & Nicolás, in issue 37(3), place the work of doing research on a precarious footing, because to pose the question supposes that the answer might be ‘No’. This sense of apprehension might be motivated by the enormous amount of time and focus researchers spend working towards positive changes in the lives of teachers and students, but working at some distance from them.

In this sense, Borges’ commentary about being an older person in love also goes for researchers’ feelings about teachers: *To be with you or not to be with you is the measure of my time* (Maurer translation, 1975, p. 11). As researchers, we measure our time through periods of close engagement with teaching, through professional development sessions, design experiments, or classroom observations, and also through periods of less direct engagement, but intense imaginings of teachers and learners, as when we prepare publications about our interactions. This temporal periodicity of closeness and distance may contribute to Gascón & Nicolás’ underlying uncertainty concerning researchers’ relationship to teachers and learners. If temporal experiences of being a researcher cause us to question the foundations of our work, then it is possible that attitudes towards time also influence the work itself, that is, our theorizing about teaching and learning.

In this commentary, we would like to answer Gascón & Nicolás’ call to “make explicit and expose to criticism the non-questioned components (principles, teaching ends)” (2017, p. 13) by suggesting that the conversation obscures unexamined relationships between research and conceptualizations of time.

We begin our commentary by highlighting attitudes towards time in the initial conversation. In their answers [1] some respondents explicitly mention the role of time. For Guy Brousseau, research “should remain circumspect about its results *until* applications of this research can provide teachers with appropriate procedures” (p. 3, our emphasis). Trigueros also stops short of recommending norms for teaching, but noted that “research developed *along years*” (p. 6, our emphasis) can improve students’ education. These comments express the ‘epistemic’ model of accumulating scientific knowledge over time:

What is scientific progress? The answer is simple. Science (or some particular scientific field or theory) makes progress precisely when it shows the accumulation of scientific knowledge; an episode in science is progressive when at the end of the episode there is *more knowledge than at the beginning*. (Bird, 2007, p. 64, our emphasis)

Bird’s progressive perspective is certainly not simple, as it has engendered a lively exchange on the philosophy of science (e.g., Rowbottom, 2010), but what concerns us here is that our conversation on didactics and teaching assumes a similar, linear sense of improvement over time—even if research has not matured into normative assertions yet, the purpose of conducting research is to reach this point someday.

Other respondents to Gascón & Nicolás also offer perspectives that are grounded upon concepts of time, though less explicitly than Brousseau’s and Trigueros’. Godino’s ‘didactic suitability’ depends on the temporal process of gaining consensus in the research community, which might require a decade or so. Cantoral’s insight that mathematics is embedded in cultural and social practices requires transmitting or constructing practices over time. We could perceive this cultural transmission happening within a few moments of a classroom exchange, but confirming it would require at least a generations’ time. Gascón and Nicolás suggest that research could progress through greater attention to institutional positioning (2017), but this would engage structural analysis of how assiduously educational organizations manage their subjects’ time.

Taking this theme of time in research as our point of departure, we explore two interrelated issues emanating from Gascón and Nicolás’ focal question:

- 1) Does the question implicitly use time to position teachers as ‘Other’?
- 2) Are there alternative perspectives on time and research that can reduce this ideological separation?

We develop our comments through two influential bodies of scholarship on time and research in cultural and linguistic anthropology: a critique of temporal perspectives in anthropological research (Fabian, 1983) and Lemke’s framework of timescales (2000) which attends to cyclic, periodic experiences of time instead of unidimensional ones.

Constructing otherness through temporal dimensions in research

The potential for unexamined concepts of time to obscure the power dimensions present in all research has been engaged deeply in the field of cultural anthropology. Johannes Fabian’s classic text, *Time and the Other: How Anthropology Makes its Object*, offers an extended critique of cultural anthropologists’ primary research method, participant observation through fieldwork (1983). Classical anthropological research re-enacts aspects of colonial history, in which a comparatively well-off European researcher spends around a year in a colonized or recently-colonized community and then upon return to the home community launches an academic career writing up the fieldwork data [2]. The central issue for Fabian’s critique is what he terms the *denial of coevalness*. Two entities are *coeval* if they are

viewed as contemporaneous, occupying the same time period. Anthropological research through the 1980s—its theories and its genres of research writing—tended to position researched communities at a different, *prior* point in time compared to the researcher and to the researcher's theories. Indigenous communities, for example, might be described as an unchanging remnant of the past instead of simply a mode of contemporary humanness. This *denial of coevalness* could appear in anthropological research in many ways, for example, through writing in a timeless present tense (the *ethnographic present*), over-emphasis on visual descriptions that make the researcher seem to disappear, and epistemologies or writing styles that fail to attend to historical dimensions of the research setting.

Subsequently, temporal dimensions of research activity became an explicit and pervasive feature of much anthropological writing. Research was seen as a fundamentally interpretive endeavor in which findings or descriptions must be understood through substantial commentary on the researcher's positionalities, identities or ideologies. At the same time, writing extensive historical detail of the research setting became a way to represent multiple presences, perspectives and forms of agency in ethnographic research reports. The highly contingent attitude towards positionally-produced research knowledge was stabilized or grounded somewhat through substantial historical contextualization.

Educational research is thoroughly different from anthropological research. It would be an unfair comparison to import Fabian's critiques part and parcel into the field of education. Most educational researchers are motivated by the desire to improve students' educational experiences rather than describing lifeways across cultural difference. Many educational researchers train future teachers and maintain rich and lasting relationships with teachers in their regions. Many educational researchers conduct research near their home communities, so that they are able to maintain frequent engagement with their field sites that is often difficult for traditional anthropologists to match.

In more general terms, though, Fabian's critique could deepen our response to Gascón & Nicolás' conversation on the relationships between researchers, teachers and teaching sites. In contrast to anthropological writing, mathematics education writing tends not to establish the histories of its research sites very deeply or to use local experiences of broader historical events as an explanation for teaching, learning or research outcomes. In classroom-based research, another temporal issue is that the researcher comes and goes but the teacher stays. Movement during the work day is a significant power difference that could create the impression that the researcher's life is dynamic, but the teacher's work is unchanging. Differential per capita investment in professors compared to teachers means that the former have more unscheduled time compared to the latter, allowing mastery of the complexities of educational research methods and theories. Teacher-led action research with its characteristic temporal cycle of 'plan, act, observe, reflect', is often positioned as valid only for the teachers' particular place and time (see *e.g.*, Zeichner & Noffke, 2001). Some educational researchers have spent an earlier part of their career as a teacher, and in some university contexts, this career history

supports the authority of the professor to conduct educational research, just as fieldworking is the fundamental form of authority for creating anthropological theory. In this case, the researcher's *former* self is contemporaneous with teachers, creating a temporal separation in which the researcher is a more highly evolved form of a teacher.

Over the last decade, mathematics education researchers have begun to recognize that researcher identity and positionality influences all stages of research, from the choice of research questions to formative interactions during the research process to issues of representation in writing about research (see *e.g.*, D'Ambrosio *et al.*, 2013). Fabian's critique of anthropological research suggests that attending to unexamined assumptions about time in research could deepen these considerations. In a limited way, then, we pose the question of whether educational research creates a *denial of coevalness* within our field.

Timescales: hierarchies of periodicity in classrooms

While the temporal underpinnings of mathematics education research are yet to be fully examined, several emerging and interrelated areas of inquiry rely on non-linear and non-progressive attitudes towards time: heteroglossia (Bakhtin, 1981; Barwell, 2014), chronotopes (Bakhtin, 1981; Chronaki, 2017), and timescales (see *e.g.*, Lemke, 2000). Each of these new attitudes towards time may complicate our understanding of research results and their enactment in teaching.

Heteroglossia refers to the mediation of multiple languages, voices, genres or social registers drawn from different moments of speaking, since no comment can really be spoken for the first time (Bakhtin, 1981; Barwell, 2014). Another discourse analysis tool derived from Bakhtin, chronotopes could be considered as genres-in-action that "invoke and enable a plot structure, characters or identities, and social and political worlds in which actions become dialogically meaningful, evaluated, and understandable in specific ways" (Blommaert, 2015, p. 109). As *topos*, the referential bundling of these symbolic systems is just as important as the specific locations that might be referenced. As *chronos*, historical relationships and identities become symbolic resources for negotiating positions, affiliations and moral preoccupations in momentary interactions. In this way, chronotopes are 'invokable histories' that recognize the allocation of particular semiotic resources towards and away from particular speakers while they negotiate meaning and their basis in previous times and places (Blommaert, 2015, p. 110). Following Matusov (2015), we suggest that the didactic theories reviewed in Gascón & Nicolás are chronotopic 'invokable histories' because they collect together a selection of historically-situated research texts; they imagine classrooms with an intended plot structure; they put classrooms into dialogue with researchers' professional biographies; and they provide an interpretive system for evaluating classroom activities in terms of research intentions.

Timescales represent a third emerging interest in non-linear, non-accumulative attitudes towards time and research knowledge. Timescales are activities or processes that unfold over a relatively predictable period of time, and that taken together, form a hierarchical system of meaning-making

resources that influence the actions in which people are likely to engage (see *e.g.*, Lemke, 2000). A timescale can refer to a biological process, a social activity, or a system in the natural world. A lifetime, for example, is a timescale even though its duration differs for different people. People's moment in their lifetime timescale can influence the activities that they choose or that are available to them. Similarly, if a mathematics lesson lasts an hour, a teacher may engage an unexpected answer differently depending on when it arises in the lifespan of the lesson. Lemke lists 24 timescales that include the few seconds required for a conversational exchange, to the hour it takes to teach a lesson, interposed between the extremes of the 10^{-5} seconds it takes for the body to produce a neurotransmitter and the 32 billion year age of the universe.

Using timescales to consider the relationship between research results and teaching depends on their hierarchical, nested character. Processes on a longer timescale tend to constrain actions at shorter timescales, and actions at shorter timescales tend to construct or constitute activities at longer timescales. Agency and novel action is always possible, but the longer timescale might create conditions that require negotiation at the shorter timescale. Herbel-Eisenmann *et al.* (2015) describe several classroom scenarios involving the interaction of shorter and longer timescales, for example, through the teacher's use of pronouns, revoicing, and historical conditions of traditional or innovative approaches to teaching mathematics. If an educational chronotope is a historically-grounded collection of discursive interpretive tools and legitimizing stances towards how to teach and learn, then timescales are the 'scope of understandability' of the chronotope (Blommaert, 2015). Upon reviewing several educational reform programs that attend to multiple timescales, Lemke and Sabelli commented that:

Any focal pedagogical 'innovation' introduced into a tightly constrained school system is in fact a series of embedded innovations at levels above and below the focal intervention, and strategies for all levels have to be considered coherently. (2008, p. 116)

In this view, research cannot inform teaching effectively if it attends only to one or two closely-linked timescales rather than the full resonance of effect above and below the focal point. Research cannot be replicated, but only forged to fit to local situations. Timescales above the focal level of implementation could include higher-level constraints such as traditions of textbook publishing, school resourcing, the theoretical traditions that the researchers draw upon, and other aspects of researcher biographies. Timescales below the focal level might require constituent-level modifications in teachers' manner of speaking, scaffolding of the task, or momentary awareness of students' histories or social positions.

Two other comments from Lemke and Sabelli are relevant to considering the temporal effects of research on teaching. First, attending to timescales requires research innovations to undergo cycles of building new practices, consolidating gains, and planning the next implementation (p. 118) which sounds notably like the action research cycle of 'plan, act, observe, reflect'. Educational research that attends to timescales will necessarily increase the authority of teachers who understand many of the hourly, daily, annual and insti-

tutional timescales the best. Second, when educational reforms attend to timescales, researchers tend to detail their involvement in the research and implementation process, "that how they participated, what their roles were, and how they were perceived by others mattered very much both to what happened and to how they reported on it" (p. 121).

Mathematics education research is at a confluence of time. Awareness of the political, positioned nature of research is emerging simultaneously with temporally-complex frameworks for analyzing classroom activity. Chronotopes, as 'invokable histories' of mathematics education research, may be powerful enough to describe the moment-by-moment formations taken by Gascón and Nicolás' key issues of teaching goals, value judgements, and research principles or practices (2017). Attention to participants' references to timescales in classroom interactions will help to trace how educational chronotopes unfold, with varying levels of participant agency and automaticity, sometimes emphasizing research principles, sometimes values, and sometimes teaching goals.

So, it seems like a good time to critically evaluate temporal assumptions that underlie research. But this has the potential to obviate the question, "Can didactics say how to teach?" because if we concur with Fabian and with Lemke and Sabelli, then teachers, researchers, and research recommendations are all coeval with each other.

Just as a researcher-person is a historically and socially-situated producer of knowledge, lacking full agency to know or act, so are research traditions. As was the case in cultural anthropology, reconciling research with time could change research writing and our expectations for research outcomes. In this sense, it is 'about time' to attend comprehensively to the institutional and social histories of our research sites. It is about time to consider that the endpoint of all research is action research, and that researchers and teachers are all reflective practitioners.

Notes

[1] The full responses analysed by Gascón and Nicolás, in the original languages and in translation, can be found at <http://flm-journal.org>. See the link to 'More information' by their article in the online table of contents for issue 37(3).

[2] This is true of Susan's career of mathematics teacher turned cultural anthropologist turned mathematics teacher/researcher.

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Emma Castelnuovo Award: call for nominations

The Emma Castelnuovo Award for outstanding achievements in the practice of mathematics education honors persons, groups, projects, institutions or organisations engaged in the development and implementation of exceptionally excellent and influential work in the practice of mathematics education, such as: classroom teaching, curriculum development, instructional design (of materials or pedagogical models), teacher education programs and/or field projects with a demonstrated influence on schools, districts, regions or countries.

The Award was named after Emma Castelnuovo, an Italian mathematics educator born in 1913, in celebration of her 100th birthday and honouring her pioneer work. The first Emma Castelnuovo medal was awarded to Hugh Burkhardt and Malcolm Swan in 2016 during the 13th International Congress on Mathematical Education (ICME-13) in Hamburg, Germany. The Award seeks to recognise and to encourage efforts, ideas and their successful implementation in the field, as well as to showcase models and exemplars of inspirational practices from which to learn. See <https://www.mathunion.org/icmi/awards/icmi-awards> for further information about the award.

The Emma Castelnuovo Award Committee consists of a Chair (Professor Konrad Krainer) and five other members who remain anonymous until their terms have come to an end.

Nominees for the award will be evaluated in light of the following criteria:

- the educational rationale for the candidate’s work and what served as a catalyst for that work;
- the problems addressed by the candidate;
- the candidate’s role in addressing the problems, whether they involve curriculum development, teacher education, professional development, design of instruction, or other areas of mathematics education practice;
- the conditions under which the work has taken place (the cultural and political context, infrastructure, funding, and people involved);
- the originality and creativity involved in how the candidate has addressed problems and overcome obstacles;

- the quality of networking with other key stakeholders (*e.g.*, bridging theory and practice);
- external or internal evaluations of the work, if available;
- the extent of the influence of the work on educational practice, including quantitative or qualitative evidence of that influence; and
- the potential of the work to serve as a model (either for inspiring others addressing similar problems or because of taking an approach that could be applied elsewhere with appropriate modifications).

Nominations for the Emma Castelnuovo Award should include the following documents in English (except for 4—see below):

1. a document (max. 5 pages) describing the nominee’s program and reasons for the nomination (including the nominee’s impact on the field);
2. a one-page summary statement;
3. an account of the genesis and dissemination of the nominee’s work and the roles of the people involved, with brief curricula vitae of the key persons (max. 10 pages);
4. electronic copies of three publications that reflect the nominee’s work related to the practice of mathematics education (*e.g.* journal articles, textbooks, other instructional materials, or CD-ROMs); (if a publication is not written in English, an English translation of a key part—*e.g.* an abstract—and an independent statement on the publication’s quality written in English—*e.g.* a review—should be provided);
5. three letters of support (from different stakeholders and, if possible, from different countries); and
6. the names and e-mail addresses of two persons who could provide further information, if needed.

All nominations must be sent by e-mail to the Chair of the Committee (konrad.krainer@aau.at) no later than April 30, 2019.

See also the announcement of the Felix Klein and Hans Freudenthal Awards on page 6.
