Looking backward to look forward: TOCE in transition

This editorial signals the end of our tenure as (founding) Co-Editors-in-Chief of the ACM Transactions on Computing Education. Our tenure began in June 2006, when we were appointed Co-EiC’s of JERIC, TOCE’s predecessor, and continued through two 3-year terms as Co-EiC’s after the ACM Publications Board accepted our proposal for a new Transactions in Computing Education that began in 2009. We have three goals in this editorial. First, we would like to provide a retrospective on how we positioned TOCE, both in terms of how it embodies our conception of computing education research (CER) as a field, as well as the journal’s role in the larger computing education community and the ACM. Second, having reviewed a bit of history, we look at some potential changes to expect in TOCE’s future. Finally, we would like to thank the many people ~~(some of whom we would like to specifically name)~~ for their significant effort in establishing TOCE as a publication venue for papers in computing education.

# Looking backward

CS Ed is relatively late compared to many other science disciplines in studying disciplinary education, what is often called “discipline-based educational research” (DBER) [ref to DBER report]. The demand for CS Ed research will likely increase, as computing education is increasingly integrated into compulsory K-12 education, not only in the US, but in many other countries (ref our special issues). TOCE thus appears at a particular historical moment in time, and plays a particular role within the CS Education community broadly construed. What we have come to realize, and what we would like to discuss here, is that we had to address two related constraints in positioning TOCE, both as a CS Ed journal, and as one that is sponsored by the ACM. Understanding these constraints, and our response to them, contextualizes our conjectures and recommendations for the future.

Succinctly stated, these constraints are:

1. Whatever criteria are used for publication, these have to be sufficiently shared by reviewers, the associate and guest editors, and the editors-in-chief, that they can come to be understood as consistent and coherent. Publication should not be seen as a crap shoot, but as something that follows a (relatively) rational process that is generally endorsed by the constituency that is (more or less) universally applied to all submissions. We call this *the rationality constraint.*
2. Given the publication criteria, there have to be a sufficient number of people who can and will write papers that meet these criteria in order for TOCE to be viable as an ACM publication from the point of view of “supply” of content. That is, there have to be enough papers for people to read and for the ACM Publications Committee to consider TOCE to be serving its constituency (see the ACM Viability Review Criteria for journals, <http://www.acm.org/publications/policies/v-review>). On the flip side, the papers that comprise the issues of the journal have to speak to an audience with sufficient intelligibility and value so that TOCE is viable as an ACM publication from the point of view of “demand” for content. That is, readers have to actually download--and reference--the papers. They must become a part of the discourse in the field. We call this *the viability constraint.*

In stating that we faced these two interlocking challenges, we do not mean to imply that, at the outset, we recognized that these were some of the key challenges that we faced, or that we had ready-made ways of addressing them, or that having recognized these challenges that our approach to working with these constraints has been static throughout our nine years as EiC’s. Rather, our coming to recognize these twin challenges, and attempting to address them, in the context of the particular historical moment in which TOCE (and computing education more generally) finds itself, has been one of what we take our (a royal “we” that includes the people mentioned in the last section) achievements to be. In fact, in a reflexive rhetorical move, one of our main purposes for writing this very editorial is as part of the basis by which we try to satisfy these two constraints, particularly that of rationality. We take a few moments here, then, at our exit from this institutional role, to describe our coming to grips with the very problems of what it means to be a computing education journal--*this* computing education journal of the ACM--at this particular time.

## The rationality constraint

One of the first tasks in starting a journal is to determine the criteria by which publications will be evaluated. We spent considerable time in surveying other CS and discipline-based education journals and conferences, appropriating from these different elements to develop the written criteria that we publish on the TOCE website (<http://toce.acm.org/authors.cfm>) and embed as specific items on the TOCE review form. We think that these were important moves in establishing the legitimacy of the journal. But from our current vantage point looking backward, this might have been somewhat naive to believe that these criteria could be reflected in text. Criteria *as applied* are much more a matter of social practice.

What do we mean by this? Regardless of what is written on review forms, such criteria come to life when reviewers write reviews when faced with actual papers, when guest and associate/guest editors make publication recommendations based to a great extent on the reviews that they have solicited from their colleagues, and when the EiC’s make publication decisions based on the reviews and associate/guest editor recommendations. Particularly during the first few years, there were many papers where the two of us debated whether the paper was publication-worthy, recognizing that in making these decisions we were, in some senses, both constructing the very criteria we were trying to interpret and ratifying or altering the criteria that we thought we already had. Similarly, we have sometimes challenged the decision of one of our associate editors, or asked our associate editors to request more rationale for the recommendations of their reviewers. Thus, rather than the criteria being something that is pre-determined and static, it is a process of negotiation over time based on our concrete interactions with the papers that were to hand, with one another, and with our associate editors and reviewers.

Social practice is also a matter of power and authority. In particular, reviewers, associate editors, and EiC’s have different institutional/formal mandates for their roles in the review process, with EiC’s given the final word in making a publication decision by the ACM (see <http://www.acm.org/publications/policies/position_descriptions> and http://www.acm.org/publications/policies/RightsResponsibilities). But EiC’s do not work in a vacuum. To a great extent, their power is not so much in the institutional sanctions as it is in the legitimacy that the associate editors and reviewers grant them in agreeing to carry out *their* work. An EiC who significantly violates norms of practice within a field of research will quickly drive down the reputation of a journal as well as drive away experts in the field who might otherwise contribute to the common enterprise that the journal represents and advances.

But the “norms of practice” for scholarship in CS Education at this point in time are neither fixed nor as fully shared among the members of the community as they are in more paradigmatic subject areas within computing. That is, even as TOCE (and the EiC’s, associate editors and reviewers) must reflect the current norms of practice for what constitutes publishability in CS Education, to the extent that they exist, TOCE also is in a position to *affect these norms.* Thus, what it means for a publication to be TOCE-worthy is a recursive process and in flux. It is also reflexive, in that throughout our tenure, we have published a number of editorials (in both TOCE and JERIC) that were directed toward articulating the rationality of how we interpreted and carried out the review process, of how we understood discipline-based and CS education research, and of how we saw TOCE in relation to the pantheon of other publications in both discipline-based education and other ACM journals. These include the editorials in 7(1), 7(3), 7(4), 8(1), 8(3), 8(4), 9(1), 9(4), 11(4), all available in the ACM digital library.

# **The viability constraint**

The ACM is clear on its criteria for what constitutes a viable journal that it publishes: “The expectations of a journal are that the journal: (1) serves an intellectually vibrant and viable community; (2) is a leading journal and preferably \*the\* leading journal in its field; and (3) incorporates innovations are a continuing part of updating and improving the journal.” (<http://www.acm.org/publications/policies/v-review>). In positioning the journal within the field, we had to do so cognizant of the other forums for CS Ed publications. These include the ACM *Inroads* magazine, the SIGCSE annual symposia, the SIGCSE International Computing Education Research conferences (ICER), the journal *Computer Science Education*, and additional international conferences such as Koli Calling and the Australasian Computing Education conferences. The niche into which we tried to establish ourselves was to have papers written that would be of interest directly to the CS educator. In addition, we required that authors provide a rationale for teaching innovations and interventions, and provide empirical evidence and analysis to support any claims of effectiveness. In other words, what were the design goals, were they met, and if so in what way? And finally, we have required that papers discuss the implications of their innovations beyond the particular site at which the teaching innovation was enacted.

Our coming to develop this concept of a TOCE-worthy publication was carried out not only with a sense of TOCE’s place within the larger CS education and publication context. It was also done in dialogical interactions with authors as they attempted to write papers to meet our criteria. That is, authors were trying to discern precisely what they needed to do to make their particular papers publishable, and we were trying to articulate what it was that we wanted to see in their papers so that we would publish them.

As it turns out, for the overwhelming majority of papers that go through their first round of review, the decision is “major revision”, i.e. that the paper needs significant changes prior to being considered again for publication. What initially surprised us was the small percentage of such papers that were resubmitted for another round of publication. What we have come to believe (and we only have our intuitions in guiding us) is that there are two primary reasons for this fact. First, most authors are CS educators. As a result, their primary shortcoming in publishing for TOCE is in carrying out an empirical study to answer a research question related to their teaching innovation. That is, many CS educators do not have the kind of expertise in educational inquiry required to do this activity to TOCE standards. Second, and related, for many CS educators, there are insufficient rewards within their local organizational setting for the time and effort required to publish in TOCE. TOCE papers are not simply “experience reports” or what Valentine calls Marco Polo papers (“I went there and I saw this.” [Valentine, 2004]). As with other ACM journals, they are archival research papers within their area of the computing field.

This explanation may also account for why, during the first few years of our work with JERIC, we had difficulty obtaining a sufficient number of papers that met our standards of publication. Thankfully, we have outgrown these initial challenges so that we consistently meet our page allocations (480 pages per year, in four roughly equally-sized issues), and we attribute this to the following. First, by having a stable and expert editorial board with whom we have had considerable interaction and who have helped us to develop our publication criteria (i.e. the “living” criteria of practice, as described above), we are receiving papers that are, even during the first round of review, meeting more of our publication criteria than when we initially started. That is, there appears to be a “trickle down” of feedback to authors, so that they are better able to write specifically for TOCE. And second, in response to our occasional solicitations for proposals for special issues, we have been fortunate to have far-sighted researcher-educators who have proposed issue themes that have significantly resonated with authors interested in speaking to the CS Ed community. Some of these themes have anticipated trends that will undoubtedly grow over time (such as the special issues on Concurrent and Parallel Computing, and the special issue on Web Development). And others have had such significant response by submitting authors that we have expanded the special issue from one to two theme-related issues edited by the same guest editors (Broadening Participation in Computing, CS Ed in Primary and Secondary Schools, and Team Projects).

Are these papers entering the discourse? By the conventional measures of downloads and citations (now easily available in the ACM Digital Library, with the most cited articles now displayed on the TOCE homepage--toce.acm.org), our papers are competitive with those of other CS Education venues, such as *Computer Science Education*. For downloads (December 2013 - November 2014, the most recent year when data is available), TOCE ranks 7th in comparison to the 39 other ACM journals and transactions for which comparative numbers are available. With an average number of citations per article of 5 for TOCE for the years 2007-2011 (the most recent figures), TOCE ranks in the 24th-26th spot (tied with two other journals) for number of citations in comparison to the 39 other ACM journals and transactions.

# Looking forward

As TOCE moves into new editorship, it will undoubtedly change, brought about by changes from within, from different conceptions of the journal as enacted by the new editor and editorial board, as well as by external changes, brought about by changes in the ACM and in the larger world of publishing.

## Changes from within

One of the strengths of the ACM model of editorship is the term limit on the Editor-in-Chief. With the coming of new editor(s) and the appointment of a new editorial board, the conception of what TOCE is will necessarily change, and the obvious place where this is likely to happen is in the criteria for publication, both written and “living.” A question to be addressed is whether the criteria should allow a broader range of papers that are currently considered for publication. For example, survey/review papers on particular topics in computing education, though occasionally submitted, are not currently solicited. We have a different review form for such papers, but there is not a general understanding among the reviewers and associate editors for what constitutes publishability for these papers. Similarly, the criterion that all papers for publication must have direct empirical evidence for its claims rules out the publication of what are sometimes called “theory” papers, papers that help researchers in (re)conceptualizing some aspect of the field. Nor has TOCE published book reviews, or debates on particular topics where opposing viewpoints are presented and argued, or third-party commentary on controversial papers along with responses by the author(s) of the controversial paper, common in such journals as *Brain and Behavioral Sciences.*

## External changes

There are two significant trends that are being actively discussed by the ACM Publications Board, both of which will likely have some impact on TOCE. The first of these concerns discussions that the Publications Board has been having with the ACM membership concerning ACM’s role moving forward with respect to so-called open models of publication.

One model transfers the cost of the journal from the readers to the authors -- rather than the publisher charging readers and libraries for access to a paper, the author pays the publisher to make the paper freely available. This approach has a number of implications, not least of which is that it disadvantages authors with less resources. In the worst case, such models lead to conflicts of interests for the reputable publishers, and the proliferation of “vanity press” journals that lower the reputation of all journals.

In other models, such as that used by the *Public Library of Science One*,the role of the Editor-in-Chief and editorial board of a journal change considerably. These individuals act much less as gatekeepers as they do in traditional publishing in assessing the likely significance of potential impact of a manuscript in addition to its technical merits (what TOCE currently uses), but instead try to ensure that a minimal “technical and ethical” standard for publication has been met without “complex or subjective acceptance criteria” [ref PLOS ONE: <http://www.plosone.org/static/publish>].

The second discussion initiated by the Publications Board concerns the relationship between ACM journals and conferences, especially given the historical role that conferences have played in Computer Science. This is in response to larger debates that have recently been advanced concerning the need for the field to adapt to recent changes in technology (which significantly shorten the review time for journals), changes in conference reviewing (which often allow for author response and resubmission) as well as the maturity of the field as a whole (ref <http://cacm.acm.org/magazines/2014/7/176210-structural-challenges-and-the-need-to-adapt/abstract> <http://cacm.acm.org/magazines/2009/5/24632-conferences-vs-journals-in-computing-research/fulltext>

http://cacm.acm.org/magazines/2011/8/114942-journals-for-certification-conferences-for-rapid-dissemination/fulltext).

It is hard to know how these will play out for TOCE, but we believe that with sufficient discussion between the new Editor-in-Chief, the editorial board members, the readership, and the boards of the relevant SIG’s (SIGCSE and SIGITE), that new relationships can be developed between one or more conferences and TOCE that will benefit the CS Education community. We look forward to these developments, hopeful that these changes will strengthen TOCE in the next decade.

# Last but not least

The quality and enduring significance of TOCE for the computing disciplines depends on the work of many people, and we are hopeful that this collective effort will only increase (in volume and quality) under the new Editor-in-Chief. We wish to thank the many authors who have sent in their manuscripts for consideration to be published in TOCE (close to one thousand during our nine years), and the many additional members of the computing education community who generously agreed to review these papers. We would like to thank by name the current members of our editorial board. These members serve as Associate Editors, which means that they take primary responsibility for obtaining reviews and making publication recommendations for up to half-dozen manuscripts per year. If TOCE has had success as a publication (and we believe it has), much of it can be credited to the efforts of this skilled group of experts who have given selflessly to the community in their efforts as editorial board members.

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We are also deeply grateful for the work of the guest editors to the special issues that we have published since 2009. We work closely with these editors for 18-24 months, where they not only shape the vision for the special issue and solicit authors, but oversee the review process for the manuscripts and make recommendations for publication as well as write an editorial for their special issue(s). Given that approximately half of our issues are special issues, these editors undertake a significant portion of the editorial work that this journal requires.

Guido Rößling and J. Ángel Velázquez-Iturbide, Program and Algorithm Visualization in Education, v9#2, 2009

Doug Baldwin and Alyce Brady, Computer Science in the Liberal Arts, v10#1, 2010

Sally Fincher and Ian Utting, Initial Learning Environments, v10#4, 2010

Richard Ladner and Tammy VanDeGrift, Broadening Participation in Computing Education, v11#2&3, 2011

Mordechai Ben-Ari, Dan Garcia and Tom Murphy, Concurrent and Parallel Programming, v13#1, 2013

Scott Grissom, Alternative to Lecture, v13#3, 2013

Peter Hubwieser, Michal Armoni, Michail N. Giannakos, and Roland T. Mittermeir, Computer Science Education in Primary and Secondary (K-12) Schools, v14#2 & v15#2

Craig S. Miller and Randy Connolly, Web Development, v15#1

Jürgen Börstler and Thomas B. Hilburn, Team Projects, v15#4 and v16#2

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Finally, we wish to express our gratitude to Laura Lander, the Journals Manager in the Publications Office of the ACM, who was our main contact with this office during our time with TOCE. Laura models what it means to be professional, competent, and ethical in how she carries out her responsibilities. We could not have done our jobs without the support that she (and the rest of the publications office) provided.

References

David W. Valentine. 2004. CS educational research: a meta-analysis of SIGCSE technical symposium proceedings. In *Proceedings of the 35th SIGCSE technical symposium on Computer science education* (SIGCSE '04). ACM, New York, NY, USA, 255-259. DOI=10.1145/971300.971391 http://doi.acm.org/10.1145/971300.971391