From the Editor's Desk: TOCE Continues on a Positive Trajectory in 2016

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During my first full year as editor-in-chief of *ACM Transactions on Computing Education* (TOCE), the editorial board and I took the following four steps to improve the journal's ability to serve the growing community of computing education researchers: (1) We streamlined the peer review process, (2) we established a new partnership with the ACM Special Interest Group on Computer Science Education Conference, (c) we transitioned to a double-blind review process, and (4) we recruited guest editors for two new special issues that address timely research topics. In this editorial, I present key statistics on TOCE's review process and submissions during the 2016 calendar year, discuss and reflect on the positive steps we took to improve the journal during 2016, and describe steps we will consider in the coming year in order to ensure that ACM TOCE continues on its positive trajectory. These include forging additional partnerships with professional conferences, altering the review criteria to make the journal more welcoming to a broader range of research, especially within the K-12 space, and developing a set of evidence standards for research published in the journal.

CCS Concepts: • **Social and professional topics** → **Computing education programs**

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1. INTRODUCTION

In 2016, I served my first full year as editor-in-chief of ACM TOCE. Thus far, my experience has been both immensely gratifying, and a rich learning experience. I have relished the opportunity to think seriously about the present and future role of ACM TOCE in the computing education research community. I have enjoyed becoming more familiar with the wide-ranging and important research in which our community is engaging. I have learned much about how to oversee and manage the iterative peer review process that is so essential to a premiere research journal. Most of all, however, I have cherished the opportunity to interact with more members of our growing community than ever before in my lifetime.

Through all these interactions, I have gained a new appreciation for the tremendous amount of volunteerism required to support and grow the journal of an active research community. I am truly grateful for all the noble work—most of it unheralded and behind the scenes—that all of those involved with *ACM Transactions on Computing Education* (TOCE) have undertaken in the past year. Indeed, ACM TOCE has grown into a premiere publication venue for computing education research because of the

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Fig. 1. Classification of 2016 submissions to ACM TOCE, with time each decision type was in review. Accept = Article Accepted; Minor = Needs Minor Revision; Major = Needs Major Revision; Reject = Article Rejected. The average time in review across all decision types was 47 days.

dedication of the members of our vibrant international community. These community members include the *authors*, who are committed to conducting and clearly presenting research that contributes new knowledge to our up-and-coming research discipline; the *reviewers*, who go the extra mile to provide specific and constructive suggestions on how to improve a manuscript; the *TOCE editorial board members*, who synthesize reviewers' comments into coherent and actionable sets of recommendations; and the *guest editors*, who translate their research interests, expertise, and connections into special issues and then undertake the difficult work of seeing them through to production.

2. A LOOK BACK AT 2016

2.1. Review Outcomes and Time in Review

To provide a basis for assessing TOCE's review process over the past year, Figure 1 categorizes the 133 articles submitted to TOCE during the 2016 calendar year based on their review outcomes. The figure also indicates the average number of days that articles in each outcome category were in review. As shown in this figure, TOCE received 100 new submissions and 33 revised submissions in 2016. Across all submissions, the average time in review was 47 days¹—some 23 days shorter than target turnaround time of 10 weeks (70 days) that I established last year. If we consider only those 85 articles that were actually sent out for peer review (52 new submissions and 33 revised submissions), then we obtain an average review time of 71 days, which almost exactly matches the journal's target turnaround time of 70 days. However, the 52 *new* submissions that were sent out for peer review spent an average of 90 days in review—20 days more than the journal's target.

With respect to the submission pipeline presented in Figure 1, I would like to highlight three additional observations. First, of the new submissions, it is notable that nearly half (48%) were desk rejected—that is, not sent out for peer review—because I determined that they were either out of scope or did not meet the journal's minimum standards. As the year wore on, I observed that we were receiving a large number of submissions that lacked a clear focus on computing education research. Some of these

¹In March, 2016, ACM TOCE switched to a monthly review cycle that begins on the first of each month. For each article submitted after February 1, I calculated its time-in-review by subtracting the decision date from the first day of the review cycle in which the article was considered. Thus, the days between a article's submission date and the start of the review are *not* considered in these calculations; authors who submit on or before the first of the month will obtain the fastest actual review times.

were *way* out of scope, while others presented more general educational research in a related field such as e-learning. In order to reduce the number of out-of-scope submissions in the future, I updated, in late 2016, the author guidelines [4] with a paragraph that delineates the scope of the journal and admonishes authors to ensure that their articles are in scope before submitting them. It will be interesting to see if this update to the author guidelines leads to a reduction in out-of-scope submissions in 2017.

Second, it is notable that once an article gets past my desk, it has a good chance of eventually being accepted for publication. Indeed, of the 52 new submissions sent out for peer review, just 16 (31%) were eventually rejected. Of the remaining 34 articles, 7 (13%) will certainly be accepted (“minor revision”), while 27 (52%) have at least a fighting chance (“major revision”). In a follow-up longitudinal study, it would be interesting to explore the extent to which the authors of articles that require “major revision” are ultimately accepted. Such a study could provide insight into how to better structure the review process to increase the chances that an article with an initial decision of “major revision” ultimately succeeds.

Third, it is reassuring that if authors do elect to resubmit an article to ACM TOCE, its likelihood of ultimately being accepted is high. Indeed, just over 90% of revised articles receive a recommendation of “accept” or “minor revisions.” Less than 10% of revised articles are returned with a recommendation of “major revisions.” This latter outcome is a strong indication that an article may not be ultimately accepted, as the revisions made to the article failed to move the article closer to being accepted. Why might an article that was already revised based on reviewer feedback again receive the “major revision” decision? Was it because the article had little chance of being accepted after the previous review (and hence should have been rejected)? Was it because the reviewers’ and associate editors’ instructions were unclear or misinterpreted (something that we could work on improving by refining the review process)? Or was it simply because the authors failed to adequately address the issues that were raised? In a follow-up study, it would be interesting to examine these cases to better understand the reasons the revisions did not appear to bring an article closer to being accepted.

2.2. Educational Settings and Research Foci

To provide a basis for assessing the kinds of research that TOCE is attracting, I performed a preliminary content analysis of the 52 new TOCE submissions that were sent out for peer review during the 2016 calendar year. My analysis focused on two content elements of the articles:

- *Educational setting.* The educational setting primarily studied: *K-12, Community College, Undergraduate, or Graduate.*
- *Research Foci.* The primary focus of the research:
 - Studies of *Individual Differences* and their influence on various aspects of education, including participation, persistence, and performance
 - Studies of *Languages, Tools, and Environments* and their impact on learning
 - Studies of *Teacher Education* programs and their effectiveness
 - Studies of learners’ *Mistakes and Misconceptions*
 - Studies that explore and evaluate *Pedagogy and Curriculum*
 - Studies of *Learning Processes*
 - Studies of *Computational Thinking*

Figure 2 presents pie charts illustrating my classification of the articles relative to their *educational setting* and *research foci*. Before discussing these results, I need to underscore that, due to time constraints, I did not verify the inter-rater reliability of the two coding schemes. Hence, these results must be considered provisional. When I present these kinds of categorical breakdowns in future editorials, I hope to have the

Fig. 2. Classification of 52 new articles submitted to ACM TOCE in 2016 by (a) *educational setting* and (b) *focus of research*.

time to be able to verify the reliability of the coding schemes, and I hope to be able to draw on more standardized descriptions of research foci.

With respect to the educational settings considered by the articles submitted to TOCE in 2016, Figure 2(a) indicates that nearly two in three articles focused on undergraduate education, while nearly all of the remaining third of articles focused on K-12 education. A focus on community college and graduate education was rare, with one article dedicated to each setting. (One article was classified as “Other” because it focused on multiple educational settings.) That two-thirds of TOCE’s 2016 submissions focus on undergraduate education is unsurprising, given TOCE’s history as a journal for disseminating educational resources for undergraduate computing education (through the ACM *Journal on Education Resources in Computing*, TOCE’s predecessor). However, given that, in 2016, nearly one in three TOCE submissions focused on K-12 education, it is clear that K-12 research is beginning to find a home in TOCE. Moreover, in light of the recent proliferation of initiatives that aim to make computing education a standard part of K-12 education (e.g., CS for all [1]), I would expect that the proportion of K-12 research published in TOCE to reach, and eventually to surpass, the proportion of undergraduate research published in TOCE.

Figure 2(b) illustrates a diverse portfolio of research themes addressed by TOCE submissions in 2016. Roughly one-fifth of these submissions were to the special issue on learning analytics, and this undoubtedly contributed to the plurality of articles (30%) that explored the influence of individual learner differences on learning. In an education journal, one would expect a healthy proportion of articles to focus on pedagogy and curriculum issues; nearly one-fourth of new TOCE submissions in 2016 focused on such issues. Computational thinking is currently a hot topic in computing education, especially at the K-12 level, and this was underscored by the fact that 15% of TOCE submissions focused on that topic. As in other STEM education disciplines, computing educators maintain an interest in studying their students’ misconceptions and mistakes; this was the focus of 11% of TOCE submissions in 2016. A smattering of other research themes rounded out TOCE’s portfolio in 2016, including studies of learning processes (9%), teacher education (6%, clearly related to recent K-12 educational initiatives), and languages, tools, and environments (6%).

2.3. Additional Activities and Outcomes

In 2016, I worked with the TOCE Editorial Board on three initiatives to improve the journal's connections to the computing education community, quality, and appeal to computing educators. First, working with the Special Interest Group on Computer Science Education (SIGCSE) Board, we forged a new partnership with the ACM SIGCSE Conference. Under this partnership, which began with the SIGCSE 2017 Conference in Seattle, authors of articles accepted for publication in ACM TOCE between November 1 and October 31 are extended the invitation to present their articles in a special TOCE Track at the subsequent year's SIGCSE Conference. Authors who respond to this invitation are placed on a list, with the SIGCSE program chairs making the final decisions regarding which articles can be accommodated at the conference. At SIGCSE 2017, I was delighted that all seven articles whose authors expressed interest in presenting at SIGCSE were presented at the conference. I am happy to report that the three TOCE sessions that took place at SIGCSE 2017 were well attended and that the feedback I have received from this new partnership has been overwhelmingly positive. The partnership appears to have the strong support not only of the SIGCSE program chairs and attendees but also of TOCE authors, who benefit from being able to get both a journal publication and a conference presentation out of a single article. I look forward to reporting on this new partnership's continuing progress in upcoming editorials.

Second, in consultation with the TOCE Editorial Board, the journal transitioned to a double-blind review process as of the April 2017 review cycle. At the time of this writing, we are ironing out the final kinks in this new review process, which we hope will raise the rigor of our review process and put us on an even plane with peer publications in other fields. To clarify the new double-blind review process, I have updated the TOCE author page [4] with links to detailed instructions on how to properly anonymize an article for review. I send thanks to our colleagues at the *ACM Transactions on Database Systems* (TODS) for their thoughtful and clear guidelines on article anonymization. Rather than attempting to reinvent the wheel, the TOCE author page simply links to the TODS author page's anonymization instructions.

Third, I am excited to be collaborating with three sets of guest editors on the production of three different special issues that address timely computing education topics. **Shuchi Grover** and **Ari Korhonen** are guest editing a special issue on *learning analytics* to be published in late 2017. To accommodate the high volume of submissions that were initially accepted when the review process completed this past fall, the learning analytics special issue will be split into two issues, each containing five articles. **Tony Clear** and **Sarah Beecham** are guest editing a special issue on *global software engineering education* to be published in early 2018. Twelve articles have been submitted to this special issue and were in the process of being sent out for peer review at the time of this writing. Finally, **Sarah Heckman** and **Mark Sherriff** are guest editing a special issue on *capstone projects* to be published in late 2018. These articles are currently in the process of being submitted; the peer review process will begin later in 2017.

3. A LOOK AHEAD TO 2017

In the coming year, there are several areas in which I would like to build on the progress we made in 2017. First, although the average turnaround time of all articles submitted to TOCE (47 days) falls well below the journal's target of 70 days, there is an obvious area where improvement can be made: the turnaround time of *new* submissions. In 2018, I would like to work toward reducing the average turnaround time of new submissions from 90 days to 80 days, with an eventual goal of 70 days. To that end, it will be instructive to explore where the most significant bottlenecks in the review process occur. I will conduct a deeper analysis in the coming year, and look

forward to sharing the results and recommendations that come out of that analysis in next year's editorial.

Second, based on the analysis of educational settings and research foci presented above, and on conversations I have had with members of the vibrant "CS for All" community, I would like to work toward making ACM TOCE a more welcoming venue for a broader range of computing education research. While ACM TOCE's early focus was squarely on undergraduate computing education, I would like to see ACM TOCE become the "go-to" publication venue for computing education research in any educational context. For example, there has been a general trend toward introducing computing to increasingly younger learners, and a concomitant increase in computing education research focused on increasingly younger constituencies, including research in K-12 and even pre-K-12 contexts. I would like to see this important line of research find a home in ACM TOCE. Likewise, an important thrust of the "CS for All" is on training K-12 teachers [1]. I believe ACM TOCE should be welcoming of articles that present research in teacher training efforts or any other effort to transform and innovate computing education for non-traditional audiences in non-traditional venues. As a first step toward making TOCE more welcoming to research in these settings, I plan to work with the Editorial Board to refine the review criteria so they welcome a broader range of research.

Third, using TOCE's partnership with ACM SIGCSE as a model, I am interested in exploring partnerships with additional computing education conferences in 2017. There is a precedent for ACM journals having agreements with multiple conferences. For example, authors of articles published in ACM *Transactions on Computer-Human Interaction* (TOCHI) are extended the opportunity to present their articles at the Conference on Computer-Supported Cooperative Work, the Conference on User Interface Software and Technology, and the Conference on Mobile Human-Computer Interaction [2]. In a similar vein, ACM TOCE could forge agreements with additional conferences such as the Conference on Innovation and Technology in Computer Science Education (ITiCSE), the Conference of the America Council of Education (ACE), and International Computing Education Research (ICER) to make it more practical and convenient for TOCE authors to present their work to a broader audience. For instance, TOCE authors from European countries would likely welcome the opportunity to present at ITiCSE, while TOCE authors from Australasia would likely welcome the opportunity to present at ACE.

Finally, just like members of any scientific community, those of us who review for ACM TOCE are placed in the difficult position of making value judgements regarding the research articles we review. Does an article make a sufficient research contribution? Does an article have a strong-enough empirical basis rooted in a clear methodology? Should an article ultimately be accepted for publication? ACM TOCE has a set of high-level review criteria. These include "adequately evaluate any teaching intervention. . . in terms of its impact on learning," "use appropriate methodology," and "provide sufficient detail to replicate and evaluate" (see [4]). However, these criteria are high level and leave much room for interpretation. To move toward clearer and more uniform standards for publication, I concur with Editorial Board member **Andy Stefik** that ACM TOCE should work toward developing a set of *evidence standards* against which articles submitted to the journal can be judged. As Editorial Board **Mark Guzdial** pointed out at a recent conference, a computing education research journal needs to strike a suitable balance between (a) promoting research rigor and (b) encouraging the publication of research that provides insight into interesting research questions that matter to the community. To me, this suggests that TOCE start with baby steps: Rather than adopting a highly stringent set of standards such as those of the What Works Clearn- inghouse [5] or Consolidated Standards of Reporting Trials (CONSORT) [3] we could

iteratively refine a more modest set of standards that provide a clearer basis for reviewing articles, while also encouraging the publication of research that is interesting and important to our nascent community. In the coming years, I look forward to exploring this possibility in partnership with the TOCE Editorial Board and members of the broader community.

As always, I would love to hear from you about any of the matters I have discussed in this editorial or about anything else on your mind. After all, ACM TOCE is *your* journal, and it cannot succeed without the input and support of the community it serves. I stand ready to listen to your ideas and suggestions, so together we can help ACM TOCE maintain its positive trajectory as a leading computing education research journal.

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