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Not "Just" an Undergrad: Undergraduate Journals as a Portal to Participating in Academic Discourse Communities

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Abstract: This essay examines a case study that investigated how students learned and how they applied their writing skills as they pursued publication in an undergraduate scientific journal at a Canadian university. As we conducted a genre analysis of student drafts submitted to the journal and interviewed students who published in the journal's inaugural year, we noted the desire and eagerness that students had to publish at the undergraduate level. We also noticed certain barriers to students fully participating in research for their discourse communities, including challenges accessing publication opportunities and revising their work for new audiences and contexts. Undergraduate journals offer a tremendous space for them to hone a variety of skills in a supportive environment while also taking the first steps to fully participating in scholarly practice.

Keywords: undergraduate publishing, scientific journals, student perspectives, discourse communities

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Introduction

Undergraduate journals provide a means to disseminate student research while becoming immersed within the scholarly publishing community (Weiner & Watkinson, 2014). These opportunities also offer undergraduate students a chance to develop their writing skills as they participate in their academic discourse communities (Caprio, 2014; Rifkin et al., 2010). Despite their benefits—better understanding published works, learning to manage collaborative and individual work, forging an area of interest, and inspiring postgraduate career trajectories (Madan & Teitge, 2013)—undergraduate journals have not been used to their maximal potential to support student success. In the sciences, opportunities for undergraduate students to publish are not common. As such, science students have little opportunity to transfer knowledge gained

in the classroom to new contexts and different audiences. Their work with a paper often ends with their course, and, as such, they miss out on the profound learning opportunities that disseminating research can provide them early in their academic and professional lives.

This essay will report on an intrinsic case study conducted to understand how students learned and how they applied their writing skills as they pursued publication in a journal to showcase scientific research at the University of Toronto. In our Canadian context, students enrolled in undergraduate programs are pursuing a three or four-year program at the university. They are, most often, coming from secondary school (we call it high school) and just beginning their professional journey as young adults. Undergraduate students do not usually get opportunities to publish their coursework, which was part of the inspiration for starting this journal. For this reason, the paper will focus on undergraduate journals being unique learning experiences not frequently offered to students at this academic level, with particular emphasis on how the journal can immerse students in their academic discourse communities and offer them opportunities to develop skills—such as applying feedback—that are not always available in their coursework.

The essay aims to bring undergraduate perspectives about undergraduate journals to the table and underscore the fact that so many students feel that they are inferior members of their discourse communities who cannot fully participate in the activities related to these communities; they believe they're "just" undergraduates and are not qualified to publish. Our findings suggest the opposite is true: students are eager and ready to participate in these scholarly activities, but they are not always ready to adapt their work for these communities. Undergraduate journals offer a tremendous space for them to hone skills in a supportive environment while also taking the first steps to fully participate in scholarly practice.

The Journal

The University of Toronto's Journal of Scientific Innovation (JSI) is a tri-campus interdisciplinary journal dedicated to the breadth of sciences. Paige launched the journal in 2021, and Chris has acted as the faculty sponsor for the journal since its inception. This project arose from our mutual desire to understand how the journal was impacting students and how we could enhance the journal's editorial structure to ensure long-term success.

The journal's mission is to provide a platform for undergraduate students to disseminate their research to academic audiences. Using the Open Journal Systems (OJS) publishing software to promote easy access to the publication for the public, the JSI is operated under the University of Toronto's Robarts Research Library. This student-led, faculty-supported initiative blends academic and public discourse practice. In the first year, two issues were launched. Two more issues will be released in the second year.

The JSI is managed by students who are divided into two positions: Peer Reviewers as well as Associate Editors. Peer Reviewers are tasked with deciding the success of anonymous papers submitted as well as providing their own feedback. This team decides what are the shortcomings of each paper and what will need to be edited if the submission is accepted or revised for a following issue. The Associate Editors then work to integrate these edits alongside the author(s) as well as complete some minor adaptations in preparation for publication.

The journal aims to provide first-time publications for undergraduate students. Students from various scientific disciplines at the University of Toronto can submit a course paper but must adapt their submission to discuss the ways in which their topic, experimental design, or scientific research fuels scientific innovation and future discovery. This learning opportunity

allows undergraduate students in the sciences to transfer their writing skills from the science classroom to a new, more public context. In the process, student authors undergo a modified version of peer review. Submissions are anonymized and reviewed by a panel of undergraduate students from the sciences at the university. These students select successful papers and suggest revisions. These revisions are then synthesized by the Editor-in-Chief and Associate Editors to soften language, focus the revisions, and provide direction for the next steps in the publication process. Successful authors are then paired with a student mentor who supports their revisions. In this process, both authors and editorial team members gain first exposure to academic peer review and revisions. Publishing in the journal is, in many ways, more of a pedagogical exercise and experiential opportunity than a scientific endeavor.

Literature Review

Benefits for Authors and Editors

Studies that discuss undergraduate journals often point to their benefits for student authors. Undergraduate authors can develop their skills through the publication process, which teaches them how to revise their work for new audiences, critically analyze and implement feedback, and apply writing strategies learned in the classroom (Bendinskas et al., 2020; Mariani et al., 2013; Walkington, 2012). Similarly, students on a journal editorial team benefit from assessing scholarship and learning about how academic knowledge is disseminated (Downs, 2021; Mariani et al., 2013; Walkington et al., 2013). In both roles, authors and editor, students refine communication skills through peer review and feedback (Walkington, 2012), and they learn to engage with their academic discourse communities (Rifkin et al., 2010). A study of an undergraduate journal by Garbati and Brockett (2018) found that undergraduate journals offer students important opportunities to develop writing, interpersonal, and communication skills. Caprio (2014) framed student journals as a pedagogical initiative that enables students to begin transitioning from students to community-engaged scholars. Likewise, Neville et al. (2012) argued that students can use undergraduate publications to become producers of knowledge in their communities rather than simply consumers of academic research. When students participate in publishing in an undergraduate journal, they enhance their academic toolkits by disseminating their ideas through a collaborative, formative, and dialogic space.

Developing these skills and participating in discourse communities can have long-term benefits for learners' careers. Lave and Wenger (1991) noted that novice learners who participate in the practices of their discourse communities can shift their locations in those communities; they can move from novices to full participants and contributors. The benefit of this immersion parallels Bendinskas et al.'s (2020) note that publication should not be the only goal for student participation in journals. Participating in journal production or preparing a paper for publication offers important skill-building opportunities for students. Participating in knowledge-building activities with an undergraduate journal, such as conducting and disseminating research, repositions learners so they can participate in the future.

Undergraduate Journals and Future Opportunities

If students do publish a paper in an undergraduate journal, their success can help them pursue future opportunities. From an academic perspective, publication increasingly becomes a factor in hiring, promotion, and career advancement as students advance through their studies (Lee & Norton, 2003). Building a curriculum vitae is equally important for students pursuing

professional programs, such as medical and law schools. While publications are not essential for successful admissions, they can be beneficial in a competitive admissions environment. Moreover, many graduate programs assume that students possess writing skills that they can transfer to graduate school (Sallee et al., 2011) despite evidence that students often require support as they transition to new genres and means of knowledge dissemination (Eaton & Dombroski, 2022; Sallee et al., 2011). Undergraduate journals offer students a chance to practice these genres in a supportive environment before they must participate in higher-stakes publication contexts.

One challenge, however, is that opportunities to publish and practice knowledge dissemination are difficult for students to obtain. In a study of education graduate student participation in academic publications, Garbati and Samuels (2013) found that less than nine percent of papers surveyed had graduate student authors. Notably, few students were solo authors, and none of the papers surveyed contained student-student collaborations. The ability for students to participate in publication is often contingent on faculty contexts. Jones et al.'s (2010) review of productivity in educational psychology journals found that faculty who publish the most and who have the highest publishing demands are less likely to include student contributors, while less productive faculty (by publication quantity) and departments are more likely to provide an environment that welcomes student participation in publications. Garbati and Samuels (2013) and Jones et al. (2010) both refer to graduate students, but if graduate students have limited access to publication opportunities, then it is likely that undergraduate students would have even less access. As we will discuss later, our undergraduate participants emphasized a lack of opportunities for them to meaningfully participate in academic research dissemination.

Undergraduate Journals and Science Communication

In the context of our undergraduate scientific publication, it is worth considering the undergraduate research environment that impacts students who participate in our journal activities. This context is intertwined with wider writing and communication practices that negatively impact students' abilities to translate their learning beyond the classroom. Junior scientists often learn to communicate their research during coursework. They, like most undergraduate students, become socialized into their disciplines (Lea, 2004; Street et al., 2015) as they replicate the writing and communication practices most prominent in their field. The problem is that they often do this work within their disciplinary bubble. Classroom projects rarely get adapted for a context beyond that space, which means that they do not learn how to translate their work for wider audiences.

A combination of specialization and lack of formal training in research writing dissemination has contributed to the problem (Brownell et al., 2013). Bankston and McDowell (2018) highlighted that this lack is at the core of challenges to address misinformation, combat distrust in scientists, and influence policy to resolve social problems. The solution, for many sources (e.g., Brownell et al., 2013; Norris et al., 2019), is increased communication training in scientific programs to resolve what Bubela et al. (2009) called a "deficit" in scientific communication pedagogy. The idea is that emphasizing communication skills in the scientific classroom will better prepare junior scientists to engage with wider audiences.

Undergraduate journals may offer an alternative way to mitigate this deficit. Given the range of opportunities that journals offer students to develop communication and research skills (Garbati and Brockett, 2018; Rifkin et al., 2010; Walkington, 2012; Walkington et al., 2013), an

undergraduate journal of science can, hypothetically, offer undergraduate scientists a venue to hone these skills and consider wider audiences. In the process, they will be better positioned to become what Caprio (2014) calls "change agents" who can fully participate and contribute to their fields.

Methodology

This paper comes from an intrinsic case study that was framed by the papers published in the first year of the journal. An intrinsic case study, according to Stake (2003), is undertaken because the researcher seeks a deeper understanding of a case. The intention is not to theorize but rather to deepen knowledge of a particular situation or issue. In an intrinsic case study, the case itself is "of secondary interest, it plays a supportive role, and it facilitates our understanding of something else" (p. 137). Our case was the JSI's first year of publication, but we were less studying an issue with the journal than the circumstances around which it was produced. We wanted to gain a better understanding of the journal's publication process so that we could refine our workflow and publication strategy.

Six of our fourteen authors agreed to reflect on their publication experience. To maintain anonymity, the author names have been changed to a pseudonym of their choice. Participants came from a range of program years. Two participants had recently graduated and were publishing their undergraduate work. Two had just completed their first year of university studies. Two others were entering their third year of a four-year program. The papers also represented a large variety of disciplines. For example, some papers came from psychology classes, one was about innovation in energy sources, another combined science with sociology, and others focused on chemistry. Most papers from participants were research papers, though the journal has adapted lab reports for publication. The journal has not yet published parts of dissertations due to contextual challenges related to lab data and requirements for graduation.

The study was motivated by a desire to refine the journal's editorial approach. As the student editor-in-chief and faculty sponsor for the journal, we wanted to establish a sustainable model that would persist for years to come. Using a case study framework allowed us to connect the phenomenon—in this case, students revising a paper for publication—with the context of the journal editorial process (Stake, 2005; Yazan, 2015). To accomplish this, we focused on two areas of the publication process. Firstly, we investigated what brought authors to pursue publication in the journal and what their expectations were. This then allowed us to examine how student authors and student editors collaborated to revise successful submissions.

We used two methods to gather information from our participants. The first step was a semi-structured interview with the participants. The interviews occurred in the first half of 2022. Prior to the interviews, we established a list of questions to guide the discussions. The questions were designed to establish a thread for the interviews but also leave space for us to pursue discussion points specific to each participant. This way, interviews could respond to individual participant contexts, with the questions acting as a gravitational center for the discussions as a whole. In this interview, we asked participants about what attracted them to publish and how the journal impacted their undergraduate education. We also asked them about their revision experience and the changes they made to their paper as they adjusted their work to suit the journal context. These interviews were recorded on Zoom, and we then cross-referenced the Zoom-generated transcript with the recording to correct inaccuracies.

The second step involved a genre analysis. The aim of the genre analysis was to compare how revisions the students made on their papers compared to their process and what they said

they revised when we interviewed them. We drew upon Bhatia's (2016) critical genre analysis because it prioritized the context in which the documents were produced as much as it emphasized the end product and their effects on intended audiences. Whereas traditional genre analysis has focused primarily on textual output (Bhatia, 1993; Swales, 1990), Bhatia's (2016) framework emphasizes professional practice "through the medium of genres" (p. 9) in an attempt to "demystify, understand, explain, and account for the kinds of professional practices in which we are engaged in our everyday professional life" (p. 23). Since we were investigating an undergraduate journal, this approach fits well with our context.

When they publish in a journal, students are practicing skills they will need to become more fully immersed in their communities, and they are honing skills that could translate to their professional practice later on (Caprio, 2014). How student authors accommodate the publication context, how they think about and revise their paper to speak to their target audiences, and how they critically engage with feedback to suit the unique demands of a publication (e.g., meeting the journal theme, using literature that joins the conversation held in the journal) all offer insight into what they students are learning as they publish their work. These same factors also provide insight into how student editors are equipped to work with authors and support them through the publication process.

We analyzed two document types. The first document was a chart where authors and editors exchanged feedback and documented their revisions to the paper drafts. Each published paper had one of these documents. We then investigated each draft authors submitted. This included at least the original submission and the final revised draft for each participant. We individually went through the drafts and the charts and coded preliminary themes. We then discussed and analyzed these themes together before returning to the interview transcripts to compare the thematic connections to the participants' perceptions. This allowed us to cross-reference the genre analysis with the participants' discussions of their professional practice (what skills they learned elsewhere that they drew upon for the publication) and the professional culture that influenced their work (their motivation for publication).

Altogether, we connected data from three sources: the interview transcripts, the revision charts, and the genre samples students provided. This allowed us to cross-reference the participants' subjective experiences with their writing itself (and vice versa). We individually examined the interview transcripts, charts, and samples and developed a list of themes. We then met to discuss our themes, narrowing them down to the most salient points. We then discussed which themes applied more to the journal process and which ones applied to the journal's impact. This division allowed us to organize the codes and make space for areas where we differed.

Although there were many aspects of the journal that we discussed as we analyzed our themes, two findings became centerpieces of our discussions. The first was the unique position that undergraduate publishing played in the participants' undergraduate education. The second was that participants often struggled to implement feedback as they revised; with the right structure, however, journals offer a fantastic opportunity for them to hone these skills. We will discuss each finding more extensively in the discussion that follows.

Discussion

A Uniquely Positioned Learning Experience for Undergraduate Scientists

Undergraduate journals offer a unique learning experience rarely presented to students. These opportunities, with their ability to contribute to students' future ability to work with academic audiences, allow for a more thorough focus on critical thinking and writing skills. One of our participants, May, noted that journals grant students the opportunity to "learn or explore ideas outside of the motivation that it is for a grade or for a course," providing students with the means to contribute to work in their fields. Another participant, Frida, acknowledged our journal's ability to offer an "accessible and friendly environment to publish your work... with a great university-accredited publication." The journal offers students the ability to be "published without a high GPA or a supervisor." The journal can even the playing field, allowing all students to feel valid in their capabilities as scientists.

The participants emphasized how the journal inspired students to continue research designed for a course and adapt it for new audiences. Our participants were motivated to think outside the systemic restrictions of their disciplines to contribute to the wider scientific discussion. Steven, for example, noted his ability to be able to "communicate the dense scientific information into an easier way, but then making that accessible for other people and easier to digest articles" by revising his work for publication. The theme of students teaching students is potent within student-operated, student-directed academic opportunities. Frida, a student interested in pursuing graduate studies that merge the humanities with the sciences, felt as if the journal allowed for students like her to expand beyond their disciplinary community: "it is definitely my personal agenda that I am hoping to share with others in the future. A lot of it is bench work... and I am hoping that what I am doing is a call to action [for my field]." May, after wanting to find a topic largely influenced by the concept of innovation, landed on a new field of interest: "That wasn't a field that I thought I was going to be interested in. I feel like [undergraduate publications] can allow their ideas or their voices to be reached to other disciplines."

There is a desire for undergrads to pursue publication, to see their work go farther, to participate as scholars would, and to orient themselves in their topic's direction as they continue through higher education. One participant, who chose the moniker "Mysterious Wanderer," spoke on the initial motivation of being able to have something publishable, "but then, as [he] got more into researching [his] topic, it became more about... is researching, publishing, and writing something that I really enjoy?" Elemmy wrote her paper through a research course and saw publishing in our journal as a milestone in her research and skill acquisition. She noted that, with the journal, there is "a team that will help you put this paper together, edit it and help you see and understand where changes are needed, and then you can use this feedback and apply it to your next project.... this is definitely exclusive to a journal opportunity." She pointed out that the publication route was not discussed as being a feasible endeavor with the course being content heavy. Opportunities like our journal can have tremendous value if they work adjacent to formal research courses.

Formal opportunities to participate in scholarly communities are scarce within undergraduate education, mainly because programs and courses often prioritize content review and coursework rather than extracurricular initiatives like a journal. One thing that stood out amongst our participants is that they demonstrated a great deal of humility; undergrads do not expect to be able to participate in their community conversations. They did not feel like they had many avenues to join the academic conversation. May reflected on her experience, claiming that many first-year students may feel as though they "don't have enough experience." May noted that believing they aren't "worthy" enough to have their paper submitted and critically analyzed

by even upper-year students causes students to think, "then maybe I should wait?" She reflected that "we admire people in higher fields because not only do we want to be like them, but because we know how hard it takes to be there and the time you need to put in." Similarly, to Frida, the journal "felt like a community of students highlighting each other's work." She continued to mention that academic acknowledgment is not always reciprocated from research involvement – "I feel like we don't really get that much credit" in wider academic circles. As Frida mentioned, the success of the journal can be attributed to "strategically not defining it as an undergrad journal." Because, as Steven and Elemmy explained, "the barrier is out there" when it comes to pursuing opportunities that assist in your ability to progress through higher education. It is a "starting point" but one that is difficult to access.

Publications and participating in a scholarly community offer a significant opportunity for students. Showing that they are part of the community to which they wish to belong—that they have taken the first steps to do the work of a scholar—is integral in standing out from the crowd in post-grad programs. Undergrad publications like our journal open not just an opportunity but an ability to immerse students in their discourse communities. Elemmy reflected on the journal's ability to "help you build a resume, start creating a reputation, and have your name in the science community," allowing for the "competitive edge that [she] is looking for." Becoming a better candidate for masters, contributing to the research that is out there, and enriching the science that is available are points that Steven also deemed influential with journal involvement. He noted that it is beneficial to "have your name associated with the journal and to see what other people are up to and what research is being put out there."

Learning experiences were not exclusive to those editing their paper for publication. Elemmy, who was recruited as a Peer Reviewer after publishing her paper, discussed what she learned from being, instead, behind the critical chair. She says the opportunity to lend her own critique "[helped her] be a little more objective with your own work." The ability to learn is a significant and valuable part of publishing and can be further facilitated with the help of similar undergraduate opportunities.

The Challenge to Implement Feedback

Despite participants' desire to publish and participate in their communities, their initial foray into the publishing world had challenges that are worth discussing. These challenges point to ways that undergraduate publications can refine their approaches to support students and help them develop their skills through publishing. When we compared the interview transcripts to the genre analysis results, we noticed a discrepancy in how participants described their revision process and how they revised their papers for publication. In the interviews, participants would regularly discuss a major change they made in their paper and the central area of improvement that was required by their peer editor. The common area for all participants was aligning with the journal's theme of innovation. For example, Elemmy described needing to incorporate innovation more overtly in the paper. During her revision, she explained that she took "that feedback from my editor, [and] I was able to make my paper more innovative and integrate more innovation in it." Another participant, Taylor, noted that their paper did not initially "fit the innovation aspect of the [journal] because it was really focused on a single source" due to the assignment parameters from their class. In the interviews, we could tell that the authors were thinking about the publication context and a wider audience. They were also aware that it was necessary to join and participate in the larger academic conversation. They all described an eagerness and willingness to do so.

When we analyzed the drafts, however, it was clear that they did not participate in as substantial of a revision as they believed. The revision charts from participants like Elemmy, Steven, and Taylor, for example, all emphasized the need to enhance the discussion around what made their research innovative. There are notes from May's editor indicating a need to "introduce more innovation into the piece while making it more modernly relevant." The authors would then respond with an indication that they had inserted innovation more in the paper. For example, the participant noted, "we overcame this obstacle by looking into some articles that provided information about small advancements in the field. The author embedded this research in the conclusion as an indicator of innovation." When we examined the drafts, we could see that the authors had pointed to innovation a bit more overtly. They'd mention why their idea was innovative. Taylor brought in more literature to expand the literature review, and they mentioned innovation more. But most authors did not make the larger discursive changes that would demonstrate their research as innovative. Their theses did not change fundamentally, and their discussion of the results did not change significantly, so the idea of innovation was held together by their data and conversation with the literature. These are the higher-order discursive moves that scholars make when they disseminate their research; it seemed like these undergraduate students were still developing this ability.

The undergraduate student editors were also still developing this ability. As the ones guiding the authors, they provided notes to include more innovation but did not always provide specific suggestions for how to do this. Instead, when the authors indicated that they added more innovation to their articles, the editors often accepted the revision without pushing further. For example, Elemmy's editor responded simply that they "discussed scientific innovation connection in introduction, discussion, and conclusion section more thoroughly (added 1-2 sentences more)." It was as if they were using a checklist to indicate completion rather than fully engaging dialogically with the authors. From a genre perspective, the authors and editors were thinking about all the components of the publication process that would be demanded of them in a professional publication. Bhatia (2016) outlined that analyzing discourse as a genre "extends the analysis beyond the textual output to incorporate context in a broader sense to account for not only the way text is constructed, but also the way it is likely to be interpreted, used and exploited in particular contexts, whether social, institutional or more narrowly professional, to achieve specific goals" (p. 6). The participants described this in their interviews. They would point to constructing the text so that it accommodated various external interpretations and contexts. For example, May described how her editor pointed out areas where her analysis "this might have been better, or this [approach] is the better wording, or this would have given a better impression [for the audience]." May and her editor were aware of the wider audience, and they concentrated on matching the paper with the publication context. However, most participants implemented these ideas in their writing in only cursory ways; they could think about accommodating the context and audience, which was a positive first step for the revision.

Still, the final drafts did not match the contextual demands of the publication as well as they could have. The final papers were still strong, but they could have been enhanced, and the student authors could have had a deeper learning experience. This suggested that authors had not fully adapted their disciplinary knowledge to the new context. Instead, they stuck with their original line of thinking and tweaked the paper around the edges.

The discrepancy between the interview and genre analysis results prompted us to consider why students struggled to implement feedback that met the journal's requirements. The papers they wrote were strong despite requiring revisions. The revisions suggested by the editors

were astute. These students were all intelligent and accomplished. They were all eager to participate in the publication and engage with the feedback process. What they had not fully developed yet was the ability to implement feedback. Because many of the course contexts in which they developed their work did not emphasize dissemination, many of these students were not overtly taught how this may happen. Frida summarized this context well: "when I write for class, I keep in mind the preferences my professor and the tone they want, the voice they want, the message they want, and the context" of the assignment. The assignments were designed for a grade and written for a different purpose, and an advanced engagement with feedback and revision was not something they considered before the publication; they were thinking instead about their instructor's requirements. Each student indicated that publication opportunities were rare for undergraduates, so the publication was a novel experience.

The journal also seemed like a terrific environment for the students—editors and authors alike—to practice because it was so uniquely positioned in their undergraduate learning. We realized that we needed more support for authors and editors. One case where the author, Frida, did take up feedback well helped us determine how this could be done. This participant, Frida, made significant changes to their work based on the feedback. They worked with Paige to revise their paper, and they went back and forth several times. They engaged in what Lillis (2003) would call dialogic feedback as Frida shifted her paper to focus more on the innovative scientific processes that were a subsidiary component of the paper they submitted. Frida described this as "how to write and Edit more than like the actual content of the paper," which "contributed to my educational development." The difference between Frida and Paige is that they had been involved in other publications before this interaction. They had prior training to draw upon, and they brought this training to the revision process. If we could provide similar training to future editors and offer more content-driven revision suggestions, authors would be in a better position to revise their work.

From a science communication perspective, these results from the genre analysis underscore how authors may not know how to adapt to new contexts in their undergrad. This is an important transferable skill, and it takes time to learn. We believe that an undergraduate journal can help improve this skill if students are given the proper support. For this reason, we have been working to implement faculty support and increased editorial training (that focuses on giving feedback and prompting deeper revision). The journal offers a fantastic outlet to support authors as they learn to disseminate research, engage with publication editors, and hone their communication skills. With the right structures, with the right mentorship, and with the right training, both the authors and the editorial team can enhance their undergraduate education through the publication experience.

Limitations

Because we concentrated on only the first year of publication, we had a small number of participants. Future research would benefit from an expanded sample size that could look at more factors that affect student journals. For example, an expanded sample size would allow for more disciplinary and interdisciplinary analyses. There may be compelling information gathered from a longer and larger study about who submits to undergraduate publications, why they submit, and how this information changes depending on the disciplinary culture.

We also entered this project knowing that we wanted to refine the journal's publication process. We often had specific areas we wanted to improve, and we recognized the possibility that we could steer the participants to discuss these specific areas or that we could filter our

analyses around these areas. We wanted to be as open as possible to what our student participants could tell us. Although we tried to expand our purview as we analyzed, particularly by discussing individual participant results before looking at the aggregate themes, our analysis is still filtered through the role that our specific journal and institutional context played in starting a new journal on campus. Research in other contexts with other lenses would be instructive and provide important information across institutions.

Conclusion

While the study results offer compelling insight into the role that undergraduate publications may play in students' learning, we view it as the start of a bigger conversation. Despite having a small sample size, our findings are encouraging for a couple of reasons. Each participant pointed to the lack of opportunities that existed for them to disseminate research and participate in publications. These findings are consistent with wider conversations about student publications (Garbati & Samuels, 2013; Jones et al., 2010). Similarly, challenges with implementing feedback resonate with other literature on dialogic feedback processes and student writing support (Eaton, 2023; Grauman, 2022; Lillis, 2003).

Our research has taught us much about how publication opportunities can help cement skill-building within undergraduate education. However, the benefits can be further reaching than solely skill-building ones; undergraduate journals have the ability to touch on the personal and career development of students – a benefit that is oftentimes overlooked or impaired during the uncertainty of career trajectories and abilities during undergraduate programming. Our participants all believed that their involvement in research would always pale in comparison to that of postgraduate students, mainly due to their educational level and the responsibilities afforded by experience. While higher status in academia is not something to be overlooked, opportunities like undergraduate publication go about developing students in a more individualistic way. For example, students building confidence and seeing themselves as contributing members for the academic discourse is important for how they see themselves as learners and participants in their field. It also leads to recognition amongst peers and the rest of the journal's audience. This recognition may not have the same magnitude as students advance in their careers, but it's an excellent starting point. Validating undergraduate students' research, participation, and hard work can have lasting impacts on how they view higher education and their willingness to partake in this path as their education advances.

The findings from this study offer compelling insight into future research pathways. Investigating how undergraduate students take up feedback across various undergraduate publications would offer insight into what editorial structures may best support student authors as they learn to disseminate their research. Such an investigation could enhance the learning experience for student authors and editors alike. Moreover, it is worth investigating the social, institutional, and cultural factors that prevent undergraduate students from fully participating in research. Our participants indicated that there is an appetite for undergraduate involvement in publishing opportunities, but there are many barriers to their participation. Most of their apprehensions are linked back to institutional culture and the fact that undergraduates are not typically perceived as knowledge-makers in their discourse communities. Going forward, conversations examining why this is the case warrant increased attention to enhance the capabilities of these undergraduate scientists.

Undergraduate journals have much further-reaching properties than simply an opportunity to publish past coursework. They are breeding grounds for confidence building and

act as assessable publication opportunities to amplify undergraduate successes and research within their community. From a science communication perspective, our observations derived from the genre analysis emphasize the importance of adapting content to new contexts as well as it being a transferable skill that takes practice to master. Publication opportunities are rare, so novel experiences can act as a spark to support undergraduate research interests and applications of writing skills not usually exercised in the classroom.

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