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Reviewing the Review Process: Designing Better Review Forms for Student Editors of Undergraduate Research Publications

Meluso Rosaria Meluso

Missouri State University, Meluso2213@live.missouristate.edu

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**REVIEWING THE REVIEW PROCESS: DESIGNING BETTER REVIEW
FORMS FOR STUDENT EDITORS OF UNDERGRADUATE
RESEARCH PUBLICATIONS**

A Master's Thesis

Presented to

The Graduate College of

Missouri State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Arts, Writing

By

Maria Rosaria Meluso

May 2021

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REVIEWING THE REVIEW PROCESS: DESIGNING BETTER REVIEW FORMS FOR STUDENT EDITORS OF UNDERGRADUATE RESEARCH PUBLICATIONS

English

Missouri State University, May 2021

Master of Arts, Writing

Maria Rosaria Meluso

ABSTRACT

In 1998, the Boyer Commission on Educating Undergraduates in the Research University suggested that undergraduate students should be involved in research to improve their learning. Undergraduate research publications arose partially as a response to this suggestion because they allow students to engage in experiential learning. They also allow students to see research as serving a larger purpose rather than simply satisfying a requirement for a grade. Students, especially undergraduates, often serve as editors on undergraduate publications, but it is unclear what they understand about research, both as it applies to their own work as well as work from different disciplines, and how well they grasp key research competencies. Through an analysis of completed student editor review forms, written interviews with managing editors from three regional undergraduate publications, and a usability test of the review form with prospective student editors, I argue student editors of an undergraduate research journal appear to have knowledge gaps related to research competencies and they, as well as their managing editors, may be aware of them. Journal leadership can begin to fill knowledge gaps by supplementing classroom learning about research methods and writing and by revising their review forms and materials to better serve the student editors' needs. Ultimately, to remain sustainable and as impactful to student editors as they are to authors, leaders and advisors of undergraduate research publications should consider running usability tests of their materials so they might diagnose usability problems and revise with their student editors as the focus.

KEYWORDS: usability, academic publishing, undergraduate research journals, research competencies, technical communication, student editors

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May 2021

Approved:

Lyn Gattis, Ph.D., Thesis Committee Chair

Rhonda Stanton, Ph.D., Committee Member

Leslie Seawright, Ph.D., Committee Member

Julie Masterson, Ph.D., Dean of the Graduate College

In the interest of academic freedom and the principle of free speech, approval of this thesis indicates the format is acceptable and meets the academic criteria for the discipline as determined by the faculty that constitute the thesis committee. The content and views expressed in this thesis are those of the student-scholar and are not endorsed by Missouri State University, its Graduate College, or its employees.

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TABLE OF CONTENTS

Introduction	1
Review of Literature	4
Student Understandings of Research	7
Student Research Competencies	10
Usability Testing	13
Methods	18
Test 1: Student Editor Research Review Form Analysis	18
Test 2: Managing Editor Interviews	22
Test 3: Research Review Form Usability Testing	24
Results	28
Test 1: Student Editor Research Competencies	28
Test 2: Managing Editor Interview Responses	32
Test 3: Research Review Form Usability Testing	37
Discussion and Conclusion	43
Discussion of Completed Review Forms (Test 1)	44
Discussion of Journal Editor Surveys (Test 2)	47
Discussion of Usability Test Results (Test 3)	49
Limitations	54
Future Study	55
Summary	56
References	58
Appendices	62
Appendix A. Human Subjects IRB Approval	62
Appendix A1. Test 1 IRB Exemption	62
Appendix A2. Test 2 and Test 3 IRB Exemption	63
Appendix B. Undergraduate Research Journal Review Forms	64
Appendix B1. Submission Form: Research	65
Appendix B2. Evaluation Form 1	67
Appendix B3. Evaluation Form 2	68
Appendix C. Usability Test Questionnaire	70

LIST OF TABLES

Table 1. Demonstrated Research Competencies in Review Forms	33
Table 2. Student Editor Suggestions for Research Review Form Improvement	42

LIST OF FIGURES

Figure 1. Student Editors' Research Reviewing Competencies	31
Figure 2. Questions Student Editors Need Clarified	39
Figure 3. Perceived Difficulty of Task-Based Usability Questions	40

INTRODUCTION

In 1998, the Boyer Commission on Educating Undergraduates in the Research University suggested that undergraduate students should be involved in research as soon as possible in their education to improve their learning. University students who are not seeking education past a bachelor's degree may disconnect research done for class and a grade from any real-world application. However, involving students in research from their first year in college may help them better understand the many forms research can take and the many applications it can have, even in the corporate world. Experts generally acknowledge the impact of experiential learning, or, learning by doing (Allan, 2018; McKeachie, 2014). To further demonstrate the important real-world applications research done in an undergraduate course can have, many universities across America have established undergraduate research publications. These are peer-reviewed, vetted publications exclusively calling for undergraduate submissions, and they have grown in popularity over the last decade. Students who participate in undergraduate research can revise and submit their work to be published in these journals, giving a simple assignment for a grade more impact and weight beyond the scope of the classroom.

While researchers have established a link between submissions to undergraduate publications and increased learning gains, far less research has been done to determine the research competencies and learning gains of students who serve as peer reviewers and editors on these publications. As a student who worked on one such publication throughout my undergraduate career and eventually became a managing editor, I began to notice research skill deficiencies demonstrated in my past review forms. I also recognized the same and far more troubling tendencies of my student editorial board. While they were all high-achieving students, they often misunderstood key research concepts and had some difficulty articulating their

thoughts and opinions about the quality and publishability of student manuscripts. It became clear to me that these student editors have vastly different ideas about research and appear to lack core research competencies despite their work on a rigorous academic publication. From this, I recognized it was not only possible, but highly likely the journal misses opportunities to publish high-quality, cutting-edge student work due to some of these issues. It also calls the rigor of the publication into question if the peer reviewers and editors working on such a journal are unsure about research as a process, practice, and craft.

The research competencies and learning gains of student editors are under-studied, and while many undergraduate research publications seek to justify the time and monetary costs of running their journal by researching how student authors feel about their learning gains as a result of the submission process, the student editorial staff is largely ignored and not considered as a population “helped” by sustaining an undergraduate research publication (Waye & Simpson, 2016). If the paradigm of learning by doing stands, then working as an editor of an undergraduate research publication could be considered a pedagogical tool for supplementing classroom learning about research and writing. Student editors, therefore, should experience significant learning gains as a result of participation.

Principles of technical communication pedagogy and practice can help journal leadership better supplement student learning about research methods and writing. While most students will receive at least some classroom instruction about the basics of good writing and research in their disciplines, a single course or two may not fully prepare a student to evaluate another student’s work for quality, let alone determine whether it merits publication. Participation on staff of an undergraduate research journal does not typically involve classroom instruction and often qualifies as an extracurricular activity or club rather than an extension of coursework and learning. Because of this, leaders of undergraduate research journals may find it difficult to train

student editors properly. However, using principles from technical communication, journal leaders can design appropriate, user-centered reviewing materials that help student editors gain research competencies they may have missed in class and improve as writers, researchers, and tutors and collaborators for their peers.

Given the increase in undergraduate research publications across the country in recent years, the problem areas and knowledge gaps I recognized in myself and my student editors may be familiar to journal leadership at other universities. ~~It is also possible that~~ student editors' knowledge gaps about research and writing may also be exacerbated by the way leadership trains them and asks them to think about and critique research. Journal leaders need to work with these student editors, find out what they know, want and need to know, and are learning, and allow their expertise to direct the content and design of the materials they use to perform their job responsibilities effectively, including review forms and training materials.

In this inquiry, I begin the process of studying student editors of undergraduate research journals. To do this, I first determine the competencies and potential knowledge gaps they candidly demonstrate when reviewing. I then ask the student leaders who train and manage them what perceptions and concerns they have about student editors' competencies. Finally, I discover the feelings and suggestions about existing reviewing materials from student editors of one particular undergraduate research journal. From this feedback, I draw some general conclusions about user-centered ways to revise existing materials specifically for student editors. I propose possible implications of improving review and training materials, both for the student editors and for the publication more broadly, and suggest directions for future study about undergraduate-exclusive publications.

REVIEW OF LITERATURE

Undergraduate research publications have become a standard in many universities across the country, particularly at research institutions. The Boyer Commission on Educating Undergraduates in the Research University (1998) found that involving undergraduates in research from as early as possible in their careers improves learning and discovery (p. 26). Often this research is submitted, either in tandem with a faculty co-author or alone, to research publications, including those that are undergraduate-exclusive (Weiner & Watkinson, 2014, p. 2). This process of writing for an audience has proven beneficial as supplemental to classroom learning and a potential way to improve professional research and writing skills for student authors (Weiner & Watkinson, 2014, p. 10). However, little work to date focuses on the benefits to those students who work on the research publication: student editorial boards.

Discussions of student editors for student-run publications in current scholarship centers primarily on students in law, medicine, or journalism. Universities often offer student-run publications, particularly law journals (Zimmer & Luther, 2009) and medical journals (Wan, McMurran, & Teo, 2016). Even then, student editors of student-run publications are primarily graduate or doctoral students (Hopwood, 2010). Studies of undergraduate student editorial boards are rare, and therefore little scholarship exists on how well undergraduate student editors have mastered research concepts and core competencies as a result of their work.

While some scholars, especially in the scientific community, raise concerns about undergraduate research and undergraduate-only publications, particularly about undergraduate journals publishing work of little significance to the broader professional communities (Gilbert, 2004, p. 23), these publications are in fact beneficial, both to students and to the larger professional communities. Undergraduate students may at first lack the skills and expertise

required to compete with their superiors in the discipline and may therefore find it difficult to publish in popular journals until their graduate or doctoral studies. However, they may still be engaged in significant research projects, both in the sciences and the humanities. Undergraduate journals provide students an opportunity to learn how to write for an audience, particularly the audience of their field of study, rather than going through the motions of research to satisfy an unspoken fact quota or receive a grade but never truly engaging in the academic conversation (Booth et al., 2016; Allan 2018). Studies have revealed significant learning gains and improvement in the understanding of research as a result of participation in student-run undergraduate research publications as student authors (Dyke Ford & Newmark, 2011; Weiner & Watkinson, 2014; Waye & Simpson, 2016). Some scholars, like Siegel (2004), wonder whether it is necessary to, “segregate undergraduate research into undergraduate-only journals,” (p. 26). Her reasoning poses an interesting question related to this segregation: “With 6,000 journals in science, technology, and medicine—and 24,000 peer reviewed journals overall—the advantage to the reader of a journal devoted to undergraduate research is not obvious” (p. 26). She asserts that research is nonageist, so researchers at any level or age should theoretically be able to make and publish their discoveries (p. 27). However, this claim demonstrates an ideal of what journals and academic research should be but does not confront the implicit ageism of academia and the professional world; experience is often a condition and requirement of publication or employment, and young adults, especially those still working toward a degree, likely will not have it. Undergraduate authors, as newcomers in academia, often need to have experience with research, an understanding of research, and mastery of research competencies before their work is published. Unless the student works with a faculty member who already has credibility in the research of a discipline, their chances of publication in one of these 24,000 peer-reviewed journals can be incredibly slim.

Research journals are so far considered the best way to exchange ideas and carry on the scholarly conversation, particularly because they have a shorter publication schedule than books, and they serve as the most impactful way to shape disciplines (Sparks, 2014, p. 155).

Undergraduate research journals fill an important gap by allowing undergraduate students a chance to publish their work and experience the publication process as more than their name buried in a string of professors' names for their contributions to a published research article on a topic they may not have chosen or really worked with. More than that, they can provide avenues for student editors to learn more about publishing, particularly academic publishing, gain valuable research experience and practice, and improve their research and writing skills.

Part of sustaining an undergraduate research journal involves mentoring student journal editors and dealing with student turnover. Apart from the impact of participation in an undergraduate research journal, current scholarship has also turned toward factors affecting the sustainability of such publications. Waye and Simpson (2016) identified lateral, direct, and indirect impacts that influence the success of a research publication. While they found student authors reported positive impacts as a result of submitting to an undergraduate research publication, including favorable experiences with job and graduate school or grant applications, learning gains in writing and research, and capstones for their undergraduate studies, they openly wonder about the benefits of their journal compared to the significant costs. They argue that, while the journals help some student authors, the number of students feels low when compared to the effort expended to publish an undergraduate research journal. Similarly, Cowell-Meyers et al. (2015) and Johnson et al. (2020) suggested student editor turnover as a significant obstacle to sustaining an undergraduate research publication. Johnson et al. (2020) identified potential solutions, including increasing faculty buy-in, employing student interns, hiring library staff to assist with building a repository for past issues, and other collaborative efforts (p. 153).

Improving and codifying training and reviewing may improve the sustainability of these publications, increase the return on investment, and make turnover less of an obstacle to the journal's success and on-campus reputation. However, these studies do not currently make suggestions related to training student editors and increasing the rigor of the review process to improve sustainability.

The specific learning outcomes for student editors of research journals are often ignored in the discussion of the necessity and impact of undergraduate-exclusive publications, and little research has examined their knowledge gaps and pedagogical needs. This group of students is worth studying, as the expectations placed upon them as editorial leaders, researchers, and writers, and the work they do in the typical publication cycle, can often help them improve their own research and writing skills.

Student Understandings of Research

In multidisciplinary undergraduate research publications like the ones I studied, where the entire editorial staff is composed of undergraduate students from across the disciplines, some barriers to success arise. Because students may lack research skills in general, it follows that student editors from multiple disciplines might experience these same potential problems. Students may misunderstand the goals and varieties of research, the qualities of research, and the importance and characteristics of good writing related to the communication of research findings. Fundamental misunderstandings about research may not be the fault of the individual student, but it is the responsibility of the student and journal leaders to bridge whatever gaps exist. In this sense, undergraduate research publications can serve as supplemental technical writing pedagogy.

Undergraduates' perceptions of research and writing may carry over from what they learned during their K–12 education. An elementary perspective on research could be an issue when they join a student editorial board and could lead to some misunderstandings of the nature of research and to skill deficiencies when the editors attempting to review their peers' research writing. In research, it appears many undergraduates have a secondary education background wherein research was performed through experiments from a textbook in a science lab or by consulting Internet and print sources to discuss a topic or argue a point. In this traditional academic research, Booth et al. (2016) suggest researchers, particularly novice researchers in secondary education or early in their college careers, may erroneously attempt to cram as many facts as possible into an essay to satisfy an instructor and earn a decent grade (p. 11). Böttcher and Thiel (2018) propose that undergraduate students, as a next step in the learning process, “are introduced to single requirements of the research process in different exercises or small projects. Particular skills are encouraged step by step, for example first, searching for literature in the library and second, evaluating prior research” (p. 103). Master's students, by contrast, may carry out more phases of the research process, and Ph.D. students have the opportunity to complete the full research process (Böttcher and Thiel, 2018, p. 103). But, with the emphasis on undergraduate research adopted by more universities and liberal arts colleges across the nation, undergraduate students need to learn about research and its varieties and engage in those processes sooner and at more advanced levels.

In teaching pedagogy, particularly regarding research, it has been suggested there is no substitute for doing, with experiential learning as a significant part of the learning process for many students (Allan, 2018, p. 250; McKeachie, 2014, p. 204–205). Research integration and participation is typically received positively by undergraduate students in their coursework (Visser-Wijnveen, Van der Rijst, & Van Driel, 2016, p. 484–485). However, not every course

has the resources or time available to incorporate large-scale research projects or research participation. Valter and Akerlind (2010) recognize this and propose instead that students are encouraged to begin, “thinking and acting like a research scientist,” in those courses that cannot afford to devote time to larger research projects (p. 95). Their proposal to clarify key research concepts for students can extend beyond classrooms strapped for resources and apply to undergraduate research publications as well.

Of course, clarifying key research concepts cannot necessarily help students’ understandings of research if they do not have a strong foundational grasp of what research is and its purpose. One issue may be that students cannot necessarily define research by the time they reach their first years of undergraduate studies. There are many possible definitions of research, but one of the more comprehensive definitions comes from Johnson-Sheehan (2007) and relates to technical writing: “Research is now a process of shaping the flow of information, so you can locate and utilize the information you need. ... [Y]ou need to learn how to evaluate, prioritize, interpret, and store that information so you can use it effectively” (p. 145). If they are encouraged to look at research as the process of shaping the flow of information to be located and used later, students may develop a more correct understanding of it. Ross’ (2014) research suggests students have a vague understanding of research but still recognized that research involves the gathering, ordering, and/or negotiation of information (p. 77–78). Two definition categories arose from student responses in Ross’ study: investigation and accumulation (p. 78). This also suggested that students perceive research as either an “engaged *process*, or as a less complex act of collection” (p. 78). Vereijken et al. (2016) also found that “beliefs about the value of research for future practice are more strongly related to student achievement than perceptions of research in teaching and beliefs about research promoting current learning.” This suggests student understandings of research center on how it can be applied to their future career or

research success rather than how it can enhance their studies and learning gains while enrolled in university courses.

Across the disciplines, in the process of performing research, students in general value gaining new knowledge, improving their resumés, learning how to conduct research, and preparing for graduate studies (Craney et al., 2011, p. 99). Other studies suggested similar values; one survey of student researchers found students reported “personal/professional gains (28%); “thinking and working like a scientist” (28%); gains in various skills (19%); clarification/confirmation of career plans (including graduate school) (12%); enhanced career/graduate school preparation (9%); shifts in attitudes to learning and working as a researcher (4%); and other benefits (1%)” (Seymour et al., 2004, p. 493). While this study supports the idea that students in general may perceive research as beneficial to their futures, they may struggle to define and understand it. Notably, this research does not address undergraduate publications at all, nor does it examine whether these same ideas about research hold true for student editors of undergraduate research publications.

Student Research Competencies

In the professional world, journal editors must possess specific characteristics and master certain competencies to succeed in their roles. Journal editors must first facilitate the scholarly conversation, though they are often mischaracterized as gatekeepers to publication (Sparks, 2014, p. 155). They must also engage in peer review, which has become a point of contention in some academic circles because of its perceived mystery (Jackson et al., 2018). Peer review, however, is integral to the thinking and learning process. It can be considered pedagogical, conversational, and almost Socratic in the way reviewers pose questions to, and thus enhance the learning of, all parties involved (Jackson et al., 2018). To be effective reviewers, journal editors

must understand the writing and research processes. They must also make decisions systematically, logically, and rationally based on some criteria of what constitutes good and original scholarship in a discipline (Zimmer & Luther, 2009, p. 962). Editors additionally must make these decisions and interact with authors based on sound ethical principles (Amare & Manning, 2009). These editorial characteristics extend to student editors, as undergraduate research publications often strive to uphold the same level of rigor as professional research publications. However, none of this current scholarship regarding journal editors addresses student editors specifically, so an application of these qualities can only be inferred. Because student editors do not yet have the same level of understanding or experience as professional researchers, their unique qualities ought to be addressed. Most obviously, they do not necessarily yet have the depth and breadth of knowledge that would give them an idea of the qualities of good and original scholarship. Student editors are also still learners, making it important to address best practices for teaching these skills and developing these characteristics. Studies may reveal how they make their decisions, as well as the effectiveness of their decision-making processes, but no scholarship yet exists in these unique areas.

Work on an undergraduate research journal may demonstrate the benefits of research to undergraduate students and can improve their mastery of core research competencies. Based on Vereijken et al.'s (2016) study, undergraduate students need to understand their potential learning gains to help them recognize the value of research. Undergraduate student authors submitting to undergraduate-exclusive research publications, as Weiner and Watkinson (2014) demonstrate, experience significant learning gains in academic and research skill areas as a result of the submission, revision, and publication process. Students who work on a research journal editorial board should theoretically experience similar gains in academic and research skill areas as their student author counterparts, as well as certain skills beyond what a student author could

achieve. They should gain deeper knowledge about the academic publication process and the amount of work that goes into the vetting and shaping of new knowledge in a discipline (Sparks, 2014; Dyke Ford & Newmark, 2011; Weiner & Watkinson, 2014). But beyond that, they should come away with other competencies. Some important competencies identified by Weiner and Watkinson (2014) included the following: how to write about research for an informed, public audience; the process for publishing an article; how scholarly publication contributes to the research community; how to use evidence to draw conclusions; how to evaluate the credibility of authors of articles/books/reports; and how to work collaboratively (p. 8). Admittedly, few students reported some or significant gains in these specific competency areas as a result of working on the editorial board of Purdue's undergraduate research publication; more students experienced increased gains from submitting (Weiner & Watkinson, 2014). This suggests a disconnect in learning and understanding between the creation, writing, and submission of research and the "judgement" or "gatekeeping" of research. This could therefore underscore a potential need for improved training of reviewers and editors on a journal's student editorial board. However, few scholars have studied this disconnect or the potential training needs of undergraduate research journal student editors.

While measuring a concept like research competencies, it is important to have specific criteria by which to judge mastery. Böttcher and Thiel (2018) propose a new instrument, *R-Comp*, that can be used to encourage research-based learning and measure research competencies. This "cross-disciplinary competence model" evaluated student research competencies in five main dimensions that split into further sub-dimensions (p. 101). These main dimensions, which results suggested were more effective than previous models and dimensions, are the following:

- Skills in reviewing the state of research

- Methodological skills
- Skills in reflecting on research findings
- Communication skills
- Content knowledge (Böttcher and Thiel, 2018, p. 110)

This model can be applied not only to university students generally (as they tested students at the Bachelor, Master, and Ph.D. levels), but also to student editors of undergraduate research journals to measure their competencies and learning gains. This model is adaptable to shift from evaluating student competencies in a classroom to exploring the competencies student editors should attain through their work, and simultaneously look for when reviewing manuscripts. This can serve as a guide to help journal leadership create more effective reviewing materials. Finally, it may help resolve the disconnect between the learning gains of student authors and student editors and provide a starting point from which to study student editors.

Usability Testing

In their introduction to a special issue of *Technical Communication Quarterly* dedicated to online teaching, Hewett and Ehmann Powers (2007) suggest treating students as users to help design better online course curricula (p. 2), building upon Miller-Cochran & Rodrigo's (2006) argument advocating for usability testing of online courses to mitigate issues. By nature of their work training reviewers to complete their job responsibilities, managing editors of research publications can consider themselves educators and their student editors users. They can engage in usability testing to evaluate training and professional development protocol for their editors. In the cases where undergraduate research journals employ documents, forms, or other documentation procedures to assist student editors as they review, these can also be evaluated for usability and efficacy. Much scholarship in technical communication pedagogy discusses the importance of usability testing, both as a teaching tool in textbooks and classroom instruction

(Chong, 2016) and as a means of evaluating the efficacy of technical communication courses (Bartolotta, Bourelle, & Newmark, 2017). Missing from this scholarship are usability test practices to evaluate the review process of student-run research publications.

One of the hallmarks of excellence in technical communication is accessibility, which often means technical communicators design with the audience or end-user in mind. Usability testing is one of the best tools technical communicators can use to determine whether a print or digital draft is effective. Scholarship about usability in technical communication varies, focusing on everything from websites and applications to print and video instructions (Alexander, 2013) to documentation for software (Postava-Davignon et al., 2004), but there is currently little scholarship available about its usefulness in developing stronger review forms for student editors of undergraduate research publications.

Though usability cannot technically be measured, many studies have concluded effective ways to evaluate properties that contribute to usability. Arguably the most famous model for identifying and measuring usability comes from Nielsen's (1994) heuristic evaluation, which emphasized the following:

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation

Nielsen's model was followed closely by ISO 9241-11 (1998), which became the international standard for measuring usability and focused specifically on effectiveness, efficiency, and

satisfaction as parameters. This model has since undergone revision, now including aspects of Nielsen's heuristic. The proposed updates to the model re-emphasize learnability, satisfaction for regular use, error protection or minimization, accessibility to users with a wider range of capabilities, and maintainability (Bevan, Carter, & Harker, 2015, p. 148). Salvo (2001) notes that it is preferable to emphasize user-focused design rather than expert-focused design when working on print and digital documents and to shift usability testing from its traditional place at the end of a design cycle to feature more prominently, often as ongoing collaboration and conversations between the designers and end users (p. 275). In this way, the user is treated as one of the experts who can provide perspectives at every level that the designer may not have ever considered. This method has become standard practice in many technical communication situations. These models and paradigms can be applied to most any document.

To evaluate the usability of an online course in writing, Miller-Cochran and Rodrigo (2006) designed a set of eight guidelines for preparing and administering a usability test with students. These eight guidelines include:

- Identify goals prior to conducting the test
- Select a testing protocol
- Choose tasks to have participants complete during the test
- Select participants who are similar to "real users"
- Have colleagues run tests if participants are your direct students
- Collect consent forms and demographic information from each participant
- Assure students that they, personally, are not being tested
- Make the testing time and space flexible (p. 102).

Because student editors are still learners, these guidelines are applicable to training and reviewing materials as well.

Traditional usability testing is task-based and focused primarily on time, completion rates, and other behavioral factors that demonstrate problems in an online or print document that

can create barriers to using it. Partala and Kangaskorte (2009) instead propose what they call the “combined walkthrough” to measure a user’s combined behavioral and affective experiences with the document, software, or program. Participants complete tasks and then rate their experiences with that completion process. Ideally, this additional affective measure can be applied to other usability test protocols, including think-aloud. Think-aloud protocol faced some controversy in the 2000s due to participants’ difficulty knowing what words to use to describe their experiences or what questions to ask for clarification (van Waes, 2000). In response, van Waes (2000) proposed task-based think-aloud protocols (p. 280). In this method, researchers provide participants a task and ask them to think out loud while completing it. This method of usability testing can help the researcher better observe participants’ behaviors, understand some of their cognitive processing, and diagnose usability problems with the document. It can be added to the combined walkthrough so participants also discuss affective measures, providing a clearer picture of usability.

I propose that, if leaders and advisors of undergraduate research publications recognize research competency gaps in their student editors, they can test the usability of their reviewing materials or training protocols and courses, just as they would any academic course that teaches writing and research methods, and diagnose usability problems that create barriers to student editors’ learning. Leaders can then use this information to design stronger, more user-centered training modules. They can supplement their student editors’ classroom learning of research and writing. This has potential to strengthen student editors’ research competencies and writing skills, increase their actual and perceived learning gains, improve the quality of reviews and of the published volumes, and theoretically help more students, which can justify the financial and time cost of running an undergraduate research journal.

The goal of this study was to diagnose potential problems with the review processes for undergraduate research journals, especially with training practices and review forms, and propose potential solutions that could be implemented at other institutions to increase the rigor of undergraduate research publications and increase student editor learning gains.

METHODS

In this study, I sought to answer three main questions:

1. What research competencies are students demonstrating or not demonstrating in their peer review of academic research and writing?
2. What research competencies do lead editors of undergraduate research journals see their student editors demonstrating or not demonstrating?
3. How can lead/managing editors and advisors of undergraduate research journals employ usability testing to assess and revise review and training materials to help student editors achieve research competencies they may be missing?

To explore these questions, I conducted three separate tests. I analyzed the anonymous digital review forms of student editors of a multidisciplinary undergraduate research publication at a mid-size, Midwestern university to determine their baseline understanding of research and their strategies for providing feedback about research. I then spoke with three lead editors of other research publications around the mid- and southwestern United States to learn what they perceived as the biggest challenges their student editors faced in reviewing research and what they believe are opportunities for professional development. Finally, I conducted a usability test with new student editors recruited to work on the multidisciplinary undergraduate research publication at the same mid-sized, Midwestern university to evaluate the clarity and efficacy of current materials and determine best practices for revision.

Because three separate tests were completed, three separate methodologies were developed. All three tests were submitted for approval through the university's Institutional Review Board (see Appendix A). Test 1 was categorized under exempt, IRB-FY2020-315, on 18 October 2019. Test 2 was also categorized as exempt, IRB-FY2021-112, on 8 September 2020 (see Appendix A1 and Appendix A2).

Test 1: Student Editor Research Review Form Analysis

During a typical peer review for this journal, student editors read a manuscript and make comments in Microsoft Word directly on the draft. They then fill out a review form (see Appendix B), answering prompts with their thoughts and feelings regarding the submission. They are asked to make a publication decision at the end of the form. They also meet ~~to~~ ~~collaborate~~ with other peer reviewers and editors and discuss the piece in greater detail, often generating more ideas about it and making more concrete decisions. Those decisions ultimately determine which pieces move forward in the publication process and which are excluded from further consideration. Regardless of publication decision, all student authors who submit to the journal receive the reviewers' anonymous feedback, compiled by the managing editor.

Qualitative analysis of the student editors' review form responses allowed me to better understand the ways the student editors think and write about research. Because most of the student editors' work deals specifically with writing about research and analyzing articles and audiences, and because this information directly relates to the conditions at one university and in the staff of one publication, qualitative analysis provided a more nuanced image of the student editors' thoughts, understanding, and decision-making processes. Additionally, it is important to note that each student editor reviewed more than one research piece, so the number of forms analyzed or number of a certain response type do not reflect a number of *students* who have a certain perception of research. Responses are rather meant to demonstrate the overall sentiments of the student editors as a group and provide an idea of the volume of review forms that demonstrate Böttcher and Thiel's (2018) research competencies.

Sample. I compiled review forms (see blank sample in Appendix B1) from 12 consenting members of the student editorial board of the undergraduate research publication during the 2018–2019 reviewing cycle for Volume 12 of the journal. I chose this particular sample year for two reasons: first, because it was the one of the largest student editorial boards the journal has

had, and second, because the journal received a record number of student article submissions that year (109 submissions). I also selected the forms completed by this staff (as opposed to archived forms) because these editors had the most recent classroom exposure to research and because and because they served during a year of production issues that delayed the journal's publication by about two months.

The staff of the undergraduate research publication was composed of undergraduate students from across the disciplines at a large Midwestern university. The one common trait they shared was their status as Honors students. They spanned skill sets and mastery of those skills. They came from different locations, were different ethnicities, and came from different socioeconomic backgrounds. They were 18 to 22 years old. About 60 percent of the staff members were female. Because they were all Honors students, they all enrolled in the same or similar courses within the Honors curriculum related to interdisciplinary studies, academic conversation, and research. They had also all been through the same training workshop in Fall 2018 and worked under the same managing editor for at least a year.

From this pool of journal staff, I obtained review forms completed by 12 student editor participants. I received 73 total documents to work with. Of these documents, I analyzed 45 to achieve a decent sample size and be able to draw reasonable conclusions about the current understandings of research while also keeping the information manageable.

Collection excluded review forms for creative writing and artwork. Although the university classifies these types of student work as research, and the journal reviews and accepts them, the journal review forms for creative writing and artwork ask student editors to look at different aspects of creative work that would not necessarily transfer to a discussion of empirical or academic research.

Data Collection. The form used to code responses and methodically analyze the text was adapted from Böttcher and Thiel’s (2018) *R-Comp* to measure undergraduate research competencies. I adapted Böttcher and Thiel’s instrument to look for five distinct dimensions and several subdimensions in student editors’ review forms. I added a sixth dimension to account for the choice student editors are asked to make about publication of the articles they review. This sixth dimension, specific to student journal editors, is “Skills in making publication decisions.” I looked for the following subdimensions, also adapted from Böttcher and Thiel’s (2018) model as well as the research journal’s student editor review forms:

- Skills in reviewing the state of research
 - Can the editor tell if this piece fills a specific research gap?
 - How does the editor define originality related to this piece?
- Methodological skills
 - Does the editor find and evaluate a thesis/hypothesis?
 - Does the editor evaluate the methodological quality of the research?
- Skills in reflecting on research findings
 - Does the editor propose a way the piece contributes to the discipline?
 - Does the editor evaluate ethical implications beyond ethical citation of sources?
- Communication skills
 - Does the editor focus on issues of grammar, usage, mechanics, spelling, and punctuation?
 - Does the editor maintain a professional, academic tone?
 - Do the editor’s comments meet the length standards for editor commentary for the journal and elaborate on their comments?
 - Does the editor include at least one good thing the author did in the piece?
 - Does the editor make concrete revision suggestions?
- Content knowledge
 - Does the editor understand or appear to understand the topic, or do they operate on a misunderstanding?
 - Does the editor understand or appear to understand the terminology used in the review form’s questions?
- Skills in making informed publication decisions
 - What publication decision does the editor recommend?
 - Does the editor provide an explanation for this recommendation?
 - What is the editor’s explanation?

I collected the data on a secure computer terminal on the university's server to mitigate the risk of unwittingly releasing sensitive, confidential information. Data and notes were stored only on secure servers through the university's cloud storage system.

Over the course of several days, I checked into the Honors office to collect data. Most questions ask for a yes or no response, but in my notes, I also included editor comments to demonstrate how and why they did or did not demonstrate a competency. I looked over each research review form, making note of these items. I also noted other interesting anomalies on the review forms, such as questions left blank, questions marked "N/A," and comments that did not quite fit a specific area listed above but still related to an understanding of research. Future researchers could use the same or similar models to analyze the work of student editors at other undergraduate research publications nationwide to demonstrate a trend more consistently.

Test 2: Managing Editor Interviews

Most undergraduate research publications are run by a managing or chief editor, who is often is often a junior or senior student, graduate student, or faculty member well-versed in the peer review and academic publishing process. As in professional research publications, these lead editors manage a team of reviewers and determine what to publish in a given volume. These individuals likely control some aspects of the reviewing process for an individual organization and are often tasked with training student editors for their role in reviewing research and writing.

I developed a questionnaire of four items asking managing editors to provide some information about their review and publication process, areas where their student editors excel, and areas where they would like to see improvement. With these four questions, I hoped to learn more about how the lead editors viewed their students' work and determine whether trends noted

at the institution in Test 1 were more universal and indicative of trends for most undergraduate research publications. These questions appear below:

1. How do you train your student editorial staff? What is your process, and what topics do you cover during training?
2. Do you use a review form? If so, what is it like? If not, how do your editors complete their reviews? Would a review form be useful to them? Why or why not?
3. Where do you notice the greatest number of growth opportunities with your student editorial staff's reviews? For example, are there concepts about research or writing they could still receive training to improve upon?
4. What skills do you notice in the majority of your student editors? What skills might they still be missing?

Sample. Prior to conducting managing editor interviews, I compiled a list of universities across the United States with undergraduate research publications. I then narrowed ~~down~~ the list of options to those publications still accepting submissions and publishing volumes of their journals into 2020. From that list, I limited the search criteria to include only journals which employed primarily undergraduate students as editors. This was done to ensure conditions were as similar as possible to the institution in Test 1.

I then contacted managing editors at 10 public universities near the middle of the country. Once again, this was done to limit the impact of demographic variables including regional and university culture. Of the 10 managing editors contacted, five responded; three agreed to interview, two individuals and one team including two lead editors. One managing editor who responded informed me no students currently work as peer reviewers for their journal and that all business was conducted by faculty, and another preferred to wait until their reviewing season was fully underway, which was not possible due to time constraints.

The managing editors surveyed were upperclassmen at mid- to large-size, four-year universities in the Midwestern United States. They all manage and train teams of undergraduate student peer editors to review submissions for a multidisciplinary undergraduate research

publication, produced annually. Their students, like their published submissions, come from a variety of major programs, which suggests they each have different research competencies. One managing editor's journal used a review form, while the others did not. One participant expressed interest in eventually adopting one. All managing editors surveyed appear to do the bulk of their training in the fall semester and reviewing in the spring.

Data Collection. Due to the COVID-19 pandemic, all interviews were conducted via the universities' secure email systems. Initial contact emails were sent out describing the project with an attached consent form. Once managing editors responded and returned the consent form, questions were sent in the body of the email. All managing editors surveyed chose to respond on a separate Microsoft Word document that was downloaded, stripped of identifying information, assigned an ID number, and saved to a secure OneDrive folder to preserve anonymity.

Test 3: Research Review Form Usability Testing

The final test in this inquiry stems from the Hewett and Ehmann Powers (2007) argument that students should be considered users of pedagogical tools. To determine the effectiveness of the same research review form analyzed in Test 1 (see Appendix B1), I conducted usability tests with new undergraduate student reviewers.

I developed a 10-item questionnaire implementing concepts of combined walkthrough usability testing protocol, based on the combined walkthrough protocol designed by Partala and Kangaskorte (2009), the task-based think-aloud protocol by van Waes (2000), and the guidelines for usability testing online course materials by Miller-Cochran and Rodrigo (2006) (see Appendix C). It was not possible to have student editors perform tasks with the review form, as this would have required them to candidly review a sample research paper, a process that often takes several hours. Instead, the test focused primarily on students' feelings about the

document's effectiveness and efficiency, and their satisfaction with the document and its questions.

Sample. I recruited volunteers through official communication from the Honors College at a large, Midwestern state university. Students were offered academic credit if they were enrolled in research courses that required participation in student-run studies. The eight students who participated in the usability test were all degree-seeking undergraduate students at the university. They were all members of the Honors College, and all but one were new or prospective members of the undergraduate research journal's student staff. While some of these students had attended a virtual training workshop, at least half had not.

Participants were traditional college-age, ranging from 18 to 22. They represented a variety of majors and programs, including English/English Education, Creative Writing, Biology, Global Studies, and Information Technology. Because they were all enrolled in the Honors College program, all had taken at least one Honors interdisciplinary research course. As with the journal staff itself, more women were represented, with seven women and one man in the sample. They represented the "real users" who would eventually encounter a review form and use it to perform their job responsibilities but had not yet seen or used or used the form, which made them ideal candidates for first impressions and candid responses.

Data Collection. Due to the COVID-19 pandemic, all testing and data collection had to be done remotely. After completing a consent form noting their intent to participate, students were contacted via the secure university email servers to set up a test time. Tests were conducted via secure Zoom video conferences, so students were able to participate from the comfort of their own home, apartment, or dorm at a time most convenient for them. All tests were conducted within a two-week window from the last week of January to the first week of February 2021, and each took between 30 and 45 minutes.

At the start of each test, I welcomed the student and spent a few minutes checking on their semester and building rapport. I then explained the test protocol, as none had ever participated in a usability test previously. I assured them they were not personally being tested and informed them I had not created the review forms and would not be offended by any comments about improving them, encouraging them to be as candid and open as possible about their thoughts, reactions, and suggestions. I asked for consent to video and audio record each session to ensure responses were accurately presented. Finally, using screen sharing, I opened the publication's research review form and asked the questions listed in Appendix C. Forms for artwork and creative writing were again excluded, for the same reasons as listed in Test 1.

Questions focused on efficacy, efficiency, and satisfaction. Several questions asked students to complete hypothetical tasks, and then analyze the difficulty of the task on a traditional 5-point Likert scale. Other questions guided students to think about the macro elements of rhetoric and design, asking them to gauge their feelings about the length of the form itself and of each question. I also requested feedback about the form's design, ease of use, and current features, as well as features the students would prefer to see included in future revisions. In addition to noting responses, I also examined body language, eye movement, long pauses, and the lengths of time it took students to notice certain features of the document, such as the instructions. The combination of students' qualitative and quantitative responses, as well as their nonverbal communication, allowed me to diagnose design and rhetorical problems with the form that may contribute to students' confusion and create a barrier to learning gains in the six areas identified by the *R-Comp* model.

At the end of the test, I thanked each student for their time and let them know where and how they could see the results of the study if they preferred. All recordings were stored on the

university's secure, private OneDrive servers to protect students' privacy. Students received a copy of their recording as well.

RESULTS

Results of this inquiry provide a clearer picture about potential knowledge gaps in student editors of undergraduate research publications. Insights from managing editors of other research publications suggest some knowledge gaps are more common than others among their student editors. Results of the usability test demonstrated a potential link between problem areas on the review form and lower scores on the *R-Comp* model, suggesting a need for managing editors to revisit their training and reviewing materials.

Test 1: Student Editor Research Competencies

Results of this inquiry indicated student editors have a reasonably firm grasp of certain competencies. However, other competency gaps were unexpected.

Reviewing the State of Research. In general, under the “Skills in reviewing the state of research” competency, student editors appeared to overwhelmingly understand the concept of originality, with many comments implying originality within one of the following four categories:

- Never been or not usually done
- Applies personal ideas or experiences
- Presents new ideas or unique perspectives
- Not a summary of or reliant on other sources

Of the 45 samples analyzed, 37 (82%) provided reasoning for a piece’s originality, although fewer than five reviews noted that the student submissions attempted to address specific research gaps.

Methodological Skills. Under the “Methodological skills” competency, student editors evaluated the thesis slightly less than half the time. Twenty review forms (44.4%) evaluated a

manuscript's thesis or main argument for quality and strength, while 25 (55.6%) did not. More strikingly, despite a question on the form asking about methodological quality, forms rarely addressed the specific methodology of the manuscript. Even in manuscripts containing empirical scientific studies with a clearly labeled "Methodology" section, the forms do not typically evaluate the methodology of the experiment or inquiry. Only eight of the forms (17.8%) addressed methodology, and many did so inadvertently under other questions. An overwhelming majority of the forms (36, or 80%) did not review this core research component.

Reflecting on Research Findings. In the "Skills in reflecting on research findings" competency, the forms indicated some major roadblocks for student editors. In many of the documents, the student editors did not appear to have closely read Question 3 about the manuscript's contribution to a field of study. Rather than answering how, as the question asks, many forms simply stated that yes, a manuscript fit a discipline or no, it did not. This also belongs to the "Content knowledge" competency, where it appears some student editors may be struggling with the terminology used in the review form or the wording of the questions. Despite the importance of ethics in publications, especially in research journals, it surprised me to learn that only seven forms (15.6%) contained any evaluation of research ethics beyond proper source citation. Though there are separate questions on the review form for references and ethics, the two are often conflated. While source citation is an important ethical consideration, it is generally not the only measure of a manuscript's ethics.

Review form responses indicated a clear competence in communicating about research. While some forms demonstrated issues with an editor's tone or ability to elaborate on their opinions, and while a few forms did contain mentions of grammar, usage, mechanics, punctuation, formatting, and style—which the managing editor explicitly asks student editors to avoid—this area showed great promise. Most prominently, nearly 100% of the forms contained

at least one item of praise for the manuscript and the author, and 34 forms (75.6%) included concrete suggestions for improvement. For the purpose of this study, “concrete suggestions” described comments that specifically tell an author what should be done to improve, while “vague suggestions” described comments that only mentioned what the author needed to improve upon. For an example of this, see Table 1.

Making Informed Publication Decisions. Finally, in the competency I added to the Böttcher and Thiel model, “Skills in making informed publication decisions,” results suggested one of two possibilities: either student editors assume the review form itself serves as an explanation for their publication decision, or they are not certain why they make their publication decisions about a manuscript. The latter seems particularly apparent when student editors answered questions with only a “yes” or “no,” listed one or two items to be improved, and marked “Is Unacceptable for Publication.” This kind of form warrants an accompanying explanation so the managing editor can get a better sense of the student editor’s reasoning. Only six review forms contained any form of explanation for the editor’s publication decision, and it is possible all six or a majority of those six came from the same editor. Most forms (39, or 86.7%) only contained a mark next to the editor’s recommendation without an accompanying reasoning. A graphical representation of these key interest areas appears in Figure 1.

Knowledge Gaps. The qualitative responses on the review forms revealed vast discrepancies in student editors’ understandings of research and its components. In a comment about a manuscript’s contribution to a field of study, a student editor revealed a content

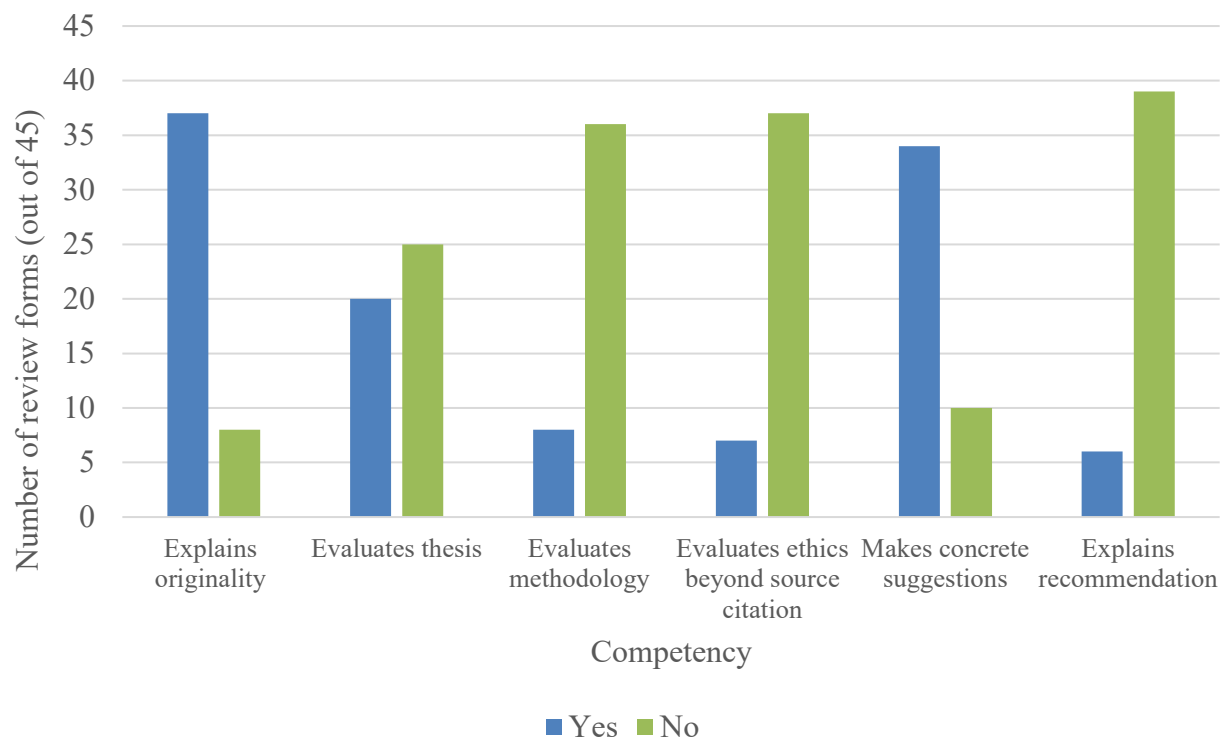


Figure 1. Student Editors' Research Reviewing Competencies: Results of the review form analysis suggest that, while student editors are excelling in certain areas, such as defining originality (skill in reviewing the state of research) and making concrete suggestions for improvement to the author (communication skills), they are struggling to attain quite a few competencies.

knowledge gap related to an understanding of what constitutes research: "I do not think it contribute to a field of study, it is rather an argumentative paper than a research one" This appears to imply argumentative or persuasive papers are not research, which is not always the case. In fact, based on the presence of a hypothesis or thesis in all papers, it seems all research is in part meant to make an argument or persuade an audience. Another review form contained this comment for Question 2, which asks whether the piece could be considered a review paper: "Yes, I would most likely consider this a review paper because the author is basically basing his/her paper on other published articles." This reveals a gap in the "Skills in reviewing the state of research" competency, as the student editor appears not to understand that all research must build on the work of previous researchers and contributes to a larger conversation. Table 1 offers

other examples of comments that do and do not illustrate a student editor's competence in each of the six competency dimensions.

Test 2: Managing Editor Interview Responses

Written interview responses from managing editors of other undergraduate research journals across the country suggest training styles similar to those used by the journal leadership in Tests 1 and 3. Responses also suggest managing editors notice student editors struggling with research competencies, as well as teaching writing to their peers.

Question 1: How Do You Train Your Student Editorial Staff? Responses to Question 1 of the interviews revealed that journal leadership could do more to train their student editors. Training ranges in length. Editor 1 details a one-hour training session at the start of spring semester and ongoing writing mentorship class that semester. Editor 2, meanwhile, holds three training meetings in the fall semester ahead of their first reviews in January. Editor 3 only has a single, two-hour formal training session.

Of training, Editor 1 says, "... we cover the timeline for the semester; email etiquette, including how editors should email their authors and faculty reviewers; a brief overview of higher order concerns and the revision process; and quality expectations." Editor 2 focuses instead on the online system they use, techniques for copyediting, and practice reviews. Editor 3 also describes using a practice review as training. In Editor 3's case, student editors are expected to attend training each year to continue practicing their skills. It is likely most student editors require more training than they are currently receiving at these institutions.

Question 2: Do You Use a Review Form? If So, What Is It Like? If Not, How Do Your Editors Complete Their Reviews? Would A Review Form Be Useful to Them? Why or Why Not? Only Editor 3 reported providing a review form for student editors to use.

Table 1. Demonstrated Research Competencies in Review Forms: This table includes comments that exemplify the kinds of responses from student editors demonstrating and failing to demonstrate each of the six competencies. Comments were copied, unedited, directly from anonymous review forms.

Competency	Response demonstrating competency	Response not demonstrating competency
Reviewing the state of research	“This work is original in that it analyzed Disney Animated movies for racial representation using U.S. Census records. However, I think it is not original in that there has been a lot written about how Disney has inaccurately represented different cultures and races.”	“The work is original because it uses multiple references to explain their point.”
Reviewing methodology	“... the data collected are thoroughly explained in the paper. The author does an excellent job of being transparent in methods and materials used.”	“I would say the research is thorough and includes decent source material to back the claims being made. They provide acknowledgement and credit to the sources used, which leads to my conclusion that this paper was ethically and methodologically researched.”
Reflecting on research findings	“There is a question of ethics, in my opinion, about the overall message of the piece. However, they conducted ethical research that used methods that made sense in regards to project to answer the question of whether or not hazing makes a difference in FSL life.”	“The research is clear and ethical.”
Communication skills	“The sample size is too small. Especially since there are different regions represented and results drawn from them, there should be more than one student from that country in a sample.”	“the thesis”

Table 2 Continued

Competency	Response demonstrating competency	Response not demonstrating competency
Content knowledge	“The paper keeps referencing other papers and is well written, but there was not experiment or statistical interpretation of these facts. It felt almost like it was supposed to be persuasive. A well researched and compelling article, but not exactly research.”	“No, based on my understanding, I would say this is not a review paper or a literature review. The paper lacks the amount of sources required and does not include all current/relevant information relating to the Core Curriculum used by the U.S. education system. I would say that this is a well-written argumentative paper that is phenomenal.”
Making publication decisions	“I personally enjoyed reading this piece. The topic was well-chosen and the paper itself is well-written. Although it may require substantial revision to reach publication quality (expansion, meeting the expectations stated in the abstract, and more sources), I think it has a lot of potential.”	Marked accept without change; question mark “?” as explanation

Editor 1 and Editor 2 detail their processes, which typically involve using features of Microsoft Word. Editor 1 says, “Editors complete reviews by leaving comments using Track Changes on Microsoft Word while keeping the following criteria in mind: originality, relevancy, quality, and amount of revision necessary. Comments are left at the end of the paper with a summary of the editor's thoughts.” Editor 1 expressed interest in the use of a review form to, “make for a more concise process.” Editor 2 discusses a similar system to that of Editor 1, saying, “We have our reviewers leave deidentified comments on the papers and suggest edits of grammar and spelling, and we also have them fill out a cover letter. This letter contains the reviewers’ interpretation of

the author's purpose, evaluation of the quality of their support, identification of major strengths, and suggestions of areas of improvement.”

Editor 3 provides a copy of each of the review forms their journal uses to evaluate submissions both qualitatively and quantitatively. See Appendix B2 and Appendix B3 to review questions from these forms.

Question 3: Where Do You Notice the Greatest Number of Growth Opportunities with Your Student Editorial Staff's Reviews? Question 3 of the written interview portion revealed that managing editors do recognize their role in facilitating student and journal growth. All three editors interviewed suggested further training of their student editors as their largest growth opportunity. Editor 1 notes sustainability and high turnover rates for journal leadership and student editors, saying,

I think the biggest opportunity for growth in the reviews of the editorial staff will come from greater organization on the part of the managing editors. Since there is such a high turnover rate of editors and managing editors, and we are a fairly young journal, there is not much of a precedence in place for many things. The review process that we currently use is not as efficient nor clear as it could be. I hope to get organized this year and leave a better guide for our future editors and managing editors that will allow them to focus on improving the journal by being able to focus on things such as delving more deeply into research concepts rather than having to focus on simply keeping the journal alive.

Editor 2 mentions similar concerns, noting how few training opportunities they have for their student editors and their need to trust student editors to already know how to give good, detailed feedback to their peers. As theirs is another younger journal, established in 2016, they have also needed to focus on the journal's “functions and logistics.” Editor 2 writes, “... our greatest area for growth is teaching what is expected from a published paper versus a class or informal report, though other training for discipline-specific writing could be helpful but are logistically difficult to implement.” This desire for discipline-specific training for student editors of multidisciplinary undergraduate research journals suggests a possible need for deeper research methods

coursework across disciplines at the undergraduate level, but that discussion is beyond the scope of this paper.

Editor 3's comments for Question 3 hinge primarily on two areas: finer details of proper grammar and citations, and training for advanced research competencies. Editor 3 begins with a desire to better define the concept of "flow" for their student editors and to help them understand MLA and APA citation styles. They also suggest the need to help student editors better understand and define research, writing,

Research is a funky topic for undergraduates since we are still building up our subject level knowledge and many paper writing opportunities are summaries of known information or are in more general education focused courses. This means that we have come to loosely define it as a paper with original thought and well supported analysis.

Editor 3 also specifically names, "asking the author questions about their procedure or conclusions" as another area they would like to help student editors improve. Results here correspond to the findings of Test 1 and Test 2 that demonstrate student editors may not understand how to critique an author's methodology, particularly in a traditional academic rather than empirical manuscript.

Question 4: What Skills Do You Notice in the Majority of your Student Editors?

What Skills Might They Still Be Missing? All three managing editors who participated in written interviews mentioned that their student editors were generally strong writers and editors with a good grasp of the journal's processes. This suggests undergraduate research publications select student editors strategically, choosing those students who already demonstrate strong writing, editing, and research skills. It also suggests the training protocols mentioned in Question 1 do provide some benefit to students with regard to an individual journal's practices, policies, and procedures.

When asked to suggest skills their student editors might be missing, Editor 1 focuses on soft skills, including understanding how to examine a paper holistically rather than giving into “the urge to nitpick from the get-go instead of sorting out higher order concerns initially,” communicating with leadership, and managing time effectively. Editor 2 reports a similar sentiment, saying, “... some reviewers are less skilled in handling the tone of their reviews and the author’s writing.” They speculate this might be due to the double-blind peer review process, which forces student editors to communicate solely through text on a page and can make it difficult for them to avoid inadvertently using a more assertive tone. Editor 2 mentions they address using a polite tone during their training process but says more work is needed. The soft skills Editor 1 and Editor 2 mention are often required in the professional world. It is possible student editors, and undergraduate students generally, may need more practice with these transferrable skills, especially as they enter their career, but such an argument would require more research and evidence that is beyond the scope of this study.

Editor 3’s comments break the pattern somewhat. They acknowledge that many of their student editors come from the same writing class and that the professor for this class focuses heavily on grammar concepts. Editor 3 concludes this may be the reason student editors are, “knowledgeable about trying to cut redundant wording, passive voice, and clearly declaring the organization beforehand.” Editor 3 does not suggest skills their student editors are missing.

Test 3: Review Form Usability Testing

Results of the usability test demonstrated issues with the research review forms (see Appendix B1). Nearly all student editors cited difficulty with a few of the questions and suggested potential additions that might improve their understanding and guide their thinking as they review.

Several patterns arose in the student editors' responses to the usability test questions. Students generally noted that many of the research terms, including "originality," "literature review," "methodology," and "ethical," were vague and more abstract than they would prefer, corresponding to the competencies many editors struggled with in Test 1. Nearly every editor surveyed had at least one question related to how they should define one of these four research terms. For originality, three separate participants (37.5%) mentioned originality as "not plagiarized." Two students suggested originality was too abstract and could be a "matter of opinion." Half of all participants suggested a literature review was a literary analysis or book review. Three participants openly discussed not knowing how to find methodology in traditional academic research that did not present a scientific, empirical study. Finally, half of all participants defined research ethics as use and citation of sources, and two mentioned possible bias as an ethical issue. Different editors suggested different solutions, but most asked for some clarification of these terms to be readily available on the form, either in the instructions for each question subsection or on a separate, attached sheet as a reminder.

Questions on the form posed some issues for participants. While nearly every question on the review form was identified by at least one participant as needing clarification, student editors overwhelmingly identified Question 2, Would you consider this a literature review? (62.5%), Question 4, Does the work present new research, or are the author's ideas clear within the work? (87.5%), and Question 8, Is the research thorough and ethical and the methodology appropriate? (62.5%) as items requiring clarification or revision (see Figure 2).

The affective measures implemented in this study focused on how difficult the participants found usability test tasks on a traditional 5-point Likert Scale. Tasks included describing in their own words what Question 4 was asking them to do and defining a literature

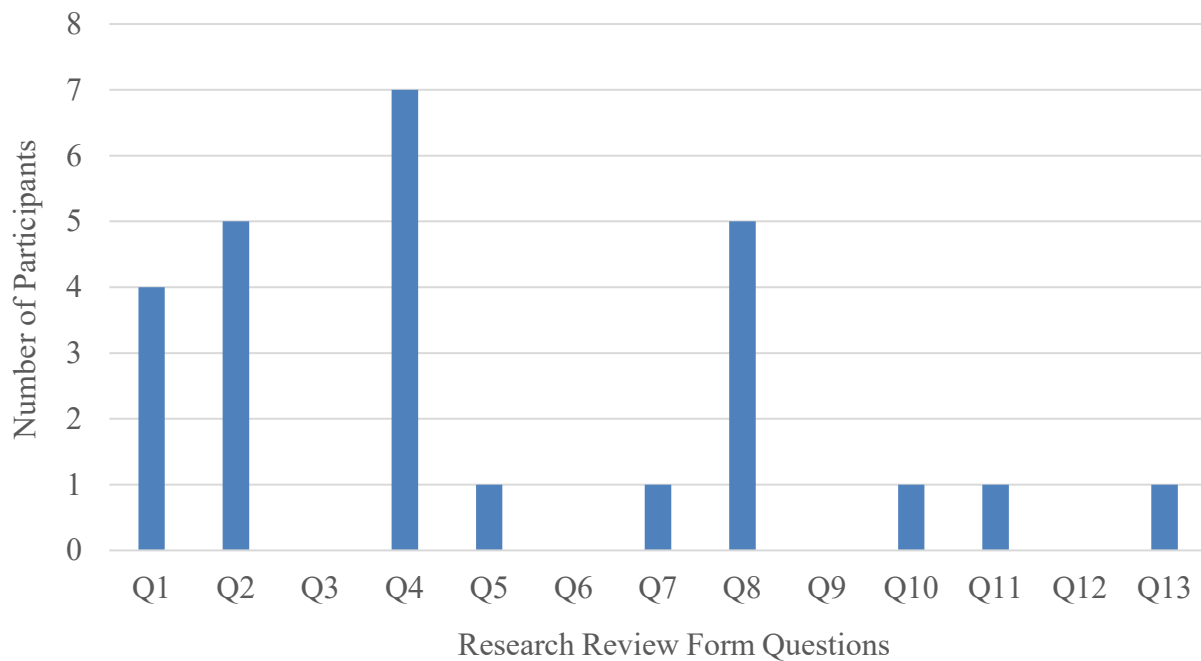


Figure 2. Questions Student Editors Need Clarified: Student editors were asked to identify any questions that were not clear or needed greater contextual information. Most participants named at least one question, with the following distribution. Question 3, Question 6, Question 9, and Question 12 were not named as requiring revision for clarity.

review based on the context clues in the form. Self-reported quantitative affective measures from the participants after completing each task-based question are demonstrated in Figure 3.

Participants suggested what they would like to see changed about the form to make it more usable for their personal needs and learning styles. While each participant had unique suggestions, some common themes emerged. Most student editors requested more context, more open-ended questions, and reminders of definitions and journal standards somewhere on the forms. This creates an interesting paradox. The desire for more context, definitions, and rubrics suggests students may not feel confident enough to individually characterize an acceptable paper for publication. They may be able to identify a strong article upon reading it, but they may want the reassurance of explicit standards to rely upon when explaining their reasoning. At the same time, the request for more open-ended questions suggests students would prefer the freedom and

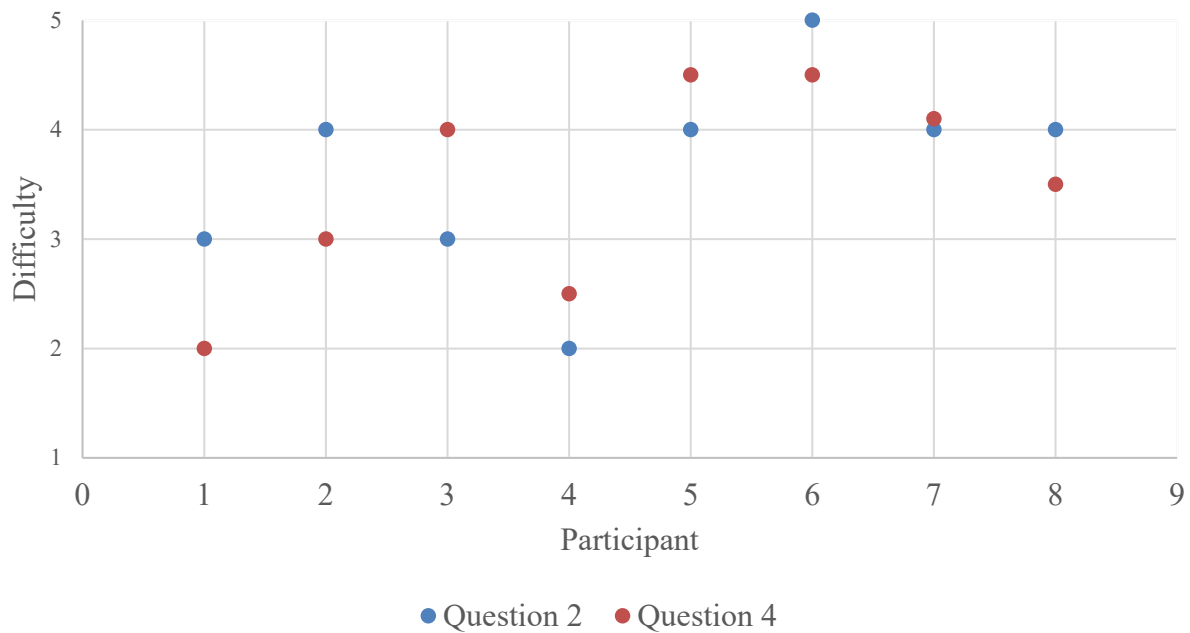


Figure 3. Perceived Difficulty of Task-Based Usability Questions. Participants listed the difficulty they experienced completing a task related to Question 2 and Question 4 on the review form. Students answered based on a traditional 5-point Likert Scale, with 1 being Very Difficult and 5 being Not at All Difficult.

space to work through their thoughts and explain their reasoning in writing. While these are not inherently mutually exclusive requests, it seems student editors feel they need more guidance, but also more encouragement and space to explain their thought processes and decisions. Main suggestions listed by each participant can be found in Table 2.

Only two student editors took note of the instructions on the review form asking editors to respond in complete sentences. For one of these participants, it took 30 minutes before it was mentioned. No other participant pointed this out, though many suggested more open-endedness. One student editor suggested that, upon seeing direct questions asked, they would only look at parts of a submission that corresponded to these questions, raising an interesting question about the usefulness of review forms that unfortunately goes beyond the scope of this paper.

Nearly every student editor who participated commented on the design of the form, mentioning that the first thing they noticed was the level one heading or the first question. Several students commented that the form looked official, like a post-test or survey or a document used by professional reviewers. One student said they appreciated the differentiation and white space between sections and questions and were grateful the form did not just present a bulleted checklist. The form was perceived as having the right number of questions and not taking more than 30 minutes to 1 hour to complete on average. Some student editors suggested switching the order of certain questions in a section to better fit how they might think about a submission, but generally, form design did not receive much feedback.

Table 3. Student Editor Suggestions for Research Review Form Improvement: Student editors identified various features that could improve their user experience with the research review forms.

Participant	Suggestions
1	<ul style="list-style-type: none"> More objective standards or rubric Reminder of definitions in each subheading More open-endedness Section for spelling and grammar
2	<ul style="list-style-type: none"> Clarification about the difference between substantial and minor revision Context for questions 1, 2, 4, and 8 Separate compound questions
3	<ul style="list-style-type: none"> More objective standards or rubric (especially for Recommendation) A working definition of a literature review somewhere on the form More open-endedness (especially in the Organization section) Questions no more than 1 sentence long
4	<ul style="list-style-type: none"> Context under section headings More white space in the first two sections Different formatting under Evaluation of Quality Separate compound questions
5	<ul style="list-style-type: none"> More objective standards or a rubric More open-ended questions Separate form for literature reviews No separate question about explanation
6	<ul style="list-style-type: none"> More open-ended questions Reminder of definitions as a separate reference page
7	<ul style="list-style-type: none"> More objective standards or a rubric Reminder of definitions as a separate reference page Separate compound questions Emphasized instructions Place “what needs to be improved” and “what was done well” questions after each major section
8	<ul style="list-style-type: none"> More open-ended questions Context under section headings Reminder of definitions as footnotes Separate compound questions Emphasized instructions No separate question about explanation Clarification about the difference between substantial and minor revision

DISCUSSION AND CONCLUSION

I based this study on the assumptions from the Boyer Commission that undergraduate engagement in research is imperative for learning, from Hewett and Ehmann Powers' (2007) argument in favor of treating students as users when evaluating the efficacy of professional development and course curricula, and from the items in Böttcher and Thiel's (2018) *R-Comp* model. I originally hypothesized three answers to my research questions:

1. Undergraduate student editors may have varying or even incorrect ideas about the nature of research and may lack core competencies required to evaluate it, especially across disciplines.
2. The issue of undergraduate students missing certain research competencies is not restricted to a single school and takes place on a more national scale at universities with an undergraduate-exclusive research publication.
3. Materials used to train student editors and complete peer reviews are not always effective, and managing or lead editors can conduct usability testing to find out from student editors themselves what could be made clearer and more user-focused.

In general, the data support my hypotheses. After collection, I noticed certain trends appeared in the data. The results of my inquiry revealed some key concerns. It seemed that, while student editors' forms illustrated a fairly standardized grasp of certain competencies from the Böttcher and Thiel (2018) adapted model, an overwhelming majority were missing key elements (Test 1). Many of the issues in Test 1 seemed to stem from student editors not understanding questions, or questions asking for simple yes-or-no responses rather than open-ended questions that promote critical thought and require elaboration. Written interviews with the managing editors of three other publications also revealed that student editors at those organizations may be missing similar key competencies as well, particularly in understanding research and communicating effectively about it (Test 2). Usability testing of the review form with the student editors (Test 3) revealed that the forms may have been unhelpful, unclear, and

not user-friendly enough to facilitate student learning. Based on the patterns found in the data, it can be concluded that the student editors, along with managing editors and journal leadership, may already recognize the research concepts they struggle with. Journal leaders could conceivably seek guidance from those editors to make review forms more user-focused. Through usability testing and subsequent revision of their materials, they can supplement the classroom learning of undergraduate student editors and help fill knowledge gaps, making them better researchers, writers, and reviewers and improving the perceived rigor and quality of the journal itself.

Discussion of Completed Review Forms (Test 1)

My examination of review forms in Test 1 suggests student editors have attained several of Böttcher and Thiel's identified research competencies, but that many struggle with advanced research concepts such as ethics and methodology and may also struggle to justify their publication decisions.

Attainment of Competencies. Many of the review forms in Test 1 demonstrated competency in the major areas for which the journal leaders train them, including evaluation of originality, written commentary that is professional and polite, and avoidance of comments about grammar and other lower-order concerns. Some of the repetition of concepts in the journal's training protocol may therefore be effective to help student editors develop a firm grasp on the basics. By contrast, responses to written interviews from Test 2, suggest some of the major problem areas for student editors could be addressed through more targeted training. More research would be required to determine a true causal relationship, but there exists a possible link between the areas of emphasis in training and the research competencies student editors demonstrated.

Many of the review forms that did contain longer explanations with concrete suggestions and more than one or two sentences of elaboration seemed to relate to a better grasp of research competencies. When student editors only answered with a “yes” or “no” or only created a single complete sentence by restating the question in the answer, it was often difficult to determine whether they had a grasp of research competencies. Managing editors could not send these single-sentence reviews to a student author as revision feedback, excluding many of those responses, and, by extension, those student editors’ input, from the academic conversation. Again, journal managing editors could remedy this through training protocol and more explicit instructions and purposefully worded questions.

Difficulty with Specific Research Competencies. I was most surprised that the review form comments so often failed to discuss methodology and ethics. While it certainly can be difficult for an undergraduate student editor to assess the methodological quality of traditional academic research or examine the ethics beyond proper citation of sources, even in the review form discussing scientific, empirical journal submissions with a “Methodology” subheading, student editors did not assess the methods or ethics. In fact, in one review form, the student editor mentions, “The method section was well done,” but they only responded “Yes” that the research was thorough and ethical, and the methodology was appropriate. This implies the author included a methodology in the manuscript, but also illustrates that the student editor did not evaluate methodological quality by any metric. In fact, the lack of a concrete, thoughtful response here suggests the student editor may not really understand how to determine whether methodology is appropriate. Both methodology and ethics seem intrinsically tied to sources and citations for undergraduate student editors. These two concepts are also linked, likely due to the review form question that puts them together. This area may require both training and edits to the review form questions.

I was also concerned about the lack of publication decision explanations. Student editors have four recommendations to choose from when determining whether the journal ought to publish a manuscript. This decision carries much weight, but the comments on the forms do not often include explanations that could give a managing editor some sense of the student editor's criteria. It appears student editors may make many of these decisions arbitrarily or subjectively rather than objectively and based on evidence. The journal's student editor training materials contained a rubric-like chart discussing criteria for publication decisions, yet these criteria rarely, if ever, accompany a student editor's recommendation. To maintain the rigor, quality, and credibility of the journal, its student editors may require more training and a question on the review form that specifically asks them to explain their recommendation.

Difficulty with the Review Form Questions. During data collection, it appeared that student editors often did not understand or fully read through the questions on the review form. Often, the questions were not worded to require an explanation or elaboration beyond a simple "yes" or "no" response. This was especially apparent when the form asks student editors about a thesis. While they often discussed that yes, a thesis was present, or no, there was no discernible thesis in the work, they did not often evaluate the quality of the thesis for deeper traits, such as quality, strength, and relevance. This may suggest that, though we train our student editors during the fall semester, they may not relate some of the items discussed during training to the questions on the review form because the form does not explicitly ask about concepts like relevance or quality and strength of a thesis. Additionally, there is a question early in the review form (see Appendix B1) that asks, "To the best of your knowledge, how does the work contribute to the field of study?" Frequently, despite this question explicitly asking, "how" the work might contribute, student editors would only respond "yes" or "no." For example, in one sample, the student editor says, "I feel like this paper doesn't contribute to its field of study in a

huge way, or in a new way,” and while this response technically meets the length standards for a student editor of this research journal, it does not really answer the “how” or “why” questions. In another sample, the student editor answers this question of contribution in the following way: “I think this contributes to the field of study well because of the depth of analysis. Also, the relevance of Disney and The Little Mermaid, compared to a lesser-known film gives this piece some uniqueness.” Here, the editor’s subjective “contributes to the field of study well,” not only fails to tell the managing editor how the work makes a contribution, but also fails to explain the student editor’s own criteria to determine it contributes well. The review forms may need some revision based on these misunderstandings to achieve better, more thorough responses. Additionally, student editors may require further training about how published research generally contributes to its field and what constitutes a research gap.

Discussion of Journal Editor Surveys (Test 2)

Written interviews with the managing editors of three regional undergraduate research publications revealed that student editors at other institutions may also experience difficulty demonstrating research competencies when reviewing articles for publication.

Training Student Editors. Based on responses in the written interview portion of this study, it seems student editors of undergraduate research publications are often selected from the top writers, researchers, and scholars at any university. Because of this, it seems many managing editors assume student editors already have good grasp of research competencies and skill in writing. It appears this perception leads to less focus being placed on training student editors to account for knowledge gaps or developing more intuitive, user-focused review forms to facilitate their critiques. This troubling trend should be addressed, as, based on results from Test 1 and Test 3, student editors appear to need and often want more training and specific guidance.

Both Editor 2 and Editor 3 expressed concerns about the logistics of training their student editors to become better researchers and writers and better evaluators of research and writing. This appears to be something of a trend, with undergraduate research journals, especially those run exclusively by students, lacking the resources and available expertise to more rigorously train student editors. This is likely a contributing factor to the continued research knowledge gaps student editors experience. While trusting student editors to have some knowledge of research and writing from classroom instruction can be effective to a degree, leadership should consider investing further in training for their student editors to maintain rigorous and sustainable standards and to raise the profile of the journal.

Editor 1 indicated a review form might be helpful to their student editors, and in lieu of a form, Editor 2 has their student editors create a revision letter. It is not possible to speculate about whether it is better to have a form or not based on this project, but future research could compare the impacts of having a review form and employing other methods of review. Combined with improved training, implementing a consistent form could standardize the review practice somewhat and provide a sense of direction and security to student editors as they continue to learn.

Opportunities for Growth. All three managing editors interviewed mentioned growth opportunities for their publications and areas where student editors could benefit from further instruction. Areas mentioned specifically include:

- Understanding/defining research
- Critiquing an author's procedure and conclusions
- Focusing on higher-order, versus lower-order, concerns
- Communicating to authors with a more appropriate tone
- Teaching what is expected from a published paper versus a class or informal report

Some of these identified growth areas also correlate to the *R-Comp* model, suggesting more student editors are experiencing knowledge gaps in key research competencies.

This demonstrates the scope of these issues and suggests a larger problem of a lack of research-focused undergraduate education that undergraduate journals are ill-equipped to fix. More research is needed, especially in pedagogy, to determine how best to address these discrepancies on a larger scale.

Discussion of Usability Test Results (Test 3)

Results from the usability test produced some interesting results. Journal leadership can use these results to revise their forms and consider new opportunities to train student editors.

Training Student Editors. The student editors surveyed pointed to Questions 1 (How is the work original or not original?), 2 (Would you consider this a literature review?), 4 (Does the work present new research, or are the author's ideas clear within the work?), and 8 (Is the research thorough and ethical and the methodology appropriate?) on the review form most often as those difficult to understand and requiring more clarity. These questions correspond to the following research concepts:

- Originality
- Literature review
- New research
- Clarity of author ideas or voice
- Ethics
- Methodology

All but two of these directly match the competencies student editors appeared to lack based on their review form responses in Test 1. This relationship suggests the terminology used in the questions, and the concepts to which those terms refer, are areas journal leadership should better emphasize. An argument could also be made that undergraduate students in general may be

missing these competencies and that course curricula in research methods for each discipline and in writing generally should be examined in further studies. Students likely need more exposure to and instruction in these concepts than journal leadership could be reasonably expected to provide, but that is beyond the scope of this study.

When managing editors design and revise materials to train student editors and facilitate reviewing, they should consider emphasizing originality, literature reviews, characteristics of new research, clarity of the author's ideas (voice), research ethics, and methodologies. Taking time to at least define and discuss these terms and concepts, possibly with relevant examples, may be beneficial. Managing editors should remember these shorter trainings might be the only instruction a student editor has received about these core competencies. The more student editors can practice these skills and evaluate these aspects of research, the more rigorous the review process of undergraduate research publications can become, and the better feedback given to student authors becomes.

Affective Measures. The affective measures following task-based usability test questions in Test 3 were interesting, but not entirely revealing of any trends. This could have been due to limitations in the testing protocol. Student editor participants were not asked to use the form to review a piece, so they were often examining the questions instead. While it is true student editors would examine these questions and need to mentally determine what the question asked of them, this was admittedly not the strongest or most immediately relevant task.

Results varied, indicating the wording of the questions and the expectations of the tasks were not consistently difficult for every student editor surveyed. Wording of questions, therefore, may not be the most pressing issue for student editors who use review forms, as they generally appear confident in their ability to dissect questions and eventually come to understand what they are being asked. Still, a majority of the participants were not able to eloquently explain what

Question 4 on the review form asked them to do, nor did they accurately define a literature review. This was true regardless of how they scored the difficulty of responding to each question. Even the single participant who had trained more extensively than the others struggled with both questions, though their self-reported difficulty rating does not reflect this. The discrepancy here could indicate that some student editors may be more confident in their ability to use context clues and understand questions than they should be, but more research is needed to strengthen and support such a claim.

Confidence and Guidance. Common themes that came up in nearly every participant's suggestions in Test 3 included more context, more open-ended questions, and reminders of definitions and journal standards somewhere on the forms. This surprised me. While student editors suggested they wanted more guidance and objective definitions and standards to follow, they also seemed to want more autonomy to explain or justify their reasoning.

The request for guidance could suggest student editors lack the confidence in their own judgements to make publication decisions about their peers' work. These students may seek parameters as an assurance that their reasons are justified and their perceptions about a piece are correct.

Though six out of 12 questions on the review form could be considered open-ended, and though the instructions explicitly state that they are to explain their reasoning, the six questions that could be answered with a simple "yes" or "no" stood out to them. It is possible that the construction of these six questions leads student editors to believe they are expected to answer with a "yes" or "no," and they may feel fear or uneasiness about deviating from any implicit expectations. This could also be due to a lack of confidence in their abilities and expertise.

More research may be needed to strengthen the connection between a student editor's confidence and their desire for both more and less guidance. In the meantime, journal leadership

should consider the reservations their student editors might have about making decisions about the manuscripts that go to print. It may help for leaders to discuss strategies for coping with such feelings and providing opportunities for student editors to practice reviewing and writing about their thoughts and decisions. It is possible that the more frequently students use these skills, the more confident they will become in their ability to make and defend publication decisions and suggestions for improvement.

Review Form Revision Suggestions. I would recommend journal leadership consider running usability tests with their own materials or finding another way to get feedback from student editors. It can be a good way to learn about student editors' knowledge gaps and diagnose usability issues with their training and review forms. Because no two students are the same, and because different universities have their own culture and climate, it is possible not every suggestion made by the student editors in Test 3 will be useful or helpful to student editors at another institution. Journal leaders can implement usability testing as part of their assessment process to find out what would best support their students and help them continue to grow as learners, researchers, writers, and professionals.

When revising materials, journal leaders could implement some of the revision suggestions made in Test 3. These could include:

- Make questions more open-ended to encourage elaboration
- Include journal standards and rubrics somewhere they can be readily accessed and referenced
- Add context or definitions of key research terms somewhere on the form or a sheet that comes with the form
- Separate compound questions (questions joined with a conjunction) into multiple questions
- Better emphasize the instructions to remind student editors what is expected of them.

These could be used as general guidelines to help journal leadership at other institutions begin revising their materials, though usability testing with their own group of model users would still be necessary.

The student editors surveyed in Test 3 overwhelmingly appeared to like the idea of having more objective standards and definitions to operate from and to have those standards and definitions easily accessible while they worked. As a usability feature, having tooltips on a digital form or separate information sheets on a print form could be beneficial. However, they could also be limiting, and could narrow what students consider when examining a manuscript. What might be more beneficial is revising training protocol and tailoring it to specifically establish a set of guidelines rather than rigid standards. These guidelines could still be included in review forms or a handbook to give student editors some direction but would not take up too much space on a review form or limit what the editors consider when reviewing a piece. It seems student editors want rules they can follow and struggle when the rules are unclear. Further research is needed to determine how to balance students' desire for rubrics and rules and the inherent messiness and creative improvisation often required of the learning process.

Based on the affective measures recorded after task-based usability questions, managing editors should carefully consider the wording of their questions if they use a review form for their student editors. It seems the syntax of a question can easily confuse a student editor and make it more difficult to perform their tasks effectively and efficiently as they try to determine what the questions are asking. Generally, it is a good idea to keep questions simple, direct, and open-ended when revising.

Relationship Between Test 1 and Test 3. Looking at the results of Test 1 and Test 3, it is easy to recognize similarities between the research competencies student editors struggled to demonstrate in their form responses and the questions they identified as requiring clarity and

context. This suggests student editors may be aware of their own knowledge gaps regarding research and simply require more training in and practice with these areas. It then falls to managing editors and other journal leadership to supplement learning and design a training course and review forms that would allow student editors to learn new concepts, practice those concepts, and improve their understanding of and skills in those areas.

Limitations

The main limitation of this study was undoubtedly the COVID-19 pandemic and subsequent stay-at-home-orders. Both Test 2 and Test 3 had to be completed remotely via email and Zoom, making it more difficult to recruit many participants and gauge reactions and body language. Though this did not have a major impact, as the realistic situation for student editors would be to access the review form document in their own home on their own computer when convenient, it caused some time constraints and led to a smaller sample size. These tests could be repeated with a larger pool of participants and improved testing protocol when tests can be administered in person to compare. Due to pandemic constraints, there was also no way to have the usability test administered by anyone other than myself, which could have skewed the results if students did not want to upset, offend, or otherwise share their candid thoughts and feelings with me. I may also have been biased in my observation of their reactions. Future iterations of this study should have an unrelated party administer usability tests and make observations to strengthen the data.

All three tests in this inquiry had a limited sample size, and results were confined to just a few undergraduate research publications at state schools in the Midwest. Future studies could focus on other institutions across the country or globally to determine whether the same results apply more generally.

Due to time constraints and logistics issues, it was not possible to have participants use the review forms to review a piece of writing during Test 3, the usability test. This was a considerable obstacle, and though Test 1 allowed me to analyze actual responses given on review forms, observing a participant completing a task as they would when using the form in a real review setting and asking about their thoughts and feelings after performing the task would have been beneficial. Future study could focus on more task-oriented usability testing. This could be worthwhile once the forms have been revised.

Future Study

In addition to suggested future research in the discussion above, there are a few other opportunities to build upon the findings of this study. Based on the process used by Editor 2 from Test 2 (see Appendix B2 and Appendix B3), and given the nature of the features student editors in Test 3 identified as potentially useful, electronic format might be the future of undergraduate research journal review forms. Digital, online, responsive forms offer more opportunities to seamlessly integrate links to training materials, incorporate images and relevant examples, and allow student editors to get information like definitions and journal standards more quickly. More research would be needed to determine whether this delivery format could further improve the student user's experience with the form and better integrate reminders, definitions, instructions, links to resources, and other features that can aid student learning and improve the quality of reviews.

Future research should also consider how student editors would rate their own learning gains, research competencies, and experiences working on the journal. Surveys could be adapted from those conducted by Weiner and Watkinson (2014), Waye and Simpson (2016), and Johnson, Putnam Davis, and Bandy (2020) to ask student editors to reflect on their experiences

and perceived learning gains as a result of participation. This could help justify the costs of running undergraduate research publications. On a micro scale, journal leadership could conduct versions of such surveys with their own staff as an assessment tool to secure more funding and buy-in from university officials, faculty, staff, and students.

Summary

As undergraduate research publications become more popular learning tools and features of universities across the country, examining the students who participate in these journals becomes even more important. Student editors of undergraduate research publications are often strong writers and researchers across their disciplines, but they may still experience knowledge gaps as they critique research and writing. Student editors appear to be largely aware of their own knowledge gaps about research and writing. Journal leadership, including managing editors and faculty advisors, also need to recognize these knowledge gaps. While many journals are run exclusively by older students, faculty advisors can step in as educators to help supplement student learning of key research competencies.

Faculty advisors and other leaders can treat participation on an undergraduate research journal as a supplemental writing and research methods course. Like other writing courses, and indeed courses in general, journal leaders can implement usability testing of their training and review forms to focus the design of these materials on the users, their student editors, and better meet their needs. Leaders can revise their materials to target key knowledge gaps, encourage open-ended critical thinking, and provide more guidance to their student editors as they engage in this experiential learning. While what works for each student or each publication will vary, it seems student editors at universities across the Midwest, and possibly across the country, could use further instruction in several research competency areas.

Ultimately, improving the training and review process can make student editors better writers and researchers in their own disciplines. It can also help them provide better feedback and instruction to their peers, the student authors who submit their work to undergraduate publications. As student editors better understand advanced research and writing techniques and can better recognize them and critique them in manuscripts, it is possible the perceived rigor and therefore profile of the publication improves, which could contribute to the sustainability of undergraduate research journals. It can also lead to the publication of stronger undergraduate research pieces that contribute more deeply to the broader academic conversation. More research is ultimately needed to determine how to best train student editors, especially those who have no experience with research and limited experiences with academic and research writing. Research is also needed to determine how student editors might rate their own learning gains and experiences as a result of working on an academic publication. Still, it is important to continue to study this population of students and find ways to serve their needs so they can benefit as much as student authors from their participation on staff of a research journal.

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APPENDICES

Appendix A. Human Subjects IRB Approvals

All tests in this study were filed with the Missouri State University Institutional Review Board and classified as Exempt. Official exemption for Test 1 appears in Appendix A1, and exemption for Tests 2 and 3 appear in Appendix A2.

Appendix A1. Test 1 IRB Exemption

Date: 5-26-2021

IRB #: IRB-FY2020-315

Title: Understandings and Perceptions of Research and Writing among Undergraduate Student Editors of an Undergraduate Research Publication

Creation Date: 10-18-2019

End Date:

Status: **Approved**

Principal Investigator: Lyn Gattis

Review Board: MSU

Sponsor:

Study History

Submission Type	Initial	Review Type	Exempt	Decision	Exempt
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Key Study Contacts

Member	Lyn Gattis	Role	Principal Investigator	Contact	lyngattis@missouristate.edu
Member	Maria Meluso	Role	Primary Contact	Contact	meluso2213@live.missouristate.edu

Appendix A2. Test 2 and Test 3 IRB Exemption

Date: 4-11-2021

IRB #: IRB-FY2021-112

Title: Reviewing the Review Process: Designing Better Review Materials for Student Editors of Undergraduate Research Publications

Creation Date: 9-8-2020

End Date:

Status: **Approved**

Principal Investigator: Lyn Gattis

Review Board: MSU

Sponsor:

Study History

Submission Type	Initial	Review Type	Exempt	Decision	Exempt
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Key Study Contacts

Member	Lyn Gattis	Role	Principal Investigator	Contact	lyngattis@missouristate.edu
Member	Rhonda Stanton	Role	Co-Principal Investigator	Contact	rhondastanton@missouristate.edu
Member	Leslie Seawright	Role	Co-Principal Investigator	Contact	lseawright@missouristate.edu
Member	Maria Meluso	Role	Primary Contact	Contact	meluso2213@live.missouristate.edu

Appendix B. Submission Forms

The Submission Form: Research form (Appendix B1) was used in Test 1: Student Editor Research Competencies and Test 3: Usability Testing. This document contains the questions student editors are asked to answer during the review process. Editors fill out the forms upon reading the submitted manuscript. Student editor comments remain anonymous to the student author, and the student editor does not know who the student author is.

The Evaluation Form 1 and Evaluation Form 2 questionnaires (Appendix B2 and B3) come from an online Google Form for Editor 3's Undergraduate Research Journal. There are two parts to this form, and reviewers are expected to respond to both parts to complete a review.

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Submission Form: Research

Submission Information

Title of Submission: |
Number of Submission: |
Name of Reviewer: |

Evaluation of Quality

Use complete sentences and give reasons or examples when answering the following:

Originality

1. How is the work original or not original?
2. Would you consider this a literature review? Why or why not?
3. To the best of your knowledge, how does the work contribute to the field of study?
4. Does the work present new research, or are the author's ideas clear within the work? (For a literature review, does it give a new interpretation of old material, combine new with old interpretations, or trace the intellectual progression of the field?)

Organization

5. Does the work contain an arguable thesis that is supported throughout the body?
6. Is the information clearly organized and the arguments logical?

Research and Methods

7. Is previous relevant work acknowledged and referenced?
8. Is the research thorough and ethical and the methodology appropriate? (Remember, literature reviews should be extensively researched).
9. Are reasonable conclusions drawn from the results?

Recommendations

Provide the author with constructive criticism and feedback:

10. What needs to be improved?
11. What was done well within the work?
12. Any further comments or recommendations not covered above?

This submission (select **only one** option):

- ☐ Should be published without change
- ☐ Will be suitable for publication after minor revisions are made
- ☐ Requires substantial revision and must undergo the review process again before being considered for publication
- ☐ Is unacceptable for publication

Please explain your recommendation below.

Appendix B2. Evaluation Form 1

1. Manuscript Title:
2. What are your thoughts about this essay?
3. Discuss the quality of the writer's central argument (thesis). Does this essay's organization advance the central argument?
4. Does the writer provide adequate support for the argument?
5. In what ways, if any, do you find the central argument to be interesting, insightful, original, etc...?
6. What kinds of supporting evidence does the writer provide for his or her argument?
7. Is the essay organized in a logical and readable manner and are there any grammar/punctuation/etc. issues that we should be aware of?
8. Does this essay show evidence of genuine undergraduate research (secondary source research or primary research such as interviews, surveys, observations, case studies, etc...)? Does the essay need further research examples or other kinds of evidence?
9. Would you recommend this manuscript for publication? Why or why not?
10. Reviewer Name:
11. Date:

Appendix B3. Evaluation Form 2

1. Manuscript Title:

2. Does this manuscript meet submission guidelines?

- ☐ Typewritten and double-spaced
- ☐ Written in Microsoft Word format
- ☐ Between 2,000-6,000 words
- ☐ Includes bibliography, works cited, or list (*sic*) of references
- ☐ Citations are in MLA, APA, or Chicago format

3. Presentation: General readability

	1	2	3	4	5	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

4. Organization and efficiency

	1	2	3	4	5	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

5. Focus/clarity of the argument

	1	2	3	4	5	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

6. Creativity of argument

	1	2	3	4	5	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

7. Content & Method: Originality of approach or unique perspective

	1	2	3	4	5	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

8. Evidence of primary and secondary sources

	1	2	3	4	5	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

9. Use of scholarly sources

1	2	3	4	5
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Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent
10. Appropriately and properly applied research methodology						
	1	2	3	4	5	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent
11. Quality and sufficiency of interpretation & analyses						
	1	2	3	4	5	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent
12. Clear and logical conclusions						
	1	2	3	4	5	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent
13. Use of references to support argument						
	1	2	3	4	5	
Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent
14. Reviewer Name:						
15. Date:						

Appendix C. Usability Test Questionnaire

These questions were posed to each participant in the usability test regarding the research review form in Appendix B1. As needed, follow-up questions were asked, and the researcher added notes about facial expressions, body language, and the time it took to notice things on the form or answer various questions.

Usability Test Questions

1. What is your first impression of this review form?
2. What is the first thing you noticed about this form?
3. What do you think about how information and features are laid out?
4. Please read through the questions on the form. Are there places where questions are not clear? Which questions, and what needs clarification?
5. Based on the context of this form, what is question 4 asking you to do?
 - a. On a scale of one to five, with one being very difficult and five being very easy, how difficult was it to come to this answer?
 - b. If you could change anything about this question to make it clearer, what would you change and why?
6. Based on the information only available on this form, what is your definition of a literature review?
 - a. On a scale of one to five, with one being very difficult and five being very easy, how difficult was it to come to this answer?
7. How do you feel about the number of questions on the form?
8. How do you feel about the length of each question on the form?
9. What questions or contextual information would you add to this form, if any, to help better guide your reviews?
10. About how long do you think this form would take you to complete?