JOURNAL OF CHEMICAL EDUCATION

Article

pubs.acs.org/jchemeduc

Chemistry Writing Instruction and Training: Implementing a Comprehensive Approach to Improving Student Communication Skills

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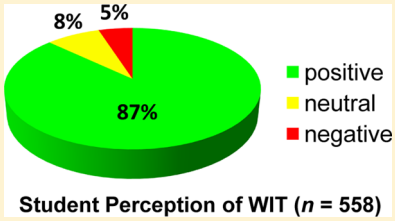
Supporting Information

ABSTRACT: The ability of science undergraduate students to capably communicate course content and their understanding of scientific phenomena through writing has long been considered a problem. Effective methods for improving student writing skills are often fragmented and undertaken on a course-by-course basis rather than as a coordinated approach. This paper describes the implementation of a departmental effort to enhance and evaluate chemistry student writing in several upper-year laboratory courses. The program involves introducing extensive writing focused aspects to course assignments and reports and has impacted over 600 students during a six-year period. Student feedback has been exceptionally positive from undergraduates as well as graduate students who previously participated in the initiative.



KEYWORDS: *Upper-Division Undergraduate, Graduate Education/Research, Curriculum, Communication/Writing, Student-Centered Learning, TA Training/Orientation*

Much has been written in recent years regarding the general weakness of science students' writing skills, particularly in post-secondary settings.[1−3] The reasons for this state of affairs are many, but originate primarily with both the types of writing activities assigned to students and the overall lack of student involvement in their course writing components.[4] Studies have also examined student cognitive processes as they relate to science writing, as well as evaluations of the deep connection between student writing competence and comprehension of subject matter.[5,6] Integration of a chemistry-specific curriculum into undergraduate courses including critical writing assignments has been studied, and it has been found that student writing skills can significantly improve through introduction of appropriate writing assignments.[7−14] Various types of writing activities have been analyzed, including topical and laboratory reports[15−18] and the drafting of an experimental report either from a selected journal article or in the style of one.[19,20] The effectiveness of course curricula incorporating elements of collaborative or peer review has also been examined,[21−25] as well as alternative methods of evaluation (e.g., via scaffolded reports[26] or incorporating report drafts).[27] A previous attempt was made to introduce a more coordinated approach at a chemistry departmental level, which was in isolation from other units.[28] Although such approaches have proved somewhat effective in specific courses, the development of a faculty-coordinated, departmentally focused communication initiative was considered important in the Faculty of Arts and Science at the University of Toronto.[29] To meet this need, the Writing Instruction and Training (WIT) program was introduced at the university in 2008 and commenced within the Department of Chemistry in July 2009. As a multidepartment program, the overall goal is to improve discipline-specific undergraduate writing. Funding is made available through WIT to train graduate student teaching assistants (TAs) in writing instruction (with a particular focus on how to provide constructive feedback) and to afford additional course hours for these TAs to respond to and evaluate student writing. Funds and expertise are also devoted to developing writing specific course materials, modifying evaluation criteria (rubrics) to include writing and ensuring that the latter are appropriate for an undergraduate curriculum.

This article presents the implementation and status of the WIT program in the Department of Chemistry at the University of Toronto. The program has a hierarchical structure involving TAs and faculty with various teaching and leadership roles and has been integrated into five third-year lab-based undergraduate courses. Three key goals have governed the design, incorporation, and iteration of this program:

- to give formal training to course TAs on how to provide clear writing instruction and appropriate critical feedback;
- to facilitate active TA participation in teaching writing skills to students (via thorough feedback, TA-run writing seminars, presentations and consultations);

Published: November 16, 2015

DOI: 10.1021/acs.jchemed.5b00373
J. Chem. Educ. 2016, 93, 86−92

- to develop course components (e.g., assignments, laboratory report schemes) that help students improve the skills required for science/chemistry-specific writing (e.g., content presentation, paper structure).

Using one of the WIT courses as a case study, examples of teaching activities are provided and ways in which idea-sharing between courses has led to improved instruction and program design are outlined. Student responses to the initiative are presented and the WIT program's impact on the general undergraduate curriculum is discussed.

IMPLEMENTATION OF WIT IN CHEMISTRY

Hierarchal Structure

To maximize the effectiveness of the WIT program, a clear administrative hierarchy has been developed (Figure 1). At the top of this structure is the Faculty of Arts and Science WIT coordinator, who is responsible for introducing the initiative throughout different departments in the Faculty of Arts and Science, as well as promoting the program in general. In each WIT unit, a specific faculty member is selected to serve as the departmental coordinator, who works toward expanding the reach of the program. The departmental coordinator liaises directly with a lead writing teaching assistant (LWTA), a graduate student who serves as a facilitator for day-to-day program operations (Figure 1).

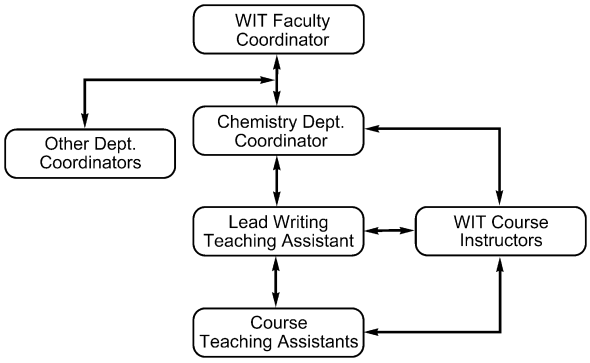


Figure 1. Structure of the WIT hierarchy, showing the relationship and interaction pathways among coordinators, course instructors/TAs, and the LWTA.

The LWTA is selected annually by the departmental coordinator following an internal application and interview process (it is possible for LWTAs to hold consecutive, multiyear appointments). This role is important as the LWTA is responsible for coordinating the specifics of WIT programming with participating course instructors and ensuring the regular course TAs are prepared for their writing instruction tasks. The LWTA is also responsible for collecting data about the program (mostly in the form of student surveys) and compiling monthly progress reports for the WIT coordinator. To ensure the LWTA is properly prepared for the position, a week-long training program is offered each summer where all LWTAs (new and returning, from all participating WIT units) meet to receive instruction, participate in workshops, and discuss their experiences and ideas with each other (Supporting Information). This exchange of ideas between LWTAs representing different departments is critical to the development of the program, as innovations made in one department are often introduced qinto other departmental WIT programs. This holds true for departments affiliated with both sciences and humanities, as although their particular requirements are variable, the basic concepts relating to techniques for developing student communication skills are universal. During the academic year, the course TAs are provided with extra hours in their teaching contracts in order to receive training and support from the LWTA and to provide additional, writing focused feedback to students. At the end of each academic year, the WIT coordinator, departmental coordinator, current LWTA, and course instructors hold a meeting where student feedback is reviewed and discussed, suggestions for improving program coherence are exchanged and new ideas for the program are proposed.

Logistics

Five third-year, single-semester undergraduate courses have been involved in the WIT program since 2009. They cover a wide range of upper-year chemistry material and include CHM317H (Introduction to Instrumental Methods of Analysis), CHM338H (Intermediate Inorganic Chemistry), CHM343H (Organic Synthesis Techniques), CHM348H (Organic Reaction Mechanisms), and CHM379H (Biomolecular Chemistry). In selecting these courses, the dominant factor was that they all contain a large practical component and therefore require students to write regular reports. The laboratory report was chosen as the model curriculum element for WIT integration as it was the most common type of writing found in undergraduate chemistry programs. It was also straightforward to customize report requirements based on student year of study and expected level of development. It should be noted that the reports received from students have an inherent degree of variability of student response (and engagement) dependent on the laboratory activities undertaken, and that the lack of complete control over such activities constitutes a limitation. Each of the five courses chosen is required for at least one degree program in chemistry, ensuring that every student enrolled in a chemistry program is exposed to WIT in at least one course, often in their third year. Many of these students are exposed to the program in more than the one course (e.g., ones pursuing a chemistry specialist degree take at least three WIT courses, and ones pursuing a chemistry major take at least two). In total, approximately 90−120 students participate in the WIT program each year, depending on the grouping of courses they take (Table 1).

When introducing WIT into a specific course, the LWTA and WIT coordinator initially met with the course instructor (1−2 h) to determine which components could be modified to incorporate enhanced writing elements. This usually involved laboratory reports, although other exercises were sometimes used (e.g., literature reviews or mock conference abstracts). The instructor and LWTA subsequently drafted appropriate course grading rubrics that included writing evaluation. Depending on the amount of writing in the course, the instructor and LWTA developed additional materials for students, such as effective writing tip sheets and supplementary information about writing that was included within laboratory manuals (Supporting Information). This usually occupied approximately 2−10 h per course per academic year, depending on whether the materials remained largely unchanged from the previous year or whether new components were added or needed modification. As the five courses changed very little from year to year, the incorporation of WIT involved a large amount of initial activity followed by annual iterative improvement of the WIT elements based on student responses and instructor experiences.

DOI: 10.1021/acs.jchemed.5b00373
J. Chem. Educ. 2016, 93, 86−92

Table 1. Enrolment in Third-Year WIT Courses during 2009−2015

Course	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Total
CHM317H	45	45	46	42	35	32	245
CHM338H	37	20	14	27	24	34	156
CHM343H	46	30	41	38	44	39	238
CHM348H	57	36	34	35	53	35	250
CHM379H	21	18	20	12	19	18	108
Uniques[a]	119	96	94	101	120	104	634

[a]Refers to the number of unique students who took at least one WIT course in a given year. Students who took constituent WIT courses in different years of study are duplicated in this number.

Early in each semester, after writing assignments are developed or updated, the LWTA trains the course TAs (11−13 a year, or 2−3 per course) in writing instruction. As the course TAs are primarily responsible for assessing student writing, it is important they understand their responsibilities and receive appropriate information regarding writing evaluation. These sessions typically run for 1−2 h (one to three times per semester based on course needs and TA experience) and the course instructor routinely attends them for consultation. During the sessions, TAs are normally provided with sample student report submissions and grading rubrics. The development of TA training materials and evaluative rubrics were based on previously reported models for report/manuscript evaluations (Supporting Information).[30] Together with the LWTA and the course instructor, participants read, comment on, respond to and assign a grade to each report. The group then collectively discusses the rationale for each set of comments and grades. The LWTA ensures that the focus is not only consistent with the design of the specific assignment, but also with the WIT program as a whole: TA feedback focuses on structure, narrative organization, and figure/table presentation divorced from the validity of the scientific content presented and at the same time de-emphasizing spelling and grammar. The TAs learn to write comments that provide specific, substantive and constructive remarks that deal with report structure, organization and content presentation, along with suggestions for student improvement, which occupies approximately 12 h of the extra time provided in their contracts. The LWTA is available throughout the semester to consult with the instructor/TAs on specific writing issues, and at the end of each course the LWTA administers a WIT-specific course evaluation.

Design Specifics

The design of WIT activities in the third-year courses focused on the writing abilities that students pursuing a chemistry program would need. In particular, it made sense to develop the writing skills students required for drafting and submission of their fourth-year undergraduate research thesis and those necessary to write scientific articles (for which previously reported guidelines were used as the ideal model).[30] This resulted in use of similar activities across different courses, thus allowing different course WIT components to reinforce each other. As many students take more than one of these five courses, some standardization in the WIT elements of different courses was both practical and advantageous, as applying the WIT design philosophy to courses with different requirements (laboratory reports, written assignments and report papers, etc.) results in constant and consistent student exposure to the writing focused curriculum (Supporting Information). By far the most successful, relevant, and widely incorporated element has been the draft report. Students have the opportunity to submit a full version of their first laboratory report or assignment early in the course and this draft is returned with substantive feedback but without evaluation (for the first report/assignment only). This allows students to improve their writing before submitting it for formal grading. TAs identify problems and issues with student writing in the draft reports that could be improved upon, without commenting on the scientific content of each report. Incorporating such formative feedback[31] allows students to write without anxiety, secure in the knowledge that they will have the opportunity to significantly improve their writing prior to the evaluation of their final report. Verbal feedback from course TAs was clear in stating that the difference in quality between the initial draft report/assignment and the corresponding report/assignment submitted for evaluation was sizable.

CASE STUDY: CHM343H

Background and Evolution

An example of the chemistry WIT program is within CHM343H, a third-year spring semester course focused on modern synthetic methodologies. Originally, the CHM343H WIT element took the form of more traditional formal experiment reports (simply structured papers with standard introduction, data, discussion and conclusion sections). However, students suggested that the report format be more similar to actual research articles they might be required to draft in the future, so in 2010 a report template in the style of a formal journal article was introduced. The reports are collected for "publication" each semester as "CHM343H Communications" (343Comm). The fundamental learning objective of this approach is to teach students about the basics of constructing an academic paper. This includes understanding the features of each section of a typical article and the structure in which results and ideas should be presented (Supporting Information).

Over several course iterations, student input was used to improve 343Comm. In 2010, though the reports followed a template structure, students received only the normal TA comments typical of the WIT program (formative feedback as described, providing extensive and in-depth suggestions regarding content organization presentation and narrative flow). Numerous students requested greater and earlier TA feedback, especially considering the radical differences between the 343Comm template and their previous writing experiences. An optional draft report was therefore added, allowing students to explore writing in a low-stakes environment and to receive extensive commentary on any writing issues that could be addressed before submission of an actual report. After the first round of draft reports, the TAs reported observing an immediate improvement in the evaluated reports of those students who had completed a draft report. To ensure that all students would have the opportunity to benefit from this enhancement (not just those students sufficiently motivated to

DOI: 10.1021/acs.jchemed.5b00373
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pursue the optional report), draft reports were subsequently made mandatory. In total, following this draft, seven experimental reports were submitted by each student over the course of the term. As it is a spring semester third-year course, CHM343H was well-suited to prepare students for the transition from writing formal reports to constructing a fourth-year research thesis. Most students enrolled in CHM343H have already taken at least CHM348H in the fall semester, meaning they have experience receiving WIT feedback on formal laboratory reports before writing the 343Comm template-based reports. This led to a natural progression from formal written reports to journal-style reports and then to the thesis required as part of their fourth-year research.

Sharing of WIT Components

Many ideas, concepts, and writing components were shared between CHM343H and other WIT courses. CHM343H incorporated design elements from several courses to better communicate its message about writing. An example of this was the introduction of a formal TA presentation on appropriate writing practices and the development of a separate rubric for writing evaluation (to decouple writing assessment from scientific content). Both of these approaches were initially implemented in CHM338H (Supporting Information). In addition, CHM343H has itself been influential on other chemistry WIT courses, with several components used in them. The highest-impact activities have been (i) draft reports as early, low-stakes writing tasks that encourage iteration and (ii) formal abstracts as highly structured, short tasks requiring the ability to concisely and effectively summarize research information. Also, the transition in CHM343H from writing traditional reports to ones in the style of a journal article has informed the development of mutually reinforcing WIT elements in other courses. For example, upon introducing 343Comm it became clear that students had great difficulty writing good abstracts: they struggled to condense the major ideas of their report and to include appropriate content. In response to this, CHM348H introduced a WIT component that provided students with an example of a "bad" abstract, required them to analyze its problems (both scientific and language-related) and to draft a superior version. After completing their revision, students were given a much-improved abstract for comparison (Box 1), so that they could compare their draft with a model. This afforded immediate feedback on their own critical evaluation of scientific writing and allowed them to self-evaluate prior to completing other WIT elements.

343Comm has additionally had a notable effect on the design of grading rubrics used elsewhere in the program. In developing a scheme suitable for grading a laboratory report written in journal-style, a highly structured rubric (Supporting Information) was constructed and clearly broken down into section-by-section objectives and evaluation criteria. The practice of using such instructional rubrics is well-known in other disciplines and their design has been reported.[32] Their use for 343Comm heavily influenced the rubrics subsequently created for other WIT courses, increasing the standardization of writing evaluation that students received.

Box 1. Sample "bad" abstract activity used to demonstrate what is expected in a report abstract

Underlines indicate inappropriate/incorrect content

Sample provided to students:

Methyl propanoate is made by reacting 5.2 mL of propanoic acid with 10.3 mL of methanol in a 50 mL round-bottomed flask under reflux, using a heating mantle, in the presence of 96% sulfuric acid as an acid catalyst. The reaction takes 90 minutes to reach completion. Then, 9.5 mL of the product (present as a viscous oil) is purified by distillation and its boiling point is 185 °C and the IR spectrum shows a strong band at 1746.3 cm^{-1}. These values are in excellent agreement with an appropriate literature reference for methyl propanoate.[1] The complexing properties of methyl propanoate with various metal cations are also investigated.

Improved sample:

Methyl propanoate was synthesized in good yield by heating propanoic acid with an excess of methanol in the presence of catalytic concentrated sulfuric acid. The product was purified by distillation and characterized by boiling point measurement (bp of 185 °C) and IR spectroscopy (strong band at 1746.3 cm^{-1}). The association constants of methyl propanoate with alkaline metal cations in aqueous and nonaqueous solutions were also determined.

EVALUATION OF WIT IMPACT IN CHM343H AND BEYOND

Methods of Evaluation

Evaluation of WIT impact was primarily accomplished via anonymous student surveys. This method was chosen as the most suitable for evaluation as it provided clear data that avoided the potential ambiguity associated with qualitative polling of course TAs from year to year. In addition, the quantitative examination of student writing grades (for which many factors could impact, such as changes in course structure, content and personnel) was considered to be problematic. The surveys thus speak to the student perception of and confidence in the WIT program. The surveys consisted of a series of questions (using a Likert-type scale)[33] which asked students about the impact of their experience with WIT in their third-year courses. In addition, space was provided for students to make written comments about aspects they found especially helpful, suggestions for improvement, or perceived program shortcomings. Furthermore, in the interest of obtaining feedback from those with an additional perspective on the usefulness of the program, responses from senior students (who had completed a number of the WIT courses specified in the previous academic year and were completing their fourth-year thesis project) and graduate students were also collected. All surveys were collected without identifying information at the end of the relevant academic term (for a WIT course or an honors thesis), or substantially after the fact (for graduate student responses). Response rates from third-year students averaged 78% and were close to 100% for fourth year and graduate students. It is acknowledged that as successful entrants to the University's graduate program, the graduate student responses may tend toward positive bias. The text of all surveys administered, as well as the raw survey results (as collected from every WIT course including that of the case study) are provided in the Supporting Information.

Undergraduate Student Responses from CHM343H

The undergraduate responses to the CHM343H surveys represent the general student opinion of the WIT program and are presented here. Those questions considered most relevant to the overall program experience (in terms of relating to

DOI: 10.1021/acs.jchemed.5b00373
J. Chem. Educ. 2016, 93, 86−92

Table 2. CHM343H Student Survey Responses during 2010−2015

	2010/11 (19)[a]			2011/12 (34)			2012/13 (33)			2013/14 (37)			2014/15 (28)		
Question	A[b]	N	D	A	N	D	A	N	D	A	N	D	A	N	D
1	67%	33%	0%	74%	6%	20%	97%	0%	3%	84%	8%	8%	86%	11%	3%
2	69%	25%	6%	88%	12%	0%	91%	6%	3%	94%	3%	3%	89%	7%	4%
3	-[c]	-	-	100%	0%	0%	91%	6%	3%	97%	0%	3%	92%	4%	4%

[a]Refers to the total number of surveys collected from CHM343H students in the given year. [b]"A" column contains total survey responses for Strongly Agree and Agree, "N" column contains total survey responses for Neutral/No Opinion, "D" column contains total survey responses for Disagree/Strongly Disagree. [c]Question 3 was not asked on surveys during the 2010/11 academic year.

WIT as a whole, rather than to course-specific WIT components) are as follows:

Question 1: The feedback provided on early work helped me to identify what I most needed to work on to improve my writing for later lab reports.

Question 2: Overall, the writing instruction (including the "journal style" lab reports, support regarding report content and/or feedback on lab reports) will help me write better lab reports in my future university work.

Question 3: Overall, I believe the writing instruction in CHM343H will help me as a scientific writer beyond my undergraduate program.

The compiled responses to these questions, separated by year and response type, are shown in Table 2.

The results in Table 2 highlight the strong student belief that participating in WIT was beneficial in CHM343H (as a result of draft report feedback, Question 1), in required future courses with laboratory components (as a result of journal-style reports, Question 2), and beyond their undergraduate studies (Question 3). This was made clear by the very positive (strongly agree/agree) overall response rates of ∼80% for question 1, ∼ 85% for question 2, and ∼96% for question 3. Student comments showed that students in CHM343H believed WIT had helped prepare them for future scientific work. Some of the positive examples received are shown below:

Writing in ACS style is important. It makes me more prepared for a future job as a chemist.

[It] improved my skill to write scientific pieces instead of regular [reports].

Keep [the] draft report. [It] really helped to identify weak areas.

I think the chance to rewrite [a lab] was the best and most instructive part. Learning by doing is always a great idea.

A noticeable increase in the proportion of positive student responses was observed from 2010 to 2013. This was attributable to the evolution of the CHM343H WIT program. The program commenced in 2009/10 and although formal reports were assigned, collected, and returned with extensive feedback common to WIT, the approaches of 343Comm and the draft report had not yet been introduced. The template for 343Comm was developed and provided to the instructor by an undergraduate in 2010/11 and 343Comm replaced the previous form of reports for the next academic year, leading to increased student satisfaction. Draft reports were subsequently introduced in 2012/13, further increasing satisfaction in certain categories.

Senior Undergraduate Student Responses

Considering the positive response to Question 2 in Table 2, it was important to assess whether students who thought the WIT program would assist future scientific writing actually found that to be the case. Therefore, surveys were distributed to fourth-year students during 2014/15 that had previously taken one or more WIT courses and who were enrolled in a capstone research course (CHM499Y: Introduction to Chemistry Research). Similar in construct to the CHM343H surveys, three questions (based on a Likert-type scale) were asked and written comments were solicited:

Question 1: The WIT program and the feedback received from my TAs helped me self-evaluate myself as a writer and see what I needed to improve upon.

Question 2: The WIT program improved my skills particularly as they applied to writing in chemistry.

Question 3: Overall, the instruction provided in the WIT program helped me in constructing and writing my CHM499Y final research report.

The compiled responses to these questions are shown in Table 3.

Table 3. CHM499Y Survey Responses during 2014−2015[a]

Question	(Strongly) Agree	Neutral	(Strongly) Disagree
1	92%	4%	4%
2	84%	4%	12%
3	65%	22%	13%

[a]As assembled from 23 surveys collected from CHM499Y students in the given year.

The results indicated that overall and with the experience of an extra year of senior undergraduate chemistry courses, fourth-year students very strongly believed that participating in the WIT program in their previous year of study had assisted in their development as scientific writers. The majority of students also considered that the program had helped them develop their final undergraduate research thesis, although a larger proportion of students responded negatively to this question than to Questions 1 and 2. Given that the format of a fourth-year thesis is very different from the journal-style reports the students encountered in third year, this result is not surprising, but it does present an opportunity to address the challenge of adapting writing skills to different genres. Some of the positive comments received are shown below:

Seeing how professional reports are written and receiving constructive criticism [in WIT] towards that level of report helped guide the planning and writing of my thesis.

[WIT] introduced programs to help me construct my schemes and format my reports.

WIT helped me in organizing my thoughts in a structured report.

[WIT] gave me a good understanding of how to do research and write a results section well.

Graduate Student Responses

To assess whether the WIT program had helped students entering a scientific career develop the necessary writing skills (as the students themselves expected given the positive

DOI: 10.1021/acs.jchemed.5b00373
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response to Question 3 in Table 2), the opinions of current graduate students who had also taken the concentration of third-year WIT courses and completed CHM499Y projects were collected. Surveys were issued to current graduate students in the Department of Chemistry who had completed WIT courses during years they were in operation. Similar to the surveys passed out to CHM499Y students, three questions were asked and comments sought, with responses shown in Table 4.

Table 4. Graduate Survey Responses during 2014−2015[a]

Question	(Strongly) Agree	Neutral	(Strongly) Disagree
1	92%	8%	0%
2	100%	0%	0%
3	83%	17%	0%

[a]As assembled from 12 surveys collected from graduate students in the given year.

Question 1: The WIT program and the feedback received from my TAs helped me self-evaluate myself as a writer and see what I needed to improve upon.

Question 2: The WIT program improved my skills particularly as they applied to writing in chemistry.

Question 3: Overall, the writing instruction provided in the WIT program helped me in drafting research papers for journals.

These results clearly showed the WIT program was considered highly effective in helping students develop scientific and technical writing skills, as evaluated by students themselves. Current graduate students found the program very useful in helping them learn to write in chemistry and more specifically, to write scientific journal articles. Compared to the responses from fourth-year students (Table 3), graduate students were much more positive when answering Question 3, likely because the journal-style report templates from WIT are based on real scientific journal articles. Some of the positive comments received are shown below:

[WIT] taught me to think critically about presenting results in a clear and straightforward manner.

[WIT] helped me develop a sense of what journal papers require stylistically.

[It assisted in] being able to dissect primary literature faster since I had to go through it a lot in undergrad for WIT-related courses.

[WIT] helped me evaluate my strengths and weaknesses in chemistry writing and formulate my thoughts more clearly.

CONCLUSIONS

The effectiveness of the multicourse WIT program that has been operational in the Department of Chemistry for the past six years, in medium-sized upper division courses, is clear. Commentary from students who had just completed WIT courses and those who have continued in chemistry-focused programs has consistently been positive. Both senior undergraduates completing their research theses and graduate students producing publishable work have found that the program has assisted them in becoming better scientific writers. The benefits of revising the program year-over-year using student feedback, comments, and suggestions to guide the development of the WIT courses in general and CHM343H in particular, illustrates the way that WIT has been integrated into the Department of Chemistry. In addition, an understanding of the real needs of students has informed collaborative efforts within the WIT team to produce components that are both useful and relevant. Principles of this flexible program (e.g., the hierarchal structure, advanced TA training, integration of discipline-specific curriculum elements and increased student feedback) could be introduced into other chemistry departments to improve undergraduate communication skills. Indeed, in future years the Department of Chemistry plans to expand WIT into earlier chemistry program courses, as increased implementation is preferable to reinforce writing instruction.

ASSOCIATED CONTENT

Supporting Information

The Supporting Information is available on the ACS Publications website at DOI: 10.1021/acs.jchemed.5b00373.

Sample WIT course element design documents (activities, grading rubrics, report templates, and ancillary information for undergraduates), an itinerary of LWTA training, distributed surveys, student feedback, and writing samples (PDF)

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Notes

The authors declare no competing financial interest.

ACKNOWLEDGMENTS

The authors thank Armando Marquez for the significant amount of assistance provided in collecting enrollment information and the Faculty of Arts and Science for continued funding. Rebecca Jockusch, Douglas McIntosh, Nicholas Morra, David Stone, Andrew Woolley, and Deborah Zamble are also acknowledged for their participation as course instructors in the WIT program. Gilbert Walker is additionally thanked for his extensive support. A.P.D. is grateful to the University of Toronto for a President's Teaching Award.

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DOI: 10.1021/acs.jchemed.5b00373
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