

WICS @ SFU: Assessing the Impact and Outcomes of a Women in Computing Science Student Group at the College Level

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ABSTRACT

In 2002, Women in Computing Science at Simon Fraser University (WICS) was established first as an email list and later as a full-fledged student group for individuals with a wide diversity of backgrounds with the following goals: first, to promote women in Computing Science; second, to support women throughout their study of Computing Science; third, to build a strong network of friendly faces for women in Computing Science, and four, to challenge the biases and myths faced by women in Computing Science [1].

In this paper, we assess the impact of WICS on its members and its value in SFU's CS Department through the results of a survey and statistics on WICS activity. We also propose future directions for the group as well as recommendations for those wishing to start similar groups.

Categories and Subject Descriptors

K.3 [Computers and Education]: Computer Science Education; K.4.2 [Computers and Society]: General

Keywords

Attrition, Gender, Retention, Undergraduate Education

1. INTRODUCTION

Women have long been under-represented in the field of Computing Science, both in academic [9] and industrial settings [10]. Many theories exist as to why this is the case; some attribute these lower levels of involvement to gender differences in experience, motivation [4] [6], mathematical ability [7], or academic preparation [5], while others point to departmental factors within academic institutions as causing low retention rates for female students [8].

To address these issues, much focus has been placed on

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improving the situation in academic institutions. For example, Coohoon[2] provides recommendations for recruiting women, such as “Promote interaction among classmates, and develop learning communities and other forms of peer support” and “Mentor undergraduates”, as well as recommendations for retaining women, such as “Provide female role models”. It can be daunting to address each of the many recommendations in the literature individually, but one way to maximize the benefits to students is to create a group to support female students.

Given that groups for female students are a good way to improve recruitment and retention in Computer Science programs, Simon Fraser University (SFU) has its own version, called “Women in Computing Science” (WICS). WICS began in 2002 and is still a vibrant and highly active group, but surprisingly the value and impact this group has on SFU's Department of Computing Science and its community of students has never been measured or documented. Therefore, here we attempt to assess WICS impact and outcomes and propose future directions for the group, as well as recommendations for others attempting to start and build similar groups in their own institutions.

2. BACKGROUND: WICS

In this section, we discuss the diverse nature of WICS' membership and the strategy it has adopted for sustaining itself while also meeting the needs of the female students in CS at SFU.

2.1 WICS Membership

WICS members have a variety of backgrounds and occupy diverse roles in SFU's Computing Science Department, including undergraduate students, graduate students, faculty, alumni, and members external to SFU, such as high school students, parents, and industry workers. WICS membership is open to male and female members, but the executive positions are reserved for female students only.

It should be noted that WICS events do overlap with those of the Computing Science Student Society (CSSS), which is part of the Simon Fraser Student Society (SFSS). However, WICS not only caters to the unique interests of women in the department, but provides more events concentrated on professional development. Also, the CS Department does

have technical talks and industry speakers, but these are more centered around the graduate school and many undergraduates don't feel comfortable attending. WICS events often take place in smaller groups with fewer numbers (rarely more than 30 attendees), so WICS members are more likely to participate.

2.2 WICS Strategy: Diverse Events for Diverse People

Given the diverse nature of WICS' membership, over the past year (2007-present) WICS adopted a policy of diversifying the types of events held each semester. These events can be broken down into the following categories: Technical Events, Social Events, Discussions, Industry-Related Events, and Conferences.

2.2.1 Technical Events

Technical events provide students with the opportunity to expand their CS-related skills such as programming or problem-solving in a low-pressure, supportive setting. WICS has held various technical events, such as a "Ruby on Rails Workshop", a "Java to C++ Workshop", and a "Technical Interview Preparation Workshop". At least one technical event per semester is held and the information and skills provided are generally complementary to those provided in the classroom setting.

2.2.2 Social Events

Being a small minority in a large department can make it difficult for members to connect and meet new connections within the department, whether they be with other students, faculty, or staff. WICS' social events provide members with an opportunity to network and enjoy a break from studying. WICS' generally starts each semester with a 'Kick-Off Lunch' and ends the semester with an outing off-campus.

2.2.3 General Meetings and Discussions

WICS has been a long-time supporter of SCWIST¹ and holds regular 'Brown Bag Lunch' events, panel discussions and presentations on various topics. WICS holds bi-monthly meetings, with each meeting ending with a puzzle or game. Prizes consisting of donated books and other inexpensive items are always provided as incentive!

2.2.4 Industry-Related Events

Industry-related events provide students with the opportunity to gain insight into working in industry. WICS participates in external events such as SCWIST's XX Science World² and organizes industry tours such as an SAP Business Objects Tour & Q/A Session.

2.2.5 Conferences

Members of WICS have been attending the Grace Hopper Conference since 2002, and in 2008 a delegation of 8 students was organized. There are similar plans for a delegation to the 2009 conference.

¹Society for Canadian Women in Science and Technology: <http://www.scwist.ca/index.php>

²<http://www.scwist.ca/index.php/main/entry/xx-evening-march-11-2009/>

Although some staff members of WICS do send out information about this conference each year, WICS provided an organizer and concentrated meetings and emails on recruiting delegates, as well as organizing flights, accommodations, and ground transportation. Without WICS heavy involvement with this recruiting, it is unlikely that so many students would have attended in 2008.

2.3 WICS Recruitment and Growth

Since WICS' inception in 2002 there has been a recurrent danger of the group's dissolution due to graduation of core members. However, by employing the strategy of diversifying events, as well as a personalized recruitment strategy, we have increased the average number of attendees at events and meetings in 2007-2008 to approximately 20.

Employing new media has helped WICS reach current and new members, and WICS is now using Facebook³, LinkedIn⁴, as well as incorporating a blog on its website⁵ and the original email list. From 2007-2008, WICS' Facebook group grew from 10 to 82 members, and this has been the most effective method for reaching members. LinkedIn, a network centered more on professionals than students, has been more successful in pulling in WICS' alumni than current members. Seven members belong to our group there. From our experience, if events and meetings are advertised solely on the email list without the support of the Facebook group, attendance is much lower.

3. EVALUATING WICS

An anonymous survey was conducted of 29 past and present WICS members. Participants were recruited both through our email list and individually, and conducted the online survey using SFU's internal survey tool, 'SFU WebSurvey'.

The survey is presented in Appendix A, and has four parts. First, we asked about our participants' demographics, such as gender and status as student, faculty, staff, or external. Second, we asked for participants' roles as well as the level and duration of their involvement in WICS. Third, we ask for feedback regarding how participants heard about WICS, WICS' events, and areas of impact WICS has had on them. The final section asks respondents to describe what their experience in CS would be like if WICS did not exist. We present the results in the following sections.

3.1 Demographics

In 2002 WICS was primarily an undergraduate organization, but we have since seen a growth in the number of graduate student members, especially from 2007-2008. This increased involvement provides excellent mentoring opportunities for undergraduate students. This increased involvement is reflected in our survey demographics, with 8 graduate students participating out of 29 total participants. In addition, 16 participants were undergraduate students, with one of these being a continuing studies student (this is an umbrella term including Certificate, Post Baccalaureate, and Second De-

³<http://www.facebook.com>

⁴<http://www.linkedin.com>

⁵<http://wics.cs.sfu.ca>

gree students⁶). There were 2 faculty members and 3 staff members. Finally, 27 survey participants identified themselves as female, while 2 identified themselves as male.

3.2 Member Roles and Involvement in WICS

Section 2 of the survey covers participants' roles as well as levels and duration of involvement in WICS. The numbers of respondents with each type of role (Executive Member - Past, Executive Member - Present, Regular Member - Past, Regular Member - Present, Just on Mailing List, and Not a Member) are shown in Table 1, which shows a distribution of participants who are members past and present, and who range from a variety of different demographics.

Interestingly, we can see from the survey results that the majority of participants began their involvement in WICS in 2007 or 2008 (16 participants), with the next largest year being 2003 (8 participants). 2004-2006 had low participation, and we see the lowest number of survey participants from those years (5 total).

3.3 WICS Events, Activities, and Areas of Impact

In this section we asked participants to rate which events they found valuable (more than one may be selected) and to also rate areas of WICS by level of importance to them.

We found that technical events (23 responses), social events (21 responses), and industrial events (19 responses) were rated as the most valuable to a majority of participants. Interestingly, conferences (15 responses) rated slightly lower than these three events, but slightly higher than discussions and meetings (14 responses). 4 responses indicated 'other'. These provided alternative activities such as networking, outreach for younger students, a games night for WICS members, and mentoring programs for high school students.

In terms of the types of events and activities held by WICS, participants were asked to rate individual aspects of WICS on a scale of zero to five, with zero being 'not important at all' and five being 'extremely important'. The results show that technical and social events had the highest average rating at 3.4 each, while meetings were rated less important at 3.1. Industry events were rated at 3.3. The average rating of WICS' importance was 3.9.

Finally, we asked participants to select all areas in which WICS had impacted them. The largest area of impact (24/57 responses) was the Social aspect of WICS, with the next largest area being Leadership (18/57). The Professional area came next at 12/57, with Academics and Other at 6/57 and 3 'No Impact' responses. For these last two, participants were permitted a free response. A participant who responded 'Other' said, "A senior WICS member told me in 2nd year that the courses would become much more interesting and fun in 3rd and 4th. Basically she told me to hang

⁶These programs are offered by SFU's Computing Science department and generally require a Bachelor's degree in either CS or another field. They are intended to help students upgrade their skills in preparation for either industry or graduate studies. More information can be found here: <http://www.cs.sfu.ca/undergrad/Advising/programs.html>

in there when I thought CS wasn't for me (I wanted to quit because of a bad grade in stats or architecture, I think).". A 'No Impact' response indicated that WICS events were at inconvenient times and as such this person could not attend at all.

3.4 Life in CS Without WICS

In this section we ask participants to speculate on how they would find being a female student in their Computing Science program if WICS did not exist. Specifically, the question we asked was: "Imagine WICS did not exist. Would your experience in SFU's Computing Science program be different? If so, how?"

The responses show the impact of WICS on students, opening doors and presenting new learning and professional opportunities. For example, one participant wrote, "...I learned about amazing events through WICS specifically the Grace Hopper Celebration for Women in Computing. I have gone twice and hope to go again even after graduation". Another wrote, "WICS brings us a lot of information. Without WICS, I would not attend CRA-W meeting."

Technical and industrial aspects may be important to participants, but one can not ignore the social aspects of WICS and their importance to the group and its members. For example, one participant writes, "Without WICS, I would have little to no social connection to the CS program and its students. It is likely I would have pursued another major option." Another writes: "...It's hard to say what choices I would have made without WICS; I might have completed my degree in CS and gained leadership experience only in the CSSS, with lots of male friends. But with WICS I've made a huge number of female friends who continue to inspire me and give me advice till this day."

Finally, it is interesting to note WICS' impact from the perspective of faculty and staff. One writes, "Before WICS, women were less active in the CSSS (and the CSSS common room). WICS has also helped more women become known to faculty and staff.". Another says, "Yes. WICS is integral to the CS community. I would most likely see a decline in female CS students and graduates if not for WICS."

4. CONCLUSIONS

We can see from the results that members highly value the industry-related, social and technical events WICS provides. These events provide professional and academic development in a relaxed social setting, a successful strategy also employed in [3]. Here we present recommendations specific to WICS as well as some future directions for the group. We also summarize our recommendations for those looking to duplicate WICS' successes in their own groups.

4.1 Recommendations for WICS

Recommendations stemming from our survey results are as follows:

1. Increase the number of technical events per semester: these were rated the most valuable WICS activity, and more members may be attracted if more of this type of event were provided each semester.

Table 1: WICS Member Roles by Demographic

Member Status	Executive Members		Regular Members		Just on Maillist	Not a Member
	Past	Present	Past	Present		
Undergraduates	3	5	1	1	4	1
Master's Students	1	1	1	0	0	0
PhD Students	2	0	1	0	1	0
Staff	0	0	0	3	0	0
Faculty	0	0	0	0	1	0
External	0	0	0	0	0	0

2. Continue organizing delegations for and promoting the Grace Hopper Celebration of Women in Computing Conference: these events rated at least as highly as WICS Discussions, but are rich in potential. Students may find internship opportunities, potential graduate supervisors, learn about cutting edge research and issues such as diversity and retention in industry and academia.
3. Put less energy/resources into discussion events: although rated the same as conferences overall, these events did not garner any special mention in the long responses and have traditionally been less well-attended than other types of events.
4. Continue the strategy of 'Diverse Events for Diverse People': diversifying our events has continued to work over the past two years. We should continue to have at least one type of each event, but concentrate WICS' resources on those rated more highly by survey participants
5. Focus recruitment efforts on undergraduate students

4.2 Future Directions for WICS

Future directions for WICS include more outreach and recruiting programs for students at earlier stages in their education. WICS is a strong supporter of SFU's ChicTech⁷ program and generally supplies all or most of the volunteers that organize it each year. WICS will continue to support ChicTech but will also explore new opportunities centered on recruitment of these students. This position is supported by our survey results, in which some participants suggested that they would like to see more such events, and this is an important means of both recruiting more female CS students as well as ensuring WICS' group renewal and survival. Other participants also expressed their support of mentoring opportunities, which are a key part of events like ChicTech.

One new idea we would like to pursue is a 'Shadow Day' where highschool students would be matched with a WICS member. The students would have one-on-one time with the WICS member, attending classes and regular daily CS activities with them.

4.3 Recommendations for Other Groups

WICS' strategy of personalized recruitment (inviting potential members by word-of-mouth, information from friends, and recruitment at Open Houses, Clubs Days, and other

face-to-face events) as well as new media such as Facebook, LinkedIn, and blogs has been very effective and we recommend new groups to use such a multi-faceted approach to recruitment. Most survey participants (21/29) heard about WICS from either a friend or from faculty and staff, but our online presence as well as consistent appearances at school events and classes form a good support for the word-of-mouth methods.

A diversified approach to events allows members to pick and choose what they want to participate in, providing something for everyone and including as many potential members as possible. This strategy has maximized student involvement in WICS and has kept the group active. We recommend that other groups employ a similar strategy and maintain consistency in the types and number of events held each semester, so members come to expect them and look forward to attending.

5. ACKNOWLEDGMENTS

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APPENDIX

A. SURVEY INSTRUMENT

A.1 Consent Form

Title: WICS & You: Assessing the Impact and Outcomes of a Women in Computing Science Student Group at the College Level

Investigator Name: Kate Tsoukalas Investigator Department: Computing Science

This short survey will take about 5-10 minutes of your time and provide us with invaluable data on how WICS has benefited you, our members, or what we can do better. Your input will help us continue to improve WICS and provide better services to the CS community.

By filling out this questionnaire, you signify that you have read this document, which describes the procedures, whether there are possible risks, and the benefits of this research study, that you have received an adequate opportunity to consider the information in the documents describing the study, and that you voluntarily agree to participate in the study.

Procedures: You will be asked to complete an anonymous online survey regarding your experience in the Department of Computing Science and with the Women in Computing Science student group. The survey uses SFU's WebSurvey tool, which means that your responses will be given over a secure website.

Risks to you: We will record your responses to the survey, which may include your email address should you choose to disclose it. This information will be kept for two years after the study has been completed on a CD in a locked cabinet in the Computing Science office. For participants who choose to disclose their email address, there is some risk that this data may become public (in the event of theft of the CD).

You may obtain copies of the results of this study, upon its completion by contacting Kate Tsoukalas at kjtsouka@gmail.com.

The University and those conducting this research study subscribe to the ethical conduct of research and to the pro-

tection at all times of the interests, comfort, and safety of participants. This research is being conducted under permission of the Simon Fraser Research Ethics Board. The chief concern of the Board is for the health, safety and psychological well-being of research participants.

Should you wish to obtain information about your rights as a participant in research, or about the responsibilities of researchers, or if you have any questions, concerns or complaints about the manner in which you were treated in this study, please contact the Director, Office of Research Ethics by email at hal_weinberg@sfu.ca or phone at 778-782-6593.

If you do not wish to continue with the survey, please click here to exit (<http://wics.cs.sfu.ca/>).

A.2 Questions

1. Would you like to specify your gender?
 - Male
 - Female
 - Prefer not to specify
2. I am/was a:
 - Undergraduate Student
 - Continuing Studies Student (Second Degree, Post-Baccalaureate)
 - Graduate Student - Master's Graduate Student - PhD
 - Staff
 - Faculty
 - External to SFU
3. My role in WICS is best described as:
 - Executive Member - Past
 - Executive Member - Present
 - Regular Member - Past
 - Regular Member - Present
 - Just on Mailing List
 - Not a Member
4. When did you first become involved with WICS (i.e. by joining the maillist or coming to meetings/events)?
 - 2003
 - 2004
 - 2005
 - 2006
 - 2007
 - 2008
 - 2009
5. How long have you been involved with WICS? If you are not currently involved in WICS, for how long were you involved?
 - < 1 year
 - 1 - 2 years
 - 2 - 3 years
 - 4 years or more
6. I attend(ed) meetings and events:
 - Always
 - Often

- Sometimes
 - Never
7. How did you hear about us? Please select all that apply.
- Friend
 - Clubs Day Booth
 - Classroom Visits
 - Flyers/Pamphlets
 - Staff/Faculty
 - Other (please list in the next question)
8. If you selected 'Other', please describe how here:
9. WICS has many different events each semester. Please select which event(s) you find valuable (select all that apply):
- Technical Events (Interview Preparation, Language Workshops)
 - Social Events (Lunches, Dinners, Outings)
 - WICS Discussions (Panels, Brown Bag Lunches)
 - Industry-related (Industry Tours, Panels, Networking)
 - Conferences (Grace Hopper Conference)
 - Other
10. If you would prefer to see other types of events or have comments on previous events, please let us know here:
11. Please rate how important WICS is to you in the following areas. (0 = not important at all, 5 = extremely important)
- WICS Meetings
 - WICS Social Events
 - WICS Technical Workshops
 - WICS Industry Events
 - WICS Overall
12. In which area(s) has WICS impacted you? You may select more than one.
- Leadership (Gain experience giving presentations, managing projects, organizing events)
 - Academics (Improved grades, study buddies, learned new skills at technical workshops)
 - Professional (Industry networking, internship/coop opportunities, full-time employment)
 - Social (New friends, contacts, connections)
 - Other (please detail in the next question)
 - No impact (please detail in the next question)
13. If you selected 'Other' or 'No Impact', please explain here.
14. Imagine WICS did not exist. Would your experience in SFU's Computing Science program be different? If so, how?
15. We may be interested in interviewing members about their experiences. If you would like to participate in these interviews, please enter your email address here: