

The Impacts of Science Shops for Community Partners and Students: A Case Study of a Cocurricular Canadian Model

Karen Nelson, Kendra Schnarr, and Elizabeth Jackson

Abstract

Since 2009, the Community Engaged Scholarship Institute at the University of Guelph has operated a science shop (the Research Shop) where it carries out high-impact community-engaged scholarship by training and employing graduate students to conduct community-engaged research as a cocurricular activity. This study investigates the first 9 years of the program to determine its impacts on community partners and students. Findings suggest that the benefits experienced by both stakeholder groups are similar to those identified in existing literature on community-engaged research and science shops, with some additional findings unique to this model. This study also found multiple challenges that are not well documented in existing literature. Overall, the research found that both community partners and students experienced distinct benefits, alongside challenges that could be addressed. Further research is needed to contribute to the overall field of science shops, specifically in relation to the benefits and challenges experienced in different models.

Keywords: science shop, community-engaged research, students, community partners, community-engaged scholarship

In recent decades, community-engaged research (CER) has gained traction as a way to bridge the gap between community and university, offering mutual benefits to those involved. In CER, researchers offer community partners their expertise in research and evaluation and often facilitate access to the broader institution (Alcantara et al., 2015). In turn, community partners bring valuable knowledge of real-world issues to the research and ensure the results will be effective within community settings (Ross et al., 2010). Approaches to CER vary among institutions and models and exist along a continuum that ranges from consultation with community partners to research that is fully participatory and/or community led (Key et al., 2019). Science shops are one model of CER that responds to community research questions by involving a broad range of stakeholders (Living Knowledge Network, n.d.). Research on science shops

has demonstrated that they are an effective and impactful model of CER; however, much less is known about their specific impacts on their main stakeholder groups (community partners and students), especially in North America. Using a case study of the Research Shop (RS), a cocurricular science shop at the University of Guelph, this study provides evidence of the unique but mutual benefits experienced by community partners and student researchers engaged in this specific model of CER. It also presents a range of challenges that may emerge and must be navigated by both stakeholder groups. Together, these benefits and challenges begin to provide a more nuanced picture of the experience of those working with science shops as well as those engaged in CER activities more broadly.

Background

CER offers high impact outcomes to both

community partners and researchers (Alcantara et al., 2015; Andersen, 2017; Israel et al., 1998; O'Connor et al., 2011). Community partners, faced with both shrinking budgets and demands for higher accountability, are often required to undertake research that supports their programming (Strand et al., 2003). CER partnerships can help to remove some of the pressures faced by community organizations and “can be an important resource for those who are working to improve the quality of life for disadvantaged people in our communities” (Strand et al., 2003, p. 18). Community partners may also increase their organizational capacity, as engagement in CER projects can increase their knowledge of current practices, policies, and literature in their program areas. This increased knowledge can enhance the work they do by informing changes to their programs and/or using the research results in funding applications (Alcantara et al., 2015; Strand et al., 2003; Tryon & Ross, 2012). Strand et al. (2003) found that these partnerships can increase community organizations’ ability to “operate more effectively and better assess [their] operations and outcomes” (pp. 19–20). Research from impartial, outside sources may also contribute to the perceived and real validity of the research. Importantly, “prestige is contributed to the partnership due to the perceived and real expertise of researchers” (Alcantara et al., 2015).

For student researchers, participating in CER provides an opportunity for practical, real world experience (Andersen, 2017; Tryon & Ross, 2012). Alcantara et al. (2015) argued that working with the community provides students unique training and education, allowing student researchers to gain “personal and professional development opportunities that are not readily available within typical academic settings” (p. 470). Skills gained outside the classroom through CER can include the further development of research and writing skills as well as an increase in knowledge in a variety of thematic areas (Andersen, 2017; Hynie et al., 2011; O'Connor et al., 2011). Students may also develop personal skills that could further their academic and professional goals, including leadership, self-motivation and problem solving, community understanding and active citizenship, and self-discovery and resilience (Garber et al., 2010; O'Connor et al., 2011). Other benefits include authorship on various research outputs, ability to secure funding for personal research

projects, and additional networks that may result from the partnership (Alcantara et al., 2015).

Another important outcome for many students is an increased understanding and recognition of the importance of different forms of knowledge that come from the community. Tryon and Ross (2012) found that “students learned to appreciate and incorporate the various forms of knowledge that were represented by their community mentors in designing the collaborative research project” (p. 206). Similarly, Hynie et al. (2011) found that students may underestimate what they can learn in a non-academic environment, particularly with regard to the amount of knowledge that can be found in the community (p. 244). In working with the community, students may also be exposed to different groups and a more diverse population than they might have encountered on campus.

CER activities offered through an institution can vary and may consist of curricular or co-curricular opportunities. Curricular models of CER offer a structured learning experience through a credit-based program. This experience may be integrated into required coursework, an option within a course, part of a capstone/independent study project, or a dissertation. Curricular CER projects are often bound by the restraints of the course, such as the time limits of a semester or specific academic goals. CER activities that take place in a cocurricular environment also offer a structured experience; however, they take place outside a course. In these models, the aim is to meet the priorities of the community partners with less focus on student learning. These activities may be integrated into formal community engagement programs, such as alternative reading weeks, noncredit courses, or research-based employment or volunteer opportunities. Both models balance the need to meet required learning for students with addressing the priorities of the community partners.

Science Shops—A Model of CER

Science shops carry out research in response to concerns experienced by the community (Living Knowledge Network, n.d.). They operate using a bottom-up and cocreative model that directly responds to the needs and concerns of civil society (Gresle, 2018). In most models, civil society organizations contact science shops regarding an issue, a question of concern, or curiosity. The sci-

ence shop then facilitates a research project to search for a solution, generate new knowledge, or combine and adapt existing knowledge (Hende & Jorgensen, 2001; Leydesdorff & Ward, 2005).

Science shops do not follow a one-size-fits-all model; they operate based on their individual context, fitting loosely into three categories based on their administration: the university model, the nonprofit model, and the hybrid model, in which the science shop is administered by a community-university partnership (Savoia et al., 2017). The nonprofit model is challenging to sustain due to limited financial and material support. The hybrid model is also rare because it requires cooperation between different institutions and organizations (Mulder et al., 2001). Most science shops fall under the university model, where they are administered directly by institutions and have the advantage of easy access to students, researchers, and research support, such as databases and libraries (Savoia et al., 2017). University-administered science shops are typically curricular; the research is performed by students under the supervision of university staff or faculty and can be linked directly to their courses, practicums, or dissertations (European Commission, 2003; Farkas, 1999; Fokking & Mulder, 2004). Science shops operating as a cocurricular activity are less common and are not well represented in published research.

Science Shop History

The first science shop was developed in the Netherlands at Utrecht University in 1973. In response to criticisms of citizens being excluded from scientific research, a group of students provided a box where citizens could deposit written research questions (European Commission, 2003, p. 4; Tryon & Ross, 2012, p. 198). Science shops quickly expanded to become access points where local community groups could bring forward research issues that students could take up on their behalf (Fischer et al., 2004). Throughout the 1970s and 1980s, the science shop movement spread rapidly in Europe, and within 10 years, every university in the Netherlands had set up one or more. By 1990, there were almost 40 in the Netherlands alone (European Commission, 2003). This initial period of development was followed by three additional "waves" spreading science shops to Germany, France, Denmark, Belgium, Austria, the

United Kingdom, and Middle and Eastern European accession countries.

Study Purpose

Science shops are one model of CER that has been proven effective in responding to community research needs, especially in Europe (Living Knowledge Network, n.d.). However, a limited body of scholarly research addresses their impacts on student researchers and community partners specifically (Gresle, 2018; Schlierf & Meyer, 2013), with no exploration of cocurricular models. To date, science shops have mainly produced gray literature, such as master's theses and reports, which have limited visibility and recognition and are often the product of a specific project rather than an introspective study (Gresle, 2018). Some researchers have used case studies to explore similarities and differences between European science shops (Leydesdorff & Ward, 2005) and to highlight the activities of specific science shops' political, social, and geographic contexts (Wachelder, 2003). Other literature has focused on the history of science shops more broadly, and a smaller section has aimed to understand the impacts of curricular science shops on university curricula (Hende & Jorgensen, 2001). Much of the existing literature consists of explorations of European models written at least 10 years ago and largely focused on Dutch science shops (Gresle, 2018).

Although research exists around the challenges experienced by science shops, it is largely related to institutional and political operational challenges and does not investigate the actual challenges experienced by student researchers and community partners. There is literature that centers on a range of positive impacts of CER; however, it mostly excludes critical reflections of frustrations, setbacks, or even failures within the partnerships (Bloomgarden, 2017).

Research Question

The gaps in the literature raised an important question: What benefits and challenges do the main users of science shops (community partners and student researchers) experience? This study was designed to respond to this question through a retrospective case study of the Research Shop (RS). The RS, operated by the Community Engaged Scholarship Institute (CESI) at the University of Guelph since 2009, is the lon-

gest running science shop in Canada. This study adds to the limited body of literature on science shops by:

1. Exploring the experiences of community partners *and* students in the context of a science shop;
2. Demonstrating a range of benefits *and* challenges associated with science shops;
3. Investigating a cocurricular, university-administered science shop; and
4. Contributing a North American perspective, illustrating that there are long-term science shops operating and thriving beyond Europe.

CESI's Research Shop

The RS is a cocurricular institutional science shop that carries out high-impact community-engaged scholarship by training and employing graduate students to conduct CER. Its research activities include literature reviews, needs assessments, program evaluations, and other approaches as appropriate to community priorities. Between 2009 and 2018, 170 RS students completed over 200 projects with more than 70 community partners. The RS's mandate is to (1) develop the capacity of graduate students to participate in effective CER and (2) contribute to the capacity of the University of Guelph to engage with community partners to address community-identified research priorities.

Although many science shops are located within a specific discipline or program, the RS, which is based in the College of Social and Applied Human Sciences, employs an interdisciplinary approach. RS students come from a variety of disciplines on campus and work in teams along with staff and community partners. The structure of the RS has changed over time based on needs and funding; at the time of this study, the RS was managed by one full-time staff member and employed an average of 20 graduate students. In contrast to the curricular university model, faculty are not involved with the RS, and the projects are separate from students' coursework. Student researchers respond to a university-wide call for applications, are interviewed, and are hired at a standard rate of pay. It should be noted that in 2017 the RS transitioned to a paid model where all student researchers are paid an hourly rate for

up to 5 hours per week. During 2009–2017 all RS assistants received an honorarium of \$200 per semester, and project managers were paid hourly.

The RS works primarily with organizations in the Guelph–Wellington area. Community partners are typically from the social service, environment, or health sectors, working in government, government-funded, or nonprofit organizations. There is no formal intake mechanism for community organizations to partner with the RS. Instead, relationships are built through networking, word of mouth, and “return” partners.

Methods

Recruitment

This study was carried out by three researchers at the CESI at the University of Guelph (the director, Research Shop manager, and research project assistant) and was approved by the University of Guelph Research Ethics Board. Inclusion criteria were determined by the research team in advance of the study; to be included, respondents must have been involved with the RS as a student or as a community partner between 2009 and 2018. This group included all students employed by the RS and all community partners engaged in projects with the RS at the time of the study. A total of 166 student researchers and 88 community partners were identified as potential respondents using student and project tracking lists from the 2009–2018 period. Prior to contacting potential respondents, the research team worked in collaboration with University of Guelph Alumni Affairs and Development to ensure that on-file email addresses were as current as possible. They also employed a research assistant to search for publicly available contact information for each student and community partner that fit the inclusion criteria. Of the initial pool of potential respondents, 128 student researchers and 76 community partners had active email addresses and could be contacted. All potential respondents were contacted via email with a link to the anonymous online survey.

Data Sources

Participants in this study included 22 community partners and 50 RS students. The primary source of data for this study was participant surveys (<https://hdl.handle.net/10214/26540>). In order to gather

feedback from both student researchers and community partners on their experiences working with the RS, the research team developed a survey tailored to each group. Questions were adapted from the PERARES Project Evaluation Toolkit (Living Knowledge Network, 2012) and the Community Based Research Excellence Tool (Centre for Community Based Research, 2018), along with previous informal evaluations of RS projects performed with students and community partners.

Community Partner Survey

The community partner survey (https://atrium.lib.uoguelph.ca/xmlui/bitstream/handle/10214/26540/RSCPSurvey_Fall2018.pdf?sequence=2&isAllowed=y) consisted of Likert scale ratings, multiple choice items, and open-ended questions. It was designed to explore participants' overall experience working with the RS. We used a single version of the survey that was slightly modified for those who had collaborated with the RS only once versus partners who had worked with the RS twice or more (referred to as long-term partners). Long-term partners were asked why they continued to work with the RS, whereas one-time partners skipped that question. A total of 22 community partners completed the survey for a response rate of 29% (from the 76 partners emailed). It should be noted that respondents reflect an unknown number of total projects completed at the RS and an unknown number of organizations; many partners have engaged in multiple projects with the RS, and some projects included multiple community partners from a range of organizations.

Student Researcher Survey

The survey for student researchers (https://atrium.lib.uoguelph.ca/xmlui/bitstream/handle/10214/26540/RSStudentSurvey_Fall2018.pdf?sequence=3&isAllowed=y) also included Likert scale ratings, multiple choice items, and open-ended questions to collect qualitative and quantitative data. It was designed to explore participants' motivations for engaging with the RS, their perceptions of the program experience, and any personal or professional impacts resulting from their involvement with the RS. There were two versions of the survey—one for current students and one for former students. These surveys included slight variations to ensure that tone and verb tense

were consistent and appropriate. In addition, former students were asked if they had pursued a community-focused career and, if so, whether that was connected to working at the RS. Alternatively, current students were asked if they were more likely to pursue a career with a community focus due to their experience at the RS. A total of 50 student researchers completed the online survey, for a response rate of 29% (from the 128 students emailed).

Data Analysis

The research team used Excel to analyze descriptive statistics on the quantitative data from Likert scale ratings and multiple-choice responses. Qualitative data from open-ended responses was imported into NVivo, coded, and thematically analyzed. The initial coding scheme was developed by one member of the research team to capture primary themes after a preliminary review of the qualitative data. It was reviewed by the other two members of the research team, clarified and refined by adding and removing categories as appropriate, then implemented. Community partner and student surveys were analyzed separately due to the differences in overall focus, as well as emergent themes in the data. The final codes are shown in Table 1.

This case study is rooted in inductive, emergent coding. The research team chose this approach in part due to the lack of peer-reviewed studies on science shops, resulting in limited sources from which to draw expected codes. Furthermore, as community-engaged researchers, the research team felt it was essential to allow key themes and research findings to emerge from the raw data versus being influenced by what they may have expected to find. This approach is aligned with how research is typically conducted at the RS, where the voices of research participants are clearly reflected in analysis and any subsequent outputs. It should also be noted that although all members of the research team reviewed the initial coding scheme, only one researcher completed the final coding of qualitative responses. Working within a small research team, this choice was made in order to protect survey respondents' anonymity, as the other two members of the team work closely with both students and community partners and could have identified respondents based on details in their responses or distinctive writing styles.

Table 1. Coding Scheme Developed for Analysis of Survey Responses

Survey	First code	Second code	Description
Community Partners	Access	To expertise	In CES/other disciplines
		To requested research and data	That is useful, fills a gap, would otherwise be inaccessible, etc.
		To resources	On campus, that would otherwise be inaccessible, etc.
	Capacity and skill-building	Institutional	Skills and capacities built by working with the RS
		Student	Assisting in building student skills
	Challenges	Commitment	Generally, or of research participants
		Research Ethics Board	With research ethics process
		Scoping	Ensuring the appropriate size/timeline of the project(s)
		Time	Delays while working on projects
		Working with students	General challenges of working with students
	Connections and relationships		With RS students, on campus
	Cost		Low cost of RS services
	Institutional capacity	Ability to serve target population	Program development, changes, etc.
		Awareness and dissemination	Of research, general work of organization
		Credibility	Of research, general work of organization
		Funding	Ability to apply for funding
		Institutional change	Specific, tangible changes being or already made
	Quality	High	High quality of work, outputs
		Low	Low quality of work, outputs
	Time		Saving community time, fulfilling needs not otherwise met, etc.

Table continues on next page.

Table 1 Continued

Survey	First code	Second code	Description
Students	Challenges	Institutional	RS structure, tasks, training, etc.
		Interest	In projects, subjects, etc.
		Time	Time management, diverse hours, etc.
		Working with community	General challenges of working with community
	Connections and relationships	With community	General value, nature
		With community and peers	General value, nature
		With peers	General value, nature
	Diversity, interdisciplinarity		Of projects, peers, approaches
	Expanding knowledge, awareness, interest	Beyond discipline	Specific examples, generally
		Of CES	Specific examples, generally
		Of community	Specific examples, generally
		Of knowledge mobilization	Specific examples, generally
	Meaning, impact, usefulness of work		Impact perceived by student for community partners, service users
	Negative experience		Generally negative experiences
	Positive experience		Generally positive experiences
	Skill development	Professional	Skills and capacities built working with RS; professional
		Academic	Skills and capacities built working with RS; academic

Data Confidentiality

All survey responses were anonymous and confidential. The qualitative data was reviewed by a member of the research team who did not possess significant knowledge of the RS's student researchers or community partners. Any obviously identifying information was removed prior to the involvement of the other team members in the data analysis to ensure that the identity of all survey respondents remained obscured.

Results

Community Partner Surveys

When asked why they continued to work with the RS, repeat community partners cited access as the main reason: specifically, access to research, skilled students, and data sources. Most returning community partners (88%) reported that they continued to work with the RS specifically to access research capacity, as seen in Figure 1. Financial accessibility is another important benefit to those working with the RS—nearly three quarters of community partners (71%) reported that they contin-

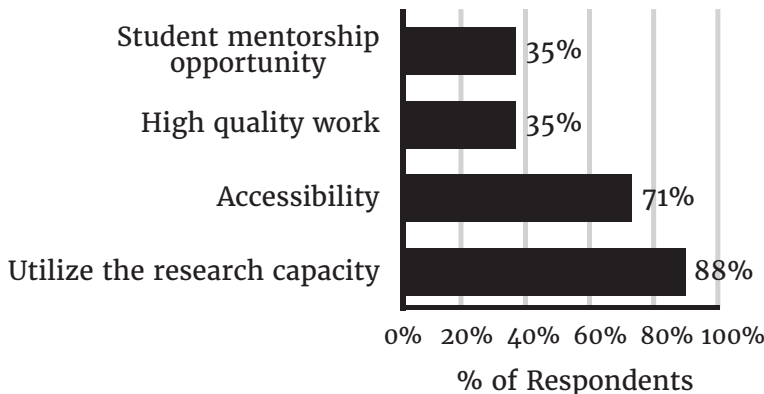


Figure 1. Why Returning Community Partners Continue to Work With the Research Shop

ued to work with the RS because it does not employ a fee-for-service model. Other reasons for continuing to engage with the RS included the high quality of the work and final products (35%) and the opportunity to mentor student researchers (35%).

Community partners also reported several other benefits associated with working with the RS. Just over half of the respondents (55%) reported that working with the RS led to the development of new research collaborations on campus. Additionally, 90% of respondents reported that the final products achieved, or somewhat achieved, the overall goal of the project (Figure 2). The written comments for this question provided additional context, with most respondents reporting overall satisfaction with the work performed by the RS. One community partner added, “The research outputs are great—very useful. They serve as focal points for dialogue and starting points for future research.” Respondents

also pointed to some of the more tangible ways in which the goals of the project were met and contributed to overall institutional change, with one community partner highlighting that “the research they have done for us is presently being used to change the way referrals are done,” and another stating, “Initial reports and products are representative of organizational project goals and direction.” Although most were satisfied with the work, some community partners expressed concerns with the overall quality of the work produced by the RS, with one sharing that “the quality of the work was not at the level expected and therefore not useful to our organization.”

Most community partners (88%) indicated that the final product was useful in providing services to the population that they serve, with 41% noting it was “completely useful,” as seen in Figure 3. Some respondents added comments, providing examples of how outputs produced by the RS were ac-

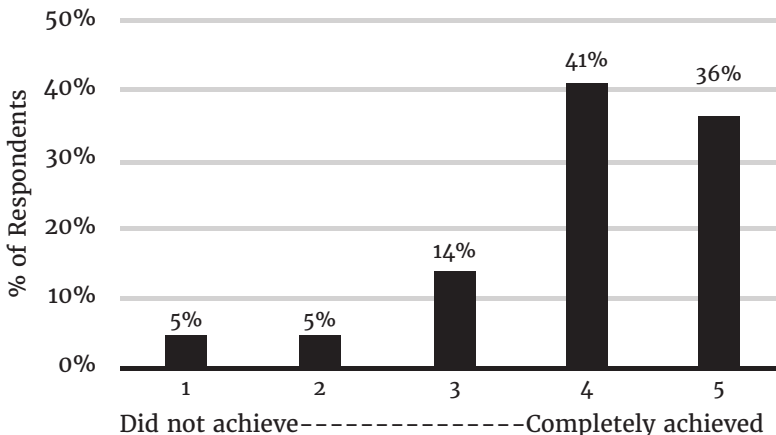


Figure 2. Research Shop Final Product Achievement of Overall Project Goal
 Note. 1 = did not achieve, 5 = completely achieved. Percentages do not total 100% due to rounding.

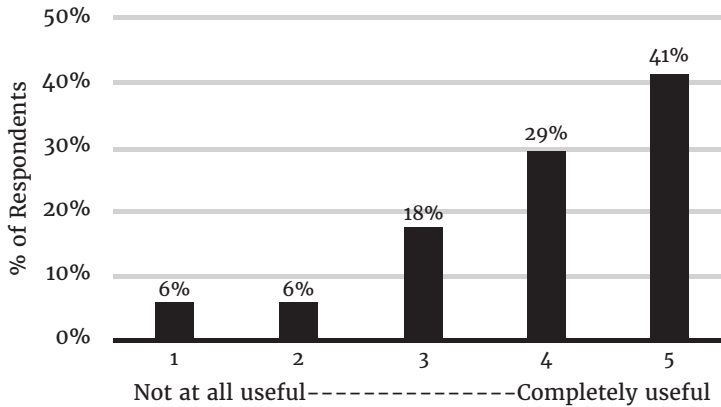


Figure 3. Usefulness of Final Products to Population Served

Note. 1 = not at all useful, 5 = completely useful.

tively being used in their organizations. One respondent reported, “It has been useful to our organization in developing programs and services to reach that population.” Another explained that “most of the work we’ve done in partnership with the RS has not been publicly promoted or released, but did inform project recommendations to the benefit of our audience.” The comments also highlight the importance of access to research and data that might otherwise be unavailable for community organizations. One respondent noted, “I’ve found it extremely useful to refer people to the work developed by the RS. It filled a gap in info that has been great to have filled.”

When asked “Has the final product(s) produced by the RS increased your organization’s capacity to apply for/receive funding?” seven (44%) community partners reported that it had. The open-ended comments provided details on how the final products created with the RS were being used or may be used in the future. One community partner reported that “the work with the RS was integral to obtaining an Ontario Trillium Foundation grant.” Another noted that their organization “hopes to use the final product to both report to current funders and in future funding applications.” Some community partners who had not yet used RS outputs for funding purposes pointed to other uses for the final products. One explained that they had leveraged their partnership with the RS to “secure papers in a high-profile conference and to apply for recognition awards for our programs.”

When asked whether working with the RS had increased their knowledge in a variety of areas, over three quarters (78%) of

respondents reported that working with the RS increased their knowledge about, and capacity for, working with students. Similarly, nearly three quarters (72%) reported that working with the RS increased their knowledge of how to access resources at the university. Over half of the respondents (56%) also noted that working with the RS increased their knowledge of how to apply research findings to benefit their organization and the population(s) they serve. Exactly half of the respondents (50%) noted they had increased their knowledge of planning a research study; 39% reported they increased their knowledge in conducting a research study, and 33% reported that they increased their knowledge of research methods.

Next, community partners were asked, “In your opinion, what is the single most valuable aspect of working with the RS?” They highlighted four major themes in their open-ended responses: addressing research questions, working with students, building relationships on campus, and increasing institutional capacity. Most frequently referenced was the importance of having the RS address research questions that were of importance to them, which provided access to research capacity, resources, expertise, and information—all at zero cost. One partner emphasized the value of the RS’s work to their organization, noting that “the research they did was amazing. I would never have had the time to do what they did even though it was important work and information.” Another highlighted the variety of resources that the RS can dedicate to community research projects, including “the student researcher’s time on the project, access to up-to-date journal articles

and published research, expertise in doing research, online survey tools, etc.” They further noted that “as small non-profits, these resources are not available to us!” One partner explained that “having this service at a low cost is also really helpful, especially for non-profits who may wish to do some data work.”

Some partners highlighted that they especially enjoyed the opportunity to work with students through the RS. One respondent linked the RS’s ability to address research questions and working with students, reporting that they appreciated the RS’s “capacity to access skills and knowledge which don’t exist within our department, and work with RS groups to develop meaningful reports, while students get hands-on research experience.” Another shared that they found personal fulfillment while working with the RS, noting that “being able to work with students and have them apply research to real community problems and organizations is very rewarding.”

Some community partners also provided insights on the broader relationships they had developed on campus via working with the RS. One respondent explained that they had found “the care taken to cultivate strong collaborative working relationships” to be especially beneficial. Another reported that they appreciated the “personal collaboration with qualified, interested people in helping us knowledgeably reach our target audience.” Finally, some community partners echoed earlier comments by highlighting that working with the RS had increased their institutional capacity. One partner explained that working with the RS had given their organization credibility, writing that “when giving presentations or applying for funding we can provide real, accurate data about challenges in our community or the benefit of a program for our community, etc.”

Community partners were also asked to “list any challenges and/or barriers that you experienced while working with the RS.” Respondents identified three types of challenges: issues with content expertise, time, and overall quality of the project outputs. The most frequently referenced challenges were related to working with students with limited content expertise. Some respondents explained that it can be difficult to bring student researchers up to speed in new content areas to ensure the work is

sufficiently in-depth. It was noted that their expectations regarding the knowledge and skill set of the student researchers were not always met. One partner explained that they felt “clarifying expectations and ensuring expectations meet the skill set of the partnering students/researchers has been challenging.” Another echoed this, reporting that “it seemed that what was requested was not clear to the students and required much clarification. The finished product, while it looked good, the content was not in-depth.”

Other challenges cited by community partners related to time—both the total amount of time dedicated to a project and the weekly allocation of student time to work on projects at the RS. One respondent felt that they did not have enough time to complete a thorough research project with the RS. Another noted that students’ many responsibilities and limited weekly time at the RS could result in project-related delays. Further, one respondent shared that “getting the researchers up-to-speed can take some time,” though they did add that this was expected and did not hamper their overall experience working with the RS. One community partner also referenced having experienced some issues with institutional processes like the research ethics approval. They noted that “the Research Ethics Board process slows down the speed at which projects can be started.” Some community partners shared that they had concerns with the overall quality of the final products created by the RS. Unfortunately, the responses here do not go into further detail.

Respondents were asked to provide any additional comments. Only a few comments were provided; all were positive and expressed gratitude for the work of the RS and the various opportunities that they perceived it to provide for students and the community. One partner expressed that they had found their work with the RS to be incredibly valuable, noting, “We have been able to learn both with them and from their expertise in relation to our objectives and population. I place a high value on their involvement and support for community partners.” Another noted that “it was a great experience. I really like the opportunity this provides for both community groups and students to interact.”

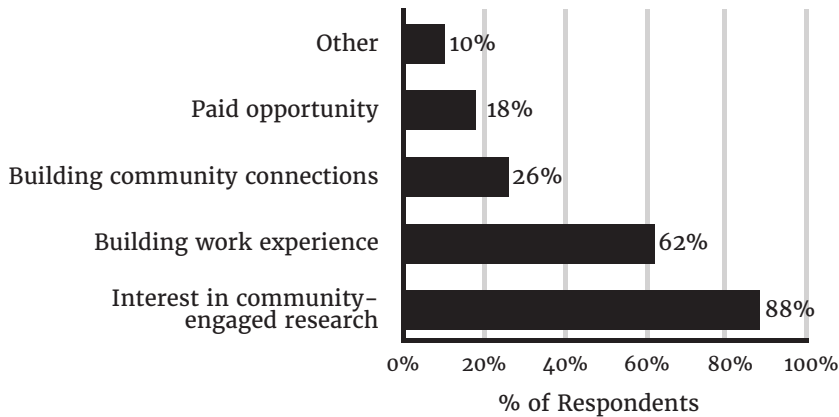


Figure 4. Top Reasons Students Chose to Work at the Research Shop
 Note. Students were asked to select top two reasons.

Student Researcher Surveys

When asked why they chose to work at the RS, many student researchers reported that they did so due to an interest in community-engaged research (88%), as seen in Figure 4. Building work experience was another important motivation for those working with the RS—over half of the student researchers (62%) reported it as a top reason. Other reasons for working at the RS included the opportunity to build community connections (26%) and the paid work opportunity itself (18%).

Many students reported that working at the RS enabled them to gain and/or improve a range of professional and academic skills. Most respondents (88%) reported that working on a project at the RS increased their knowledge and skills beyond what they had learned through their academic program and/or other academic experiences (see Figure 5). In the open-ended comments for this question, respondents overwhelmingly noted that they had gained professional skills (project management, oral and written communication, clear communication, collaboration, research, teamwork, knowledge mobilization, and critical thinking) and academic skills (time management, project scoping, project management, research, CER, writing, and teamwork) while working at the RS. As one student commented, they

gained many transferable skills that are not a primary focus in my academic program, such as working with community partners (communication, managing expectations, scoping projects, balancing

academic and community needs), using plain language, and creating products that are accessible to a wider audience.

Also frequently cited by respondents was the interdisciplinary/cross-sectoral learning they experienced at the RS while doing work with clear community impacts that was often outside their area of expertise. One respondent noted, “My work with the RS exposed me to concepts/types of research that I would not have learned about in my studies.” Another wrote, “Working at the RS has given me opportunities to work within my own community, on projects that are outside of my expertise. My knowledge and skills surrounding CES have broadened and diversified through working on these projects.”

When asked about their level of interest in community issues, 100% of students surveyed reported that it had stayed the same or increased since working at the RS. Additionally, 91% of respondents reported having participated in, or planning to participate in, other community-engaged activities (see Figure 6). These activities included sharing their research findings with the relevant community, taking regularly offered community-engaged courses, and taking courses related to knowledge mobilization. Notably, over three quarters (79%) of respondents noted that their positive experiences at the RS encouraged them to seek out and participate in other community-engaged activities.

This impact is not limited to academic activities. For example, 89% of respondents who worked at the RS at the time of the

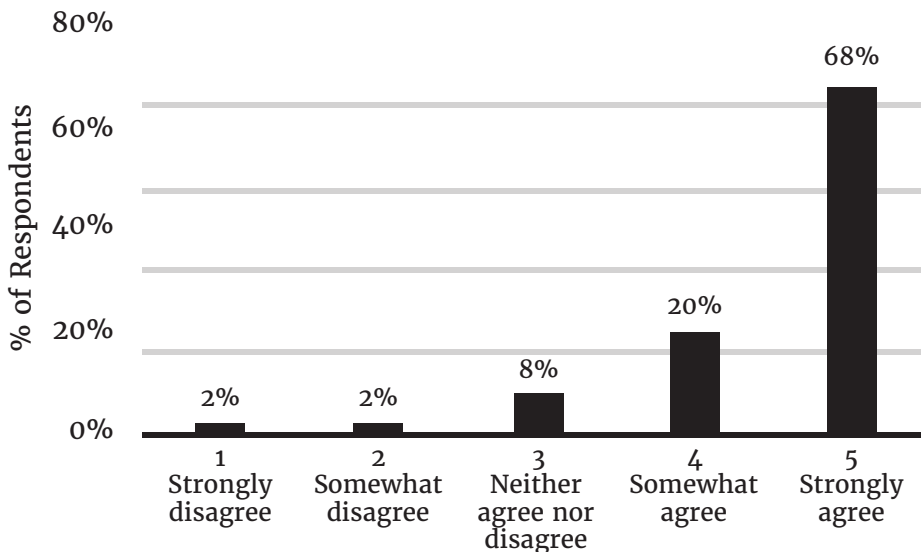


Figure 5. Students' Increase in Knowledge and Skills Beyond Academic Experiences

Note. Based on student respondent agreement with the following statement: "Working at the Research Shop has increased my knowledge and skills beyond my academic program and/or other academic experiences."

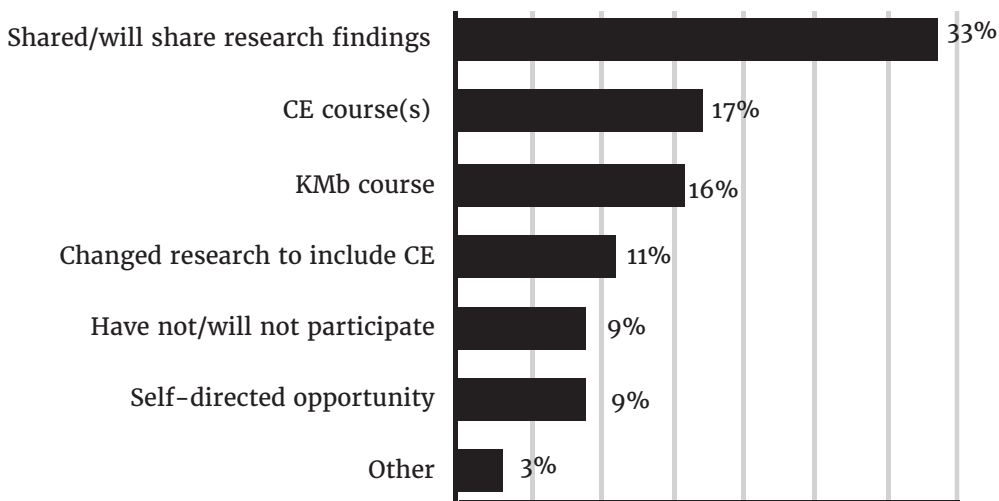


Figure 6. Other Community-Engaged Activities Students (Past and Present) Have Engaged, or Plan to Engage In

Note. Kmb = knowledge mobilization. Percentages do not equal 100% due to rounding.

survey indicated that their experience at the RS made them more likely to pursue a community-engaged career. Respondents provided context in the comments by highlighting that working at the RS had demonstrated the real-world impact of community-engaged work, expanding their awareness of and interest in CES and the local community. One respondent noted that

working at the RS has opened my eyes to the amazing work going on in our community and the important role that research can play in this work. . . . I have also learned more about the strengths I can bring to this kind of work, and it has become easier for me to see myself working in this area.

Another added that “before starting at the RS I had some interest in CES, but I now hope to find a job that will allow me to work with communities and do research.” Similarly, the majority (86%) of former RS students indicated that they had pursued a career with a community focus. Many (69%) respondents attributed this decision, at least in part, to the RS.

Students also felt that the RS helped prepare them for their careers—84% of respondents reported that they feel prepared for the career they plan on pursuing or have pursued due to their work and experience at the RS. The open-ended comments provided further context to these figures. Respondents’ personal career plans and interest in community prior to joining the RS varied, but those who felt that the RS prepared them for their careers primarily cited the importance of the range of skills they developed. One respondent noted, “My experience at the RS has taught me that I want to pursue a career in research. I have gained skills in developing a research methodology and putting in place a project management plan to be able to execute complex projects.” Also frequently referenced were the relationships built with both community and peers through the RS. A respondent highlighted that “developing and nurturing these relationships . . . has prepared me for not just the career I plan on pursuing, but for the unexpected and unplanned opportunities I know will come my way as well.” For many, the community connections forged while working at the RS, along with seeing the impact of CER firsthand, encouraged them to seek profes-

sional opportunities in CBR. One respondent noted that “my experience there shaped my community-based research direction, which has since developed into an expertise and career. I continue to credit that early internship as valuable training experience in my field.”

Next, student researchers were asked, “In your opinion, what is the single most valuable aspect of working with the RS?” The open-ended responses fall into four overall themes: skill development, building relationships on campus and in communities, gaining experience doing CER, and interdisciplinary/cross-sectoral learning. Echoing their responses to previous questions, student researchers overwhelmingly highlighted the significance of the professional and academic skills they built at the RS. One respondent noted that they benefited most from “learning how to communicate and work with partners from all different worldviews and backgrounds.” Some also highlighted that they were able to develop specific academic skills that were not offered in their own departments, such as student mentorship and qualitative research methods.

The next most frequently cited benefit was related to building relationships on campus and in communities. For some, these relationships led to further personal and professional growth. As one student explained, “I met so many people, both within the Research Shop and in the community. . . . These connections led to career and volunteer opportunities, relationships, and overall, a more open mind about the types of people I can relate to.” For others, forging relationships with students and community partners broadened their horizons. One student researcher emphasized that they enjoyed “getting to meet and speak with stakeholders whom I would never have had the opportunity to speak with otherwise.” Additionally, many respondents identified that a significant benefit of working at the RS was gaining more intimate knowledge of the local community, including services, challenges, and goals.

Respondents also highlighted the extent to which they benefited from gaining experience doing CER and were inspired by the potential impact of the research, with some even citing this on-the-ground experience as a key motivation for seeking out and/or continuing to participate in community-engaged work. Some students noted that

they saw this as an opportunity to give back and have impact beyond their own academic research at the university by helping community organizations increase their capacity to serve their target populations. Others felt that learning about the origins and theory of CER, as well as the potential value and impacts of CER on the local community, was extremely beneficial. One respondent commented that working with the RS allowed them to “influence and create positive social change through collaborative projects. This is an aspect of my internship which was truly inspiring, and which is not often available or possible working with other institutions on campus.” Student respondents also highlighted the importance of the interdisciplinary/cross-sectoral learning that took place at the RS. One student wrote that they appreciated “working with people from varied backgrounds—students from all different departments, very different community partners on each project. The work is very interdisciplinary, and everyone brings different experiences and points of view.”

Students were also asked to “list any challenges and/or barriers that you experienced while working with the RS.” Respondents noted four types of challenges: time, working with community, institutional/structural barriers, and overall interest. Most frequently cited were challenges related to time—some respondents noted that it could be difficult to balance RS work with their required coursework and other commitments, with one student explaining that there was sometimes “not enough time in the week to allocate to RS projects due to other grad school-related duties.” Other student researchers highlighted the significant time commitment required by CER projects generally, with some noting specifically that they found it challenging to accommodate sudden or unexpected changes that had significant impacts on project outputs and timelines.

The next most frequently referenced challenge was working with the community, which was largely related to partners’ expectations and communication. Some respondents highlighted that partners’ expectations were often unrealistic based on what a student team could achieve on a very part-time basis, with one remarking that “the partners should understand that this is a partnership and not free research labour to get out of hiring consultants.” Others noted that community partners were sometimes

difficult to communicate with due to staff turnover and/or lack of capacity.

The institutional/structural barriers faced by student researchers varied, but were related to internal communications and processes, including RS structure and training. One student remarked that “community partners expressed frustration with the quality of work, lack of maturity, poor research abilities, and demanding nature of working with RS interns, but [I] felt conflicted about sharing concerns with CESI staff.” Others expressed a desire for training and resources that were more tailored to the work they were doing. Alternatively, some student researchers were not interested in building new knowledge or skills at the RS; this was especially noted when research topics did not match up with their own interests and/or expertise. One student wrote, “I felt like for one of the projects it wasn’t really within my area of interest or expertise at all so I found it hard to stay engaged.”

Finally, before completing the survey, respondents were asked to provide any additional comments about their experience at the RS. Like community partners, only a few student respondents provided comments in this section; again, the comments were positive and largely centered around the perceived value of the RS and the opportunities it provides for student researchers. One student commented, “I met some amazing people! Love the variety of disciplines I would not have met otherwise siloed in my faculty. Diversity always increases the perspective, filter, level of analysis and idea-generation.” Another highlighted that “working at the Research Shop was a formative piece of my career development and I’ve often drawn on the experience in my work since.”

Discussion

This study is the first to examine the impacts of a long-standing cocurricular science shop in North America. Its findings demonstrate that the RS has had significant impacts on its student researchers, community partner organizations, and in many instances, the populations they serve. In examining the benefits and challenges for both students and community partners, this study expands upon and supports the literature showing the potential impacts of science shops and CER more broadly.

Community Partners

The current study supports the existing evidence around the many benefits community partners experience when engaged with CER and/or science shops. The benefits include having research questions addressed, increasing institutional capacity, building relationships across the broader (university) institution, and working with students, the latter of which was a unique finding. This study also uncovered a range of challenges experienced by the partners which, while they are specific to their experience with the RS, may also provide insights relevant to other science shop or CER models.

Addressing Research Questions

The primary benefit community partners experience when working with the RS is having their emergent research questions addressed. Many community partners reported that they struggle with research activities due to a lack of internal capacity, funding, and/or access to data and literature. This finding is consistent with science shop and CER literature that shows that community organizations most frequently partner with institutions for access to research (Alcantara et al., 2015; Kontić & Kontić, 2018). Some organizations reported that their funders require them to carry out research; others wished to conduct research in order to improve their service provision or to address gaps in their knowledge. Many community organizations are stretched thin with limited time and funding, and do not have the internal capacity to conduct research, funding to hire a consultant, or access to the necessary data and literature. CER partnerships like those cultivated at the RS can help address some of the research and evaluation pressures faced by community organizations. As a university-administered science shop, the RS can leverage university resources for community benefit. It is this ability to address emergent research priorities that keeps community partners connected to the RS—the majority (88%) reported that they continue to work with the RS to access its research capacity.

As with most science shops, a benefit of working with the RS is having research questions answered at low (or no) cost. Partners are not required to pay to work with the RS, though they may be asked if they have financial capacity to support project-related costs. The low/no cost model of science shops is especially important for

not-for-profit organizations with limited resources who may not have the financial capacity to hire researchers. Specifically, partners reported that working with the RS provided them with information, research, and resources that might otherwise have been inaccessible.

Increasing Institutional Capacity

The current study suggests that working with the RS increased community partners' institutional capacity through both the research process and its research outputs. This finding is supported by the literature as well—it has been demonstrated that science shops can increase community partners' institutional capacity by increasing their knowledge of current practices, policies, and literature in their program areas. This increased knowledge may enhance the work they do by applying the research to make changes to their programs and/or use the research results in funding applications (Alcantara et al., 2015; Strand et al., 2003; Tryon & Ross, 2012). In the current study, many partners reported that working with the RS increased their ability to serve their target population, resulting in value added to their organization. Some also reported that working with the RS provided them with the necessary information to improve their service delivery and make positive, evidence-informed changes to their programs. Several respondents noted that RS outputs were especially helpful when applying for funding and/or charitable status—both for grants they had already obtained and funding opportunities they hoped to access in the future.

Many community partners also felt that working with the RS lent credibility and a reputation for rigor to their work due to their affiliation with a research-intensive institution, which is evidenced in the literature (Alcantara et al., 2015). This perception allowed some community partners to access new platforms to present this research, both locally and nationally, and to argue for the continuation of their programs. Broadly, community respondents noted that working with the RS increased the dissemination of their research as well as their organizations' public profile.

In addition to research outputs that met emergent questions and needs, some respondents noted that the process of planning, scoping, and carrying out the research in collaboration with the RS resulted in sec-

ondary benefits, including skill development and sparking larger conversations around organizational goals. Research has shown that community partners are often able to learn new skills or enhance current skills when working with researchers. Curnow (2017) found that community organizations often act as researchers themselves, learning practical skills in the process. In the current study, 56% of respondents reported an increase in knowledge of applying research findings to their organization, and half increased their knowledge of planning a research study.

Building Relationships on Campus

Another benefit for RS community partners is the potential to foster long-term partnerships with the supporting institution, with the RS serving as the access point to campus. This finding is consistent with academic and gray literature on science shops and CER, specifically around the broader access that partners gain to the academic institution they are working with. Community partners engaged in CER may also participate in, and learn about, other initiatives on campus, increase knowledge of accessing academic resources, gain confidence in working with those in an academic environment, and create new opportunities to work with diverse programs (Alcantara et al., 2015; Garber et al., 2010; Kontić & Kontić, 2018; Strand et al., 2003). In this study, most (72%) community respondents reported that working with the RS increased their knowledge of how to access resources on campus, and over half (55%) felt that working with the RS led to the development of new research collaborations between their organization and the University of Guelph. This finding speaks to the potential for university-based science shops to act as a connection point for community organizations to access the tremendous resources held on campus.

Working With Students

Finally, community partners in this study reported that working with the RS allowed them to learn *from* students and to learn to work *with* students, findings that do not appear in existing science shop literature. A few reported that their organizations lack staff; therefore they value the opportunity to work with students, both due to students' genuine interest and for the additional capacity of being able to talk through issues with others and learn together. Most

partners (78%) in this study reported that working with the RS increased their knowledge about, and capacity for, working with students. Some also reported that they enjoyed the process of building relationships with and mentoring students; 35% reported that they continue to work with the RS because of the opportunities for mentoring students. Some respondents commented specifically on the genuine interest of the students working on their projects, and the value of those relationships to creating a useful output. These findings indicate that working with the RS may develop community partners' skills in working with students and speak to the broader relationship impacts gained between students and community partners. RS community partners noted working with students was rewarding, collaborative, and beneficial to them.

Challenges

CER literature highlights many of the potential benefits to community partners' working with programs such as the RS. In addition to these benefits, this study also uncovers a range of challenges. Many of these findings are unique and are not reflected in other studies; this study was designed to ask stakeholders specifically about challenges in response to the general lack of information in the existing literature. Although these findings apply only to this case study, they should be acknowledged and considered alongside the benefits of CER, specifically in relation to a university-administered, cocurricular science shop.

In this study, community partners' most frequently reported challenges related to time. Because the RS operates as a cocurricular activity and is not bound by semester timelines, projects can vary in research scope and thus in duration. Typically, this flexibility is appreciated by community partners who may have projects emerge that do not fit neatly into course structures or topics. However, this study suggested that this flexibility can also lead to challenges, as some respondents reported that it was difficult to scope a project based on the experience level of the student researchers and the amount of time available for the proposed project. The research ethics process was also noted as a source of frustration by several respondents. The application, revision, and approval process can take a significant amount of time to complete, which can be frustrating for organizations who are not familiar with the process. Some

respondents noted that this extra step slows down the speed at which projects can be started, and sometimes results in changes to the initial research plan.

Although many partners reported positive experiences working with students, others noted challenges that can occur as well. Student researchers at the RS are at various stages of their academic path and possess different levels of experience, sometimes resulting in varied levels of quality or depth of work, which can impact the overall usefulness of the research to the community organization. Only slightly over a third (35%) of respondents reported that they continue to work with the RS because of high quality work, possibly indicating that it is a combination of benefits that brings them back. Despite these challenges, most partners in the RS continue to request ongoing collaborations with the program (77% reported working with the RS more than once), and many (55%) continue to work with the broader institution in which the RS is situated.

Student Researchers

This study found that students engaged in the RS realize many benefits, including developing professional and academic skills, engaging in interdisciplinary and cross-sectoral learning, gaining experience doing CER, and building relationships in the community and on campus. Like the findings for community partners, it also brought to light several challenges, some of which are well documented in the existing literature.

Developing Professional and Academic Skills

The primary benefit to students engaged in science shops is the opportunity to gain a wide range of academic and practical/professional skills that may benefit them in further academic pursuits or professional positions. In the current study, most students (88%) developed skills beyond what they had learned through other academic experiences. The skills reported included time management, project scoping, research design, community-based research, writing, and teamwork. Some felt that working at the RS contributed to their growth as researchers, as they gained confidence in new research methods and adapted their own graduate research to be more community focused. These findings are consistent with the literature, which suggests

that students may further develop their research and writing skills, learn new research skills, and increase their knowledge in a variety of thematic areas by engaging in CER (O'Connor et al., 2011). Similarly, many studies have found that the academic skills built through engagement in CER have the potential to significantly impact those students continuing to further graduate studies or pursuing an academic career (Alcantara et al., 2015; Garber et al., 2010; O'Connor et al., 2011).

Many respondents also reported that working at the RS enabled them to increase and improve professional skills, including project management, communication, accessibility, clear communication, balancing community and academic needs, community-based research, research methods, teamwork, knowledge mobilization, and critical thinking. This finding is consistent with the literature, which demonstrates that working with the community provides students invaluable learning experiences that are not typically found in academic settings (Alcantara et al., 2015; European Commission, 2003; Kontić & Kontić, 2018; Tyron & Ross, 2012). Students who receive training in research methods and other CER-related skills (via science shops or other channels) may experience advantages in workforce readiness and other professional opportunities (Alcantara et al., 2015; O'Connor et al., 2011). These findings suggest that students engaging in CER, like those at the RS, may be at an advantage as they progress to further academic or professional pursuits.

Engaging in Interdisciplinary and Cross-Sectoral Learning

This study demonstrates that working on a diverse range of projects and topics at the RS helped to expand student researchers' knowledge and expertise in several areas, including specific thematic areas, CER, and knowledge mobilization. Similar findings on these benefits have been echoed in the literature (Andersen, 2017; Hynie et al., 2011; O'Connor et al., 2011). Researchers come to the RS from a variety of disciplines and backgrounds; although their existing interests and skills are considered when projects are assigned, they often work on projects rooted in unfamiliar subject matter. Working on these projects increases their ability to conduct research outside their comfort zone. It also provides them with

new knowledge and subject matter expertise on topics of interest to the local community. Although some student respondents reported that they did not gain additional skills, many reported that working at the RS provided an opportunity to gain knowledge in a previously unknown subject area. For others, community research projects acted as an opportunity to see how research is gathered, mobilized, and applied outside academic institutions. Some student respondents felt that the interdisciplinarity of the RS also served to expand their knowledge and expertise. By working collaboratively in interdisciplinary teams, RS student researchers are provided with the opportunity to learn with and from their peers who may have different experiences, commitments, and disciplinary knowledge.

Gaining Experience Doing CER

Another benefit for RS student respondents was concrete experience performing CER, which sustained or increased their interest. The quantitative data suggests that students who work at the RS do so primarily because they are interested in CER. In some cases, RS students reported that this exposure inspired them to make changes to their own research, so that it was completed with a community-engaged, focused, or informed lens. This phenomenon is supported by the literature, which notes that many students hope to participate in community engagement in order to positively impact local and global communities. Doberneck et al. (2017) wrote that “this next generation is committed to equality, social justice, civic duty, and the public purposes of higher education, but is often confronted by institutional structures, policies, and practices that delegitimize their experiences, perspectives, and approaches” (p. 122). Having a “real world” experience, such as that offered by a model like the RS, can provide students with an opportunity to positively contribute to their community during their academic studies.

Building Relationships in the Community and on Campus

This study adds to the evidence that student researchers engaged in CER find working with community partners a valuable experience. These studies emphasize the value in building new relationships with the community partner(s) and/or broader community. Many students also report that they maintain relationships with their com-

munity partner(s) after the project has been completed (Hynie et al., 2011; O’Connor et al., 2011; Tryon & Ross, 2012). The current study also suggests that the relationships fostered at the RS were impactful for students. When asked about the benefits of working at the RS, many student respondents highlighted the benefits of collaborating with community partners, including feeling more connected to the local community, expanding their networks, and gaining community connections, learning how to work with community collaborators, and working toward a common goal. These relationships have proven to be quite impactful; for some students, the community connections forged through the RS helped them find employment after graduation, integrate more effectively into other community contexts in the future, and gain a better understanding of how community organizations function. Overall, and in keeping with the literature, RS student researchers reported that they were more connected to their local community as a result of their community-engaged work at the RS, with some maintaining relationships/staying connected with the partners once they had graduated and moved on from the RS.

In addition to building relationships in the community, some respondents reported having built positive or useful connections and relationships with their peers through the RS. Working in small project teams and meeting as a larger cohort, RS students work with and learn from a group of peers with a common interest in CER. These relationships facilitated greater connections within the RS and provided a collaborative, friendly environment as students worked toward a common goal. This suggests that a collaborative, interdisciplinary atmosphere is conducive to learning, and that peer-to-peer relationships can lead to the development of useful skills and knowledge.

Challenges

Studies that explore the impacts of CER for students are largely positive and focus on the benefits of such work. In response, this study uncovered a range of challenges that have been faced by student researchers working at the RS, many of which are unique in the existing scholarship and provide new insights about this kind of work. They should be considered alongside the benefits to begin to form a complete picture of the RS, science shops, and CER more

broadly.

Some student respondents felt that institutional and/or structural barriers kept them from reaching their full potential as researchers. Some respondents reported experiencing challenges in communicating with RS staff and peers regarding their experiences and responsibilities. Survey data also suggested that time was a challenge for some respondents, as they reported sometimes having difficulty balancing their RS responsibilities along with their other academic and personal responsibilities. Other respondents also reported that, under the honorarium system used at the RS until 2017, they felt that they were not adequately compensated for work that they completed.

Although many respondents enjoyed the variety and interdisciplinarity of RS projects, others expressed frustration with the varied research topics and methods explored in the RS. Finally, respondents experienced unique challenges related to working with the community. Some respondents felt they did not receive enough information, support, or communication from community partners regarding expectations, content area, project scope, deadlines, timelines, and impact of research. They also felt that community partners sometimes had unrealistic expectations of the student researchers, holding them to consultant-like standards. Despite these challenges, student respondents did not report any long-term negative impacts of engaging in CER at the RS.

Limitations

Overall, the RS survey provided rich qualitative and quantitative data that largely corroborated the existing literature and provided valuable insight on the impacts of CER and science shops in a Canadian context. However, some limitations must be recognized. The primary limitation was the response rate of both the community partners and students (29%). This low response rate resulted in a lack of statistical significance for the study.

Conclusions and Implications for Future Research

This study demonstrates that there are significant impacts associated with CER, science shops, and more specifically CESI's RS. These impacts are primarily positive and largely confirm those already reported by

existing studies on both CER and science shops. Each stakeholder group experiences unique impacts: Community partners benefit primarily by having their research questions addressed but struggle with challenges related to time and quality, whereas students benefit mostly from skill development and struggle with structural barriers. Overall, both stakeholder groups value the skills developed, knowledge gathered, and relationships built through the CER process and projects completed through the RS.

This research has the potential to create its own positive impacts—both locally and internationally. The results presented in this article will inform the RS's evolving practice, ensuring that it continues to address community, student, and institutional needs and generate positive, mutually beneficial impacts for stakeholder groups. It also provides a snapshot of the RS from 2009 to 2018 that can be used as a baseline when considering continued impact and evolution in the future, or when comparing impact with other science shops and CER mechanisms. This article contributes to the diversity of the existing body of literature on science shops and CER by providing a case study of a cocurricular, university-administered science shop in North America. It has the potential to add to the overall visibility and perceived legitimacy of CER and science shops on an international scale.

Expanding on this study, future research could explore other models of cocurricular science shops with the aim of determining whether similar benefits and challenges exist among similar models. Alternatively, it could be worthwhile to compare science shops in a common geographic area (e.g., Ontario, Canada, North America, etc.) to see if benefits, challenges, and overall impacts align. Approaching these topics would continue to add nuance to the international body of literature on CER and science shops, and also provide further information on both cocurricular and North American science shops. Finally, future research should also apply a critical lens to the science shop model, including seeking to understand how equity, diversity and inclusion, and systemic oppression play roles in student and community partner access to science shops. As CESI and the RS move toward critical community-engaged scholarship, it is important to assess and evaluate its impacts on our own programs, along with the research we perform.



About the Authors

Karen Nelson, MSc., is the research shop manager at the Community Engaged Scholarship Institute at the University of Guelph.

Kendra Schnarr, MA, is the research projects assistant at the Community Engaged Scholarship Institute at the University of Guelph.

Elizabeth Jackson, PhD, is the director of the Community Engaged Scholarship Institute at the University of Guelph.

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