

The Challenges of Going Global with Undergraduate Research: The Matariki Undergraduate Research Network

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Abstract

To determine the logistics, benefits, and challenges of developing and implementing an international undergraduate research network, the authors analyzed the Matariki Undergraduate Research Network (MURN). MURN attempted to connect undergraduate students from four countries across two years, with 21 and 23 students respectively. Using mixed methods, the authors explored faculty and student experiences of MURN. Although MURN worked well at the local level, it had limited success at a global level. Teaching across time zones and academic-year differences posed the biggest challenges. Students and faculty reported a range of benefits typical of engagement with undergraduate research but noted weak international connections. A credit-bearing program with partners in similar time zones and academic-year systems, as well as a requirement for collaborative projects across institutions, are recommended.

Keywords: *higher education, international education networks, international undergraduate research*

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The promotion of undergraduate research (UR) gained worldwide momentum following the report of the Boyer Commission (1999), which lamented the fact that undergraduates could study in research-intensive universities with little awareness of or involvement in the research culture. Since Boyer's work, many prominent higher educationists have been advocating ways to get undergraduates

involved in research (e.g., Brew 2003, 2006; Healey and Jenkins 2009; Jenkins, Healey, and Zetter 2007). Consequently there are now many programs incorporating UR across the globe. For example, a perusal of the international section of *CUR Quarterly* over the past four years includes examples of UR from Australia, Canada, Germany, Ireland, the Netherlands, New Zealand, and the United Kingdom. Although national conferences for UR have been running for some time—especially in the United States (with the National Conference on Undergraduate Research since 1987)—in the last decade there have been international conferences for UR, including Australasia (ACUR) in 2012; the International Conference for Undergraduate Research (ICUR) in 2013; and the inaugural World Congress for Undergraduate Research, held in Qatar in 2016.

Thus, in one sense, UR has already gone global. Moreover, there are several reports of UR programs with an international aspect. For example, McGuinness and Simm (2005) discuss a global range of fieldwork destinations for undergraduates in UK universities, and Houser, Cahill, and Lemmons (2014) analyzed faculty and student perceptions of a UR program with an international field experience. Banks and Gutiérrez, when reflecting on two case studies of international UR field experiences, commented that “infusing these [UR] experiences with a global perspective has a high potential to yield extraordinary outcomes for academic communities” (2017, 25). However, what is missing from this literature are examples of UR initiatives that are founded on international collaborations. This article will analyze the logistics of developing

and implementing an international UR network, seeking to determine the benefits and challenges to both undergraduates and faculty involved in such a network.

The Matariki Undergraduate Research Network (MURN)

Origins

In 2012, the authors attempted to develop a global network that connected undergraduate researchers. The initiative was led by the second two authors at the University of Western Australia (UWA), who had been administering the Undergraduate Learning and Teaching Research Internship Scheme (ULTRIS) at UWA (Sandover et al. 2012). Because their university was promoting internationalization, they wanted to expand their program, linking undergraduate researchers in different countries. Sandover and Partridge decided to approach members of the Matariki Network, which is a partnership established in 2010 that is composed of seven institutions: Dartmouth University, US; Durham University, UK; University of Otago, NZ; Queen's University, Canada; University of Tübingen, Germany; Uppsala University, Sweden; and University of Western Australia, Australia. To keep the UR network manageable, they recruited only two partner universities: in 2012, this was the University of Otago (UO) and Durham University (DU); in 2013, UWA, UO, and Queen's University (QU) composed the network. The rationale of MURN was to provide a unique opportunity to connect students engaging in undergraduate research programs from different universities across the Matariki Network. MURN aimed to:

- Give undergraduates an authentic research experience within a well-supported and scaffolded program
- Develop transferable research skills in students
- Provide students with a global perspective on the scholarship of teaching and learning
- Provide insight into, and basic preparation for, post-graduate research and how it is conducted at different institutions
- Use the results to inform policy and practice within the institutions

Thus MURN attempted to include both local and global aspects, with research conducted locally while undergraduate researchers were connected globally.

Organization

Following some initial correspondence, a face-to-face planning meeting was held at UO in April 2012. During the two-day meeting, details of the structure and design of the program were agreed upon, and decisions were made regarding the use of technology to support learning. Some of the most difficult issues to resolve in designing the global classroom were time-zone differences and academic-year differences (the Northern Hemisphere's

September-to-May year and the Southern Hemisphere's February-to-October year). Because the Matariki institutions were keen to support initiatives across the network, it was relatively easy to obtain funding, at least for a pilot of the MURN program. The program launched in mid-2012. In the first iteration, there were nine students from UWA, six from UO, and six from DU. Each university ran a competitive recruitment process, with between four and nine undergraduates from a range of disciplines recruited at each institution.

The MURN program was extracurricular, and students were offered payment for their involvement in the program of six to eight months. The program focused on research in higher education, so that students from diverse disciplines could participate. Also, the teaching team at each university was typically associated with a higher education center. The students were taught research methods in higher education over a six-week period through a global classroom that included a series of web conference workshops (using Adobe Connect), and online resources using the UWA learning management system. UWA supplied the teaching material, although some modules were refined or developed by the entire teaching team. Groups also met at each institution, and the students were assigned supervisors for their research projects. During the research methods course, students generated a topic according to their interests, and, following completion of the training, they researched this topic with the guidance of a supervisor. For both 2012 and 2013, internationalization in higher education was the broad topic for research. Students principally researched individual projects; only minimal collaboration occurred across universities. Students had to produce a research proposal, obtain ethical approval if needed, collect and analyze data, and write an academic paper for submission to a journal and/or presentation at a conference. Examples of the research projects undertaken by students in 2012 and 2013 are given in Table 1.

A debrief of the teaching team in late 2012 confirmed that the pilot had been successful overall, but some challenges were encountered (discussed later). The program was repeated, but this time ran from February to August. With the relatively short lead-in time, DU was unable to participate, so instead Queen's University in Canada was recruited. In 2013, there were 13 students from UWA, four from UO, and six from QU. Although Adobe Connect continued to be used for web conferencing, Edmodo was used to host the online resources, and students were encouraged to link with peers via Facebook.

The team at UO established the *e-Matariki Undergraduate Research Journal* (eMURJ) as a vehicle for publishing student work. Students shared their research findings in

TABLE 1. Examples of Projects Completed by Students as Part of MURN

- Professors without Borders: The Benefits of a Scholastic Mentorship Program (QU)
- An Analysis of the Impacts of Globalization on Global Development, with Extension to Teachings of Globalization at Queen's University (QU)
- An Investigation of Relative Ethnocentrism among Undergraduate Business Majors (UO)
- Analyzing New Zealand Undergraduates' Exchange Destination Choices (UO)
- Is UWA Riding the Asia Wave? Students' Perceptions towards the University's Curriculum on Catering for Asia Literacy (UWA)
- The Value of International Medical Experiences as Perceived by Medical Students and Clinical Staff (UWA)
- "Dur-ham? Where?" A Study of the Strategies to Raise Durham University's International Profile (DU)

Note: DU = Durham University, United Kingdom; MURN = Matariki Undergraduate Research Network; QU = Queen's University, Canada; UO = University of Otago, New Zealand; UWA = University of Western Australia, Australia

October, with many later publishing their work in eMURJ and other journals. Most of the UO and UWA students presented their work at the 2013 ACUR held in Sydney, whereas some of the QU students presented at the Queen's University Undergraduate Research Conference.

Study Methods

Drawing on the pragmatism paradigm, a mixed-methods research approach was employed to analyze MURN. Data were collected to capture both faculty and student views on the initiative. The University of Otago granted ethical approval for the study.

Data Collection

A range of data sources were used to analyze the development and implementation of the MURN initiative: surveys of students in 2012, a survey of instructors in 2013, and informal feedback gathered throughout the two-year initiative.

The 2012 students in MURN were sent a link to the online survey "Student Assessment of Their Learning Gains" (Seymour et al. 2000; SALG n.d.). This survey tool was chosen because it had been used to assess research experiences of undergraduates, and some customized questions were added to target student experiences of MURN in particular (see questions in Table 2). The survey covered topics such as comprehension of class content, increase in skills, class impact on attitudes, integration of learning, teaching quality, learning activities, learning resources, and support for learning. These questions involved rating responses using a five-point Likert scale, with some free-form responses requested for

elaboration. The customized questions asked about the impact of interaction with local supervisors, local peers, and international peers on their learning (using the five-point Likert scale), with free-form comments for further elaboration, suggested improvements in interactions with international peers, and the extent that the MURN program met their expectations.

Twelve out of the 21 students responded, resulting in a response rate of 57 percent.

In 2013, a survey was emailed to all seven instructors across the network and all responded, resulting in a 100-percent response rate. The survey of the instructors pertained to their motivation for participating in the MURN initiative, their expectations for their involvement in the program and whether these expectations were met, their experiences teaching research methodology in higher education using workshops and digital platforms, their experiences supervising undergraduates, their experiences with international collaboration, the institutional learning that occurred, and advice to others wishing to establish an international UR initiative. The survey was designed so that free-form responses could be given and thus capture rich descriptions of experiences.

Data Analyses

The quantitative student survey data were tabulated, but given the small sample only descriptive statistical analyses were done. The qualitative faculty data were analyzed by the lead author using a general inductive approach (Thomas 2006). Themes were derived from responses to the questions put to faculty regarding their motivation

TABLE 2. Student Assessment of Learning Gains

	Average (std dev)
As a result of your work in this class, what gains did you make in your <i>understanding</i> of:	
- Research as an activity	4.08 (0.79)
- Research guided by a specific problem, question, or hypothesis	4.17 (0.72)
- Research involving methods for collecting data	3.67 (0.98)
As a result of your work in this class, what gains did you make in these <i>skills</i> :	
- Finding articles relevant to a particular problem in professional journals or elsewhere	3.25 (0.87)
- Critically reading articles about issues related to your research topic	3.33 (1.07)
- Identifying patterns in data	3.75 (0.45)
- Recognizing a sound argument and appropriate use of evidence	3.17 (1.27)
- Writing documents in discipline-appropriate style and format	4.00 (0.85)
- Working effectively with others	2.42 (1.08)
- Preparing and giving oral presentations	3.10 (1.52)
As a result of your work in this class, what gains did you make in the following <i>attitudes</i> :	
- Enthusiasm for research	3.75 (1.14)
- Interest in discussing research ideas	3.75 (0.87)
- Interest in taking or planning to take units or courses involving research work	3.83 (1.27)
- Confidence in your understanding of research	4.0 (0.85)
- Confidence in your ability to do research	3.67 (0.89)
- Your comfort level in dealing with complex issues	3.25 (1.29)
As a result of your work in this class, what gains did you make in integrating the following:	
- Connecting key ideas with other knowledge	3.42 (1.08)
- Applying key ideas to other situations	3.25 (1.06)
- Using systematic reasoning for problem solving	2.83 (1.11)
- Using a critical approach when analyzing data and arguments in daily life	3.17 (1.40)
How much did the following aspect of the class help your learning:	
- The structure of the ULTRIS–MURN program	3.08 (0.67)
- The pace of the ULTRIS–MURN program	3.08 (0.90)
- The knowledge of the presenters	4.09 (1.04)
- The enthusiasm of the presenters	4.36 (1.03)

(table continues)

TABLE 2. (cont.)

How much did each of the following aspects of the class help your learning:	
- Attending workshops	3.42 (1.08)
- Interacting with a supervisor	4.67 (0.65)
- Working with other ULTRIS–MURN students	3.25 (1.42)
How much did each of the following aspects of the class help your learning:	
- Writing activities, such as research proposal, literature review, and academic paper	4.33 (0.79)
- Feedback on progress from supervisor	4.33 (0.89)
How much did each of the following aspects of the class help your learning:	
- The pre-reading materials and information	2.83 (0.83)
- Online technology (Adobe Connect, Access Grid, LMS)	1.67 (0.98)
- Supervisor	4.75 (0.62)
How much did each of the following aspects of the class help your learning:	
- Explanation of how to identify and select a research topic	3.91 (0.70)
- Explanation of how to undertake a literature search	3.73 (0.79)
- Explanation of how to collect data	4.00 (0.60)
- Explanation of how to analyze data	3.42 (1.16)
How much did each of the following aspects of the class help your learning:	
- Interacting with location supervisor(s)	4.75 (0.62)
- Working with local peers	3.58 (1.44)
- Interacting with international peers	1.42 (0.67)

Note: The sample size was 12, and the averages were rated on a five-point scale (1 = no gain, 5 = great gain). Standard deviation is noted in parentheses.

for participating in MURN, the experiences of teaching and supervising, and their experiences of the international collaboration, which allowed themes to emerge from the data in a grounded approach. The themes were checked with all other members of the research team to promote trustworthiness.

Results

Student Experiences

Table 2 presents a summary of evaluative data gathered by the survey on learning gains of students involved in the 2012 program. Regarding understanding of research, two indicators in particular were highly rated: learning about research through engagement with a problem, question,

or hypothesis; and research as an activity. In the free-form comments, four students revealed that the program had exposed them to social science and/or qualitative research, and two commented that they were now aware of the need to place their research in a broader context and explain how it contributed to the field.

Regarding research skills, the only area in which students did not report a moderate to great gain was in working effectively with others (see Table 2). One student elaborated: “Regarding team-work and working with others, I’d say that this aspect of MURN received little emphasis and there didn’t seem to be much point in engaging with my peers overseas seeing as they were doing different projects and had different aspects.” The highest rating was

for identifying patterns in data and writing documents in discipline-appropriate style and format. Only one student reported no learning gain for research skills, whereas others reported gains in presentation skills, statistics, interview design, qualitative data analysis, and writing ability.

In relation to impact on attitudes, there were positive gains for all indicators (see Table 2), with the highest rating for confidence in understanding research. One student said, “it made me realise this is not an area I would want to continue with,” whereas others were more enthusiastic about the impact of MURN, describing increased enthusiasm and a more positive attitude toward research.

The key influence on student learning was the supervisors, and workshops and working with peers rated reasonably well, but online technology was rated poorly (see Table 2). Eleven comments specifically mentioned supervisors, and all were positive; for example, “the most important resource in completing the project was my supervisor, who was very helpful and provided constructive feedback.” Several commented about the workshops providing a “good background,” and a few commented on learning from their peers, with one saying, “Best source of learning was fellow students, despite them doing very different topics.” However, there was little interaction with international peers (this received the lowest rating at 1.42), with comments such as “minimal,” “did not interact to a massive extent,” “didn’t really work at all,” and “little interaction.” The frustration with the online technology was apparent: “I found the online technology we used basically useless,” and “technological difficulties were an issue”; this received the second lowest rating (1.67).

Despite some negative perceptions about the program, students were appreciative and enthusiastic overall. The six free-form comments were very positive, noting the opportunity to write and publish a paper or to present at a conference, the value of small-group teaching, the individual supervision, the freedom to develop personal ideas, the enjoyment, and the benefit to a curriculum vitae and possible future career.

Faculty Experiences

Most faculty were motivated to join MURN because of an interest in undergraduate research, a desire to supervise undergraduates, and an opportunity to participate in a global partnership. On the 2013 survey, four faculty commented that they hoped to develop relationships with academics at Matariki partners, four said they wanted the sense of pride of seeing undergraduates become excited by doing research and developing transferable skills, and two mentioned personal development reasons—to gain insights into distance teaching and experience in an undergraduate research program.

The views of teaching in the MURN program were mixed and well summed up by one DU instructor, who commented that MURN was “enjoyable, fruitful, and frustrating.” Faculty members enjoyed teaching undergraduates and supervising research. For example, one UWA instructor commented: “My experience of teaching research methods in workshops has been very successful and satisfying. The small groups of self-motivated students have been keen and energetic participants.” For most, the supervising of undergraduates was the best aspect of the initiative. One UO instructor commented that it was “a privilege to work with undergraduates and see them become empowered and excited by doing research.” The act of supervision was found to be rewarding, and one commented that it had provided an opportunity to question personal assumptions about what undergraduates could do and the level of guidance they needed. One of the newer instructors in the program from UO stated that she wanted more input from experienced supervisors, as she was worried that her students “weren’t getting a good supervision experience.” A UWA instructor commented, “the facilitative nature of the workshops has created a strong sense of engagement and collaboration.”

However, some instructors were frustrated by having to use the centrally supplied materials. Said one UO instructor, “I would rather we agreed on the learning objectives, and then develop our own teaching materials.” The QU instructor commented that having a framework for the program was useful but found that some online resources were better than others. Most of the instructors found the global classroom challenging. One QU instructor said, “What did not work well for us was having to adhere to a specific schedule which was completely out of synch with our academic year.” Similarly, one UO instructor said, “I found the apparent need to be consistent across institutions to be a challenge.”

Faculty experiences with international collaboration yielded the most positive comments from the planning group, which had frequent and ongoing contact with international colleagues. For example, one UO instructor commented that the international collaboration was “challenging but definitely worthwhile. For me it has been exciting working with academics in different countries to get this initiative going.” However, all recognized the difficulties of motivating students to engage with their international peers. Comments included: “this was a weakness in the execution of the project” and “very difficult to generate.” As the QU instructor commented, “from a student perspective they would say this was the least successful component of the program.” The barriers to meaningful international engagement included a dearth of collaborative projects (there was only one), the technology, the time-zone and academic-year differences, and the absence of regular connections between the participating institutions.

Discussion and Conclusions

This article aimed to analyze the logistics of developing an international UR network and determine the benefits and challenges for both faculty and undergraduates associated with an international UR network.

Developing an international UR network occurred in just six months. The process was particularly facilitated by a face-to-face meeting of faculty from the three participating universities in 2012, as well as the ability to draw heavily on a framework and teaching resources from UWA. However, the reliance on the centrally provided resources, although welcomed by one university, was found to be problematic by another. Teaching in a global classroom was a unique aspect of this initiative, as this brought together undergraduate researchers from three countries. But the effectiveness of these teaching sessions was hampered by time-zone differences, different academic calendars, and difficulties with technology. The online resources and opportunities for students to connect online were very poorly rated (at 1.67). In 2012, the UWA student learning management system was used to provide online resources, but because non-UWA students had difficulty with access, the program switched to Edmodo in 2013, which seemed to work better. In both years, Adobe Connect was used for web conferencing, but the system was quite unstable, with many technical issues during the global class sessions. For initiatives seeking global connections, technology must be a strong enabler, which was not the case with MURN.

The most disappointing aspect of the MURN program was that the potential gains of an international research experience were minimally realized. There was a lack of opportunity for students from different countries to collaborate on projects. In the initial design of MURN, leaders of the initiative felt that the projects should be individual and locally based to keep them manageable and to obtain ethical approval for research. At the end of 2012, despite feedback that students desired collaboration with peers from other countries, there was resistance within the instructor team to allowing this in the second iteration, although a few students did connect with peers to gather data. For future initiatives that desire international connections, it is essential for the program to require projects with international collaboration.

Given these findings, it was not surprising that both students and faculty found the most valuable aspects of MURN to be the local community of researchers, rather than any global relationships. Students rated the support of supervisors very highly (4.75) and also enjoyed learning from and with their local peers. Faculty similarly enjoyed the supervision aspect and took pride in seeing the empowerment of students undertaking research. Such benefits have been reported by others (e.g.,

Spronken-Smith et al. 2013). Students also appreciated the skill sets being developed, particularly the opportunity to write an academic paper, undertake the peer-review process, and present at a conference. These benefits for students also were consistent with past research (e.g., Healey and Jenkins 2009; Seymour et al. 2004). Faculty were more positive about international connections with other faculty, and the value of networking by faculty mentors and supervisors of undergraduate researchers has been noted by Dotterer (2002).

Despite a lack of international connections, it was apparent that students and faculty found MURN a worthwhile learning experience, particularly at the local level. In a final reflection, shared by several of the authors, it was felt that perhaps students did obtain more value from the international collaboration than was immediately apparent. When the UO and UWA groups met at the ACUR conference, they immediately bonded and supported each other's presentations. Their engagement with each other's presentations, knowledge of the research topics, and level of sophistication in raising questions about the research indicated a greater level of international engagement than previously thought. Perhaps undergraduates can collaborate internationally using technology, but to add real meaning to the experience they should meet their collaborators (at the conclusion of the process) to present their findings to a wider audience. Aside from the value of meeting their peers, the students' opportunity to present their research serves to complete the research cycle—a very important part of undergraduate research (Spronken-Smith et al. 2013). Also, as noted by Hill and Walkington (2016), undergraduate participation in conferences can develop a host of transferable skills, such as an increase in self-confidence, enhanced communication skills, and the ability to present research to a nonspecialist audience.

Although not mentioned in the survey responses, funding was a major barrier to the continuation of MURN. Faculty at each institution had obtained grants to support the program, but this was not seen as sustainable over the long term. The team came to the realization that, to sustain such an international network there would need to be a credit-bearing course that would attract funding. Indeed, this would have been pursued had it not been for the dissolution of the teaching center at UWA and a change of roles for the leader at UO. Such matters highlight the vulnerability of such programs when they rely on champions and the goodwill of the institution to fund such initiatives.

All in all, the initiative was very worthwhile. However, although many aspects of the program were a great success, connecting undergraduate researchers across the globe was very difficult. Nevertheless, this account of the initiative may provide valuable insights into the

challenges of establishing such networks and possible ways to succeed. Given the authors' experiences in the program, the following recommendations may be useful to others wishing to develop sustainable international undergraduate research networks.

- Instigate a credit-bearing program, rather than relying on institutional grants. This will allow ongoing funding and ensure continuity of faculty involvement.
- Keep the program within one hemisphere. This will help align academic years.
- Try to partner with institutions in compatible time zones. Again, this helps with connection between institutions.
- Keep the membership relatively small. Three participating institutions is ideal.
- Regular and ongoing communication between program coordinators is necessary.

Program administrators may find the following recommendations helpful:

- Institute mentoring support for new supervisors of undergraduate researchers.
- Place students on collaborative project teams, with membership across each institution. This will ensure a truly international undergraduate research experience.
- Ensure that processes for ethical approval of research at each institution can be navigated in a timely manner so that collaborative, cross-border projects can be accommodated.
- Discuss with students the best methods for connecting online. It is better to allow them to use social media platforms than impose more formal learning management systems.
- Target a conference that will bring the group together for research presentations.

With the continual improvements in technology, it is believed that some of the issues faced are no longer applicable. For example, the array of web-conferencing platforms has expanded and improved, with many that are much more stable and user friendly than the versions used for this study.

These recommendations are based on a study of one international UR network, composed of a small number of faculty and students. Therefore, the findings and recommendations should be treated with caution. Future research is required on other international UR initiatives—particularly any that are being sustained—to determine the factors that enable continuation of the particular initiative.

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