Engaging Students with Environmental Sustainability at a Research Intensive University: Examples of Small Successes

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Abstract

The University of Melbourne's Vision for Education for Sustainability is "To develop graduates who will lead change for a sustainable future" (University of Melbourne 2011). This goal is for all graduates and many aspects of a student's experiences will cumulatively contribute toward this outcome. While the individual experiences of students will vary, in particular in the formal curriculum depending on that student's specialization, there are elements of sustainability in the formal and hidden curriculum that all students will experience or can access. This chapter will first explore students' perceptions and concerns regarding environmental sustainability, as gauged through a biennial survey, and then discuss some examples of ways that students of the University of Melbourne engage with aspects of environmental sustainability, including through research, the formal curriculum, the hidden curriculum of the campus, and campus operations.

Keywords

Environmental sustainability · Student engagement · Curriculum · Hidden curriculum · Campus operations · Sustainability integration · Embedding sustainability

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1 Introduction

Sustainability challenges are complex and have many facets and they can be understood in a range of ways by the various stakeholders, who sometimes have conflicting values and interests (Lukman and Glavič 2007). Ratner (2004, p. 62) suggests that:

> When construed not as a fixed end, but as a dialogue of values among competing actors, the sustainability concept acquires a complexity that is more fitting to the diversity of ways in which the idea is applied and contested in practice.

A major aspect of engaging students with sustainability thus is that, in addition to specialist expertise in their chosen discipline, students develop an appreciation for, and a greater understanding of, the values and perspectives of stakeholders outside their own specialty area. Ideally students will also develop knowledge and skills that will prepare them to work in cross- and inter-disciplinary teams to understand and address sustainability challenges. However, it was found in a study of four universities in New South Wales, Australia, that relatively few students engaged directly in sustainability initiatives and it was suggested that "many students appear to be focused on completing their courses and surviving economically rather than on getting involved with university sustainability programmes" (Butt et al. 2014, pp. 802–3). This suggests that integrating student engagement with sustainability into a student's formal studies and in ways that all students connect with, such as experiencing the campus, may increase student engagement with sustainability. The case studies presented here support students developing this broader view of sustainability challenges and enable students to develop knowledge and skills that will prepare them for future challenges. Case studies include examples where the engagement opportunities are through formal studies, some through the lived experience and culture of the university (the 'hidden curriculum', Orr 1992) and other opportunities for student engagement are through extra-curricular activities. The presentation of the case studies is structured around the dimensions of university sustainability defined by Calder and Clugston (2003).

The seven key dimensions of university sustainability functions, as defined by Calder and Clugston (2003), are:

- Research & Scholarship
- Curriculum
- Student Opportunities
- Operations
- Faculty & Staff Hiring, Development & Rewards
- Outreach and Service
- Institutional Mission, Structure and Planning

This chapter will not address all of these dimensions, although all are acknowledged and accepted as being important aspects of a university's journey to sustainability. Of particular relevance to this chapter are: Research & Scholarship, Curriculum, Student Opportunities, and Operations, as these are the dimensions that most closely engage

and empower students in regard to sustainability. The chapter will look at student engagement in these dimensions and where the dimensions intersect. It is particularly at the intersections of various dimensions of sustainability that universities and other educational institutions have rich opportunities to engage their students (Chambers 2015). Sustainability is complex concept and taking an interdisciplinary approach to sustainability is derived from a broad consensus that sustainability issues cannot be sufficiently understood in isolation (Jones et al. 2010). Although the chapter is structured around individual dimensions, it will be evident that the case studies described bring together multiple dimensions. An important aspect of student engagement is going beyond the obvious, though frequently neglected, aspect of curriculum and considering the hidden curriculum (Orr 1992) of the campus and how it can be utilized in student engagement. The infrastructure and daily operations of the campus, as well as the culture of the university, act as a hidden curriculum that teaches students about what the university values. Through the approach of 'campus as laboratory' and a whole-of-university approach (McMillin and Dyball 2009) our students are engaging with sustainability simply through being on the campus, whether in class or not.

The other dimensions of sustainability, though not discussed explicitly in this chapter, create the conditions and the culture within which student engagement with sustainability can occur, and thus provide the necessary backdrop for the case studies presented here. For example, the University's goal ('Institutional Mission') of developing "graduates who will lead change for a sustainable future" (University of Melbourne 2011) means that the activities explored in this chapter have been prioritized and invested in by staff of the university. Similarly, staff with expertise and interests in sustainability (*Faculty and Staff Hiring*, *Development & Rewards*) are a prerequisite for the student engagement explored in this chapter.

1.1 Context

The University of Melbourne is a large research-intensive university situated in the city of Melbourne (population approximately 4 million) in Victoria, Australia. In the 2013 *Universitas Indonesia* Green Metrics ranking (see http://greenmetric.ui.ac.id) the university was ranked ninth worldwide for urban campuses and ranked 18 (out of 301) for overall excellence in campus sustainability. The main campus covers 22.5 ha adjacent to Melbourne's central business district and there are six other campuses, both urban and rural. The university has approximately 45,000 students and approximately 8000 academic and professional staff.

In 2012 the University developed a paper positioning its research over the coming decade and defined three 'Grand Challenges' facing society that universities can contribute to and that the University will have as centerpieces for its research endeavors in the coming decade (University of Melbourne 2012). These three Grand Challenges are: 'Supporting sustainability and resilience', 'Health & wellbeing', and 'Place & purpose'. Thus, sustainability is a centerpiece of the University's research efforts for the coming decade.

In addition to placing sustainability as a focus of research, the University has made commitments to sustainability in its operations and in the education of its graduates. The University's strategy document, *Growing Esteem* (University of Melbourne 2010) states that by 2015 the University will have made substantial reductions to its environmental impact, and progress towards these achievements is well underway and is reported elsewhere (University of Melbourne 2013). The *Growing Esteem* strategy document also sets the goal of the University to 'establish itself as a model of sustainability' (University of Melbourne 2010) and undertakes this challenge through the integration of sustainability principles and practices throughout its operations, teaching, research, and community engagement. The University of Melbourne has thus chosen to position itself as a leader in research into sustainability, in the operations of its campuses, and in the education of its graduates. Student engagement with sustainability is undertaken in a variety of ways that together contribute to our graduates being better prepared to lead change for a sustainable future (University of Melbourne 2011) as is aspired to by the University. It is in this context that this chapter will explore how the University has been, and is, engaging students with sustainability. Case studies included in this chapter have been selected to demonstrate a range of approaches and ways that sustainability engages our students and that illustrate ways that various teams within the university can come together to contribute to this engagement.

2 Student Views

Student environmental groups, increasing enrolments in environment-related courses, conversations with students, and student activism around environmental issues are indications of tertiary students' interest in environmental issues, though a recent study at four New South Wales universities suggested that students at those universities did not have a substantial influence on sustainability-related decision-making (Butt et al. 2014). The University's sustainability team sought to quantify environmental attitudes, priorities, and concerns of students and staff at the University through an online survey (now undertaken biennially) to assist with planning engagement activities. Students and staff were invited to participate via invitations through numerous University communication channels and 1246 students responded in 2012 and 532 in 2014.

Environmental sustainability and climate change were identified by respondents to the 2014 survey as the two most important issues facing Australia today. These two issues were ranked more highly than education, health care, and the economy, and support the assertion that the environment is a major concern for our students and staff. One key issue highlighted by students in both 2012 and 2014 was the importance of strong environmental sustainability leadership and culture at the University. In 2014 sustainability leadership was highlighted as the third most important area of focus for the University (behind waste management and reduction of the University's carbon footprint).

Convenience appears to be a key element of engaging students with sustainability. University sustainability initiatives that engage students include recycling (96 % participation) and use of sustainable transport (90 %). With increased provision and promotion of water fountains for re-filling water bottles on campus, more students were using water fountains on campus (75 %, up from 67 % in 2012). However, whilst many students are motivated to undertake sustainability for altruistic reasons (82 % do so because they believe it is the right thing to do, whilst 76 % do so because they believe it will make a difference), their stated barriers to participation focus on a lack of information (52 %) and the perceived inconvenience of sustainability-related initiatives (34 %). Completing the survey also provided students with a formal channel to make suggestions to University leadership about sustainability initiatives that they feel should receive greater focus.

The Sustainability Survey Report 2014 (University of Melbourne 2014), which is based on this survey, provides valuable data to inform future decisions and to focus efforts in the specific areas of greatest importance to students. Areas identified as important to students are to actively engage students and demonstrate the University's performance in sustainability leadership, reducing the University's carbon footprint and active waste management. Survey results have also highlighted student demand for greater dissemination of sustainability information and more effective promotion of sustainability initiatives and events to increase awareness across the University.

Further work is required so that we can work towards understanding the factors contributing to results and to identify longitudinal trends and ensure that the views of a representative sample of students are gained.

3 Research & Scholarship: Using the Campus as a Laboratory

As a means to engage both specific groups of students and the wider student body, one approach taken by the University is built around using the campus as both a site for research about aspects of sustainability and as a space to showcase the outcomes of research. This section illustrates using the campus as the site for research opportunities at an urban and a rural campus. At an urban campus the green roofs initiative investigates how green roofs can ameliorate the heat island effect, while at the rural campus research across numerous disciplines within a farming community is undertaken.

3.1 Green Roofs: Research Influencing Campus Design

The 'Campus as a Laboratory' philosophy is exemplified by the green roofs at the University's Burnley campus, a small urban campus located 7 km from the city centre. The three green roofs of the Burnley Green Roofs project are located on the

main administration building at Burnley campus and comprise the main demonstration green roof, the research roof, and the biodiversity roof. The green roofs are used for research and as a demonstration and teaching resource for students and courses conducted at the Burnley Campus. This includes a new post-graduate program, the *Specialist Certificate in Green Roofs and Walls*. Taught by industry experts and academic staff, the course integrates green roofs and walls research with real world experience across a number of disciplines. The teaching aims to provide students with exposure to cutting edge ideas and research innovation, coupled with design and management problem solving, all critical in an area where transdisciplinary thinking and practice is required.

The subject '*Designing Green Roofs and Walls*' explores design and specification of green roofs and walls and engages students in green infrastructure as it relates to the University campus. Students apply their learning to design a proposed green roof for a building at the University's main campus that has been evaluated by a structural engineer. Students use the structural capacity information to design green roofs with appropriate and achievable design outcomes. Students also consider key stakeholders in their designs and many of the green roofs are designed as outdoor classrooms or meeting areas. This requires students to engage with academic and professional staff to ascertain needs and concerns and integrates sustainability-related learning into campus development. Project outcomes include enhancing the broader student experience through providing well-designed spaces, together with the direct participation of students in campus development. By greening the campus, students are also helping to address the 'urban heat island effect', a contributor to extreme summer temperatures in Melbourne, and reducing the risk of flooding in central Melbourne.

3.2 Dookie Campus: Innovations to Influence Others

The rural campus at Dookie, 220 km north of Melbourne, comprises a large working farm and bushland reserves on a 2500 ha site and has a primary focus on agricultural education. Many cross-disciplinary projects are undertaken in collaboration with other faculties, government departments, and the local community and utilize elements of the campus farm estate and the campus is used as a demonstration site to "demonstrate the new paradigm in agricultural production by engaging with industry partners, government, the local community and global collaborators" (http://www.dookie.unimelb.edu.au/dookie21/).

A recently completed robotic dairy, only the third of its kind in Australia, embraces state-of-the-art technology that demonstrates innovative dairy practices to farmers and students and will facilitate future research experiments. The dairy includes a solar array and water recycling and was developed with government support to demonstrate more sustainable farming methods. Projects currently underway include a biodigester for the piggery and an algal ponds project to generate bio fuels (currently at tender stage), methane measurement and trialing of

lower emissions feedstock, and a demonstration micro-hydro system is under development. These projects involve the schools of Chemical and Biomolecular Engineering, Agriculture and Food Systems, and the University's Property & Campus Services.

The diversity of the University's campuses enables students and staff to undertake a wide range of research projects and research-led teaching across many disciplines. The rural setting of Dookie campus provides opportunities for land-based technological research that would not be possible at urban campuses. These projects directly address the University's grand research challenges in a very visible way and exposes students and the local community to the University's commitment to sustainability.

4 Curriculum: Sustainability in Coursework

This section describes a subject where sustainability practices at the University have been incorporated into coursework curriculum and lead to credit points for students and link to other aspects of the wider student experience, such as the infrastructure and operations of the university. The impacts of this subject are experienced by many students beyond those who undertake it, as they live and work within the campus environment and the outcomes of the subject inform the operations of the campus. These opportunities where our students have the empowering experience of contributing to change, not just learning about it, are likely to play a significant role in developing the graduate attribute of 'leading change for a sustainable future'. Partnerships between the University's operational and academic arms provide rich opportunities for students to engage in sustainability through the formal curriculum.

4.1 Subject: Interdisciplinarity & the Environment

Interdisciplinarity & the Environment is a capstone subject, taken by approximately 120 students each year in the Master of Environment, which is a cross-faculty program that prepares graduates to work in a variety of interdisciplinary environmental professional roles. The subject focuses on the 'knowledge challenges' experienced by sustainability professionals, particularly the challenges of framing sustainability to support decision-making and integrating knowledge across traditional boundaries of disciplines and professions. The subject requires students to integrate knowledge from across their studies, extend their professional skills in collaboration and integration, and apply their knowledge and skills to environmental decision-making. Each year students grapple with one or more 'real world' dilemmas of making decisions for sustainability. In 2014 all students worked on a single project as the coursework requirement for the subject.

In 2014 students contributed to the University's deliberations around the Green Building Council of Australia's 'Green Star Communities' (GSC) sustainability rating tool (Green Building Council of Australia 2014). Students undertook discussions with Property and Campus Services (PCS) and assignment work in *Interdisciplinarity and Environment* was developed around the Green Star Communities accreditation process. Students explored how a sustainability issue (climate change, environmental risk, or community resilience) was framed by the GSC accreditation documents and then worked in a multidisciplinary team to develop recommendations for PCS on whether and how they should pursue the relevant GSC credit points.

In this project, PCS took the role of briefing agency, while students took the role of environmental consultants. PCS prepared a briefing paper to help students understand the University's decision-making context and priorities in relation to Green Star Communities. PCS staff attended tutorial classes early in semester to discuss the brief with students and throughout the semester students could communicate with PCS staff through the subject's online discussion board. PCS was the target audience for collaborative briefing papers, and—with student permission—the best papers were shared with the University to help inform its response to the Green Star Communities program.

From the perspective of students and academics, projects that facilitate engagement with 'real world' sustainability challenges and professional sustainability practitioners offer clear and real benefits. For students, such projects enable deeper understanding of theory in practice, and a safe environment in which to try out emerging professional skills and more clearly imagine their future professional practice. For academics, projects established in partnership with sustainability agencies facilitate the design of authentic and meaningful assessment tasks that are both information-rich and relatively open-ended in the manner of so many professional projects. Sustainability agencies can provide access to key documents and data, can introduce students to the particular political and social context in which decisions must be made, and help students appreciate the uncertainties and active boundary setting that are so critical to professional activity. For these reasons, it is very valuable to develop academic assessment through a partnership between a subject coordinator and an industry partner.

This kind of partnership adds further value for the University through contributing to achieving the University's sustainability goals, both operational and educational. The focus of sustainability is not just on reducing operational impact, but also integrating sustainability principles and practices through the University's core activities. Sustainability leaders at the University argue that the greatest positive impact we can have is not in operational efficiencies but in the degree to which we can empower our students as future leaders. Property and Campus Services therefore seeks out opportunities to satisfy operational objectives in ways that engage and empower staff and students through curriculum and research. Property and Campus Services are involved in a wide range of research-related projects (described elsewhere in this article and in Chambers 2015) and in small student projects, however this project was the first to engage a large group of students with

particular expertise in sustainability who devoted a significant portion of assessment tasks to focus on a key deliverable for PCS.

A curriculum and operational innovation such as this is not without challenges, and staff and students noted several aspects they would like to sharpen in future partnerships. For example, the timing of semester and the external constraints of the project were not well matched, which created challenges and limited genuine student contributions to outcomes. However, the project provided an additional opportunity for the University's operations team to formally and meaningfully engage with students and to access their environmental expertise and enthusiasm. Beyond the value of the submitted material, this experience established a process of engagement between academic and operational units that aligns directly with the University's sustainability aspirations and has generated capability and confidence to seek out and develop similar opportunities in the future.

This subject demonstrated that students from a range of disciplines engaging with a common problem under the guidance of academic staff and consulting with staff from PCS can lead to meaningful student engagement with sustainability and its complexities at the University. By incorporating projects such as this into coursework subjects, students gain valuable learning and cross-disciplinary experiences that prepare them to be more effective practitioners and advocates that can lead change for a sustainable future.

5 Student Opportunities: Workplace Experiences

In addition to coursework subjects, in many courses students take on projects in authentic workplaces, both within the University and beyond. In the subject entitled, the *Melbourne Business Practicum*, the Faculty of Business & Economics offers opportunities for students to work in small groups on challenging projects in a workplace environment. Each student group acts as consultants on a project. Projects described here were located within the Property & Campus Services unit of the University and addressed sustainability issues. These projects benefit students by giving them exposure to contemporary sustainability issues in the 'real world' environment of the University, with all the challenges and constraints of such a complex organization, and in working with others to achieve meaningful change. The University benefits greatly from having our very capable students undertaking these projects.

5.1 Review of Fair Trade Practices

In May 2012, the University became a certified Fair Trade University (http://www.fta.org.au/fair-trade-universities.html), committing to increasing the use of Fair Trade products in University kitchenettes and at events and by encouraging cafés and shops on campus to offer Fair Trade products. An important component of the

Fair Trade initiative is to embed student involvement across many areas of the initiative. This included a student-led consulting project in the *Melbourne Business Practicum*, in which a group of students reported on the uptake of Fair Trade around the University. The results and recommendations within the report provided the University with valuable information on perceptions about Fair Trade on campus and provide a solid foundation to build on the initiative, especially in regards to cafés and the student body.

The 'Fair Trade Ambassadors' program is an example of further student engagement in raising awareness of Fair Trade, in which six student volunteers were selected to join the University's Fair Trade Steering Committee. The students now take an active role in making University decisions relating to Fair Trade. This is a teaching and learning opportunity that works to enhance the student experience while engaging with the wider community. This particular program offers a 'win-win' situation whereby students are empowered to actively support and lead change in their University while enhancing operational outcomes for Fair Trade at the University.

5.2 Developing a Framework for Integrated Sustainability Reporting

The need for the University to develop an integrated reporting framework for sustainability at the University has been recognized for some time and the University's Sustainability Executive provided strong support for this framework to be developed by students, rather than through external consultants. A proposal was submitted for the initial student project through the *Melbourne Business Practicum*. A project team was established and a framework was developed through an information gathering process that included a review of contemporary sustainability reporting in the higher education sector; gathering of key data; identifying of information gaps; and developing recommendations.

The students involved were accounting and finance specialists with no previous exposure to sustainability principles and practices. After undertaking the project they all reported a strong and new interest in sustainability. This project demonstrates how commercial principles can be applied to provide structure around sustainability practices and has established a foundation for further development regarding integrated reporting at the University.

6 Operations: The Hidden Curriculum of the Campus

Students and staff experience the campus on a daily basis and it is a 'second home' to students for the three or four years that they are studying for a degree. The daily experiences and interactions that students have while on campus send a profound

message to students about what the University values. This has been elegantly summed up by Orr (1992) as the 'hidden curriculum' of a university.

> We think that education occurs mostly in buildings, yet apparently we believe that the design and operation of those same buildings have nothing to do with education… The design of academic buildings is a kind of crystallized pedagogy full of hidden assumptions about power, about how people learn, how they relate to the natural world, and how they relate to one another… the design and operation of buildings provide an educational opportunity as well… (Orr 1992 p. 7).

Thus, the infrastructure and the operations of a university, though not a part of academic services or explicitly thought of as part of the teaching program of a university, sends powerful messages to its students about what it really values with respect to sustainability, and many other matters. The manner in which the physical campus is presented and the engagement of students in its development and operations is central to the students' experience of sustainability during their time at the University.

6.1 Recycling & Waste: Messages in the Bins

Waste and recycling bins are a visible and daily reality of a campus landscape and can send messages to students, staff and visitors to the campus. In 2010 the University developed a Waste Management Plan and set a 2015 target of 50 % of waste to be recycled (from a baseline of 16 % recycled in 2009) and appointed a Waste & Recycling Coordinator to drive the changes necessary to achieve this ambitious target. A research project (Gilmour et al. 2013) that involved PCS staff and academic staff was undertaken to investigate the availability and placement of bins and human behaviors, with a goal of informing campus practices to minimize waste going to landfill.

Data from bin audits enabled an understanding of how location, labeling, and distance to the nearest recycling/landfill bin influenced behaviors of people disposing of waste and provided evidence of the importance of labeling and of co-locating landfill and recycling bins. The study demonstrated that the provision of suitable infrastructure can lead to dramatic improvements in rates of recycling and less recyclable materials going to landfill. The results of the study led to the replacing of waste bins and recycling bins across the campus with clearly labeled and twinned waste and recycling bins that are a visible and daily reminder about not only what to do with waste, but also that the University sees waste minimization as a priority. Thus the placement and the labeling of something as commonplace as bins can make real contributions to both operational targets and in sending clear messages to students through this aspect of the hidden curriculum.

6.2 Geothermal Installation at the Campus Sustainability Centre

In 2013 a shallow geothermal facility was installed in the building that houses the Office for Environmental Programs (OEP) and Campus Sustainability Centre. The 25 kW facility acts in both an operational and educational capacity—it provides efficient heating and cooling to the ground floor of the building and provides teaching and research opportunities.

The planning, approvals and implementation phases of this project involved the collaboration of numerous stakeholders, predominantly academic staff and doctoral students from the Infrastructure Engineering department within Melbourne School of Engineering, staff of PCS, staff of the OEP (as the major building tenant), and external stakeholders who provided technical services and parts.

This project creates many benefits through the integration of research activities with the operations of the University. Public display screens in the Campus Sustainability Centre capture system performance and act as a visible reminder to the community of efforts to operate the University in a sustainable manner. System monitoring enables ongoing research and teaching opportunities. The project has also informed the design of an 80 kW shallow geothermal facility as part of major construction works elsewhere on campus.

While the processes involved in this project were challenging and resource-intensive, the long-term benefits are considerable. Engagement across organizational boundaries enabled the benefits of an otherwise purely operational implementation to provide fertile opportunities for ongoing research and teaching. The expertise of academic staff and students in the field of infrastructure engineering enabled an outcome that would have been unachievable solely through operational means.

7 Conclusions

Examples presented here illustrate a range of initiatives and activities through which students engage with sustainability across a number of the dimensions of sustainability defined by Calder and Clugston (2003). Some examples directly affect relatively small numbers of students, such as in the specific subjects discussed, although the impacts of the outcomes of those subjects may affect a much wider student population through the work of those students informing campus infrastructure or operations, and some initiatives will directly impact many students. As has been explored elsewhere (see Chambers 2015) most of the initiatives do not fit neatly into a single dimension of sustainability, but rather cross a number of the dimensions, although for convenience they have been presented under a single heading here.

Student engagement with various aspects of sustainability within curriculum, research, and operations enables students to gain valuable experience and rich learning through these authentic challenges of sustainability in the complex environment of a university. This leads to substantial benefits for both students and the university. Students have rich interdisciplinary and authentic experiences to draw on when applying for jobs after graduation. The university gains the many benefits from the efforts of the students, who are the elite of their generation, as do other students through their daily experience on the campus.

While each university has its own history and characteristics, the circumstances and culture of the university in which the case studies are set is not particularly unusual—it is subject to the usual tensions and pressures experienced by large research-intensive universities. Thus, the types of initiatives described here could be replicated elsewhere if there is a desire and a willingness to set and support ambitious goals and if there is support for staff to cross traditional boundaries and to explore new ways of engaging and empowering students in pursuit of these goals.

The sustainability initiatives and activities described here are all aspects of the University's core activities of research, teaching and learning, and community engagement and they are collectively, and with initiatives not outlined here, helping to shift the culture of the University. This is a slow process that is achieved both through governance decisions and through the daily lived experiences on campus. As the title of the chapter suggests, the examples explored in this chapter are small wins where individual staff have created alliances and developed relationships, often across traditional boundaries, to create opportunities for engaging students with sustainability. There is much scope for a more structured and systematic approach to developing further opportunities for students to have more active engagement with sustainability through the formal and hidden curriculum. The University's goal for its graduates to be able to 'lead change for a sustainable future' applies to all graduates, and so an active engagement with sustainability, rather than only passive engagement, is not only desirable, it is necessary. The university has much scope for expanding these active opportunities and celebrating the early successes may encourage more work in this important area that is valued by both students and the University.

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