INNOVATION IN LOCAL AND GLOBAL LEARNING SYSTEMS FOR SUSTAINABILITY

TOWARDS MORE SUSTAINABLE CONSUMPTION AND PRODUCTION SYSTEMS AND SUSTAINABLE LIVELIHOODS

LEARNING CONTRIBUTIONS OF THE REGIONAL CENTRES OF EXPERTISE ON EDUCATION FOR SUSTAINABLE DEVELOPMENT

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RCE Saskatchewan: Advancing Sustainable Livelihoods Through Equipment-Centred Learning and Sharing

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RCE Saskatchewan

RCE Saskatchewan is situated in the prairie region of Western Canada. It encompasses the province of Saskatchewan's two major cities, Regina (the provincial capital) and Saskatoon, as well as smaller communities within the corridor between these two cities (including the town of Craik) and communities to the north-east (including Nipawin and Melfort). Saskatchewan has a culturally diverse population with a substantial indigenous and métis population, historic immigration from western and eastern Europe in the 19th and 20th century, and currently high rates of immigration from across the globe. RCE Saskatchewan initially identified a number of sustainable development priorities for the region. These included sustainable community planning, addressing climate change, adapting cultures for sustainability, farming and local food production, advancing health and healthy lifestyles, reconnecting to natural prairie ecosystems, and developing sustainable infrastructure (including water and energy; see RCE Saskatchewan, 2012, Project Inventory). These were identified through the participation of its founding partner organisations. RCE Saskatchewan partners include eight higher education organisations: two provincial universities, one aboriginal university, one provincial technical institute, two faith-sponsored colleges, and two regional colleges (RCE Saskatchewan, 2012, Partners). The RCE has received government support from provincial ministries (including ministries of the environment and education), the national Ministry of Environment, and cities and towns in the region. In addition, key partners include existing and emerging sub-regional community partnerships for sustainability (for example, CSLP, 2012). Specific RCE events, such as the RCE's annual Education for Sustainable Development (ESD) Recognition Event, consistently receive support from cooperatives, state enterprises, professional associations, and environmental NGOs (RCE Saskatchewan, 2012, Recognition). The RCE is also engaging the non-formal education sector, particularly the business community, hosting a Sustainability and Education Academy seminar for senior executives in collaboration with Professor Charles Hopkins and York University (SEdA, 2012).

Project Overview and Achievements

A central concern framing the issues of focus for the RCE is sustainable livelihoods. The region continues to export raw resources with minimal value added production. Saskatchewan is resource rich: a major exporter of wheat and other grains along with oil, uranium, potash, and other minerals. Due to global demand, the provincial economy is booming despite economic hardship in other parts of Canada. This resource boom presents its own challenges; much of the development in rural areas is tied to extraction of non-renewable resources and the need to cope with their disruptive ecological impacts and lack of long term sustainability. This is despite an abundance of renewable energy sources in Saskatchewan (e.g. wind and solar), alternative production inputs tied to a prairie ecosystem, and an available land base for experimentation with sustainable production systems. With the economic boom, population growth is also occurring in larger urban centres. This has created acute problems in the area of housing, with lack of affordability, low vacancy rates, and new housing construction generally lacking sustainable design features found elsewhere. Though some light manufacturing exists, many industries serve traditional resource sectors while most consumer durables are imported.

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Partners of RCE Saskatchewan are developing two initiatives that will help address the current context of development in Saskatchewan. The first project, under the direction of the University of Regina, has involved intra- and inter-organisational planning to install a vertical axis wind turbine (VAWT) on the University of Regina campus for both energy generation and educational purposes. The VAWT has now been installed and the University is near completion of a web based dashboard to share data from the VAWT for use in diverse educational settings. The second initiative is a collaboration of higher education partners of RCE Saskatchewan (including Luther

View of the Arm River from Craik Eco-Centre

College, the University of Regina, and the University of Saskatchewan) with the town of Craik to enable sharing of productive capital (such as machines, vehicles, and buildings) within the Craik community. To date, this project has involved identification of specific types of equipment to be shared, free/open source software programmes potentially available for enabling this sharing, and specification of software features to enable equipment to "volunteer" for projects. Underlying this concept of volunteerism is a reconceptualisation of "equipment as citizen" with this new ethical valuation to be supported by the software. In both the wind turbine project and the sharing productive capital project, educational strategies are being developed centred on the pieces of equipment themselves while presupposing diverse educational audiences.

Project Context and Background

The context of production and consumption in Saskatchewan can be partly characterised by a historic lack of a manufacturing base for final goods consumed by consumers. This can be tied to several regional features including Saskatchewan's sparse and geographically dispersed population, high transportation costs as a landlocked province with significant distances to navigable waterways and sea ports, economic costs associated with extreme temperature conditions (with an average high of 26 degrees celsius in Regina in July and an average January low of -22 degrees), and inherent weather risks associated with an agricultural economy.

At the same time, this lack of traditional development has meant significant innovation in other sectors to manage economic risks including a large cooperative and credit union sector, citizen-owned state enterprises (including telephone, power, and insurance crown corporations), and a non-profit sector (with Saskatchewan boasting some of the highest rates of volunteerism in Canada and the world). A further challenge relates to a skills gap between the existing labour force – especially young people and indigenous youth – and the relatively high technology jobs that are available in growing resource sectors of the economy. Strategic community interventions that enable the laddering of individuals into the workforce (possibly through the use of intermediate technologies) and beyond traditional glass ceilings are critical. This is potentially achieved with community innovation and experimentation with sustainable and appropriate technologies.

Vertical Axis Wind Turbine Installed at the University of Regina

RCE Saskatchewan Initiatives addressing this Context

RCE Saskatchewan has sought to advance projects that provide place-based and object-centred learning opportunities to advance sustainable production and consumption. These include developing regional laboratory centres for sustainability (focusing initially on wind energy) and developing community spaces and technology for sharing productive capital. The first project entitled "Re-engineering Research and Learning for Sustainability" has involved experimenting with small scale wind power generation in an urban rooftop setting. The University of Regina, a founding partner of RCE Saskatchewan, has made a strategic commitment to sustainability as part of its strategic plan "mâmawohkamâtowin: Our Work, Our People, Our Communities" (University of Regina, 2009:4). Appropriately for the kind of collaborative work required for sustainability, the Cree word mâmawohkamâtowin means "co-operation; working together towards common goals". University of Regina researchers across disciplines (including the faculties of engineering and education) worked with the University's Institute of Energy, Environment and Sustainable Communities and its Physical Plant to install a vertical axis wind turbine (VAWT) in the research park of the University. The turbine is a 3.5 kW hour Cleanfield Vertical Axis Wind Turbine. The VAWT is connected to the provincial power grid through net metering, in cooperation with the provincially owned power company, SaskPower. The installation of the turbine is meant, at one level, to practically examine the use of this type of wind turbine manufactured by Cleanfield Energy of Ontario within a prairie setting (see Cleanfield Energy, 2012). The installation allows examination of the correlation of produced energy in light of local atmospheric conditions (such as wind direction and speed, humidity, and pressure) along with impacts of extreme temperatures. This data will also be helpful in examining optimal locations for such wind turbines on the prairies.

Other educational goals are also associated with the project. The University of Regina is creating a webpage "dashboard" that will allow for public access to the data collected from the wind turbine. The dashboard will show real-time power generation in relation to wind speed and direction, along with weekly and monthly averages. The data will not only be available to the general public but is specifically intended for use by Kindergarten to Grade 12 teachers working on environmental sustainability issues and renewable energy. The data will also be made available to undergraduate and graduate students at the University. This will include the University's Faculty of Education. Undergraduate education students can consider interdisciplinary curriculum development tied to the place-based data provided by this wind turbine (and other such projects developed in the province) to support the sustainability emphasis of the province's education curriculum. In addition, the data will be available to other RCE partners working in the area of wind energy on the prairies. This includes the Saskatchewan Institute of Applied Science and Technology that has also been examining small wind turbine technology (with a 1.3 kW turbine) in the nearby city of Moose Jaw (Thompson, 2009).

The second project, entitled the "Sharing Productive Capital Project (SPCP)", is attempting to enhance existing free/open source software with the aim of enabling the sharing of equipment, vehicles, and buildings within the town of Craik, a small community in Saskatchewan. Craik has been a leader in sustainability innovation in the province. This includes its having developed an eco-village and straw bale eco-centre (CSLP, 2012).

In working with the Craik Sustainable Living Project, a founding partner of RCE Saskatchewan, it was found that there were a number of opportunities for sharing underutilised equipment within the community. Given the success of volunteerism within the community of Craik in advancing sustainability initiatives, a key question was whether the equipment available for sharing could be understood through the design of the proposed software as "volunteering" to advance specific projects. Mobilising equipment through volunteerism, however, requires seeing physical capital as analogous to autonomous decision-makers with the ability to choose their own courses of action, namely as citizens. The overarching goal of the Sharing Productive Capital Project, then, has become exploring how productive capacity and sustainability might be advanced by applying concepts related to citizenship to the treatment of underutilised productive capital.

A reconceptualisation of machines in terms of the idea of citizenship and, more specifically, autonomy or self-governance, draws on areas of the humanities, especially ethics and political philosophy. With funds from Luther College, a founding partner of RCE Saskatchewan, an initial literature review of philosophy related to the ethical treatment of machines and other human artifacts was conducted. Several findings emerged in thinking about how one might "liberate" currently owned productive equipment. In this light it would be seen, analogous to citizens, as having intrinsic value, thereby enjoying various rights and freedoms. For example, the "freedom from interference by others" when applied to machines requires software that mobilises machines in a way that optimises their community use, rather than having their use arbitrarily restricted by a traditional equipment owner. Software can also enable equipment to "freely associate" with other pieces of equipment in a community's repository to achieve a much greater set of production possibilities. The "quantity and quality of choices" open to machines can also be enhanced by having software that allows users to identify and tag existing uses for a piece of equipment within a given setting, as well as identifying new uses. These diverse uses can then be actively promoted to the community. One can also view equipment, analogous to citizens, as wanting to act on "higher-order life plans". This requires software design that enables equipment time to be dedicated to higher-order, longer term community projects, particularly where there are conflicting demands on use. Finally, for humans to effectively exercise citizenship this requires certain underlying material conditions to be met, such as food, shelter, and health. Within the context of equipment treated as citizens, this might require ensuring a sustainable supply of energy (i.e. food), tracking the equipment's current location and proper storage (i.e. shelter), and developing proper maintenance schedules (i.e. health).

Following this literature review, free/open source software applications that might be adapted to suit the project's goals were identified including collection management software, library management software, and volunteer management software (for example, Tellico, Alexandria, LibLime, Evergreen, Koha, CiviCRM, and Son of Service). Meetings were then held in Craik to discuss current ways of sharing within the community and needed software functionalities to enhance this sharing. Following this consultation, the Craik community identified five types of productive assets to share initially. These included: equipment for ecologically friendly construction (for example, straw bale housing); gardening equipment; specialised tools (e.g. masonry equipment and power tools presentation equipment for workshops; and outdoor education equipment. In seeking to build and implement the software, the SPCP project seeks to use scenario-based design, a prominent method used in computer science. As such, the community of Craik developed five scenarios for the software's potential use based on their experiences with each type of equipment. The community also identified priorities for software functionalities. Initial specifications for the development of the software were then undertaken.

In 2011, a community of researchers from a variety of disciplines (philosophy, computer science, education, and religious studies) and several RCE Saskatchewan partners (including the University of Saskatchewan, University of Regina, and Luther College) formulated a proposal to the Social Sciences and Humanities Research Council of Canada (SSHRC) to advance the project. The proposal was to initially develop a community inventory of equipment in Craik in the five areas identified, along with implementing a free software prototype developed by graduate students and customised for the community of Craik. The proposal also included participation by other RCEs interested in sharing productive capital in their respective regions, specifically RCE Kano in Nigeria. Unfortunately, this interdisciplinary project proposal was not funded by SSHRC. The respective RCE partners are currently examining how the project might be funded by another partner of the RCE and/or advanced by mobilising in-kind voluntary contributions. In addition, computer science students at the University of Regina (undergraduate and/or graduate) have also assisted to further the software's development as part of a directed reading course during the summer of 2012.

Conclusion

Both projects illustrate the need for collaborative, interdisciplinary partnerships to have the critical mass of resources and expertise to advance place-based and object-centred learning. Additional educational opportunities become possible upon implementation of

the project given its transformative impacts within a given community. Knowledge formation and skill development will naturally follow these opportunities for situated experiential learning. At the same time, the projects each need to address multiple educational audiences and achieve clear developmental milestones to ensure ongoing engagement by project partners. Both projects also show the need for transformative education at the level of values. Each requires re-envisioning the ethical status of the physical equipment being studied. In the case of the sharing productive capital project, the innovative application of concepts associated with citizenship to non-human equipment provides for a wide range of educational possibilities. These creatively build on an existing platform of complex ideas associated with various rights and freedoms held by a country's citizenry yet applied to a novel context – that of equipment. Building on such a platform will hopefully allow for a more rapid engagement and advancement of learning. The potential for rapid innovation by applying existing ideas to a novel context should not be underestimated nor should it be surprising to those engaged in the field of sustainable development. In the case of sustainable development, the application of the concept of "capital" (traditionally applied to machines and money) when applied to sustaining human beings and natural objects (as human capital and natural capital respectively) is a foundation of sustainable development. This sustainability discourse has had a remarkably transformative impact. Seeing machines as citizens may be likewise transformative.

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