

SUPPORTING INFORMAL ENVIRONMENTAL EDUCATION IN HIGHER EDUCATION
USING A BLENDED PRESENTATION MODEL: USING INTERNET-BASED RESOURCES
TO ACHIEVE DURABLE SUSTAINABLE BEHAVIOUR AT
VANCOUVER ISLAND UNIVERSITY

by

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Abstract

Environmental education, in both a focused and broad sense, is needed to foster sustainable behaviours and attitudes that will result in the resilience required to preserve natural environments, social justice, and economic stability. McKenzie-Mohr (2011), and Moloney et al (2010) among others suggest the most effective impact on these target behaviours and attitudes happens at the community level. It follows, then, that not only geographical but internet communities, too, can have significant impact in developing the durable, positive actions required to maintain healthy, thriving environments for all. Internet-based resources offer potential to connect disparate geographical areas, disciplines, and experiences to support the sustainability and environmental literacies needed to support widespread, effective action. This study examined the efficacy of a blended learning (BL) model in supporting informal environmental education learning opportunities at a post-secondary level through using multiple pathways of presentation and engagement of students, staff, and faculty. Conclusions include recommendations, based on analysis of engagement and participation, for elements to include in future community-based initiatives in a post-secondary setting.

Keywords: environmental education, blended learning, sustainability

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Chapter 1 - Introduction

The need for consistent, effective actions to mitigate climate change is critical. Achieving those enduring behaviours and establishing strong social norms, though, is challenging. McKenzie-Mohr, Schultz, Lee, and Kotler (2012) explain that change happens most effectively at the community level, and M'Gonigle and Starke (2006) argue that universities, because of their diverse community, are a natural forum for infusing a strong sense of environmental awareness and stimulating sustainable action. Indeed, pedagogical differences bring a richness of perspective, but do not bind a diverse community to a course of action. Further, building a community does not fall to any one sector but is dependent on cooperation of often diverse groups coming together in shared experience with each bringing their own perspectives and practices (Ling, Hanna, & Dale, 2009). In a diverse community, however, how can the experiences and understanding of small groups be leveraged to engage the wide audience of students, staff, and faculty in a common goal of sustainable development?

Formal teaching in sustainable development that engages students, staff, and faculty is unlikely to occur across an entire post-secondary institution. Further, as formal education tends to be knowledge-based, it is not desirable as information alone is not enough to induce action (Schultz, 2014). Education for sustainable development (ESD) maintains that a traditional transmission model of education does not achieve the transformational learning, and transformational learning is critical in effecting a significant shift in social norms and actions to achieve environmental change (Tilbury & Cooke, 2005). Informal learning experiences, where learning happens through shared experience, conversation, and connection (Jeffs & Smith, 1997, 2005, 2011) are powerful in building strong communities of practice. Orchestrating events where there is opportunity for autonomy, reflection, and connection in contributing to a body of knowledge has potential to

unite these groups into wider action. Informal education, then, must go beyond simple transmission of information in order to develop connections between disciplines and aid in developing communities of practice rather than pockets of action.

A blended learning (BL) approach, which makes use of the affordances of Web tools as well as face-to-face interaction, offers a possible framework to deliver a deliberate informal learning program that fosters enduring sustainable behaviours. Evidence suggests that BL is both engaging and provides a high degree of satisfaction for learners (Dziuban, Hartman, & Moskal, 2004). As with ESD, blended learning necessitates a break from traditional one-way transmission teaching practices. A connectivist construct, Downes (2012) describes BL as self-directed learning that nurtures both the self and society. Further, BL creates a forum that allows for play. That is, ideas gleaned from a formal education context can be applied, explored, and shared with others who may or may not have similar backgrounds or perspectives. These kinds of informal learning experiences, where a community with multiplicity of backgrounds comes together in activity and has opportunities to express and share ideas not only supports teaching and learning, but has the potential to result in transformational learning. The question to be addressed, then, is could providing intentional informal learning opportunities using a blended teaching model of both face-to-face and virtual interaction (social media) and reflection result in enduring, sustainable behaviours in a post-secondary community? Thus, the objective of this project was to examine the benefit of a blended learning model in an informal learning situation intended to promote and support ESD and action.

Impact

VIU has approximately 18,000 students and over 2,000 staff. As with all BC public service organizations, the Greenhouse Gas Reduction Target Act (Bill 44) states that VIU is

mandated to decrease greenhouse gas emissions by at least 33% less than the level of those emissions in 2007. To date, carbon reduction at the institution is not on track to achieve that goal.

While this project focused on the specific enduring sustainable behaviour of switching off unneeded lights and monitors, it was intended that other impacts would occur that would aid in motivating both individual and institutional action needed to reach greenhouse gas emission reductions. These anticipated impacts included, but were not limited to, the following:

- Building community by increasing connections between operational areas, academic units, and the student body;
- Enhanced sustainability awareness for the VIU community;
- Supporting the core values of Vancouver Island University's (VIU) Academic Plan.

The general BL model outlines participant control over time, place, and pace of online information accessed; participant opportunity to take part in face-to-face sessions away from home; and that these face-to-face sessions are integrated with online content (Clayton Christensen Institute for Disruptive Innovation, 2012). In this study, online and face-to-face interaction that encouraged and supported autonomy of expression, interaction between departments and areas of studies, and reflection on experience were constructed with a focus on the specific action of conservation. While face-to-face opportunities may not have been available to all participants, online elements could be accessed in random order any time in any place and had no specific learning outcomes but instead provided opportunity for interaction, reflection, and action.

Chapter 2 - Literature Review

Drexhage and Murphy (2010) contend that sustainable development is the guiding principle of “international institutions, governments, businesses, and civil society” (p. 9). As a result, to be ‘sustainable’ – that is, to behave in an environmentally responsible manner by demonstrating an awareness of the three pillars of sustainability (society, environment, financial stability) -- has permeated most aspects of day-to-day life. In our aspirations to be ‘green,’ we may take reusable bags to the grocery store, make use of refillable water bottles, or strive to buy local. We are bombarded with product advertisements that support a concept of behaving in an environmentally responsible way, yet, in spite of the growing body of information on how to be sustainable, actions of institutions, governments, businesses, and society are often decidedly unsustainable. Kahn, Severson, and Ruckert (2009) outline the idea of an environmental generational amnesia where each successive generation comes to see a deterioration of nature as normal. Related to this idea of amnesia is that of the dissonance between societal norms and practices. Kahn and Friedman (1995) note that the act of polluting is not a black and white event. Although societally we see it as bad, we engage in behaviours every day that have deleterious consequences on environments near and far. There is a disconnect between behaviour and consequence which is further compounded by the commodification of greenhouse gas emission. Carbon dioxide equivalent gasses produced can be offset through buying carbon credits which are derived from carbon sequestration activities such as afforestation, or through projects that offer a lower impact form of energy such as wind farms. Effecting behaviour change is a multifaceted challenge, and requires an eclectic range of strategies (Fien, 2002, p. para. 1) rather than information campaigns, which have been shown to be ineffectual in supporting significant change (McKenzie-Mohr et al. (2012).

Drexhage and Murphy (2010) speak of the broad acceptance that sustainability is the union of economic development, social justice, and environmental protection, yet with natural resources in danger of being exhausted or compromised, needed political and citizen engagement and action have not reached a point of being effective. Profound structural change that will require difficult choices and action rather than discussion are imperative. Similarly, McKenzie-Mohr et al. (2012) contend a broad range of actions, and not necessarily specifically related to the environment, are need to become part of everyday life in order to swiftly bring about changes needed for a sustainable future. Mische (1992) observes that "...it is not the unschooled and illiterate who are perpetrating the gravest environmental harm, but those who have been schooled and conditioned in patterns of unquestioning consumption, waste, and ignorance of their integral relationship and dependency on the Earth and each other" (para. 1). It is clear that how to be environmentally responsible has been forgotten by many. Ways of living and being are learned through a variety of channels; both formal (education), and informal (observation, cultural norms). Siemens (2004) posits that informal learning from a wide array sources such as personal networks, communities of practice, and work-related tasks now supplants learning from formal education. There are many ways to achieve a common end—in this case, environmentally responsible behaviour-- both formally and informally. The affordances offered by web-based tools make them an attractive option to explore in effectively supporting that learning. The divergent disciplines of study, and range of timetables in a university environment would be well-served by the flexibility offered by web-based tools, and the university's infrastructure is usually able to support the anywhere, anytime access to these tools.

The University as Leader

While the university can provide the tools for environmental education (leading to environmentally responsible behaviour), where it should be located, and who should own it is less clear. Fielding and Head (2012) note that if it is perceived that government is the locus for environmental protection, then behaviours deleterious to nature are more likely to occur in adolescent and young adult populations in Australia. Indeed, many studies cite that feelings of powerlessness negatively affect environmentally responsible behaviour (Bramston, Pretty, & Zammit, 2010; Bush-Gibson & Rinfret, 2010; Pooley & O'Connor, 2000). If there is a belief that responsibility lies with an outside body, there is no need for the individual to actively engage in the solution. The perception, then, that environmental protection is the responsibility of a governing body (the office of the university president) community engagement in environmentally responsible behaviour will be low. For environmental education to result in durable, environmentally responsible behaviour, learning needs to happen at a more granular level than the president's office.

Further, this education must go beyond any specific discipline. Tilbury and Cooke (2005) argue the need for sustainability to be strategically entwined in all aspects of a university which includes facilities operation as well as areas of research, curriculum, and administrative practice (p.62). M'Gonigle and Starke (2006) contend that universities need to take a lead role in motivating and supporting change. They further explain that universities are in a unique position in that they are based at the community level, the position that McKenzie-Mohr (2011) noted is the most effective in bringing about change, but have worldwide ties. Jane Jacobs (2004) maintains cultural health is in decay, in part to a lack of action and information sharing, and in response to Jacobs' premise, M'Gonigle and Starke stated, "we are losing our cultural memory,

and without this memory, societies cannot survive” (p. 15). This sense of a diminishing connection with culture is echoed in Kahn et al.’s notion of environmental generational amnesia. Because a university community is typically intergenerational, it is in a unique position to be able to span and connect a wide generational plane through the word of mouth and example that Jacobs (2004) believed to be key in sustaining a vibrant society.

There is an urgent need to foster durable, sustainable behaviour through both formal and informal environmental education at a community level. Widespread, community-based efforts are needed, and there is strong logic for leadership and mentoring to come from universities. What does institutional sustainability—achieved through environmental education—look like and what is necessary to achieve it? Not only do universities have a broad range of diverse teaching disciplines, but are often made up of several different sectors that include students, educators, support staff, operational staff and administration. Ralph and Stubbs (2013) opined that universities hold great potential for a ripple effect of sustainable behaviours into the community through excellence in operations, research and teaching. In addition, they point out that there is strong resolve to integrate sustainability into curricula, operations, and governance. However, Bekessy, Samson, and Clarkson (2007) commented that in view of the urgency of sustainable action, university support through signing international documents of intent such as the Talloires Declaration, and gradual policy and practice shifts are not enough. Shriber and Tallent (2003) explain that although the intent is good, and that there are “pockets of environmental activities” at most institutions, there was a general lack of coordinated, shared strategies to support sustainable literacy and actions at the post-secondary level.

Connectivism in Sustainable Education

It is essential that all sectors of an institution be included and linked in environmental education and action. In this way, this is consistency in both community messaging and practice. This need for a connected community parallels Siemen's (2004) theory of connectivism where he points out that "the organization and the individual are both learning organisms" (para. 4) and that connection between diverse, perhaps unrelated, fields allows the learner to acquire the learning needed to act (Siemens, 2004). Indeed, the core principles of connectivism parallel the kind of action needed in bringing about significant change in sustainable behaviours.

Connectivism states that being able to recognize correlations between fields, ideas, and concepts is key to learning as well as coming from a diversity of opinions (Siemens, 2004). Therefore, transformation toward environmentally responsible behaviour should not be dictated but supported (Moore, 2005). The complexity of addressing sustainability issues demands accessing and adopting many ways of knowing. Working toward effective sustainability solutions encourages and enhances this kind of connectivist knowledge development. Utilizing internet-based resources, and encouraging the development of context across an array of disciplines then, reinforces this link with specialized nodes as well as nurtures relationships which facilitate continual learning as well as allowing students, staff, and faculty to access information at any time and in any amount appropriate for their needs.

Challenges in Motivating Environmentally Responsible Behaviour on Campus

Achieving the level of connection needed for action, though, requires more than just information. Fielding and Head (2012) observed that information is necessary but rarely sufficient to motivate environmental behaviour, and Ralph and Stubbs (2013) remarked that "academic silos can be a barrier to successful programs" (p. 86). They demonstrated that

motivations to engage in environmentally responsible behaviour are different for the various stakeholders found on a university campus. Typically, financial and legislative drivers guided operations areas within an institution, whereas students and staff who could see results of environmental efforts actively advocated for further environmental action and policy. The significance of making a visible, concrete difference in order to sustain environmentally responsible behaviour is replicated in a range of studies (Bramston, Pretty, & Zammit, 2010; Guagnanao, Stern, & Dietz, 1995; Staats, Harland, & Wilke, 2004). Staats et al. (2004) and McKenzie-Mohr et al.(2012) also emphasise the need for supportive social interaction in fostering environmentally responsible behaviour, and observe that timely feedback on the result of behaviours helps to not only increase their adoption, but maintain them over time.

Internet-Based Support

Many studies demonstrate that achieving lasting environmentally responsible behaviour requires a complex interaction of attitudes, awareness, motivation, knowledge, and social support (Guagnanao, Stern, & Dietz, 1995; Meinhold & Malkus, 2005; Mobley, Vagias, & DeWard, 2010; Pooley & O'Connor, 2000; Staats, Harland, & Wilke, 2004). Web-based tools are an attractive option in supporting that interaction. Ruchter, Klar, and Geiger (2010) contend that using mobile devices could be seen as an antithesis to environmental education as they have the potential to divorce the individual from nature. Internet-based resources, though, allow a wider exposure to a range of natural environments, and further allow those environments and experiences to be shared widely in real time. Murphy (2008) proposes that fostering biophilia—wanting and needing to relate to nature—increases sympathy, affinity, and interest in the environment, partially borne out in Kahn, Severson, and Ruckert's (2009) work which revealed that a plasma screen displaying a real-time outdoor setting resulted in subjects reporting an

increased connection to their social world; an increased psychological wellbeing; and demonstrated improved cognitive function. Similarly, Nisbet, Zeleski, and Uzunboylu, Cavus, and Ercag (2009) found that the engagement level of students using mobile technology for environmental study led to greater time spent on task and on self-reflection. Bush-Gibson and Rinfret (2010) indicated this element of self-reflection as one of the keys to transformative learning (moving education to action) and challenged universities to reassess instructional delivery to include a strong experiential learning component in order to nurture environmental education activism. These examples, though, are more student-focused and do not involve all of a campus community.

Building Community in the University Environment

Beyond student engagement in content-specific courses of study, internet-based resources provide a multi-faceted tool in developing synergy between all campus constituents. Francisco, Fawcett, Schultz, Berkowitz, Wolff, and Nagy (2001) report international success with an online toolbox to support community-building skills and argue the importance of an “exchange network that connects a diverse community of people engaged in transformational work” (p. 299). They further state that this type of internet-based resource “transcends distance in promoting democratic social relations across communities of place and interest” (p. 300). This scope perhaps is intended in for a wider application than a university campus, but, in order to effectively connect with all campus constituents, engaged in, or wanting to be engaged in, environmentally responsible behaviour, the tenets of social interaction, feedback, and working for a common cause remain the same. In furthering the premise that community-based action is most important in achieving environmentally responsible behaviour, Acklanda and O’Neil (2011) present a model of an online collective identity which “emphasizes the importance of a

shared sense of identity between social actors for the emergence of collective behaviour” (p.178). They conclude that their model “emphasizes the importance for online Social Movement Organizations of participation in informal networks and direct control over the means of communication, both of which favor the pre-eminence of expressive behavior leading to the formation of collective identity” (p. 187). This then, supports the premise that individuals need to feel that they are making a difference, and that they have control and efficacy in making a difference to their environment.

Conclusion

Research points to the need to engage diverse communities in coming together and tackling the challenges of climate change and environmental degradation (Ralph & Stubbs, 2013). In sharing knowledge, expertise, and action across communities, generations, and social spheres, enduring and effective solutions can be found. Universities are cited as being logical leaders in environmental change, yet these same institutions have been slow to form successful campus communities of practice in managing environmental issues (M’Gonigle & Starke, 2006). Environmental education strategies of what to do in motivating and supporting success in these communities are widespread; however, there is little to show how to effectively implement those strategies across the diverse range of disciplines at post-secondary institutions, and then maintain the momentum.

A review of the literature shows internet-based resources increase engagement and aid in breaking down discipline-specific silos (Dziuban, Hartman, & Moskal, 2004). These findings suggest that there is promise in galvanizing pro-environmental behaviours in both formal and informal learning opportunities through deliberate and thoughtful internet forums, but there is a gap in the research in using a BL model to engage a diverse community in a specific ESD task In

using this model, applied to informal learning opportunities, it is hoped that increased engagement across the community, connection between disciplines, awareness of how ESD can be applied to specific areas of study, and, ultimately, attaining the transformational learning needed to take significant action in decreasing energy use at VIU will occur.

Chapter 3 - Procedures and Methods

This initiative employed several modes of communication, face-to-face events, and online tools to engage participants in the specific behaviour of switching off.

My Green VIU Initiative Overview

Awareness initiatives to inspire ESD and action have been in place for several years, but have not taken advantage of using both face-to-face opportunities and the affordances of Web 2.0 tools. My Green VIU was developed to more specifically leverage the power of both these mediums to deliver an initiative based on a BL model.

The VIU community was challenged to actively and consistently turn off unneeded lights and monitors at the Nanaimo campus. To show commitment to that action, participants were asked to take a selfie picture or video to show the target behaviour occurring at VIU. The picture or video would then be uploaded to VIUTube, and tagged with #MyGreenViu. VIUTube is similar to Instagram in that one can post a picture, tag it for ease of search, and can then like and/or comment on other pictures. However, VIUTube is a somewhat closed system in that one must be a student, staff, or faculty member to like or comment on a picture. Further, VIUTube is housed on Canadian servers thereby controlling access to participants' personal information. In using this social media tool, it was hoped that participants would communicate with the community through commenting on their own and/or others' pictures of turning off. It was also anticipated that this opportunity to communicate with a wide and diverse audience would encourage active participation (posting a picture) from others.

It was projected that the active participation aspect of this initiative would both encourage participation of others as well as serve as a public commitment to the behaviour of

‘turning off.’ This type of commitment is more likely to result in long-term target behaviour (McKenzie-Mohr, 2011).

Posting afforded the participant an opportunity to win a weekly prize (a unique hoodie) as well as the grand prize (unique hoodie and \$150 in VIU gift certificates). The grand prize was awarded based on the greatest number of likes, with four runner-up prizes of \$25 gift certificates.

Those who chose not to post a picture could also take part in this initiative. All were invited to comment on a picture or like it. In this way, there was an opportunity to connect with the community with less risk of public identification. It was expected that a wide audience would feel comfortable participating in this style of environment. Facebook and Twitter were also available to the community for commenting.

Face-to-face engagement. Throughout the initiative period, frequent face-to-face interactions occurred at a number of venues. In these scenarios, we used several strategies to draw community members into sharing their knowledge and attitudes about sustainability at VIU. An information table was set up at New Student Orientation (August 28). This event was chosen as it provided an opportunity to interact with new students and illustrate that one of the expectations of the VIU community is that members are actively engaged in conservation behaviours. The researcher was part of Rock the VIU (September 11)-- an event to welcome back all students to VIU as well as to inform them of various ways to actively interact in campus and Nanaimo communities. This event afforded an opportunity to engage with a wider student body. Similar interactive information booths were set up at the student residences on September 18, at the Sustainability Fair held at VIU on September 24, and at the VIU open house on October 3. In these last two instances, there was opportunity to engage with students, staff, and

faculty. Again, all sessions provided information about the desired target behaviour, and how to demonstrate a commitment to conservation to the VIU community.

In these face-to-face interaction opportunities, information was presented using active strategies. In order to enhance engagement and information, games that reinforced the message of energy conservation were employed and are as follows.

Turn it off beanbag toss. Participants were challenged to toss beanbags at six push lights mounted on a sandwich board. In this way, the target behaviour was introduced. Through gaming, the presenters had an opportunity to ask participants how they conserve electricity (activating prior learning) and explain how everyone can participate in energy conservation at VIU. A token (see Figure 1.) for participation was used. The ease of turning off a switch was emphasized in comparison with the more challenging task of tossing beanbags to turn off lights. Any further questions about the behaviour of turning off lights-- or energy use at the university--were then encouraged. At the close of the game, participants were asked what else could be turned off at the campus over which they had control.

Card game. A matching or choosing card game was also employed. Electrical use pertaining to Canada, BC, and VIU were presented and participants were asked to make the correct match or choose the correct card. This afforded the opportunity for participants to comment on the information and for us to explain how one could be part of energy conservation at VIU. In each of these game settings, participants were also informed of the initiative and given an opportunity to ask questions for any needed clarification. Card style and information can be seen in Appendix A

Card Game.

Hand-cranked blender. A hand-cranked blender was used to demonstrate the physicality of energy. Participants were invited to mix their own smoothie. In using their own energy to blend the drink, participants had an opportunity to see what producing enough energy to keep a light or monitor on felt like. Again, information about participating in the initiative was shared. In all face-to-face instances, how to access further online information was shared.

Other campus face-to-face interactions.

As well as information booths, several classroom visits were made allowing interaction with students and faculty. In classroom situations, questions to spark prior



Figure 1. Reminder token

knowledge were posed, followed by a short discussion of the initiative. Students and faculty had further opportunity to ask for clarification or to make further comment. Additionally, how to access online information about energy conservation and sustainability at VIU was shared. A thank-you token (Figure 1.) was given to all interested participants whether they were actively involved or not. This token was designed to reinforce the idea of individual responsibility (We are all energy conservationists) as well as a reminder of the internet site where more information could be found.

Web Tools Used

The web portion of this project used a variety of tools. Web pages, social media, LMS, and email were employed. Through face-to-face interaction, social media, LMS, and email, participants were 'pushed' to the initiative web pages which contained information about why the behaviour

was important, how to take part in the initiative, and suggestions of other ways to conserve electricity at VIU. Information on these pages was parsed so as to increase readability of the pages and to encourage interaction with the material. A webcast of how to post to VIUTube was made, as well as screen captures on where to find posted pictures/videos. Google Analytics were analysed for views and traffic patterns.

The VIU Events web page and InVIU—VIU’s intranet for staff/faculty—were also used to inform the community of this initiative. These modes, too, contained a push message to the initiative web pages. Facebook and Twitter were utilised in this campaign to push the community to web pages about the initiative as well as to VIUTube where entries could be viewed, liked, and commented on. Further, Facebook provided an avenue for participants to comment on the initiative as well as to share it within personal learning networks. Twitter was linked to Facebook, so the same message was available on both these channels. Both Facebook Insights and weekly Twitter usage metrics were used to assess participant engagement with these tools. Pictures and videos were incorporated into Facebook posts as well as targeted hashtags (#MyGreenViu) with the intent of familiarizing viewers with the elements of the initiative. Images included VIU mascots ‘Abbie’ and ‘Bookie’ as well as VIU’s president. Facebook views and Facebook insights were analysed to gauge engagement with content. A notice (Figure 2. My Green VIU poster) was also used as a graphic in many online communications and was posted around the university campus.



Figure 2. My Green VIU poster

A number of faculty shared information about this initiative in the newsfeed of their learning management systems LMS. The VIU Digest, a VIU community newsletter; WorldVIU; and the Sustainability Updates community also shared initiative information via email. In addition, the researcher's signature block was designed to alert the community to the initiative (see

Figure 3. Email signature block).



Figure 3. Email signature block. Part of a multiple pathway communication strategy.

VIUTube. The repository for pictures entered into the My Green VIU contest, VIUTube was kindly provided by VIU's Centre for Innovation and Excellence in Learning (CIEL). The page on which the pictures were posted required that images be put there manually otherwise they would be closed off from the VIU community at large and available only to those to whom the proponent shared a link. CIEL provided that assistance in curation and watched for pictures tagged with #MyGreenVIU. While the page of pictures/videos was publically available for view, uploading, liking, and commenting were only available to the VIU community. The Sustainability page within VIUTube was seeded with pictures before and part way through the initiative to provide examples to possible participants. Viewers (who were members of the VIU community) were able to like as many pictures as they wanted, but were not able to like one picture multiple times.

Observations

A number of markers were observed during this initiative. Monitors left on in computer commons areas, targeted building energy monitoring, anecdotal evidence, and the actual number

of participants who posted on VIUTube were monitored. The intent was to develop some quantitative evidence for the target behaviour of ‘turning off.’

Computer commons areas. During the initiative and after, several computer commons areas were observed for evidence of the target behaviour of turning off monitors. A short video was taken in one computer area and then posted to Facebook explaining the expectation of monitors being turned off after use. Observations were made in B250, 305, and 356 at various times of the day and throughout the week, including weekends.

Energy use monitoring. Several of VIU’s buildings are connected to Prism Engineering Ltd.’s Prism Utility Management and Analysis (PUMA) system that continually monitors energy use of a building. Energy use during the initiative was monitored in B180, 250, and 255 and was compared to last year’s and three years’ previous readings.

Anecdotal notes. The researcher kept informal notes during the initiative to record reported reaction to the initiative. An informal feedback session was held with several colleagues who participated in the initiative. From these discussions, it was expected that some insight into reasons for participation, efficacy of communication modes, engagement in the blended model, and patterns of intrinsic motivation and extrinsic motivation could be gained.

Questions were as follows:

- Tell me how you found out about the My Green VIU initiative.
- Were there any parts (aspects) of the initiative that especially grabbed your attention?
- MyGreenVIU had several pages on the VIU sustainability website that explained how to participate as well as information about energy use at VIU. Did you access any of those pages?

- And remind me—did you stop by any of the face-to-face demos or events during #MyGreenVIU?
- Tell me about the difficulty level of participating in this initiative.
- Your pictures/videos were great. Did you share your participation with anyone?
- Did you follow this initiative on Facebook or VIUTube?
- I’m really interested in any other comments or insights you have about My Green VIU.

Timeline

Near the scheduled end of the initiative, several entries were submitted, and monitoring of social media seemed to suggest increased interest in the initiative. That, coupled with a lower than anticipated uptake than anticipated uptake of the initiative resulted in a two-week extension of #My Green VIU as illustrated in

Figure 4. Revised activity timeline.

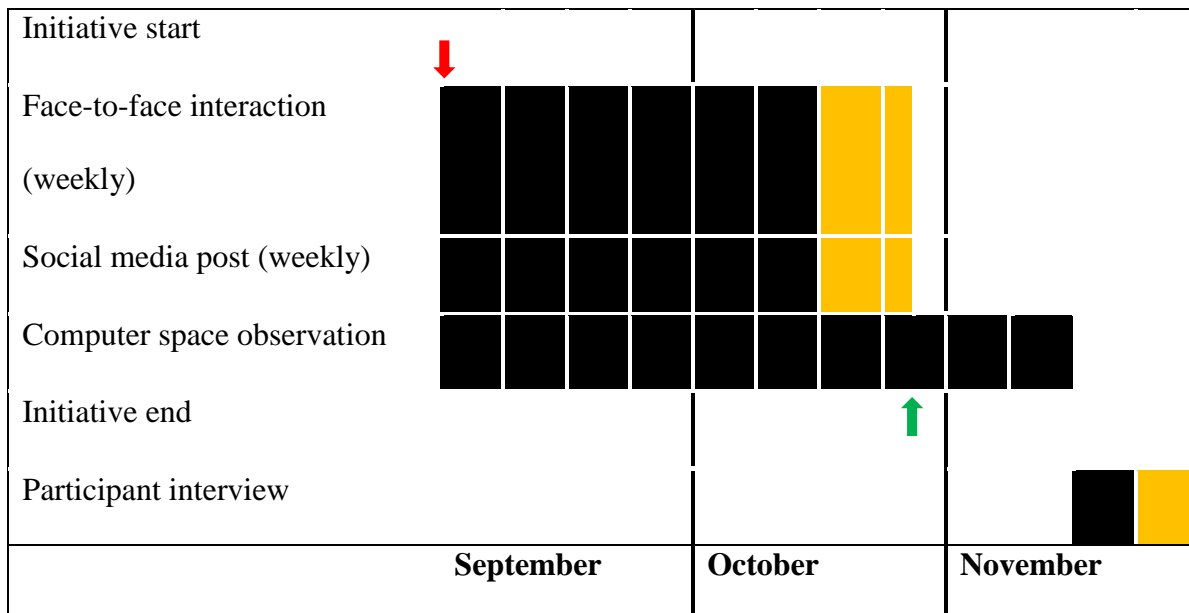


Figure 4. Revised activity timeline.

Resources, Expenses, Support

This project was based on the initiative that ran through VIU's office of Environment & Sustainability. Most resources, expenses, and supports were part of the mechanisms that support that program. These supports included the following:

- Funding from the Workplace Conservation Awareness program for incentives
- Work opportunity students will provide some assistance in delivering the initiative such as face-to-face presentation, collection of data for monitors left on
- Facebook/Twitter updates

Use of VIUTube was kindly made available by VIU's Centre of Innovation and Excellence in Learning.

Chapter 4 – Field/Beta Testing and Findings

In assessing the benefit of a blended learning model in an informal learning situation, measurement of participation through use of VIUTube, and data from online tools was reviewed and compared with face-to-face events and Facebook posts. The specific action of turning off was observed by intermittently surveying several computer commons areas throughout the initiative, and for two weeks after the completion of the initiative. As well, energy use in three buildings on the VIU campus were measured and compared to previous years' consumption. Finally, anecdotal notes were analyzed.

VIUTube Entries

Figure 5 on the following page shows entries for the initiative. Pictures marked in green were 'seed' pictures intended to provide illustration and motivation to potential participants. Overall participation in My Green VIU was 10, and was comprised of entries from students, staff, and faculty, evenly split between students (5) and staff (4 -- one staff participant made two entries). This number of entries was representative of a very narrow margin of the VIU community. The hearts visible beneath each picture show the number of likes, and the eye icon indicates total unique views. Although some of these photos are not part of the contest, they did receive votes. While the total number of unique views of the whole page cannot be derived from data available, there were at least 105 views, as demonstrated by the highest number of views of "My Green VIU—Wendy."

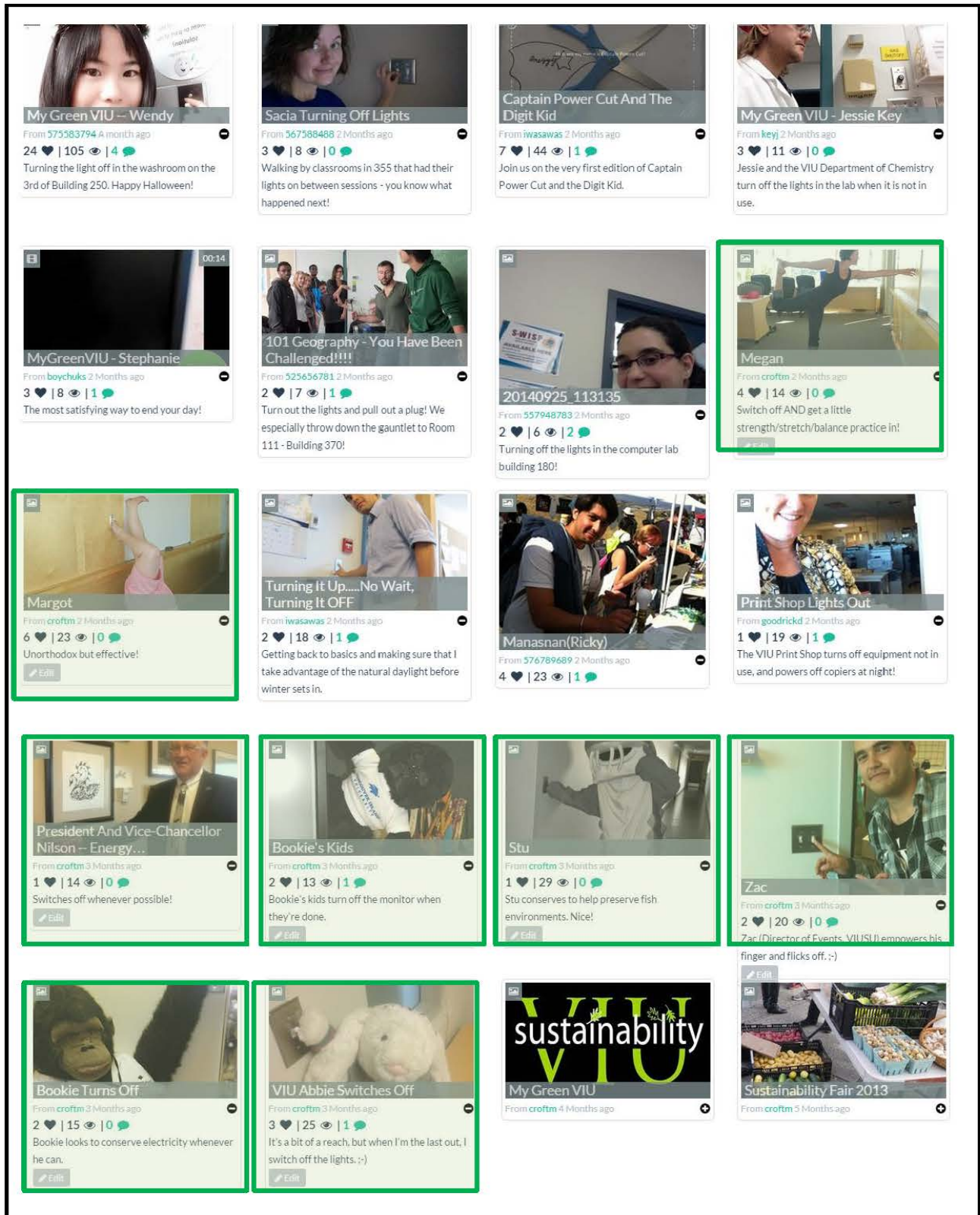


Figure 5. Screenshot of VIUTube Entries.

Social Media and Web Page Views

In this initiative, the Facebook and Twitter pages were linked. Because Twitter analytics are weekly, teasing out granular trends comparing web pages and social media posts is unreliable. Similar trends between posts and increased web page traffic, though, were noted. In Figure 6, a comparison of weekly totals between web pages and social media channels can be seen. These numbers do not differentiate between student, staff, faculty, or those who are not part of the VIU community.

Although the Sustainability VIU web pages have an identical template, they are distributed across two different programs. One is part of the main VIU web site, while the other uses Wordpress, runs in a parallel fashion from the main VIU pages. Some aspects of Google Analytics for these two sets of pages show somewhat different levels of detail. Common analytical aspects of these pages are compared here.

Sustainability main refers to viu.ca/sustainability which is based in the main VIU site, and *Sustainability sites* denotes the pages created in Wordpress. In face-to-face instances, the address for *Sustainability main* was referenced as it was determined that it would be easier for participants to remember. A link to the Wordpress page explaining My Green VIU, which had a far more complicated URL, was at the top of this page. From this Wordpress page, there were links to other Wordpress pages that discussed different aspects of the initiative.

It can be seen that the *Sustainability sites* page had a slightly higher viewership than did the *Sustainability main page*. Social media channels commanded a higher viewing rate in comparison with the web pages, and Facebook views edged out Twitter views.

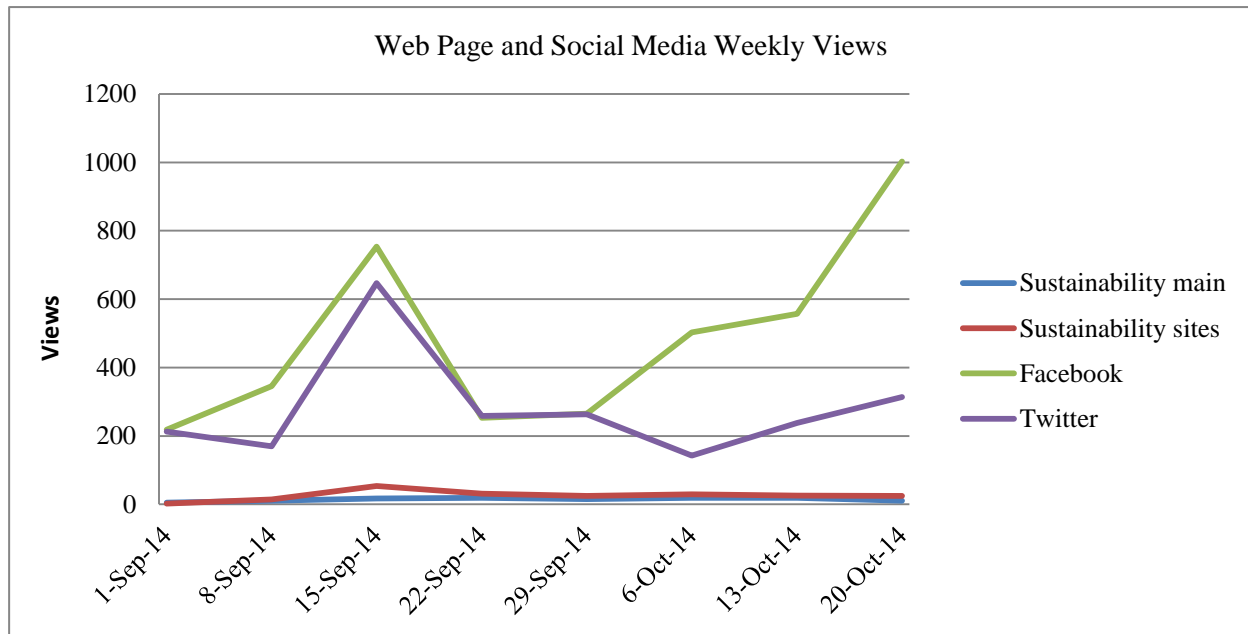


Figure 6. Web page and Social Media Weekly Views. Data was collected from Google Analytics, Facebook Insights, and Twitter Weekly updates.

Engagement in Relation to Facebook Posts and Face-to-Face Events

Error! Reference source not found. shows the relationship between viewing behaviour in relation to Facebook posts and face-to-face events. This figure is very condensed, and a more detailed version that includes the type of event and content of the post can be seen in Appendix B Web/Social Media View.

As in Figure 6, web page views for the viu.ca/sustainability page are shown in blue, and the Wordpress page is depicted by the red line. The broken purple line shows the daily total view of all pages on the main VIU sustainability site. These pages are all prefixed with viu.ca/sustainability. This cumulative measure showed behaviour that was not expected in this analysis, so has been included. A similar daily breakdown of all sustainability pages in the Wordpress area of VIU web pages was not available. Total views of those pages throughout the initiative were calculated to be 622, compared to the Sustainability main pages, which totalled

579 views over the same period. It is not assumed that there were 1200 discrete views of these pages.

Note that in Figure 7, the Facebook reach scale is to the right, and reach is denoted by the green line. Similar to Figure 6, it can be seen that Facebook reach is considerably wider than that of the web pages. Total reach of Facebook posts over the initiative period totalled 4081. Once more, these are not discrete views.

Vertical lines denote either face-to-face events (yellow vertical line) or Facebook posts (magenta vertical line) specifically mentioning My Green VIU. Generally, peaks and rising trends in web site views and social media reach are seen around these events. Again, these numbers do not differentiate between student, staff, faculty, or those who are not part of the VIU community.

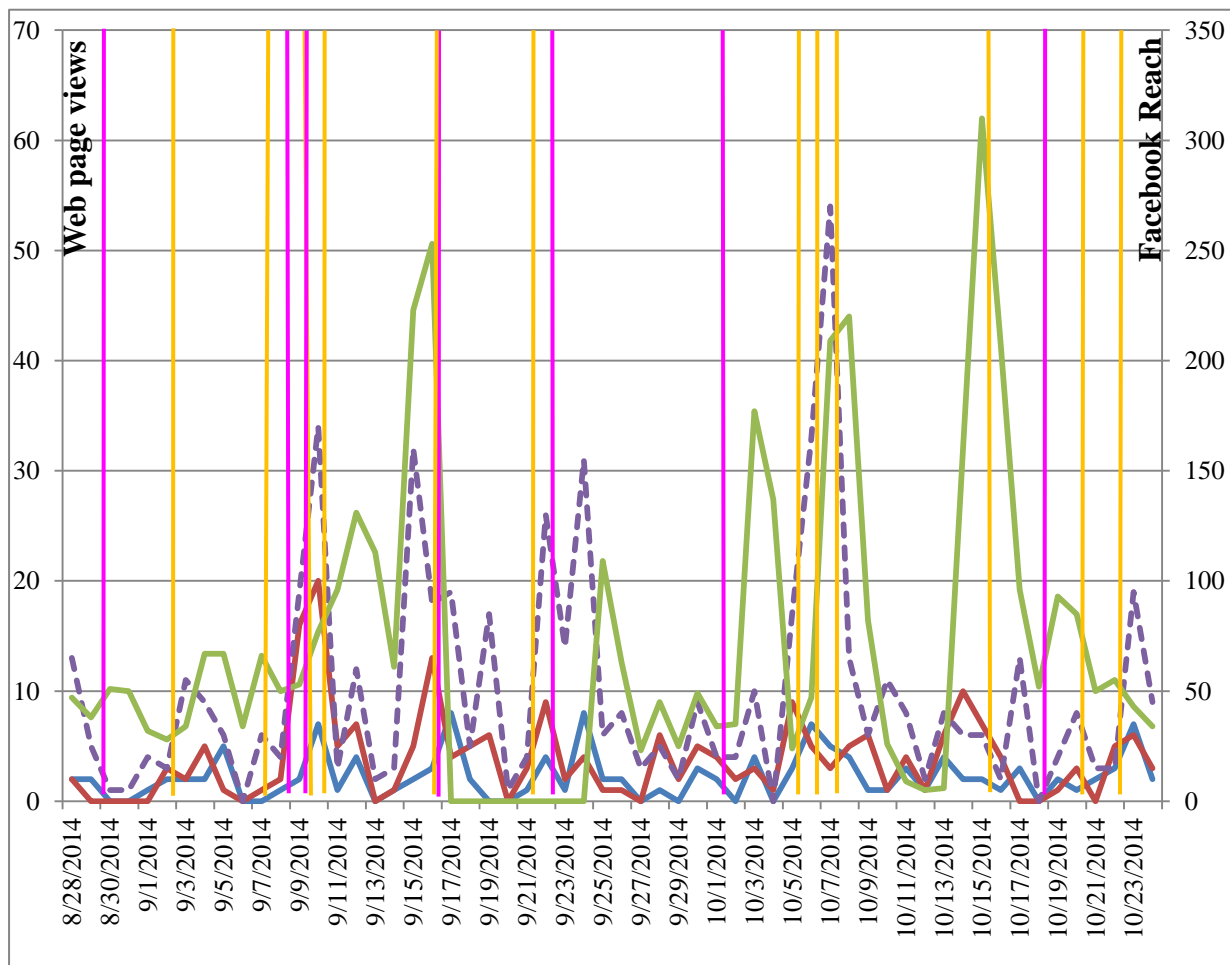


Figure 7. Web Viewing Behaviour in Relation to Facebook Posts and Face-to-Face Events. Data was collected from Google Analytics and Facebook Insights.

Web Page Traffic Patterns

A simplified view of a general path of clicks through the VIU web pages is depicted in Figure 8. Web Page Traffic Patterns. The numbers denote total views of these pages during the period of the initiative. Date was retrieved from Google Analytics.

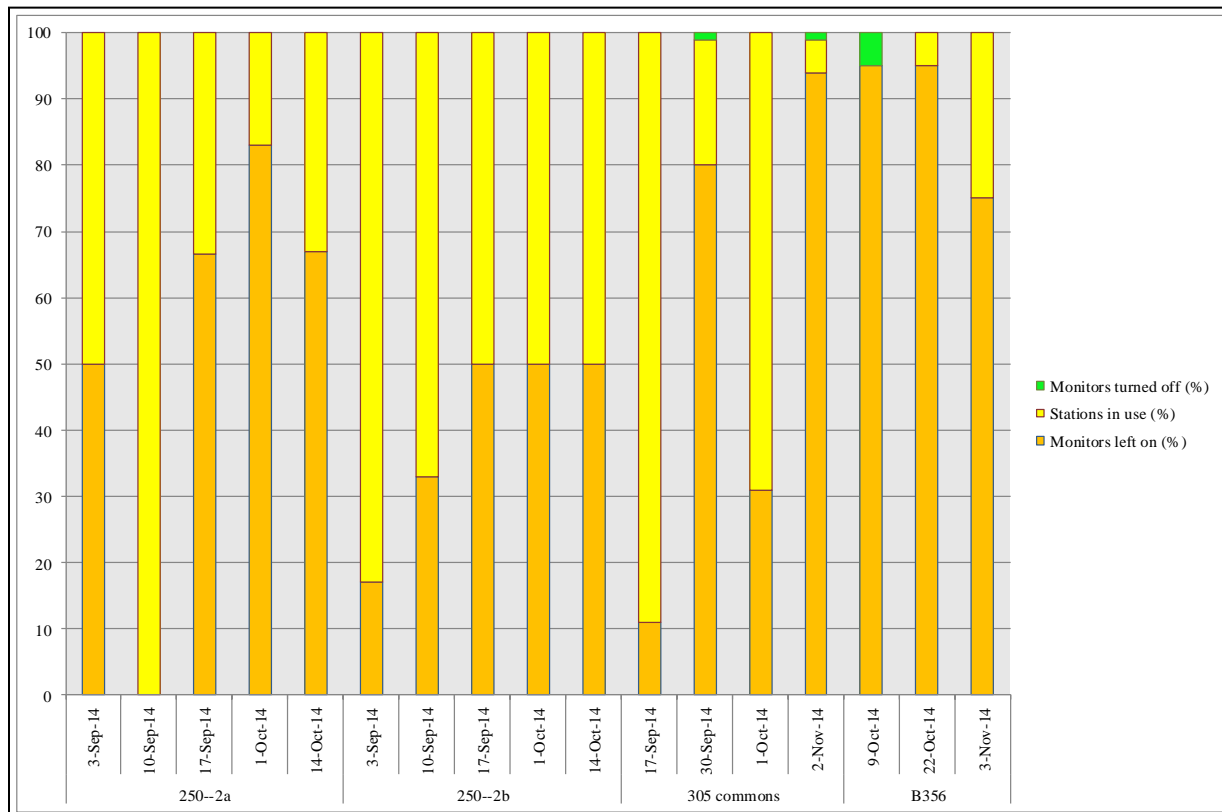


Figure 9. Power Status of Computers (%) in Computer Commons Areas

Energy Monitoring

Electricity consumption in the three target buildings (B180, 250, and 255) from the same period from 2011-2014 is shown in Figure 10.

Appendix E shows a larger view of this data. Consumption is measured in kWh. Each building's electricity use is shown during the period of the initiative for this and the preceding three years. These measures have been corrected for weather.

The percentage of energy used in comparison with the previous year is shown by the orange line, and the percentage of energy used in comparison with a three-year average is shown by the green line. Building 250 shows a small increase in energy use in comparison with the previous year, but less energy use when compared to a three-year average. Overall, the trend is one of decline in energy use.

with a more detailed version shown in Appendix C

Web page Flow

In developing a web presence for this initiative, the intention was to bring participants to the main sustainability page, with an obvious link to the My Green VIU pages. The My Green VIU landing page described the overall initiative with links to the other pages. The numbers in each box correspond to the total number of views these pages had over the course of the initiative, and those in brackets show average minutes spent on each page. Figure 8. Web Page Traffic Patterns. The numbers denote total views of these pages during the period of the initiative. Data was retrieved from Google Analytics.

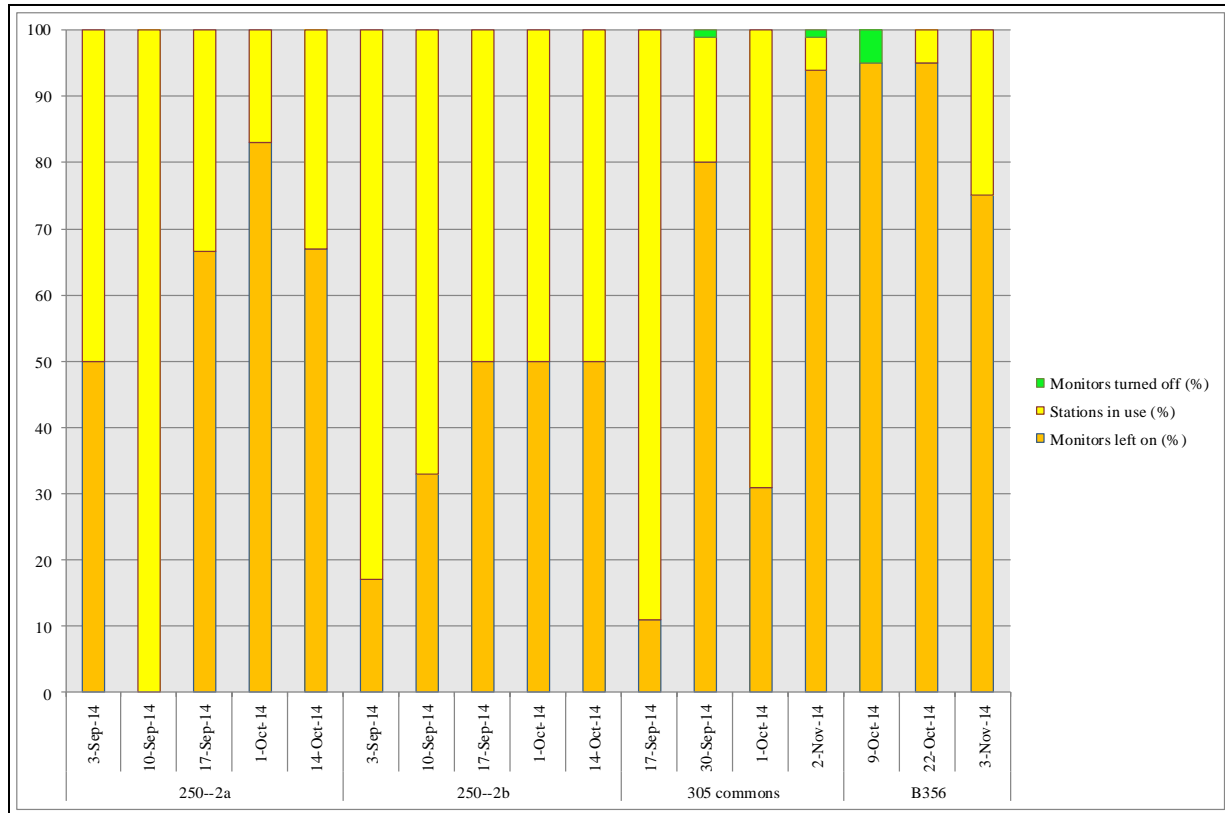


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suggests linear navigation, which was not the case with these pages. Each page had links to other areas of the website and there was no need to travel in a pre-determined line. Links for all the shown pages were listed at the bottom of each of those pages, as well as opportunities to explore other areas of the sustainability website, or to navigate away from those pages entirely. The pages *How to Play* and *Find Out More* each had videos that roughly correspond to the times shown in Figure 8.

Computer Commons Observations

Several computer commons areas were visited throughout the course of the initiative at various times throughout the week. Figure 9 shows patterns of the target behaviour (see Appendix D for a larger version).

Monitors left on describes computer stations where a monitor was left on, but no one was working at that station, and there was no indication that it was in use. In-use stations were those where there was someone working at the station, or there was evidence that someone would be returning shortly to continue using the station. Although times were not recorded, the pattern suggests that monitors, in general, either were in use or left on

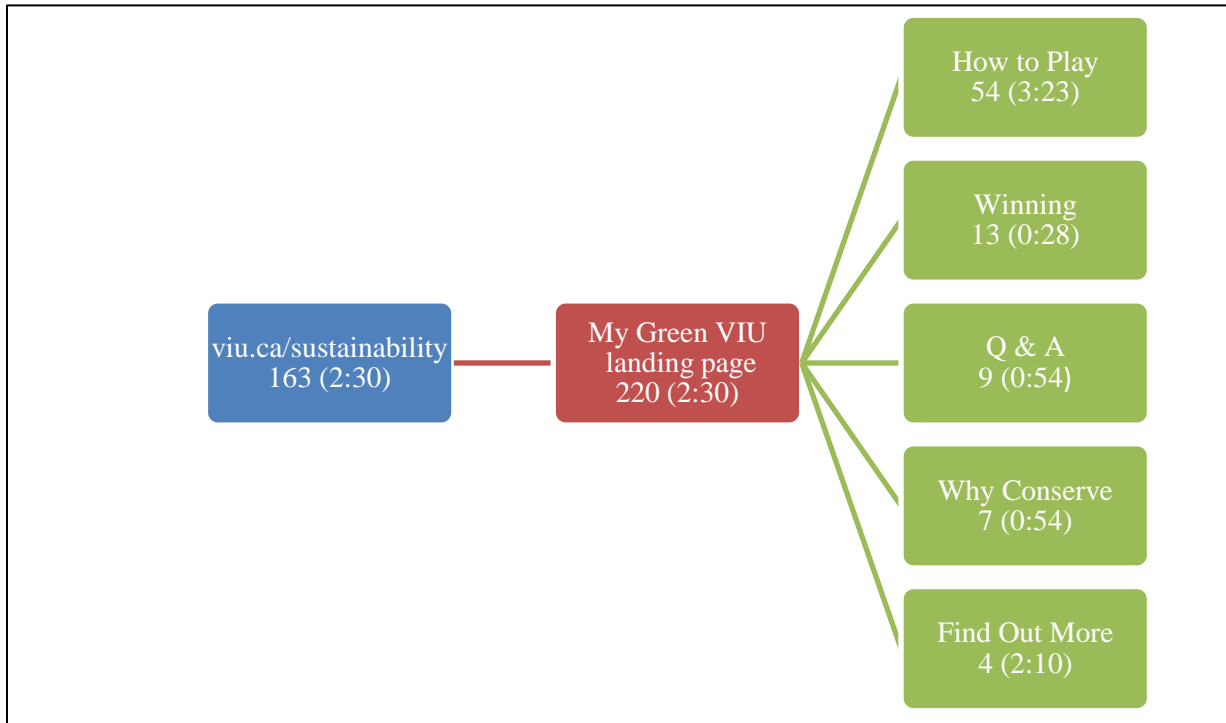


Figure 8. Web Page Traffic Patterns. The numbers denote total views of these pages during the period of the initiative. Date was retrieved from Google Analytics.

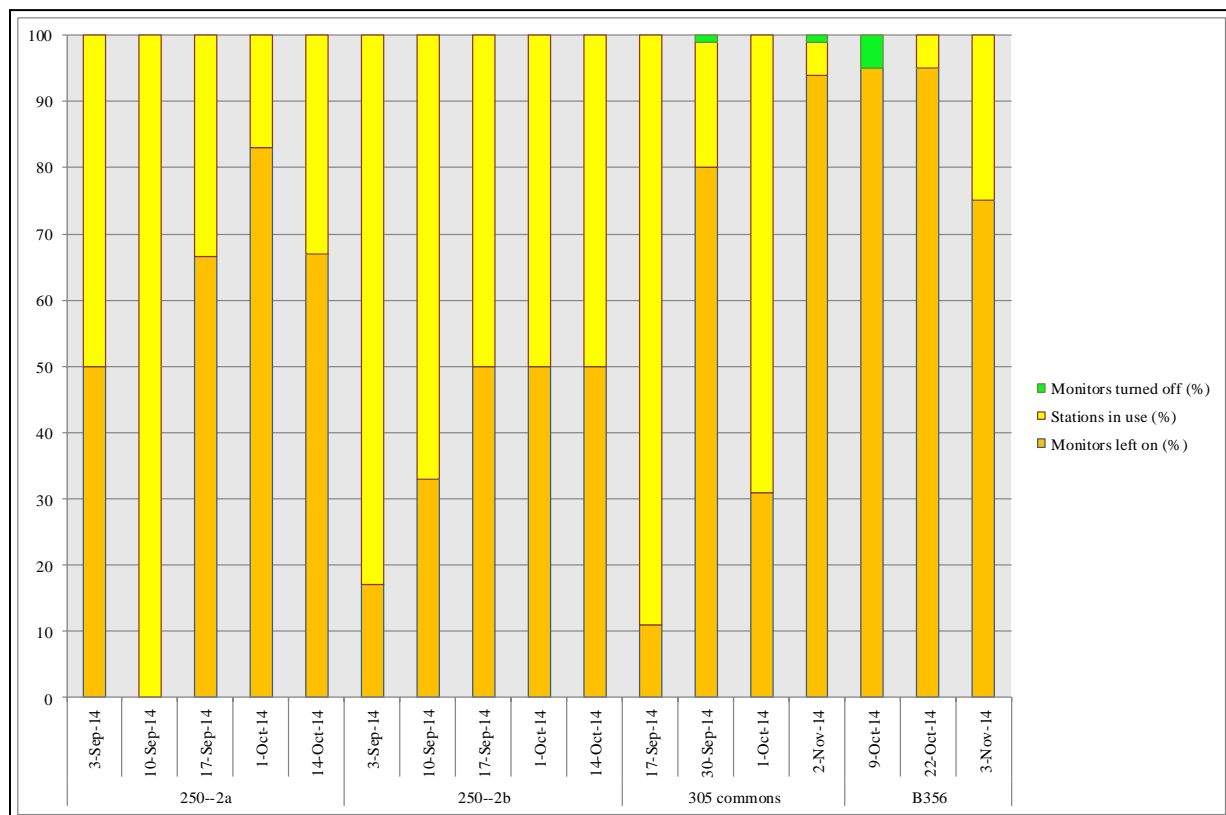


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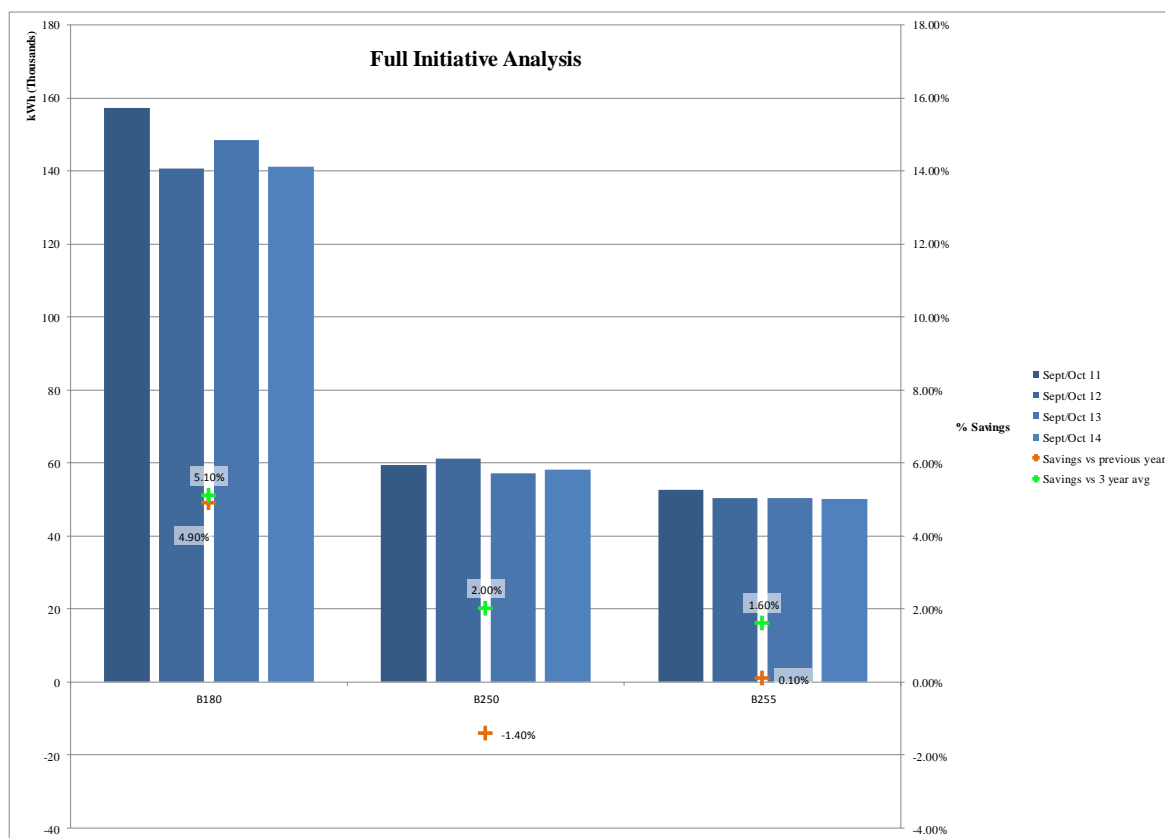


Figure 10. Full Initiative Energy Analysis. Data retrieved from S. Jones (personal communication, November 7, 2014)

Anecdotal Results

Further evidence of building community was seen in one student participant's efforts in sharing the initiative with her class. After speaking with the researcher at FROSH, she shared (face-to-face) the initiative with peers in a geography class. Through the student's efforts, that class became aware of turning off the classroom light at the close of the class and challenged others to review and ensure lights were turned off at the end of classes. They observed that another section of the geography class consistently left lights on at the end of class. Challenge posters were made by students and strategically posted; especially on the door of the 'errant' classroom. In a short time, it was noticed that the lights were consistently turned off at the close of their peers' class. A further challenge was made via VIUTube and several social media paths. Most of these avenues were unknown to the researcher. Although individual students in this area did not post pictures, these actions evidence engagement with the initiative and movement from presentation to action.

These student efforts did not happen exclusively in student communities; instructors were aware of these student efforts and shared the story with colleagues. A clear illustration of building communities of practice by learning through shared experience, conversation, and connection as described by Jeffs and Smith (1997, 2005, 2011), this anecdotal evidence also shows that vectors of influence can be more far-reaching than expected.

Chapter 5 – Conclusions and Recommendations

A BL model is based on connectivism, which outlines that learning is made through connections, virtual or otherwise; development of communities of practice and personal learning networks; and creating meaning and context between diverse, perhaps unrelated, fields (Siemens, 2004). Transformational learning occurs when meaning is built by the individual from these experiences, and it is this kind of transformational learning that leads to action (Tilbury & Cooke, 2005). As well as observed action, then, evidence of engagement, connection, community building, and network development, would support the efficacy of BL as integral in crafting informal learning opportunities.

In isolation, markers of participation and observation of the target behaviour did not appear to support a BL model in promoting and supporting ESD; however, examination of the larger picture revealed patterns for deeper consideration. Posts to VIUTube were just one facet of the whole BL model that emphasises connection. In order to garner views, it was necessary for participants to connect with their communities and share an awareness of practice, thus connection and community were built. Similarly, observed ‘turning off’ behaviour was negligible. However, independent student action to engage peers demonstrated that action, though not anticipated by the researcher was going on, and through that action, connection and community were being built.

Some comments from colleagues indicated that they were much more aware of turning off monitors, though this awareness, reportedly, did not necessarily translate into the defined observable action of monitors left off. Increased awareness, though, is a good starting point. Roth (1992) argues an environment is only as good as the collective environmental actions of its community, and that some environmental awareness is better than no awareness at all. This shift

in awareness may partly explain a decreasing trend in electricity use in the three observed buildings on campus. As there have not been any operational changes made to those buildings (switch to LED lights for example), the lower energy use trend may be partly attributable to a behavioural shift brought about by this initiative. Because of the size of the campus, specifically defined observable behaviour, reveals on part of what may actually go on in terms of target behaviour.

Another area that is difficult to fully quantify is social diffusion. Key to getting others to engage in sustainable behaviour McKenzie-Mohr (2011), social diffusion, With the affordances of social media tools such as Facebook and Twitter, social diffusion is faster and has potential for a far wider reach than just conversing face-to-face with colleagues and classmates. A number of students volunteered that they had put information about this initiative on their own Facebook networks, and other students reported that their instructors had mentioned the event. Clearly, diffusion was occurring, and this behaviour would also suggest that networks of information were being developed across disciplines, thus further supporting the connectivism aspect of learning as described by Siemens (2004) as well as spanning generations as envisioned by M'Gonigle and Starke (2006).

Social media, too, allows for chat forums. Both VIUTube and Facebook were possible platforms for conversation, as was Twitter. While there was opportunity, and urging, to comment using these channels, they were not used in this way. Behaviour though, was much more voyeuristic. Senbel, Blair and Ngo (2014) commented their Facebook use experiences in an energy conservation campaign were similar. They found that participants used the Do It in the Dark initiative Facebook page much more as a bulletin board than as a place to share ideas with others.

In informal conversations with participants in My Green VIU, it was mentioned that while they did share their participation in My Green VIU, it was via their own choice of email, Facebook, or face-to-face representation. This behaviour implies that personal learning networks were being utilized, and seems to indicate that while there was conversation happening, it was more likely to transpire in participants' circles of contacts rather than in forums that were specifically designated for that purpose. This, in part, supports Downes' (2010) view that a strong network is decentralized and disintermediated with the organization of information left to the learner. In terms of informal education, then, a central Facebook page, or similar tool may offer more leverage as a notice board and prompter rather than as a prescribed arena for participant interaction, or reflection.

Social media and face-to-face interaction used push messages to specific web pages, so a general pattern of flow between a narrow range of topic-specific pages was expected. The initiative pages referenced in face-to-face and online prompts did engage participants; however, within the range of initiative pages, views centred on the initiative overview and how to play. Engagement of other initiative pages was limited. Comparatively, sustainability pages on a wide range of topics garnered the attention of viewers revealing that a much wider range of sustainability information than that of the initiative was being accessed. Views of other sustainability pages in general were much greater than the initiative pages. Again, this evidences the development of personal learning networks as well as self-directed learning. Rather than a prescribed, somewhat linear path to specific information (the initiative), viewers spent time choosing areas of their own interest which included time spent looking at earlier initiatives, and operational information such as recycling processes at VIU.

This result infers that greater uptake of foundational information could be achieved through page or site design. Supporting information for engaging in an initiative may not have to be directly linked to initiative-specific pages, but rather be part of the whole sustainability site. In this way, the viewer is free to make individual connection with information that has personal resonance. Conversely, that information could be housed on one page rather than being spread across several pages. Links to many pages often result in cumbersome navigation that could negatively impact engagement.

Facebook drew far more viewers than did web pages. Certainly, they are different tools, but the researcher had anticipated that the VIU community would be more likely to visit web pages after a face-to-face event, especially as many were given a concrete reminder for the webpage address. It was mentioned that the Facebook page was available, but participants received no specific URL. In spite of that, most face-to-face events were followed by, or coincided with, a spike in Facebook reach. While this was also true of the initiative web pages, the reach was far greater on Facebook. This would suggest that Facebook is a medium of choice for a greater segment of the VIU community and could be used in a more strategic and deliberate way in future engagement.

VIUTube, with similar affordances to Facebook, did not have the uptake that was expected. Although little difficulty was reported in using VIUTube, it was not as seamless as mainstream applications such as Facebook and Instagram. VIUTube, which works similarly to YouTube, was employed as it is a closed system. That is, only students, staff, and faculty at VIU can post to it and can 'like' and 'comment.' In this way, the intent was to offer a platform that allowed more control over security of personal information and of images. Images uploaded to VIUTube, though, needed to be curated. There was some comment that because the upload

experience was not instantaneous, and there was no personal notification of image views, the tool lacked some critical feedback mechanisms. This would indicate that initiatives that involve image sharing need tools that allow more immediate feedback and that notify the participant of any status change rather than the onus being on the participant to follow up. While still viable as it provides an alternative to more mainstream applications, VIUTube will not be used as the sole presentation platform in future BL models of presentation.

One commonality of the participants in this initiative was that they all had some face-to-face connection with those presenting the initiative information, and in several instances, had a previous collegial relationship with the researcher. Although web prompts and reminders supported their action of sharing a picture or video, there was a personal interaction component. This would suggest that face-to-face interaction is more likely to result in action. Further, it may show that who delivers the message may have impact on active participation. This parallels McKenzie-Mohr's (2011) premise that messages from a credible source are more likely to be attended to. Face-to-face interaction, too, seems to motivate further exploration of online information. Perhaps most importantly, face-to-face events help build connection and community as evidenced by anecdotal evidence.

Although visible and active participation did not achieve expected levels, anecdotal evidence of unobservable behaviour, as well as the downward trend in electricity use in targeted buildings infers that target behaviours are occurring. Further, the capacity for consistent participation in actions that demonstrate environmental aptitude may still be evolving in a large part of the community. There is a great deal more evidence from this study, as measured by web page and Facebook interactions, that indicates growing awareness, implying that there is an increasing attentiveness to environmental and sustainability matters within the VIU community.

Thus the community is moving forward in what Roth describes as the “environmental literacy continuum” (p. 28) and is growing in its environmental literacy. As this literacy increases within the community, higher levels of action will be expected.

Recommendations

Quantitative measures and anecdotal evidence show that the BL model employed by the My Green VIU initiative resulted in markers indicative of the connectivist behaviour that BL is intended to motivate and support. This study indicates that a BL model of online and face-to-face interaction has value in a diverse community such as a university campus. However, from this study, there are a number of recommendations to improve the BL model so that it more successfully fosters sustainable action rather than sustainable information dissemination.

Anecdotal instances described in this study were not measurable with the tools available to assess the My Green VIU campaign, and they suggest that a more robust understanding of the value of BL in presenting informal learning situations could be developed through interview and/or survey methodologies.

The timing of this project, at the start of a term, was considered optimal for introducing/reinforcing specific behaviours. However, while the start of the school year marks the beginning of new endeavours for students, staff, and faculty, it is also an extremely busy time. As Kollmuss and Agyeman (2002) note in their review of environmental behaviour studies, those who do not have sufficient resources, which includes time, are less likely to act in an environmental fashion. The start of term, too, is a time of heavy information dissemination and there is strong competition for attention. All communication channels are saturated with a plethora of messages. As this initiative was an informal learning opportunity, it may have taken a back seat to messaging that was more related to specific formal learning outcomes or other more

immediate student, staff, and faculty needs. Launching a new initiative at the beginning of the year may have greater uptake if it is started several weeks after that start of the school year.

A schedule of message delivery, both the timing and the messenger, requires careful consideration. In giving some thought to competing messages and the scarcity of time resources of the target audience, stronger participation may be achieved through increased face-to-face interaction with those seen as credible. Therefore, development of a group of peers for the various communities at the university environment may aid in furthering messaging about opportunities to participate in sustainability. Advocacy for community action should also come from instructional staff, and the development of this network would also encourage and support the growth of VIU community's environmental literacy. Helping students and faculty more easily make connections between informal formal learning opportunities may help in fostering this network.

Multiple pathways of engagement and of demonstrating sustainable behaviours need to be employed. In reviewing how community members came to know of My Green VIU (whether they participated or not), anecdotal evidence indicates that all methods of communication were attended to. While online methods were most often mentioned, other types of notices, including posters, at the very least reinforced messages received electronically. As Facebook is currently a favoured means of information search, more strategic use of its features such as setting up events, changing the cover photo and profile picture to reflect an initiative could cultivate greater engagement and participation. Similarly, multiple ways of showing target behaviours could aid in nurturing involvement. There are a variety of online tools such as Instagram, Twitter, and Pinterest that have capacity for photo and or video sharing, and have the capacity for 'likes' and commenting. They are familiar to a wide community and uploading images is instantaneous.

While these are great features, there is another part of the community that prefers not to use these tools, thus a more controlled platform such as VIUTube is needed. Utilizing a selection of tools rather than limiting participation to just one has potential to increase participation in initiatives.

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**Appendix A
Card Game**

These cards represent the type of questions asked in this game. Participants were asked to choose the correct statement. From this task, conversation grew around energy conservation and behaviours at home and on campus.

If everyone in BC turned off just one unnecessary light when they left the room, we'd save enough energy to charge



8.6 million
Smartphones
for a year

If everyone in BC turned off just one unnecessary light when they left the room, we'd save enough energy to charge



8.6 million
Smartphones
for 6 weeks

If everyone in BC turned off just one unnecessary light when they left the room, we'd save enough energy to charge



8.6 million
Smartphones
for 6 months

Other questions included the following (highlighted phrases indicate the correct answer):

In a year, VIU uses about the same electricity as—

1200 houses

600 houses

300 houses

You would need to pedal for

9170 hours (382 days)

10280 hours (428 days)

3667 hours (153 days)

to power an average BC house for a month.

If every household in BC turned off a 100-watt incandescent light for four hours each day, each bulb could save 3.3 cents a day. It would also save enough electricity to power Whistler for

12 years

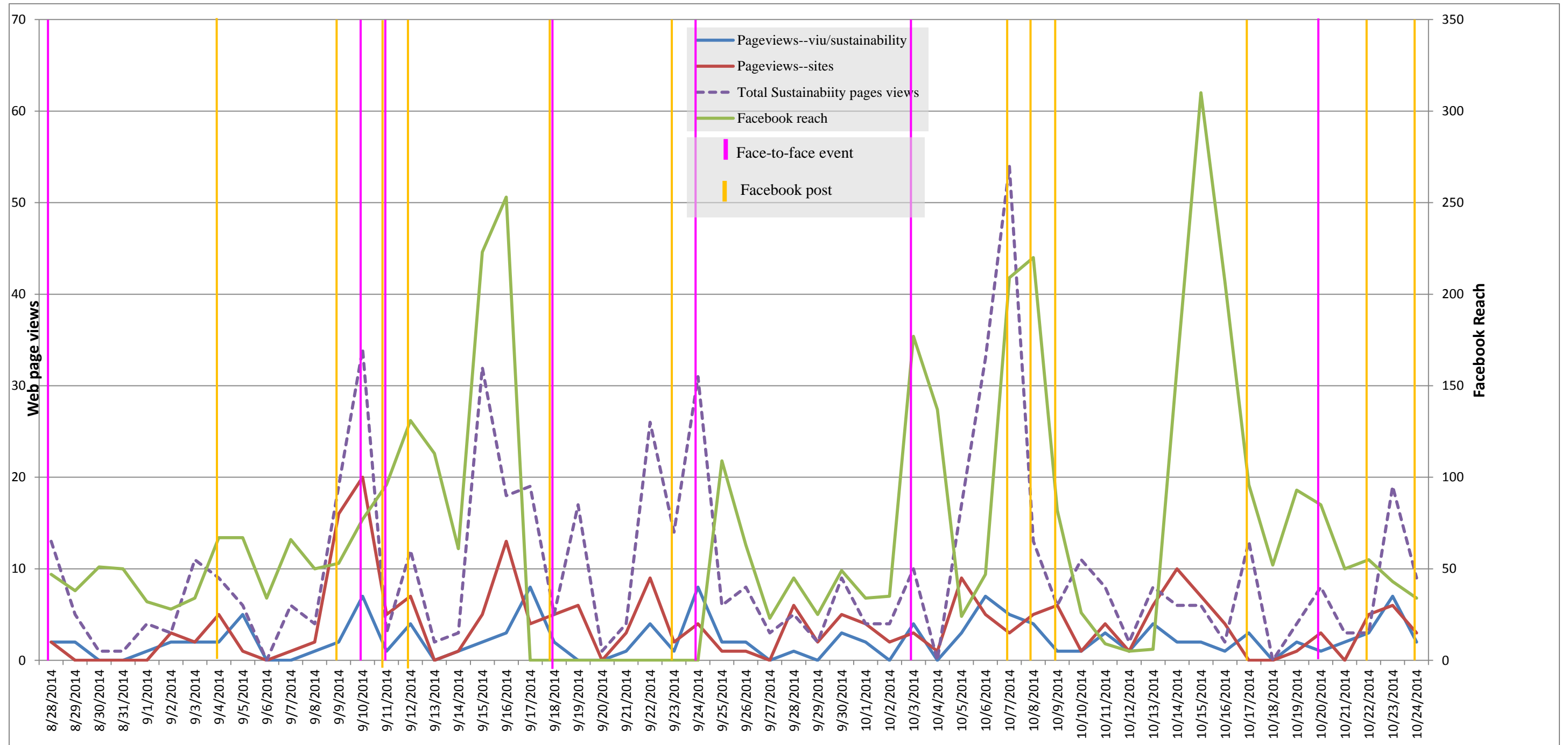
12 hours

12 weeks

Match the country to the energy use number:

Japan	#5 electricity user worldwide
Canada	#1 electricity user worldwide
Germany	#9 electricity user worldwide

Appendix B
Web/Social Media View



See next page for further description.

Face-to-Face Events

August 28	Rock the VIU--New Student Orientation
September 10	Applied Business Technology class visits (2)
September 11	FROSH event
September 18	Information tent at Residence
September 24	Sustainability Fair
October 3	VIU Open House
October 20	Hand-cranked blender in cafeteria

Facebook posts

Post Message	Posted	*Lifetime Post Total Reach
Stop by and see us at #FROSHVIU next week. Test your energy literacy, learn more about #mygreenviu or just say hi. :-)	9/4/14 9:34 AM	13
Be an energy conservationist! Take a picture of you turning off a light or monitor at VIU, upload it to VIUTube, and tag it with #mygreenviu More details here http://sites.viu.ca/sustainability/sustainability-2014/1368-2 #viu #conservation #turnoff	9/9/14 9:25 AM	30
It's #froshviu today! See you there? Stop by and test your electricity literacy or try the turn it off challenge! And keep an eye on VIUTube for pictures of folks turning off! https://viutube.viu.ca/public/category/Teaching+and+Learning%3ESustainability/170 #viu #mygreenviu	9/11/14 9:00 AM	20
How many ways are there to turn off a light or monitor? Lots! Show us yours! ;-)	9/12/14 11:52 AM	53
Look closely... Great opportunity to be an #energyconservationist at #VIU! When you've finished at a computer station, turn off the monitor (NOT the tower though) And now till October 10, upload your energy conservationist picture to VIUTube! Details here: http://sites.viu.ca/sustainability/sustainability-2014/1368-2	9/18/14 9:10 AM	23
You know you want to! Upload your selfie turning off a light or monitor here at #VIU to VIUTube by October 10. Weekly prizes as well as a grand prize. Pictures so far here: https://viutube.viu.ca/public/category/Teaching+and+Learning%3ESustainability/170 More info here: http://sites.viu.ca/sustainability/sustainability-2014/1368-2	9/23/14 3:15 PM	97
Some great entries so far to #MyGreenVIU Check out this one and more at https://viutube.viu.ca/public/media/Captain+Power+Cut+and+the+Digit+Kid/0_lrzjjmk5/170 #energyconservation	10/7/14 9:58 AM	21
#MyGreenVIU--extended until October 24! There's lots of opportunity to turn off at #VIU For more details, click the My Green VIU app on the left of this screen. :) #offtober http://youtu.be/L2bqy06ID0U	10/8/14 10:30 AM	23
VIU Geography 101 class challenges the #VIU Community to take part in #MyGreenVIU (look to the left under APPS for a link) Fingers/toes/elbows/nose -- use whatever works to be a part of conservation! ;-)	10/9/14 11:40 AM	52
Last week for #MyGreenVIU! Take a selfie turning off a light or monitor at #VIU . Post it on #VIUTube. Check out the entries here https://viutube.viu.ca/public/category/Teaching+and+Learning%3ESustainability/170 More details? Click the button in the APPS section on the left. ;-)	10/17/14 9:01 AM	37
Time's running out! Show us how you conserve at #VIU! Details here: http://sites.viu.ca/sustainability/sustainability-2014/1368-2 Friday is the last day for #MyGreenVIU Congratulations to winners so far--Stefan, Stephanie, Jessie, and Manasnan!	10/22/14 9:58 AM	22
Be sure to vote for your favourite switch off! https://viutube.viu.ca/public/category/Teaching+and+Learning%3ESustainability/170 #mygreenviu #conserve #sustainability	10/24/14 4:09 PM	19

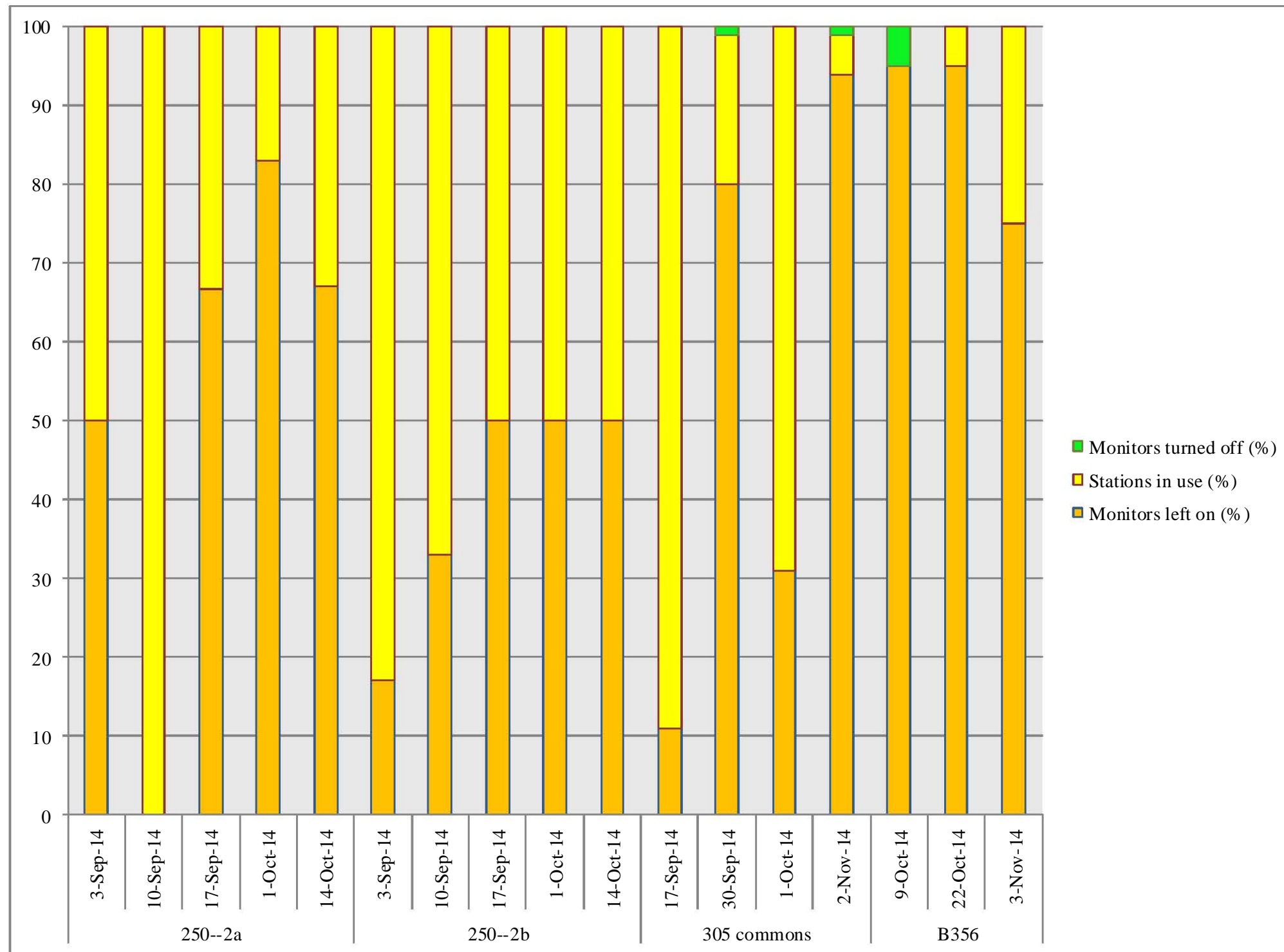
Post Message	Posted	*Lifetime Post Total Reach
<i>*The total number of people the Page post was served to. (Unique Users)</i>		

These results are from VIU.Sustainability Facebook page Insights <https://www.facebook.com/VIU.Sustainability>

Appendix C
Web page Flow



Appendix D
Power Status of Computers (%) in Computer Commons Areas



Appendix E
Energy Savings in Selected Buildings

