

Using signage to reduce energy consumption in UBC student residences

Dylan Meng, Jiaying Zhao

University of British Columbia

VOL 500

June 11, 2015

Disclaimer: "UBC SEEDS Program provides students with the opportunity to share the findings of their studies, as well as their opinions, conclusions and recommendations with the UBC community. The reader should bear in mind that this is a student project/report and is not an official document of UBC. Furthermore readers should bear in mind that these reports may not reflect the current status of activities at UBC. We urge you to contact the research persons mentioned in a report or a SEEDS team representative about the current status of the subject matter of a project/report".

Using signage to reduce energy consumption in UBC student residences

Dylan Meng, Jiaying Zhao
University of British Columbia

The current study focused on determining the effectiveness of injunctive nudges in the form of stickers on the reduction of energy consumption. Six buildings in Totem Park Residence at the University of British Columbia participated in this study (N = 1202), where four buildings were in the intervention condition and two buildings were in the control condition. The intervention was designed in the form of stickers promoting turning off light switches and electronic devices, using cold-water washes when doing laundry, and taking shorter showers (Figure 1). The stickers were put up in the intervention buildings from January to April, 2015. The control condition had no stickers.



Figure 1. Four stickers used in Totem Park Residence on reducing energy consumption regarding light, digital devices, cold water laundry, and showers.

The location of the stickers was consistent between buildings and were as follows: the light switch and device stickers were above the light switch in the communal area of each floor, the shower sticker was on the tap of the shower, and the laundry sticker was on top of the laundry machine. These locations were chosen in a way such that the shower, laundry machine, and, light switch could not be used without seeing the stickers before use so as to maximize the intervention exposure.

The main measure of the study was the kWh per student of each building and how it changed over time and differed between buildings. These measures were taken directly from the Schneider Electric report over 2014 and 2015. Buildings were first divided into Treatment and Control buildings where Dene, Haida, Nootka and Salish were Treatment buildings and Kwakiutl and Shuswap were Control buildings. The light and device stickers were installed during room checks after students moved out in December and were present before students returned in January. Laundry stickers were installed in mid January and shower stickers were installed in early February.

Weekly kWh per student measurements were first collected from January to April 2014 (01/06/2014 – 03/31/2014) to establish a baseline measurement before any kind of intervention was implemented. The same measurements were then collected for the same time in 2015 (01/17/2015 – 04/11/2015) after the intervention was implemented, as well as for the semester directly before it (09/20/2014 – 12/13/2014). See Figure 2.

A 2 x 2 ANOVA was run for building Condition (Treatment and Control) as well as Year (2014, and 2015) to determine their effects on the weekly kWh per student and found no significant main effect of the Condition factor ($F(1,130) = .576, p = 0.45$), the Year factor ($F(1, 130) = 0.015, p = 0.90$) and also no interaction ($F(1,130) = 0.714, p =$

0.40). A two-tailed, individual samples t-test was also run between the Treatment and Control buildings in 2015 (after the intervention stickers were put up) and no significant effect was found ($t(70) = 0.063, p = 0.95$). When the same test was run for individual buildings between 2014 and 2015, it was found that Dene showed a significant decrease in weekly kWh per student ($t(21) = 6.37, p < 0.01$) whereas all other buildings either showed no change or increased in energy usage.

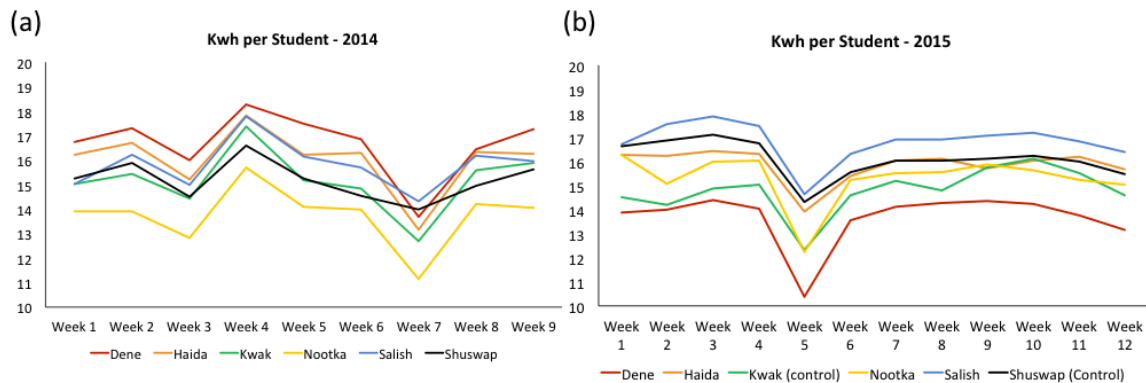


Figure 2. (a) Energy consumption (kwh per student) in each building in the spring term in 2015, from 01/17/2015 to 04/11/2015. (b) Energy consumption (kwh per student) in each building in the spring term in 2014, from 01/06/2014 to 03/31/2014.

A second 2 x 2 ANOVA was run for building Condition and Time (Before and After) for energy usage on the weekly kWh per student for the fall term and the spring term in the 2014-2015 school year (see Figure 3). A significant main effect was found for the Condition factor ($F(1, 138) = 4.69, p = 0.03$) where the intervention buildings used less energy than control buildings. The main effect of the Time factor was also significant ($F(1,138) = 10.58, p < 0.01$) where energy use decreased after intervention. An interaction between Condition and Time was also found ($F(1, 138) = 4.31, p = 0.04$) where the treatment buildings used significantly less energy than the control buildings before intervention but used the same amount of energy after intervention.

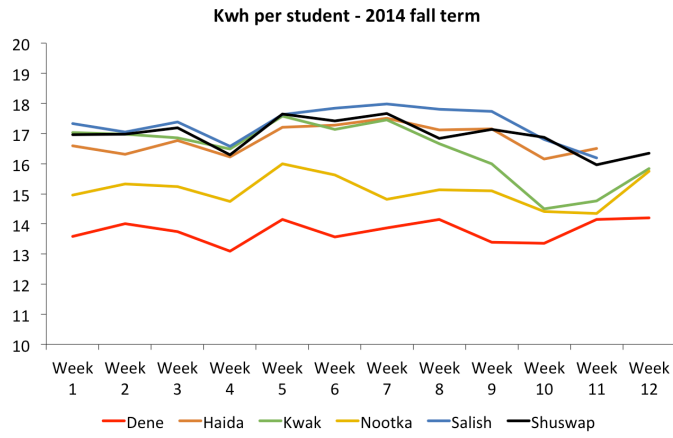


Figure 3. Energy consumption (kwh per student) in each building in the fall term in 2014, from 09/20/2014 to 12/13/2014.