

UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

Impact of Wayfinding Signages and Posters on the use of Water Fountains

Forever 4.0: Ziru Xu, Qiansui Zhou, Xiaochao (Sophie) Xiong, Linnea Lin, Wanzi (Sophy) Dong,

Yueyang (Gary) Teng

University of British Columbia

PSYC 321

Themes: Water, Buildings, Community

April 4, 2019

Disclaimer: "UBC SEEDS Sustainability 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 research 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 the SEEDS Sustainability Program representative about the current status of the subject matter of a project/report".

Executive Summary

Promoting the use of water fountains has a significant impact on environmental sustainability, and appropriate wayfinding signages are crucial to easier access to water fountains. This experiment was conducted on individuals in UBC through naturalistic observation and examined whether the installation of wayfinding signages and campaign posters influence people's usage of water fountains on the lower floor of the UBC AMS Student Nest. We hypothesize that the signages and posters will both individually increase the utilization of the water fountain, as well as when installed together. This study has three conditions: (1) neither signages nor posters were installed, (2) only signages were installed, and (3) both signages and posters were installed. We also randomly surveyed 100 participants to investigate their preference and perception of the water fountain. We conducted multiple chi-square tests and found a significant difference comparing the signages condition and the signages and posters condition, and low recognition of the wayfinding signages. While individual installations of the wayfinding signages or the posters did not lead to a significant increase in the usage of the water fountain, the usage increased when the two were combined. Implications and recommendations for future studies are also discussed in detail to enhance the impact of wayfinding signages and posters.

Key words: water fountain, wayfinding signages, posters

Introduction

Water is essential for life, and hydration is crucial for health and well-being. Likewise, adequate water intake helps regulate body temperature, maintain blood pressure, lubricate the joints, and prevent kidney damage (Popkin et al., 2010). Drinking sugar-sweetened beverages (SSBs) instead of water is associated with an increased risk of diabetes, obesity, and cardiovascular disease (Malik et al., 2010). Despite extensive researches emphasizing the adverse health effects of high SSB intake, the consumption level of the world's population is still very high (Singh et al., 2010). Not only that, most people prefer drinking bottled water to maintain hydration. According to a 2015 Statistic Canada survey, almost one in five Canadian households drink primarily bottled water. The reasons that people choose bottled water over tap water includes taste preference, convenience, and safety (Saylor et al. 2011). However, large quantities of bottled drinking water have led to many environmental problems, including water waste, pollution, and climate change. The choice of drinking tap water can help remedy the negative impact of bottled water on the environment. Thus, it is vital to investigate how to promote usage of water fountains.

Various researches have studied features that may influence water fountain usage. Schools are a crucial place when it comes to offering increasing water intake, and to improve the convenience and appeal of drinking water, Erica et al. conducted a study of an intervention in 10 Boston public schools. The intervention involved promotional poster and cup dispenser near the water fountain, and the results showed that the intervention increases student water assumption. In addition to improving water intake, the study found that as more students consumed water during lunch, fewer students drank sugar-sweetened beverages. This suggested that promoting the convenience and attractiveness of drinking water can increase the usage of water fountain (Kenney et al., 2015). In addition, Barrett et al. (2017) investigated the promotional campaign to raise the use of drinking fountain among the American Latino youth. This campaign included messages and information about the benefits of drinking water and the safety of tap water. As a result, an increase in water consumption further illustrated that the campaign had a positive effect on promoting drinking water. Additionally, another study has augmented the audiovisual water fountain and observed the usages of drinking water. Arroyo et al. concluded that the expansion of sound and light are effective in attracting the attention of people who pass by water fountains and motivated more people to drink from the water fountain (Arroyo et al. 2012).

Based on the previous studies, by adding cup dispensers, promotional posters, and campaigns, using an audiovisual water fountain would increase the usage of water assumption. This suggests that water intake behaviours can be motivated by the attractiveness of posters and inventive water fountains. However, few studies examined the effect of wayfinding signage on the usage of the water drinking fountain. According to the survey of UBC SEEDS project in 2018, students demanded for the addition of a wayfinding system to better find the locations of drinking fountains (Sané et al. 2018). Thus, wayfinding signages were implemented in various facilities in order to provide directions to the water fountains.

The aim of our study is to examine how wayfinding signages and campaign posters would impact people's frequency on using the water fountain on the lower floor of the AMS Student Nest, at the University of British Columbia. For this study, we have three main predictions: (1) wayfinding signages will promote the use of the water fountain, (2) campaign posters will encourage the use of the water fountain, and (3) the combination of both wayfinding signages and posters will promote the use of water fountain.

Methods

Participants

We observed individuals (including UBC students, staffs, visitors and all other individuals) whom have either passed by the water fountain, used the water fountain (involved fountain bubblers vs bottle fillers), or both, in the UBC AMS Student Nest lower floor, accumulating to a total of 4600 participants (See Appendix I). With individuals whom had passed by the water fountain, we tallied a total of 4075 people (Baseline: N=1551, Signages Only: N=1641, Wayfinding Signages/Posters: N=1408). In addition to water fountain usage, we counted a total of 525 individuals who used the water fountain (Baseline: N=181, Signages Only: N=161, Signages/Posters: N=183). Additionally, we randomly sampled 100 individuals present in the Nest lower floor to participate in the survey.

Conditions

Our observations are divided into three conditions to measure the impact on the implementation of the wayfinding signages and posters. Our independent variables are the three different conditions: neither signages nor posters, only signages, and both signages and posters. Our dependent variable is the number of individuals whom either passed by the water fountain, used the water fountain, or both, under these conditions. At the baseline condition, we observed individuals who passed by the water fountain, used the water fountain, or both, without wayfinding signages or posters being implemented. In wayfinding signages condition, three wayfinding signages were implemented in the Nest lower floor (see Appendix II). The wayfinding signages were designed in dark blue with the symbol of a stick figure using the water fountain. Two of the signages were posted on the concrete columns with a directional arrow to the left, where the water fountain is located (see Appendix III). Lastly, in wayfinding signages and posters condition, we posted two environmental friendly posters above the water fountain while three wayfinding signages remained. The poster was of an individual smiling, containing the message “You turn me on” (see Appendix IV).

Measures

Our study adopted naturalistic observations under the three conditions to measure the usage of the water fountain, and we randomly selected individuals present at the Nest lower floor to be surveyed as participants after observations are finished. We observed and tallied the number of people who passed by the water fountain, used the water fountain, or both, during weekdays from 12 pm to 2 pm for three weeks straight, totalling 12 hours per week, allocating one week to each condition. All data we collected under the three conditions were then calculated by using a Chi-Square Statistic. We first counted the number of people who passed by the water fountain within 1.5 meters under the three conditions (see Appendix V). Second, the number of people who used the water fountain was counted under each of the three conditions. The “water fountain usages” were defined as any behaviours of using the water fountain, such as refilling the water bottle, drinking water directly from the water fountain, and any other use. Lastly, questionnaires (see Appendix VI) regarding people’s awareness and perceptions regarding the signages were given out to a 100 randomly selected sampled of individuals in the Nest lower floor, after we finished all observations. The questionnaire consisted of five questions. Of the five questions, four were close-ended questions, comprising of one yes-or-no question regarding participants’ awareness in

the installation of the wayfinding signages and three questions that used 5 Likert-scale regarding the usefulness and preference of water fountain signages, and their frequency of using the water fountain. One open-ended question was collected to evaluate the sample participants recommendations regarding the water fountain signages. Questions regarding the usefulness and their preference regarding the water fountain signages were not required to be answered for participants who had not noticed or were unaware of the installation of the signages.

Procedures

The study took place in the Nest Lower Floor and was designed to naturally observe the two variables, in which people passed by and used water fountain under the three conditions during the weekdays. The observations were held in three weeks and were divided into one week for each condition. More specifically, we chose to observe people from 12 PM to 1 PM, and 1 PM to 2 PM, four days a week. Before the observations started, we measured 1.5-meter range from the water fountain in the Nest Lower Floor to indicate the degree of pass by.

In the first week of the observation, we observed and collected our data at the dining table around 3 meters far away from the water fountain without any wayfinding signages and posters under the baseline condition. We used clickers to record the number of people who passed by within 1.5 meters as well as the number of people who used the water fountain. After finishing the measurements in the baseline condition, three wayfinding signages were provided and installed by UBC Building Operations (Sign Shops) in the Nest Lower Floor (see Appendix II) in the following week. One of the signages was mounted on the concrete wall close to the water fountain standing out from the wall so it would be more visible, while the other two were posted on the concrete columns in the middle of Nest Lower Floor in front of the convenience stores. Procedures here were the same as the baseline condition except the wayfinding signages were installed before we observed and counted our data under this condition. For our last condition, we posted two posters that were provided by SHHS (Student Housing and Hospitality Services) above the water fountain, while the wayfinding signages remained (see Appendix IV). The procedures for this condition were the same except we had both wayfinding signages and posters implemented at the same time.

After finishing all the measurements, we randomly sampled 100 participants who showed up in the Nest Lower Floor from 12 pm to 2 pm, and we completed the survey by using the researcher's laptop. The optional oral debriefings were available at the beginning of the study.

Results

The overall results are shown in Appendix Table I. Our detailed results suggest that of the total 4600 participants observed, our baseline condition consisted of 1370 participants passed by the water fountain, and 181 participants used it. In the signage condition, 1480 participants passed by the water fountain, and 161 participants used it. In the signages and posters condition, 1225 participants passed by the water fountain, and 183 participants used it. We used a chi-square test to analyze the influential results; and since we conducted multiple chi-square tests, we correct our p-value to 0.0166 (0.05/3). For the overall relationship amongst the three conditions (baseline, signage, and signage with posters), the chi-square statistic is 7.7611, with a p-value of .02064. The result is marginally significant at $p < .0166$. For the baseline and signage condition, the chi-square statistic is 2.8799, with a p-value of .089692. The effect is not significant at $p < .0166$. Compare to the baseline condition with the signages and posters condition, the chi-square statistic is 1.2051, with a p-value of .272296. The result is insignificant at $p < .0166$. For signage and signage and

posters, the chi-square statistic is 7.6852, with a p-value of .005568. The effect is significant at $p < .0166$.

Our survey results suggest that 90.4% of our sample did not notice the signage at all, and 89% of our sample who have noticed the signage found it usable and likable. Participants vary their frequency of the usage of the water fountain, with 9.3% never using the water fountain, 14.6% rarely using the water fountain, 39.7% sometimes using the water fountain, 28.4% often using the water fountain, and 8% always using the water fountain.

Discussion

Our study aimed at examining the usefulness of water fountain wayfinding signages and posters in promoting the water fountain usage in Nest lower floor in the University of British Columbia. To explore the correlation between the signages and posters, and water fountain utilization, our study was conducted by using naturalistic observation. The observation was divided into three conditions, in which we observed people who passed by as well as who used the water fountain at a baseline, with signages posted only, and with both signages and posters implemented. The dependent variable is the water fountain utilization, and the independent variables are the implementation of the signages and posters. This itself limit the internal validity of our study since no manipulation was induced; it is hard to conclude the causal relationship. The study is limited to students from the University of British Columbia, and we were not able to sample their detailed demographic information, which can be a challenge to the external validity of our study.

Furthermore, we recruited participants at peak hours only, which may not be able to generalize to all-time utilization of the water fountain. Although our group was responsible for collecting the data on the lower floor of Nest, the installation of the decals (which were not used in our study) and the study variables of the group responsible for the water fountain on the main floor of the Nest may present as confounding variables to our research. Moreover, the weather changed dramatically during the timeframe of our data collection period. As a result, possible interpretations may include that a rise in temperatures may alter the number of people utilizing the water fountain. On-campus events were also set up outside of the Nest, which could also have changed our result in generalization.

Furthermore, double-counting was potentially also an inevitable confounding variable to our study, due to the difficulty in differentiating individuals who may have previously passed the water fountain. Since our survey data indicated that 90.4% of the participants did not notice the wayfinding signage, it is hard to conclude the underlying reason for the decrease or increase in numbers. Aside from the campaign posters, there appeared to be another campaign in the Nest which also included the installation of round decals both on the walls and floors. Further studies can be run within a timeframe which has controlled the amount of related ongoing campaigns. Although our client was mainly interested in the impact of wayfinding signages, we excluded posters in our survey completely. It would be helpful for future interventions if we also examined people's perceptions of the posters, as well as their demographic information. Lastly, our study selected only one of three designs of posters to minimize third variables, whereas future studies can test out different styles and designs of posters since our results indicate a most significant increase in the usage of water fountain from the installation of the posters. Our survey proposed that few people used the water fountain regularly; thus, it is essential to try out different methods in promoting the usage of the drinking water fountain for further reducing the use of plastic and advocating for a more sustainable and environmental-friendly lifestyle.

Recommendation

Overall, our data suggest that the installation of water fountain wayfinding signage and the drinking water campaign posters does have a significantly positive correlation with the number of participants utilizing the water fountain located in the lower floor of the Nest. The installation of the signage does not have a significant influence on the usage of the water fountain. In other words, our study's results show that the number of people who used the water fountain decreased after the installation. In addition, the combinations of signages and posters show a significant increase in the usage of the water fountain.

Recommendations for future studies, as well as for our client, are mainly derived within the survey presented to a random selection of participants present at the lower floor of the Nest during lunchtime peak hours. One question within the survey asked participants for their input regarding the signages and posters present around the water fountain. A majority of participants recommended lowering the height placement of the signages on the walls to better meet one's visual perception, as well as enlargement the signages. Similar in concept to these recommendations, the signage could also be adjusted to a brighter colour to attract more attention. Besides, other practices could include altering the design of the signage, as some participants perceived the signage to be instructions for a correct posture when drinking water. Furthermore, water fountains could potentially be installed next to the bathrooms, as water fountain locations are often associated with bathroom locations. Lastly, in addition to incorporating the recommendations above, a possible and immediate improvement to the signages could be to increase the signages and posters merely, as a majority of our participants did not notice the signages.

Reference List

- Arroyo, E., Bonanni, L., & Valkanova, N. (2012). Embedded interaction in a water fountain for motivating behavior change in public space. Paper presented at the 685-688. doi:10.1145/2207676.2207773
- Barrett, N., Colón-Ramos, U., Elkins, A., Rivera, I., Evans, W. D., & Edberg, M. (2017). Formative research to design a promotional campaign to increase drinking water among central american latino youth in an urban area. *Journal of Health Communication, 22*(6), 459-468. doi:10.1080/10810730.2017.1303557
- Hood, N. E., Turner, L., Colabianchi, N., Chaloupka, F. J., & Johnston, L. D. (2014). Availability of drinking water in US public school cafeterias. *Journal of the Academy of Nutrition and Dietetics, 114*(9), 1389.
- Kenney, E. L., Gortmaker, S. L., Carter, J. E., Howe, M. C. W., Reiner, J. F., & Cradock, A. L. (2015). Grab a cup, fill it up! an intervention to promote the convenience of drinking water and increase student water consumption during school lunch. *American Journal of Public Health, 105*(9), 1777-1783. doi:10.2105/AJPH.2015.302645
- Malik, V. S., Popkin, B. M., Bray, G. A., Després, J., & Hu, F. B. (2010). Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. *Circulation, 121*(11), 1356-1364. doi:10.1161/CIRCULATIONAHA.109.876185
- Popkin, B. M., D'Anci, K. E., & Rosenberg, I. H. (2010). Water, hydration, and health. *Nutrition Reviews, 68*(8), 439-458. doi:10.1111/j.1753-4887.2010.00304.x
- Sané, S., Tran, A., Bebek, A., & Yu, E. (2018). The Promotion of Indoor Drinking Water Fountains at UBC. *UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program*.
- Saylor, A., Prokopy, L. S., & Amberg, S. (2011). What's wrong with the tap? examining perceptions of tap water and bottled water at purdue university. *Environmental Management, 48*(3), 588. doi:10.1007/s00267-011-9692-6
- Singh, G. M., Micha, R., Khatibzadeh, S., Lim, S., Ezzati, M., Mozaffarian, D., & Global

Burden of Diseases Nutrition and Chronic Diseases Expert Group (NutriCoDE). (2015). Estimated global, regional, and national disease burdens related to sugar-sweetened beverage consumption in 2010. *Circulation*, 132(8), 639-666. doi:10.1161/CIRCULATIONAHA.114.010636

Statistic Canada. (2015). *Households and the Environment Survey: Public Use Microdata File*, 2015 (16M0001X). Retrieved from Statistic Canada website: <https://www150.statcan.gc.ca/n1/daily-quotidien/161216/dq161216c-eng.htm>

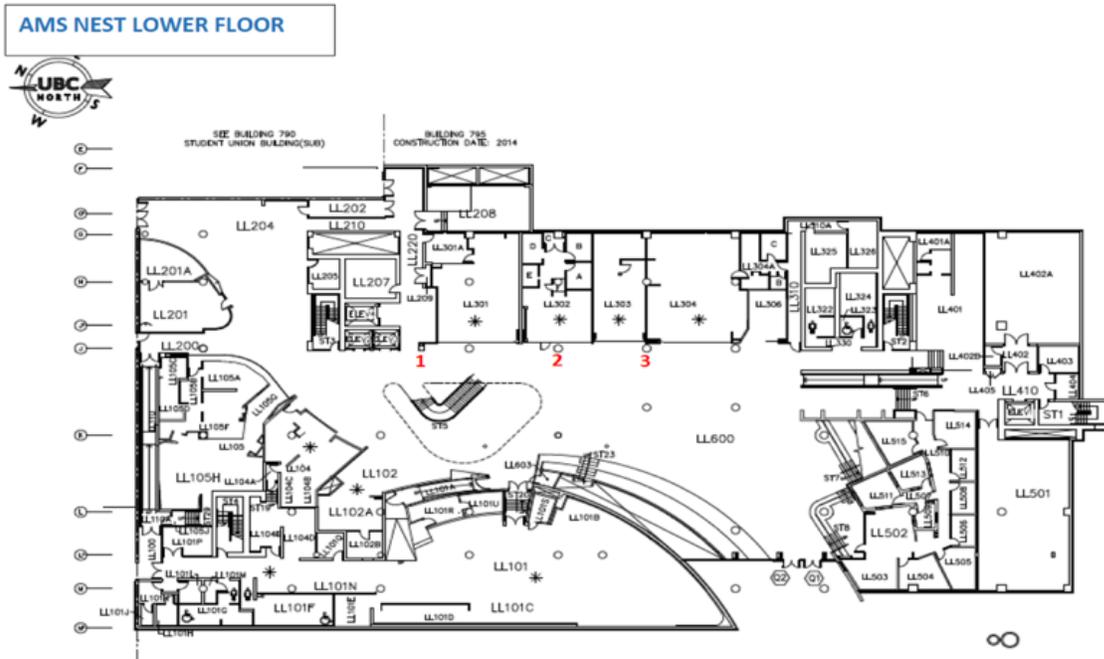
Appendix

Appendix I: Table for participants

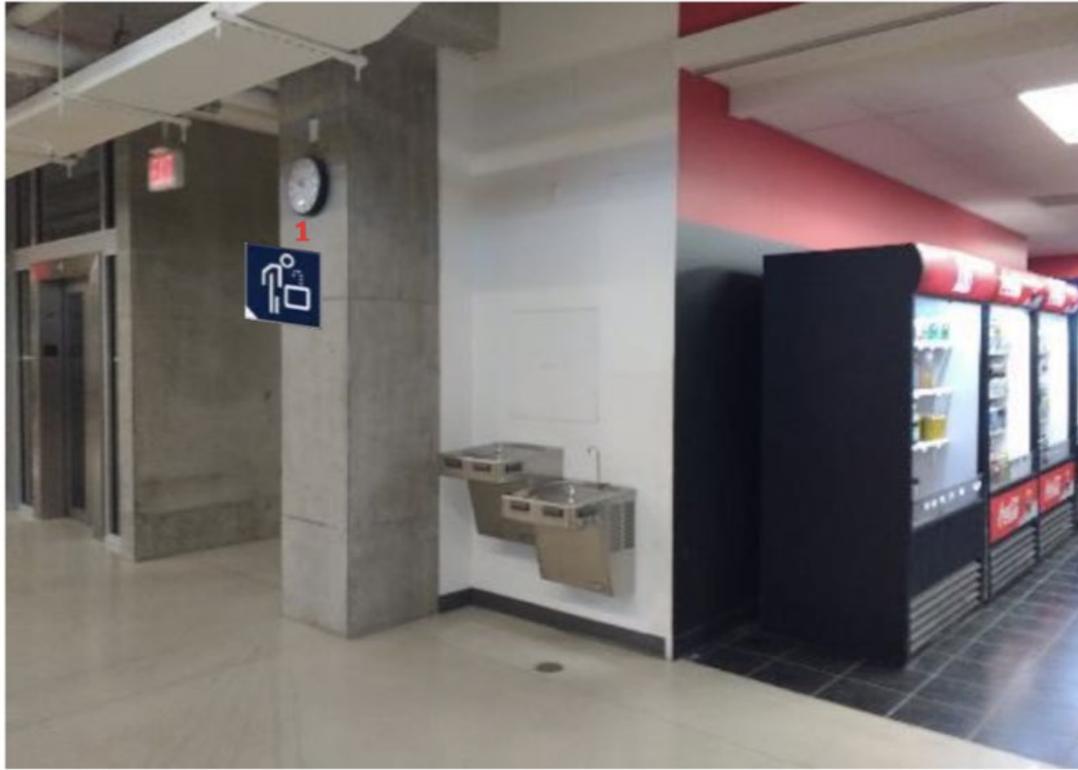
Pass by	294	363	338	375	390	371	351	368	235	397	262	331
Used	41	50	46	44	38	46	35	42	37	56	43	47
Total	335	413	384	419	428	417	386	410	272	453	305	378

Total # of baseline: 1551	Total 4600
Total # of signages: 1641	
Total # of poster/signages: 1408	
Passed by (baseline): 1370	Total 4075
Passed by (signages): 1480	
Passed by (signages/posters): 1225	
Used baseline: 181	Total 525
Used signages: 161	
Used poster/signages: 183	

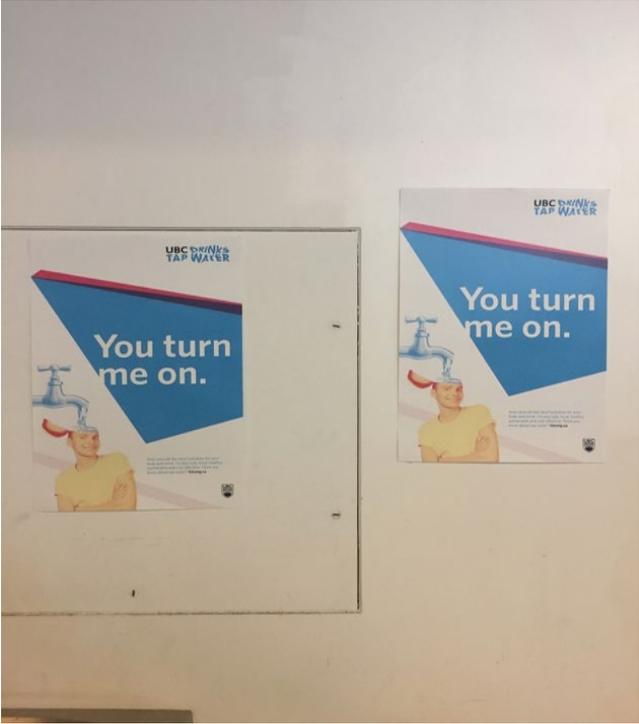
Appendix II: Map of the Nest Lower Floor (3 wayfinding signages locations installed)



Appendix III: 3 Wayfinding signages in the Nest Lower Floor



Appendix IV: 2 Posters in the Nest Lower Floor



Appendix V: Water fountain pass by range



Appendix VI: Survey

1. Have you noticed the signages of the water fountain?				
No	Yes			
2. How useful was the signages in helping to find water fountain?				
Not useful at all	Somewhat not useful	Moderate	Somewhat useful	Very useful
3. How much do you like the signages?				
Strongly dislike	Somewhat dislike	Moderate	Somewhat like	Strongly like
4. How often do you use the water fountain to get water?				
Never	Rarely	Sometimes	Often	Always
5. What are some recommendations on the water fountain signages?				

