

UBC Social Ecological Economic Development Studies (SEEDS) Student Report

Promoting Social Sustainability at UBC: The Impacts of using the Dyson Airblade™ Hand Dryers versus Paper Towels in UBC Vancouver Campus Washrooms

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May 2011

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Introduction

In 2010 the University of British Columbia (UBC) launched its *UBC Sustainability Initiative*. This initiative aims to encourage and facilitate sustainable behavior by challenging UBC students, faculty and community to “explore and take into account the social, economic and ecological consequences” (UBC Sustainability Pledge 2010) when making all decisions and choices. UBC Building Operations (Custodial Services) have proposed substituting the current single-use paper towels to the Dyson Airblade™ Hand Dryer in UBC washroom facilities as the more sustainable choice. Sustainability, as it is defined and implemented as guiding practice here at UBC, requires the three facets of sustainability be evaluated and ideally, all met. This multifaceted analysis has been termed the triple-bottom-line assessment; social, ecological and economic consequences of an activity or product are evaluated and the strategy that is adopted must best balance all of these bottom lines.

In co-operation with UBC SEEDS (Social, Ecological, Economic Development Studies) UBC students of 2009 APSC 261: Impact of Technology on Society, conducted research to evaluate and compare the economic and environmental sustainability of single-use paper towels and hand dryers (see: Adebbe et al. 2009; Amin et al. 2009; Bonatto et al. 2009). Hand dryers were found to be the ecologically and economically sustainable choice.

Statement of the Problem

Although the above mentioned UBC reports aimed to conduct triple-bottom-line assessments, more research was needed to specifically evaluate the social sustainability of hand dryer use versus paper towels in UBC washrooms. Firstly, the studies did not address the health impacts of potentially altered hand washing behavior due to the introduction of a new technology alternative to paper towels. Nor have current hand washing practices been observed or recorded to evaluate hand hygiene compliance on UBC Vancouver campus. This current research evaluates the Social Sustainability of

the Dyson Airblade™ Hand Dryer in UBC Vancouver Campus bathrooms. To evaluate its social sustainability there are a number of health implications to consider:

- A) Does the Dyson Airblade™ Hand Dryer meet the health requirements that are a part of proper hand hygiene?
- B) What are the current hand washing / hand hygiene compliance rates on campus at UBC?
- C) Is the installation of the Dyson Airblade™ Hand Dryer likely to alter hand washing behavior / hand hygiene compliance of UBC washroom users?

Background

H A N D H Y G I E N E (H H)

Following proper hand hygiene has been identified as one of the most effective ways to prevent the spread of infectious illness (Aiello et al. 2008; BC Centre of Disease Control 2011; Health Canada 2010; Vancouver Coastal Health 2010). Health Canada, the BC Centre for Disease Control and Vancouver Coastal Health all outline the same basic steps to ensuring proper HH:

- 1) Wet hands with warm water.
- 2) Apply soap.
- 3) Rub hands together vigorously for a minimum of 20 seconds. Scrub entire hand, including back of hands, between fingers and under nails.
- 4) Rinse hands well.
- 5) Dry hands with a towel (in public washrooms use single-use towels) or blow dryer.
- 6) Turn off the tap using the paper towel so that you do not re-contaminate your hands. When using a public bathroom, use the same paper towel to open the door when you leave.

UBC is committed to ensuring the well being, health and safety of its community by providing the necessary information and tools to do so. In light of the above recommendations for HH, UBC Building Operations maintains the public washrooms, ensuring they have running warm water and are stocked with soap and paper towels in order that users can follow proper HH. As well, UBC has placed 'prompts' (see Figure 1) in the public washrooms of its Vancouver campus. These prompts are pictorials whose aim is to educate and remind UBC Vancouver campus washroom users about proper HH.



Figure 1. Source: UBC Building Operations, March 2011.

THE DYSON AIRBLADE™ HAND DRYER MEETS HAND HYGIENE REQUIREMENTS

Studies conducted prior to 2007 evaluating hand dryers, hand hygiene and health were evaluating old hand dryer technology. Many of these studies resulted in conflicting findings (as cited by: Sutton 2009; Hinz and Bondy 2010; Gustafson et al 2000) and none used the same methodology nor consistently evaluated the same technology. Some studies concluded that hand dryers, even ‘old technology’ hand dryers were the most hygienic way to dry one’s hands in a public washroom (Gustafson et al 2000; Taylor et al 2000). Others concluded that hand dryers were not particularly hygienic; the studies recognized that the ‘old technology’ hand dryers required the user to hold their hands under a stream of warmed air to dry, often rubbing one’s hands together. Many of these studies hypothesized that the user’s hands were being recontaminated by aerosols in the washroom air, drawn into the hand dryer and blown back on to the hands of the user (Taylor et al 2000; as cited by Hinz and Bondy 2010). Or, they argued that hands were not dried sufficiently as users were not holding their hands beneath the driers for the full time allotted (> 30 sec). To control for these possibilities, the Dyson Airblade™ Hand Dryer uses a HEPA filter to filter pathogens and bacteria from the air blown onto users’ hands and the users’ hands are completely dried in under 15 seconds (Dyson 2011).

Subsequent studies found that it was the rubbing motion that was significantly contributing to the levels of bacteria measured on users’ hands, thus identifying a measurement bias present in many early studies of hand dryers (Hinz and Bondy 2010). Carried on the skin of the human body are two types of microorganisms, or microbiological flora, transient and resident (Taylor et al 2000; Jumaa 2005; WHO 2009). The *resident* microflora are a person’s normal population of microorganisms present and are not considered a health hazard (Taylor et al 2000), whereas the *transient* microflora are often pathogens that are picked up through surface contact. The aim of proper HH is to remove the transient microflora from one’s hands (Jumaa 2005). The resident microflora are typically found in the deeper layers of the skin and sebaceous glands (Jumaa

2005), rubbing one's hands together under a hand dryer can draw these resident microflora to the skin's surface (Hinz and Bondy 2010). These resident microflora are measured as present when the hands are then tested; they are then evaluated as (still) contaminated. *Comparative evaluation of the hygienic efficacy of an ultra-rapid hand dryer vs conventional warm air hand dryers* (Snelling et al 2010), evaluated several different types of hand dryers where the users both rubbed their hands together, and then tested them again when they held them still under the airstream. Their results confirmed that the rubbing motion inhibited the overall reduction of bacterial numbers on the skin, and in some instances the measurements of bacteria were higher (Snelling 2010). However, when the users kept their hands still, using the same hand dryers, the bacterial counts were significantly reduced (Snelling 2010). Studies that have controlled for this measurement bias have found that hand dryers are an acceptable part of a hand hygiene routine (WHO 2009). The Dyson Airblade™ Hand Dryer is designed so that the user must raise and lower their hands through a stream of directed air but they are unable to rub their hands together (see Figure 2).

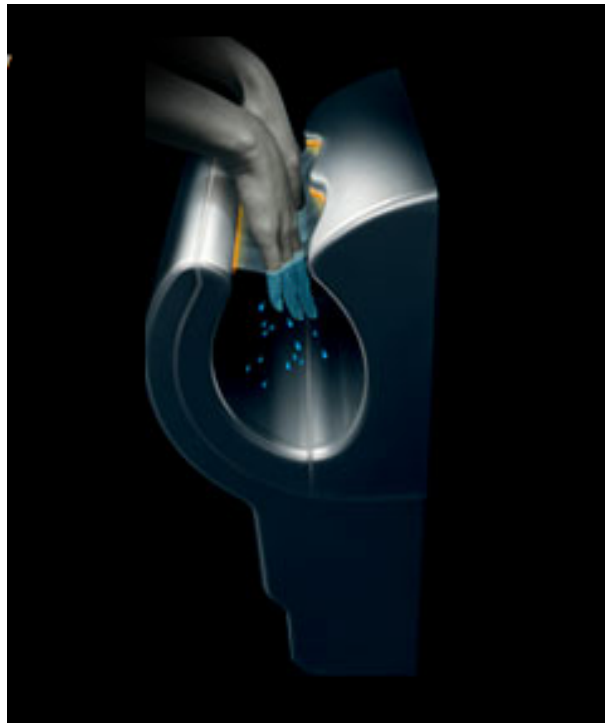


Figure 2. Source: dysonairblade.ca, date accessed May 16, 2011.

Current studies addressing hand hygiene and the prevention of the spread of illness have concluded that ensuring one's hands are sufficiently dried after washing is one of the most important factors when preventing the transfer of pathogens (Lingaas and Fagernes 2009; WHO 2009; Merry et al 2001; Patrick et al 1997). Moisture levels significantly affect the amounts of bacteria and other pathogens transferred through contact; wet surfaces can transfer significant amounts of bacteria whereas the "transfer of bacteria from dry skin to a dry surface is rather inefficient both for transient and permanent bacteria" (Lingaas and Fagernes 2009: 47). Therefore, it is important that one's hands are not only properly washed, but properly dried to prevent the spread of illness. The Dyson company, acknowledging the importance of drying one's hands, has also created pictorial prompts as a public service message which could be placed in the washrooms in conjunction with their hand dryers (see figure 3). The World Health Organization (WHO) concludes "hands should be dried using either individual paper towels or hand driers which can dry hands effectively and as quickly as it can be done with paper towels, and have been proven not to be associated with the aerosolization of pathogens" (WHO 2009: 31).



Figure 3. Source: Dyson PSA September 2009.

ABSENT FROM HH RESEARCH AND HH GUIDELINES

In the HH recommendations given by Health Canada, the BC Centre for Disease Control and Vancouver Coastal Health it is stated that users of public washrooms should use paper towel to open the door when exiting. Yet, absent from the research studies that address hand hygiene and hand washing methods is the research that focuses specifically on washroom door handles and the transfer of pathogens back onto the hands of users. Most studies that investigated contact transfer of pathogens in washrooms measured numerous surfaces including toilets, floors, sinks, taps and door handles (Mendes and Lynch 1976; Ekanem et al 1983; Drankiewicz and Dundes 2003), and within these studies door handles were found to have the lowest levels of bacteria present. Furthermore, studies measured the amount of pathogens present on these surfaces but did not measure the amount of bacteria transferred back onto the hands of subsequent users. While contact transfer of pathogens is a likelihood, as addressed in *Development of a method to measure bacterial transfer from hands* (Lingaas and Fagernes 2009), door handles should not pose a significant risk to washrooms users provided their hands have been dried properly.

Also, absent from the HH recommendations and UBC HH prompts is the necessary instruction advising public washroom hand washers of the need to dispense the paper towel they will require as the first step to proper HH. When a user's hands are wet they are at a much greater risk of (re)contamination (Patrick et al 1997). Dispensing paper towels with wet hands poses a more significant risk to washroom users than does touching a door handle with dried hands. UBC does not currently provide touchless/automatic sensor paper towel dispensers; therefore, to avoid (re)contamination a user should dispense the paper towel they will need to dry their hands prior to washing one's hands.

Methods

In order to assess the the current hand washing / hand hygiene compliance rates on campus at UBC a hand hygiene audit was conducted in a number of women's washrooms at the UBC Vancouver campus. In order to assess whether the installation of the Dyson Airblade™ Hand Dryer is likely to alter hand washing behavior / hand hygiene compliance of UBC washroom users, a hand hygiene audit was also conducted in a women's washroom at Langara College Vancouver campus. Although Langara College Vancouver campus has a student body approximately half that of UBC Vancouver campus, Langara College Vancouver campus has a similar demographic to that of the population of UBC Vancouver campus. Bathrooms of equivalent size and usage were evaluated for this study. Langara College Vancouver campus had recently installed Dyson Airblade™ Hand Dryers on a trial basis and was also providing paper towels to those washroom users allowing users to chose either hand drying method.

HAND HYGIENE AUDIT

Between February 28, 2011 and April 07, 2011, users of women's washrooms at UBC Vancouver campus and users of one women's washroom at Langara College campus were observed. In order to assess hand hygiene compliance it was necessary to conduct an observed hand hygiene audit, as previous research studies investigating hand hygiene compliance found that self reported behavior was not reflective of observed behavior. Self reported behavior of hand hygiene compliance was found to be much higher than observed actual behavior (Monk-Turner et al 2005; Whitby et al 2007; WHO 2009). The hand hygiene audit quantified not only the percentage of users that washed their hands after using washroom facilities, it also evaluated whether the users followed the necessary steps, when applicable, while washing their hands to ensure adequate hand hygiene (HH steps 1 - 6).

HAND WASHING

Observations were made to assess what percentage of UBC Vancouver campus public washroom users wash their hands after using the washroom facilities. All those that exited a washroom toilet stall were considered to have used the facilities. These users were then observed to determine whether or not they washed their hands. Just as in the study *Another Look at Hand-Washing Behavior* (Monk-Turner 2005) if a user used a sink they were evaluated as a 'hand-washer'. A potential bias in hand washing behaviour observations has been identified; the presence of an observer often induces better than usual hand washing behavior (Monk-Turner et al 2005; WHO 2009). In order to control for this observational bias all observations were made in campus washrooms with a high volume of traffic; observing the behavior of those aware that they are in the company of others using the washrooms, typical of public washroom use. With the exception of one observational block of time at UBC (n=60) and all observations at Langara (n = 135), quantifying hand washing behaviours were observed separately from evaluating hand hygiene compliance.

HAND HYGIENE COMPLIANCE

Observing hand washing behavior demonstrated that many did not follow the procedures to ensure proper hand hygiene; while still washing their hands many were washing them improperly (Monk-Turner et al 2005). Specific behaviors to ensure proper HH, as outlined by UBC and Vancouver Coastal Health, were observed. The researcher watched and coded those who were 'hand-washers'; however, not all who used a sink were observed. The attempt was made to observe all but due to the high volume of traffic the researcher only recorded the behaviour of those that could be observed until they completed the steps or left the washroom.

It was recorded whether, when washing their hands, the participants:

- a) used soap
- b) lathered for a minimum of 20 seconds
- c) turned off the faucets with paper towel
- d) dried hands with paper towel
- e) (when applicable) used paper towel to open the door when exiting the washroom

Soap use was defined as touching the soap dispenser with the hand in such a way that the researcher could either hear or see the action (Monk-Turner et al 2005). Although both proper HH procedure and the UBC prompts stress the importance of washing all areas of the hands, with soap for a minimum of 20 seconds, this researcher did not observe what areas of the hands were washed. If subjects were not washing for 20 seconds or longer then it was reasoned that the washer could not have, in the reduced time taken, properly washed all areas of their hands.

LOCATIONS OBSERVED

The women's washrooms where observation were made on UBC Vancouver Campus included the main floor washroom in the UBC Student Union Building (SUB), the main floor washroom in the P. A. Woodward Instructional Resources Centre (WW) and the main floor washroom of the Irving K. Barber Learning Centre (IKB). All washrooms had 6 or more toilet stalls, 5 or more sinks and soap dispensers, a minimum of 2 paper towel dispensers and all had 5 or more of the UBC HH pictorial prompts (fig. 1) clearly displayed, affixed to the mirrors above each sink. The door of the SUB was propped open negating the need for users to use paper towel to touch the door handle, therefore data for step e was not available for this washroom. The doors to the WW washroom were not propped open. However, due to the layout of the washroom, this researcher was not able to observe subjects washing and drying their hands, and exiting the washroom. No data for step e was recorded in the WW observations. The door to the IKB washroom was not propped open. This researcher was able to collect data for all steps (a - e) for all of those observed in IKB.

Observations were also made in the main floor women's washroom in the A Building of the Langara College Vancouver Campus. This washroom has 6 toilet stalls, 6 sinks, 5 soap dispensers, one paper towel dispenser and two Dyson Airblade™ Hand Dryers. The Langara campus washroom door was propped open and the sinks have touchless taps; therefore, no data was recorded for steps c or e. Hand hygiene prompts or pictorials were not present in this washroom.

ETHICAL CONSIDERATIONS

When observing hand washing behavior and hand hygiene in UBC and Langara College campus washrooms no identifying data was recorded. The only data recorded was hand washing behaviors a-e (as outlined above) and the date, time and location and layout of washrooms observed. Subjects being observed could expect as much anonymity as one would reasonably expect when using a public washroom. This research was conducted under Behavioural Research Ethics Board approval certificate H11-00867.

LIMITATIONS

The limitations of this research are its observation bias addressed above, and its selection bias. “Selection bias: Observers systematically select certain times, care situations, health-care sectors, HCWs or opportunities for their observations; consequently, their results do not reflect the overall hand hygiene compliance” (WHO 2009: 163). This researcher specifically chose high traffic washrooms and only observed behaviors during times of the day when it was anticipated they would be most busy (between 11:00 - 14:00). Also, due to gender, this researcher was only able to observe hand washing behaviors and hand hygiene compliance in women’s washrooms. Therefore these results will not be representative of all UBC Vancouver campus or Langara College Vancouver campus washroom users. The results of this research however, will likely reflect higher estimates of hand washing behavior and hand hygiene compliance than actual behavior due to these biases. The observational bias is likely to cause a greater number of users to wash their hands due to observation. The selection bias, particularly the exclusion of observations in men’s washrooms, has also likely raised the observed percentage of ‘hand-washers’. In all studies, of both self-reported behavior and observed actual behaviour, men were significantly less likely to wash their hands after using the washroom (Park et al 2010; WHO 2009; Aiello et al 2008; Jeong et al 2007; Monk-Turner et al 2005).

Results

UBC VANCOUVER CAMPUS

Table 1. Observed rates of hand washing after washroom stall use

time of audit	11:55 -12:10	12:10 - 12:21	12:21 - 12:28	12:28 - 12:38	05/04/ 2011	11:09 - 11:24	11:25 - 11:40	07/04/ 2011	Total
used stall	30	30	30	30	120	30	30	60	180
washed hands	28	27	29	28	112	27	30	57	169
Totals	93.30%	90%	96.70%	93.30%	93%	90%	100%	95%	94%

Table 2. Observed Hand Hygiene Compliance Totals

Location	HH step	water	soap	wash >20	taps	dry p/t	door	did not dry	followed all steps
IKB		30	20	1		28	1	3	0
SUB		60	48	5	1	53	n/a	7	0
IKB		30	18	0	0	27	2	2	0
WW		30	20	3	4	29	n/a		0
SUB		60	49	1	5	58	n/a	1	1
SUB		60	49	2	1	60	n/a	0	0
	Totals	270	204	12	11	255	3	13	1
	%		76	4	4	94	5	5	0.4

LANGARA COLLEGE VANCOUVER CAMPUS

Table 3. Observed rates of hand washing after washroom stall use

time of audit	13:23 - 13:39	13:40 - 14:00	16/03/ 2011	12:03 - 12:20	12:20 - 12:27	12:27 - 12:55	29/03/ 2011	Total
used stall	30	15	45	30	30	30	90	135
washed hands	30	15	45	30	30	30	90	135
Totals	100%	100%	100%	100%	100%	100%	100%	100%

Table 4. Observed Hand Hygiene Compliance Totals

HH step	water	soap	wash >20	dry p/t	Dyson	did not dry	followed all steps
	45	37	1	16	29	0	1
	30	25	0	11	18	1	0
	30	25	1	13	17	0	1
	30	25	0	11	18	1	0
Totals	135	112	2	51	82	2	2
%		83	1.5	38	61	1.5	1.5

Findings

U B C V A N C O U V E R C A M P U S

It is important that the HH compliance rates at UBC be measured when evaluating the social sustainability of introducing new technology that would alter the ability to follow the steps of HH. Part of this research determines whether or not the removal of paper towels from the bathroom would compromise users' hand hygiene practices and/or compliance rates.

This research has demonstrated that the overwhelming majority of users of UBC Vancouver campus washrooms are not effectively following the steps of proper hand hygiene; less than 0.5% (n = 1) of all users (n = 270) followed all of the appropriate steps of HH. Roughly 25% of UBC 'hand washers' do not use soap when washing their hands. One of the most alarming findings of this research is that less than 5% of hand washers are washing their hands for a sufficient length of time (>20 sec) and therefore also not washing all areas of their hands. Fewer than 5% of UBC subjects used paper towels to turn off the faucets in the washrooms, and of those who did use paper towels to close the taps (n=11) 18% neglected to wash with soap. Although this researcher was only able to gather data for 60 UBC subjects who could have used paper towel to open the door, the data indicates that only 5% did so. Of this 5% (n = 3) of users who used paper towel to open the door, all of them failed to correctly follow the other steps of proper HH. None of the three used paper towels to close the faucets nor did they wash their hands for a sufficient length of time; one subject did not use soap to wash.

This research finds that paper towels are not being used by a majority of women in these washrooms to turn off the faucets or open doors. Replacing paper towels with the Dyson Airblade™ Hand Dryer in UBC Vancouver campus washrooms will not compromise users' current HH practices.

L A N G A R A C O L L E G E V A N C O U V E R C A M P U S

Observations were made at Langara College in order to provide information regarding a similar demographic's HH compliance and the possibility of altered HH compliance rates

due to the introduction of a new hand drying technology. Langara provide an opportunity to assess whether or not subjects would make use of the Dyson Airblade™ Hand Dryer when presented with the option, as paper towels were also available.

There are no HH prompts or pictorials present in the Langara campus washroom observed yet HH compliance rates are not significantly different to those observed at UBC. Given the option, 61% chose to dry their hands using the Dyson Airblade™ Hand Dryer. Of the 2 Langara users who practiced proper HH both chose to use the Dyson Airblade™ Hand Dryer over paper towels. While this is far too small a sample size to indicate anything of significance, it could indicate that those aware of proper HH recognize the Dyson Airblade™ Hand Dryer as an appropriate part HH. This research was able to observe that of the 61% who made use of the Dyson Airblade™ Hand Dryer, those that were required to wait for a short time before use did not chose paper towel despite it being immediately available.

This research finds that the statistically similar HH compliance rates and accepted use of the Dyson Airblade™ Hand Dryer by Langara College Vancouver campus washroom users indicate that it is also appropriate for use in UBC Vancouver campus washrooms.

Recommendations

The Dyson Airblade™ Hand Dryer has been shown to meet the requirements necessary to dry hands as part of effective HH. This research also finds that the installation of the Dyson Airblade™ Hand Dryer would not be likely to negatively alter hand washing behavior or the hand hygiene compliance of UBC washroom users. This research has concluded that the Dyson Airblade™ Hand Dryer is a socially sustainable option. It is recommended that UBC should install the Dyson Airblade™ Hand Dryer as it is also the most economically and ecologically sustainable choice. The Dyson Airblade™ Hand Dryer meets the requirements of UBC's Sustainability Pledge; installing the technology on campus would further UBC's ability to increase the sustainability of its Vancouver campus.

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Appendices

Appendix A - Observed rates of hand washing after washroom use UBC SUB Main Floor Women's Washroom

time of audit	11:55 -12:10	12:10 - 12:21	12:21 - 12:28	12:28 - 12:38	05/04/ 2011	11:09 - 11:24	11:25 - 11:40	07/04/ 2011	Total
used stall	30	30	30	30	120	30	30	60	180
washed hands	28	27	29	28	112	27	30	57	169
	93.30%	90%	96.70%	93.30%	93%	90%	100%	95%	94%

Appendix B - Observed HH: SUB Women's Washroom Main Floor 28/02/2011 (12:50 - 13:10) Proper HH score = 5

water	soap	wash >20 sec	p/t to close taps	dry hands w paper towel	score
1	1			1	3
1					1
1	1			1	3
1	1			1	3
1	1				2
1	1			1	3
1	1			1	3
1				1	2
1	1			1	3
1	1			1	3
1	1			1	3
1	1	1		1	4
1	1			1	3
1	1			1	3
1				1	2
1				1	2
1	1			1	3
1	1		1	1	4
1	1			1	3
1	1			1	3
1					1
1	1			1	3

Appendix C - Observed HH: WW Women's Washroom Main Floor

01/03/2011 (12:50 - 13:05)

Proper HH score = 5

water	soap	wash >20 sec	p/t to close taps	dry hands w paper towel	score
1	1	1		1	4
1	1			1	3
1	1			1	3
1				1	2
1				1	2
1	1			1	3
1	1			1	3
1	1				2
1				1	2
1	1	1		1	4
1				1	2
1				1	2
1	1		1	1	4
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1				1	2
1	1			1	3
1	1			1	3
1	1	1		1	4
1	1			1	3
1			1	1	3
1				1	2
1	1		1	1	4
1	1			1	3
1			1	1	3
1				1	2
1	1			1	3
1	1			1	3
30	20	3	4	29	

Appendix E - Observed HH: I. K. Barber Women's Washroom Main Floor

14/03/2011 (13:30 - 13:48)

Proper HH score = 6

water	soap	wash >20 sec	p/t to close taps	dry hands w paper towel	open door w paper towel	
1	1			1		3
1	1			1		3
1				1		2
1	1			1		3
1	1			1		3
1				1		2
1	1			1	1	4
1	1			1		3
1	1			1		3
1				1		2
1	1	1		1		4
1				1		2
1	1			1		3
1				1		2
1						1
1	1			1		3
1	1			1		3
1	1			1		3
1				1		2
1	1			1		3
1	1			1		3
1				1		2
1	1			1		3
1	1			1		3
1				1		2
1	1			1		3
1	1			1		3
1	1			1		3
1						1
1	1			1		3
1	1			1		3
30	20	1	0	28	1	

water	soap	wash >20 sec	p/t to close taps	dry hands w paper towel	score
1				1	2
1	1			1	3
1	1			1	3
1				1	2
1	1			1	3
1	1			1	3
1	1			1	3
1	1				2
1	1			1	3
1	1			1	3
1	1			1	3
1				1	2
1	1			1	3
1	1			1	3
1	1			1	3
1	1		1	1	4
1	1			1	3
1	1			1	3
1	1			1	3
1	1	1	1	1	5
1	1		1		3
1	1			1	3
60	49	1	5	58	

Appendix G - Observed HH: SUB Women's Washroom Main Floor
 7/04/2011 (11:10 - 11:40)
 Proper HH score = 5

water	soap	wash >20 sec	p/t to close taps	dry hands w paper towel	score
1	1			1	3
1	1			1	3
1	1		1	1	4
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1				1	2
1	1			1	3
1				1	2
1				1	2
1				1	2
1	1			1	3
1				1	2
1				1	2
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1				1	2
1				1	2
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1	1		1	4
1	1			1	3
1				1	2
1	1	1		1	4
1	1			1	3
1	1			1	3
1	1			1	3

**Appendix I - Observed rates of hand washing after washroom stall use
Langara College A Building Main Floor Women’s Washroom**

time of audit	13:23 - 13:39	13:40 - 14:00	16/03/ 2011	12:03 - 12:20	12:20 - 12:27	12:27 - 12:55	29/03/ 2011	Total
used stall	30	15	45	30	30	30	90	135
washed hands	30	15	45	30	30	30	90	135
	100%	100%	100%	100%	100%	100%	100%	100%

**Appendix J - Observed HH: Langara College A Building Main Floor Women’s Washroom
16/03/2011 (13:23 - 14:00)
Proper HH score = 4**

water	soap	wash >20 sec	dry hands w paper towel	use Dyson Airblade	score
1	1			1	3
1	1		1		3
1	1			1	3
1				1	2
1	1		1		3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1	1		1	4
1	1			1	3
1	1			1	3
1	1			1	3
1	1		1		3
1			1		2
1					1
1	1			1	3
1			1		2
1	1		1		3
1	1		1		3
1	1		1		3
1	1		1	1	3
1	1			1	2
1	1			1	2

water	soap	wash >20 sec	dry hands w paper towel	use Dyson Airblade	score
1	1			1	2
1			1		2
1	1			1	2
1	1		1		3
1	1			1	2
1	1			1	2
1	1			1	3
1	1			1	3
1	1			1	3
1			1		2
1	1			1	3
1			1		2
1	1		1		3
1	1			1	3
1	1		1		3
1	1			1	3
1	1		1		3
1	1			1	3
45	37	1	16	29	

Appendix N - Langara Observed Hand Hygiene Compliance Totals

HH step Langara	water	soap	wash >20	dry p/t	Dyson	did not dry	followed all steps
	45	37	1	16	29	0	1
	30	25	0	11	18	1	0
	30	25	1	13	17	0	1
	30	25	0	11	18	1	0
Totals	135	112	2	51	82	2	2
%		83	1.5	38	61	1.5	1.5

Promoting Social Sustainability at UBC:

*The Impacts of using the
Dyson Airblade™ Hand Dryers versus Paper Towels
in UBC Vancouver Campus Washrooms*

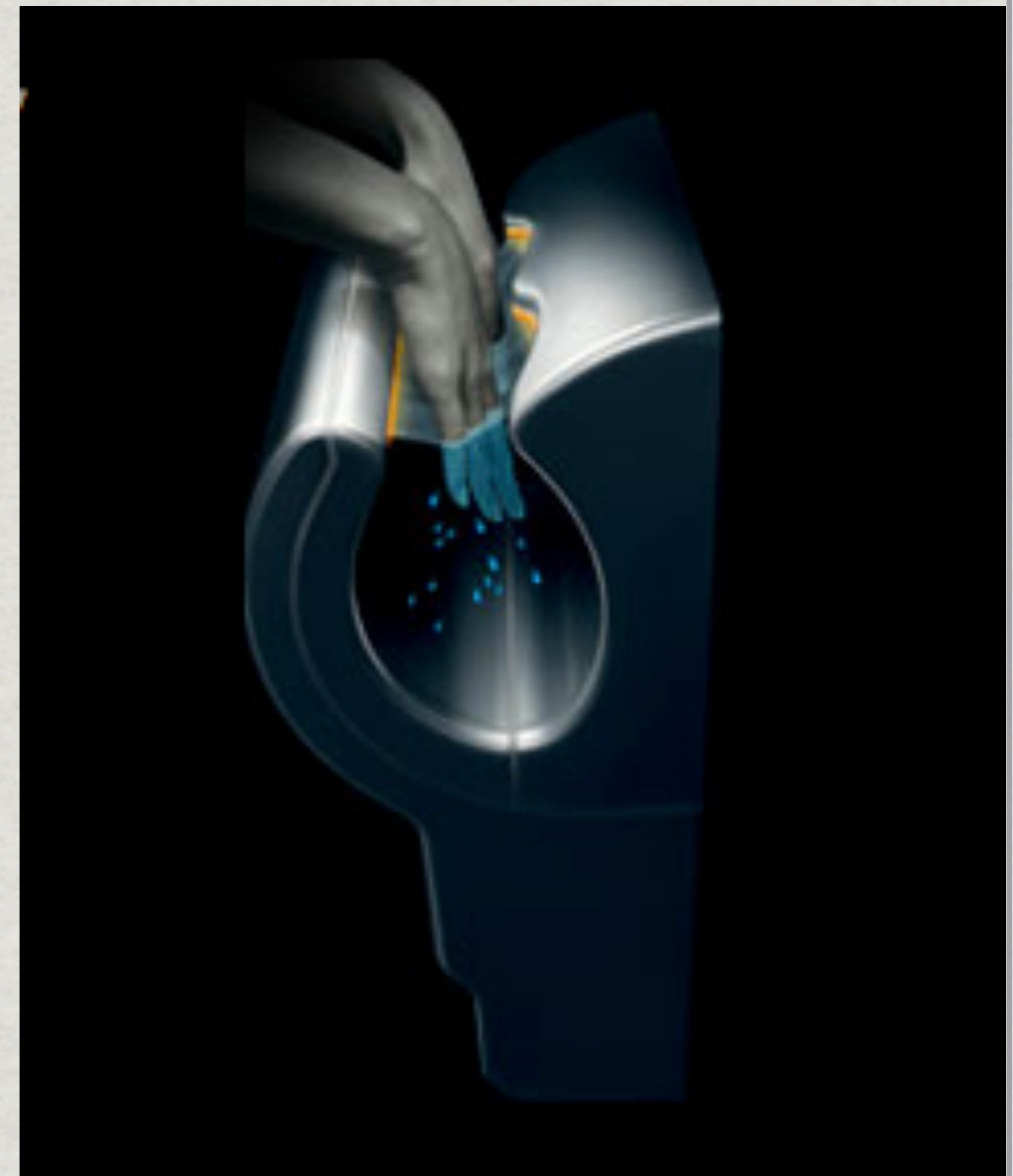
Larissa Braun Neville

UBC Sustainability Pledge

- * "I pledge to explore and take into account the social, economic and ecological consequences of my decisions. I pledge to use the knowledge I gain at UBC to improve the sustainability of the communities in which I live, learn and work."

Dyson Airblade™ Hand Dryer

- * Economically Sustainable ✓
- * Environmentally Sustainable ✓
- * Socially Sustainable ?



Social Sustainability

- ✱ How will the instillation of the Dyson Airblade™ Hand Dryer affect the health and well-being of the UBC community?

Research Questions

- * A) Does the Dyson Airblade™ Hand Dryer meet the health requirements that are a part of proper hand hygiene?
- * B) What are the current hand washing / hand hygiene compliance rates on campus at UBC?
- * C) Is the installation of the Dyson Airblade™ Hand Dryer likely to alter hand washing behavior / hand hygiene compliance of UBC washroom users?

Does the Dyson Airblade™ Hand Dryer meet the health requirements that are a part of proper hand hygiene?

- ✱ The World Health Organization concludes “hands should be dried using either individual paper towels or hand driers which can dry hands effectively and as quickly as it can be done with paper towels, and have been proven not to be associated with the aerosolization of pathogens” (WHO 2009: 31)

Proper Hand Hygiene

- * 1) Wet hands with warm water.
- * 2) Apply soap.
- * 3) Rub hands together vigorously for a minimum of 20 seconds. Scrub entire hand, including back of hands, between fingers and under nails.
- * 4) Rinse hands well.
- * 5) Dry hands with a towel (in public washrooms use single-use towels) or blow dryer.
- * 6) Turn off the tap using the paper towel so that you do not re-contaminate your hands. When using a public bathroom, use the same paper towel to open the door when you leave.

How to Wash Your Hands

Hand Hygiene with Soap & Water



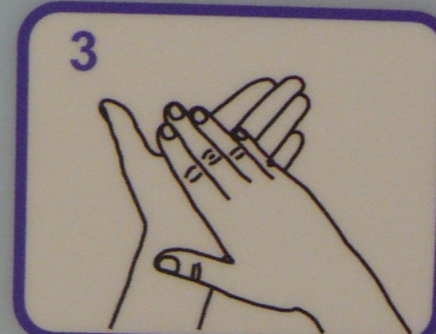
Minimum wash time: **20-30 seconds**



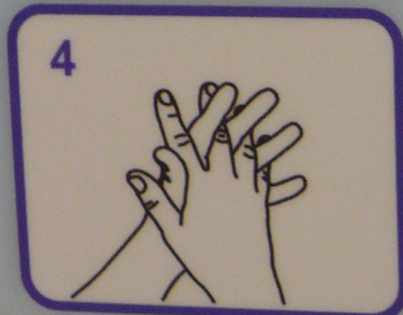
1 Wet hands with warm water



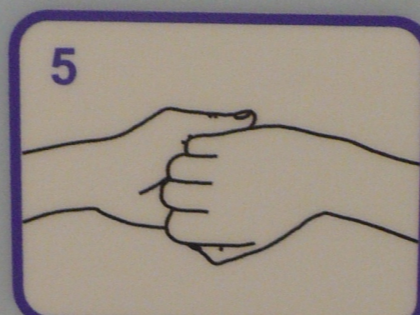
2 Add soap to palms



3 Rub hands together to create a lather



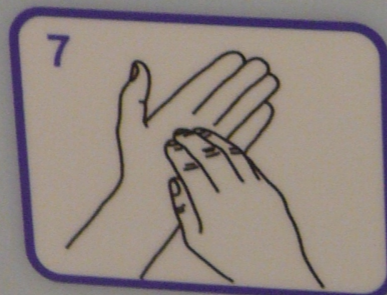
4 Cover all surfaces of the hands and fingers



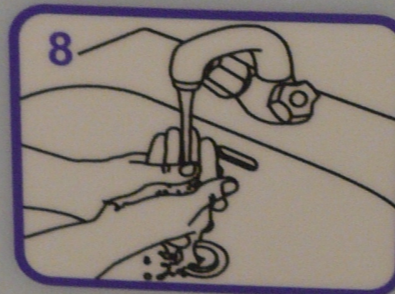
5 Clean knuckles, back of hands and fingers



6 Clean the space between the thumb and index finger



7 Work the finger tips into the palms to clean under the nails



8 Rinse well under warm running water



9 Dry with a single-use towel and use the same towel to turn off the tap and open the washroom door. Dispose of towel in wastebbin as you are exiting.



DEPARTMENT OF HEALTH, SAFETY AND ENVIRONMENT

www.hse.ubc.ca

What are the current
hand washing / hand
hygiene compliance
rates on campus at
UBC?

Hand Hygiene Audit

- * Did UBC 'hand washers':
 - * a) use soap
 - * b) lather for a minimum of 20 seconds
 - * c) turn off the faucets with paper towel
 - * d) dry their hands with paper towel
 - * e) use paper towel to open the door when exiting the washroom (when applicable)

WOODWARD BUILDING WOMEN'S WASHROOM MAIN FLOOR

MARCH 01, 2011 (12:50 - 13:05)

PROPER HH SCORE = 5

water	soap	wash >20 sec	p/t to close taps	dry hands w paper towel	score
1	1	1		1	4
1	1			1	3
1	1			1	3
1				1	2
1				1	2
1	1			1	3
1	1			1	3
1	1				2
1				1	2
1	1	1		1	4
1				1	2
1				1	2
1	1		1	1	4
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1			1	3
1	1	1		1	4
1	1			1	3
1			1	1	3
1				1	2
1	1		1	1	4
1	1			1	3
1			1	1	3
1				1	2
1	1			1	3
1	1			1	3
30	20	3	4	29	

UBC HH Audit Results

- * 94% washed their hands after using the toilet
- * ~25% failed to wash with soap
- * <5% washed for 20 seconds or longer
- * 4% used paper towel to turn off the taps
- * ~5% did not dry hands
- * 5% used paper towel to open the door
- * **Overall, only 1 person out of 270 (<0.5%) followed all of the steps of proper HH**

Limitations

- ✱ Observational Bias - being watched can cause better behaviour
- ✱ Selection Bias - choosing specific locations and times to make observations
- ✱ Lack of observations in Men's washrooms

Conclusion:

- *Removing paper towel from UBC campus washrooms should not compromise user's current hand washing / hand hygiene compliance

Is the installation of the
Dyson Airblade™ Hand
Dryer likely to alter hand
washing behaviour /
hand hygiene
compliance of UBC
washroom users?

Langara College Vancouver Campus

- * has a similar demographic to that of the UBC Vancouver campus population
- * had recently installed Dyson Airblade™ Hand Dryers on a trial basis
- * was also providing paper towels to those washroom users allowing users to chose either hand drying method



LANGARA MAIN FLOOR WOMEN'S WASHROOM

Langara HH Audit

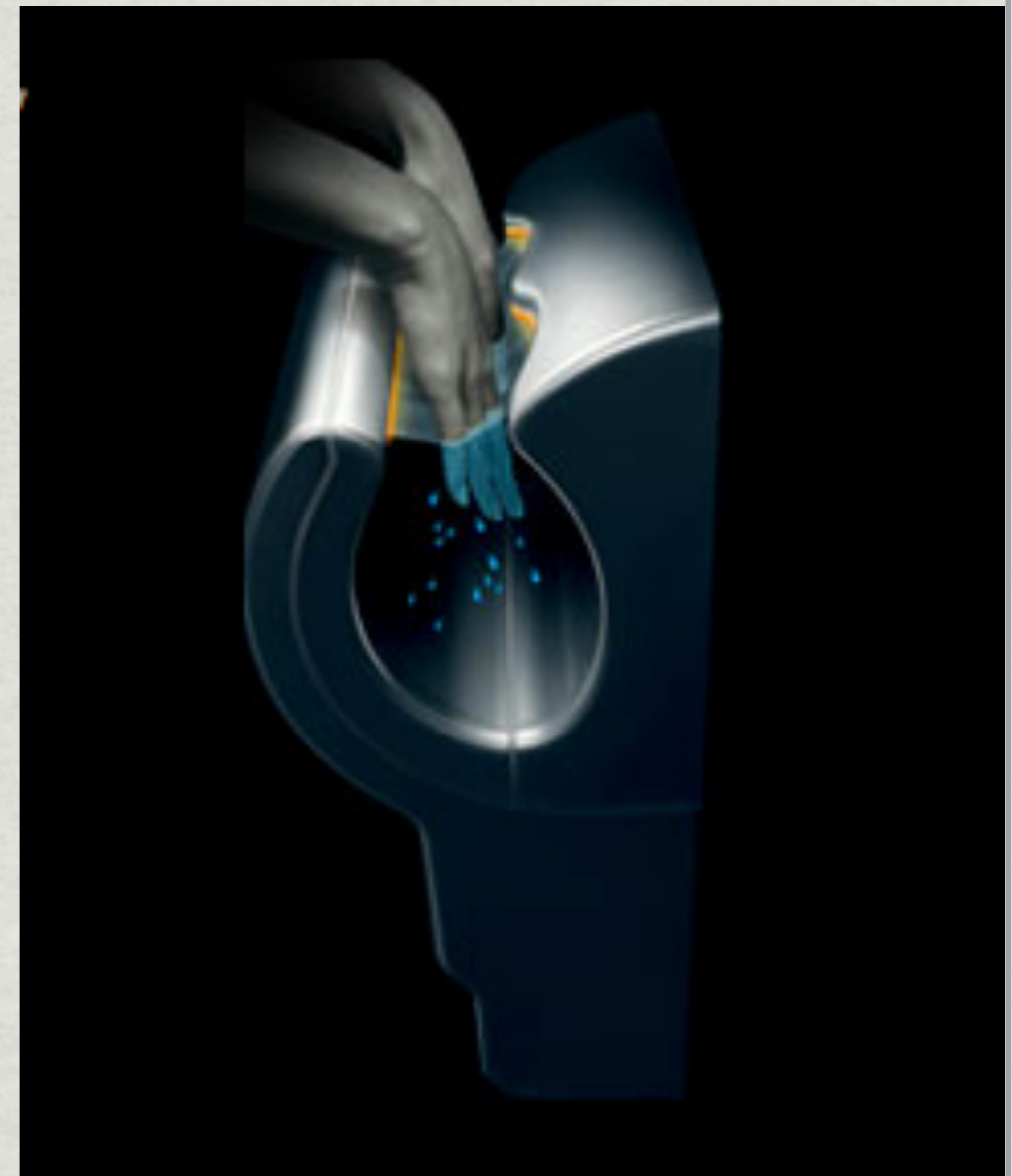
- * 100% washed their hands after using the toilet
- * 83% used soap
- * 1.5% washed for 20 seconds or longer
- * 98.5% dried their hands
 - * 61% chose the Dyson Airblade™ Hand Dryer
 - * ~38% chose to use paper towel
- * **Overall, 1.5% (2/135) followed proper HH**

Conclusion:

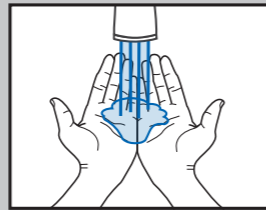
- ✱ Similar HH compliance rates and accepted use of the Dyson Airblade™ Hand Dryer by Langara College Vancouver Campus washroom users indicate that it is also appropriate for use in UBC Vancouver Campus washrooms.

Dyson Airblade™ Hand Dryer

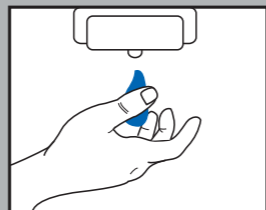
- * Economically Sustainable ✓
- * Environmentally Sustainable ✓
- * **Socially Sustainable ✓**



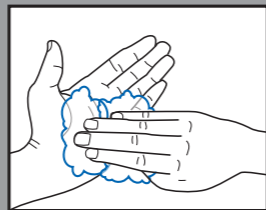
Dyson HH Prompts



Wet

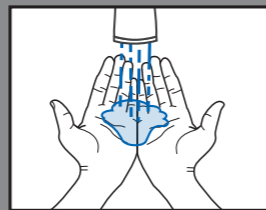


Soap



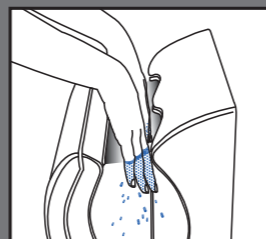
Wash

Wash hands thoroughly for at least 20 seconds in warm soapy water.



Rinse

Rinse completely.



Dry

Good hand hygiene is imperative in reducing the spread of bacteria. Damp hands can spread up to 1000 times more bacteria than dry hands.

**Stop the spread. Wash and DRY.
The power is in your hands.**

This Public Service Announcement is sponsored by Dyson Airblade™

Recommendations

- ✱ The Dyson Airblade™ Hand Dryer meets the requirements of UBC's Sustainability Pledge; installing the technology on campus would further UBC's ability to increase the sustainability of its Vancouver campus.

Questions?

