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Evaluation of "Ghost Flushing" Habits: A Quantitative Survey on Non-Sanitary Use of Toilets among Civil Engineering Student in Nueva Ecija University of Science and Technology

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Abstract- ***This research study evaluates the prevalence and impact of "ghost flushing", the non-sanitary use of toilets as surrogate waste disposal units among Civil Engineering students at the Nueva Ecija University of Science and Technology (NEUST)- Sumacab Campus, Cabanatuan City, Nueva Ecija. Using a descriptive-comparative quantitative design, the study surveyed 313 students to examine behaviors such as disposing of non-biodegradable solid waste (e.g., wet wipes, hair), food particles, and the unnecessary use of water for noise masking or odor control. The findings indicate that while students generally avoid disposing of food and chemicals in toilets, ghost flushing habits remain consistent across all year levels. A One-Way Analysis of Variance (ANOVA) confirmed no significant difference in these habits between first-year and fourth-year students, suggesting that improper toilet use is a deep-seated behavioral habit rather than a result of technical ignorance. Environmentally and economically, the study estimates that these habits result in approximately 660 unnecessary flushes per week, totaling 158.40 m³ (158,400 liters) of clean water wasted annually. This translated to an institutional financial loss of approximately ₱5,338.08 per academic year. The study concludes that such repeated individual actions lead to significant cumulative stress on the campus's hydraulic infrastructure and recommends targeted awareness campaigns and policy interventions to foster better infrastructure stewardship***

Index Terms - Ghost Flushing, Sanitation Behavior, Plumbing Systems, Water Waste, Water conservation.

I. INTRODUCTION

The modern plumbing system is a marvel of civil engineering, meticulously designed to facilitate the efficient removal of human waste and ensure sanitation within densely populated environments. In institutional settings like the Nueva Ecija University of Science and Technology (NEUST), campus infrastructure relies on the assumption that hydraulic fixtures, specifically toilets, are utilized strictly for their intended purpose: the disposal of human waste and approved toilet tissue. When this operational boundary is breached, the integrity of the entire sewage network can catch on any slight irregularity in your plumbing system. Over time, more tissues and other debris accumulate at these catch points, creating a partial or complete blockage (Melbourne, A.H.P., 2025). A concerning behavioral phenomenon emerging in communal campus restrooms is Ghost Flushing. This term describes the improper use of toilets as surrogate waste disposal units, where user flush non-biodegradable or incompatible materials such as wet wipes, hair, cigarette butts, food scraps, and chemical residues. Sal Manzo Plumbing (2025) indicates that the introduction of such non-flushable items into sanitary systems triggers a cascade of operational challenges, including localized obstructions, pipe degradation, and severe sewage backups that necessitate costly, emergency-level plumbing remediation.

This study aims to evaluate the prevalence and impact of "Ghost Flushing" habits, specifically the non-sanitary use of toilets among Engineering students at the Nueva Ecija University of Science and

Technology (NEUST)-Sumacab Campus, Cabanatuan City, Nueva Ecija.

II. METHODS

The study utilized a descriptive-comparative quantitative design to identify patterns in non-sanitary toilet practices and test for significant differences based on year level and gender. The research was conducted at the NEUST Sumacab Campus, specifically within the College of Engineering.

The total population of Civil Engineering students was 1,434. Using stratified random sampling, a sample size of 313 students was established, representing all year levels (66 1st-year, 107 2nd-year, 63 3rd-year, and 77 4th-year)

Data was gathered via a researcher-developed Google Forms questionnaire validated by expert review. The instrument assessed:

i Respondent profiles and general toilet utilization.
ii Frequency of "Ghost Flushing" habits (solid waste, food/chemicals, and noise masking/odor control).
iii Awareness of environmental and economic impacts.

III. RESULTS AND DISCUSSION

Table 1 Distribution of Respondents in terms of Year Level

Year Level	Frequency (f)	Percentage (%)
1st Year	66	21.08%
2nd Year	107	34.19%
3rd Year	63	20.13%
4th Year	77	24.6%
Total	313	100%

The involvement of students from all year levels allows the study to account for the different usage patterns of campus facilities across various stages of academic stay. The higher turnout from lower-division students provides a clear view of the habits formed by those who stay more frequently within the university premises. This distribution ensures that the findings represent the general student population, making the gathered data more relevant to the institution's current needs.

Table 2. Distribution of Respondents in terms of Gender

Gender	Frequency (f)	Percentage (%)
Male	172	54.95%
Female	136	43.45%
Prefer not to say	5	1.6%

The data reflects a fair representation between male and female respondents, which is necessary to avoid a biased analysis of facility use and hygiene. By gathering data from different genders, the study is able to consider a wider scope of needs and behaviors regarding school amenities. This balanced demographic profile improves the reliability of the results, as it considers the distinct ways different groups interact with and maintain shared university spaces.

Table 3 Frequency of Toilet Use on Campus

General Toilet Utilization	Frequency (f)	Percentage (%)
1-2 times	126	40.25%
3-4 times	78	24.92%
5 or more	107	34.19%
Never	2	0.64%

The results indicated that nearly 99% of the respondents utilized the campus toilets daily, with 40.25 percent using the facilities 1-2 times and 34.19 percent utilizing them 5 or more times a day. This high frequency of daily interaction with the flushing system established a significant opportunity for "Ghost Flushing" habits to occur. Since these habits involve the non-sanitary disposal of trash, such as wet wipes, hair, and cigarette butts, the data suggests that the frequent use of toilets among students could lead to increased risks of plumbing blockages and excessive water wastage within the institution. infrastructure.

Table 4 Disposal of Solid Waste

Questions	Mean	Verbal Description
1. How often do you flush	1.72	Never

paper towels or facial tissues (non-dissolvable) down the toilet?		
2. How often do you dispose of hair strands (e.g., from a comb) into the toilet bowl?	1.50	Never
3. How often do you flush wet wipes or "flushable" wipes?	1.59	Never
4. How often do you dispose of small plastic wrappers in the toilet?	1.40	Never
5. How often do you use the toilet to dispose of sanitary items or cotton pads?	1.35	Never
Overall Weighted Mean	1.51	Never

This presents the extent of "Ghost Flushing" habits among respondents concerning the disposal of solid waste in toilets. The data reveals that flushing non-dissolvable paper towels or facial tissues obtained the highest mean of 1.72, while disposing of sanitary items or cotton pads yielded the lowest mean of 1.35. Overall, solid waste disposal garnered a weighted mean of 1.51, corresponding to a verbal description of "Never." This indicates that the majority of Civil Engineering students adhere to proper disposal protocols on average.

Table 5 Weekly Frequency Estimate

Frequency Category	No. of Respondents	Percentage
0 times (Never)	175	55.91%
1-3 times (Low frequency)	64	20.45%
4-6 times (Moderate frequency)	20	6.39%
7 or more (High frequency)	54	17.25%
Total	313	100%

Despite the average "Never" rating, this reveals a persistent "Knowledge-Practice Gap" among a subset of students, where convenience overrides technical understanding of hydraulic limitations. High-frequency users (17.25%) pose risks of "user-induced loading," potentially causing localized obstructions and fatbergs in the campus sewage network. These findings align with Adegbore et al. (2025), who found that university undergraduates' waste disposal behaviors stem from psychological and environmental factors, not just knowledge. Such habits stress infrastructure, threaten public health, and hinder Sustainable Development Goal 6 (Clean Water and Sanitation).

Table 6 Disposal of Food/Chemicals

Questions	Mean	Verbal Description
1. How often do you pour leftover coffee, milk, or sugary drinks into the toilet?	1.61	Never
2. How often do you dispose of food scraps (e.g., noodles, rice) from your lunch in the toilet?	1.23	Never
3. How often do you pour oily or greasy liquids into the plumbing fixture?	1.41	Never
4. How often do you dispose of liquid chemicals (e.g., ink, cleaning agents) in the toilet?	1.57	Never
5. How often do you use the toilet to dispose of chewed gum?	1.39	Never
Overall Weighted Mean	1.44	Never

The analysis of 313 NEUST Civil Engineering students reveals negligible food/chemical "ghost flushing" in campus toilets. All five behaviors, disposing of food scraps and chewed gum (least practiced), pouring oily or greasy liquids, leftover beverages (e.g., coffee, milk, sugary drinks), and liquid chemicals (e.g., ink, cleaning agents), registered uniformly in the "Never" category (means 1.23–1.61; overall weighted mean 1.44, equivalent to approximately 0.14 instances/student/week). No respondents reported frequent occurrence, with less than 15% estimated "Rarely" (low-frequency) and approximately 85% confirming zero incidence.

This indicates strong adherence to proper waste-disposal practices and minimal contribution to clogging, pipe degradation, or wastewater contamination, rarer than more "ambiguous" or convenience-driven misuses like solid waste disposal

(Wada et al., 2020). Unlike prevalent school sanitation issues such as dirty toilets, crowding, or avoidance (Daramola, 2018), food/chemical "ghost flushing" poses negligible plumbing risks (e.g., grease clogs, corrosion), confirming students clearly distinguish sanitary fixtures from general waste receptacles.

Table 7 Noise Masking & Odor Control

Questions	Mean	Verbal Description
1. How often do you flush the toilet *before* use to mask the sound of urination/defecation?	2.27	Rarely
2. How often do you flush *multiple* times during a single session to reduce odors?	2.53	Rarely
3. How often do you flush just to ensure the bowl is "clean" before sitting down?	2.59	Rarely
4. How often do you hold the flush handle down longer than necessary to ensure everything clears?	2.48	Rarely
5. How often do you flush the toilet simply to hear the water flow (e.g., as a habit or distraction)?	2.14	Rarely
Overall Weighted Mean	2.40	Rarely

The empirical findings suggest that respondents largely eschew "ghost flushing" or excessive water consumption for acoustic privacy, yielding an overall mean of 2.40 (Rarely). This behavior reflects a prevailing environmental consciousness and a departure from traditional "toilet phobias" that prioritize noise masking. While Rodriguez-Montoya (2026) conceptualizes water use as a "silent" habit loop, the data indicates a critical shift in priorities: the higher mean for pre-use cleaning (2.59) identifies sanitary vigilance as the primary driver of water usage. Consequently, this suggests that in a post-pandemic context, the demand for visible hygiene standards in public infrastructure has superseded privacy concerns as the dominant behavioral motivator.

Table 8 Water Volumetric Waste (Awareness)

Questions	Mean	Verbal Description
1. I am aware that a single unnecessary flush wastes approximately 6 to 9 liters of treated water.	3.02	Agree
2. I believe my individual flushing habits significantly contribute to the campus's total water waste.	2.96	Agree
3. I am aware that "Ghost Flushing" increases the load on the NEUST water pumps.	3.11	Agree
4. I understand that unnecessary flushing depletes the local groundwater supply used by the campus.	3.14	Agree
5. I realize that "noise masking" flushes are the largest contributor to clean water wastage.	3.02	Agree
Overall Weighted Mean	3.05	Agree

The findings reveal a disconnect between the respondents' conceptual understanding of environmental issues, such as groundwater depletion, and their sense of personal accountability. While participants demonstrate awareness of the systemic consequences of water wastage, the lower rating regarding personal contribution suggests a failure to internalize how individual behaviors impact resource depletion. This gap aligns with the United Nations Environment Programme (UNEP, 2021), which posits that behavioral change is often stifled by an underestimation of individual influence. Consequently, these results highlight the necessity for targeted awareness campaigns that transition from general environmental education to fostering a localized sense of individual responsibility in water conservation practices.

Table 9 System Loading (Plumbing Integrity)

Questions	Mean	Verbal

		Description
1. I am aware that non-dissolvable solids (wipes/hair) cause friction loss in pipes.	3.27	Agree
2. I understand that "Ghost Flushing" is a primary cause of sewage backflow in campus buildings.	3.12	Agree
3. I believe that disposing of food in toilets leads to fatbergs (grease clogs) in the septic tank.	3.30	Strongly Agree
4. I am aware that the campus sewage system is designed only for organic human waste and toilet paper.	3.30	Strongly Agree
5. I recognize that frequent "Ghost Flushing" leads to more frequent plumbing maintenance shut-downs.	3.21	Agree
Overall Weighted Mean	3.24	Agree

The data demonstrates that Civil Engineering students possess a robust conceptual understanding of the relationship between user behavior and sewer hydraulic integrity. High agreement regarding the formation of fatbergs from food and Fat, Oil, and Grease (FOG) disposal aligns with Yusuf et al. (2023), confirming that such contaminants are primary drivers of blockages and overflows. Furthermore, students correctly identify that non-dissolvable solids and improper flushing exacerbate friction losses and system backflow, necessitating increased maintenance expenditures (Simmons & Ducoste, 2024). These findings suggest that the fundamental technical knowledge required for effective source-control management is already established within this demographic, providing a strong foundation for future professional practice in wastewater infrastructure.

Table 10 Economic Cost

Questions	Mean	Verbal Description
1. I am aware that NEUST pays for every cubic meter of water wasted through these habits.	3.17	Agree
2. I believe that the money spent on wasted water could be better used for lab equipment or facilities.	3.29	Agree
3. I understand that repairing clogged pipes due to trash disposal is a high maintenance expense.	3.37	Strongly Agree
4. I am aware that water wastage leads to higher electricity bills for the university (pumping costs).	3.33	Strongly Agree
5. I believe students should be held accountable for the financial loss caused by non-sanitary toilet use.	3.10	Agree
Overall Weighted Mean	3.25	Agree

Respondents showed high awareness of water wastage's financial impacts, such as pipe repairs and pumping costs, with many strongly agreeing that poor sanitation raises institutional expenses. Yet, lower accountability ratings indicate limited personal responsibility, aligning with the World Bank (2020) report, which links inefficient water use to higher energy and maintenance costs and stresses awareness campaigns and accountability for sustainable management.

Ghost flushing among 313 students caused an estimated 660 extra flushes weekly (mean 2.108 per student/week), yielding 0.66 m^3 daily, 3.96 m^3 weekly, and 158.40 m^3 annually over 40 weeks, equivalent to ₱5,338.08 in losses at ₱33.70/m^3 (Cabanatuan City Water District rates). This cumulative inefficiency stresses wastewater systems, increases hydraulic loading and maintenance needs (Almomani, 2016), and underscores the need for behavioral interventions and campus awareness to curb such resource waste.

Table 11 Mean Comparisons of "Ghost Flushing" Habits Among Year Levels

Source	SS	df	MS	F	p
Between Groups	2.23	3	0.74	1.72	.164

Within Groups	133.49	309	0.43		
Total	135.72	312			

Ghost flushing habits, such as disposing tissues, wet wipes, hair, or masking noise, prevailed uniformly across year levels in NEUST Sumacab Campus's engineering department, indicating a widespread behavioral or cultural norm overriding technical knowledge rather than a year-specific awareness gap. This aligns with Vicente-Molina et al. (2013) on the "Knowledge-Action Gap," where convenience trumps pro-environmental actions despite education, and Barr (2007) on social norms and situational factors like privacy needs; thus, interventions should focus on collective campus-wide awareness campaigns and policies rather than targeted curriculum or year-level fixes.

Table 12 Mean Comparisons of "Ghost Flushing" Habits Among Gender

Source	SS	df	MS	F	p
Between Groups	0.03	2	0.01	0.03	.968
Within Groups	135.69	310	0.44		
Total	135.72	312			

The findings suggest that "Ghost Flushing" habits such as disposing of solid waste in toilets or using water to mask noise are consistent across students regardless of gender. This lack of significant difference implies that non-sanitary toilet use is more closely tied to shared behavioral or cultural habits than to gender-related characteristics. Similar to research on hygiene and sanitation behaviors, contextual factors such as facility conditions, convenience, and social expectations often influence behavior more strongly than demographic variables like gender (Barr S., 2007)

IV. CONCLUSION

The study concludes that ghost flushing is a deep-seated behavioral habit rather than a result of technical ignorance. Despite high technical awareness of pipe friction and fatbergs, Civil Engineering students at NEUST continue to engage in improper flushing primarily for convenience or hygiene anxiety. The cumulative impact of these minor individual actions leads to substantial environmental waste and financial loss. Stewardship must be treated as a core professional competency, as academic advancement alone does not resolve the "knowledge-action gap".

V. RECOMMENDATION

Based on the analysis of the study, the following recommendations can be made:

1. Install multilingual signage in all restrooms highlighting "Ghost Flushing" risks, water waste stats (e.g., 158,000L/year), and proper disposal alternatives.
2. Launch mandatory orientation sessions for new students on sustainable plumbing practices and campus waste policies.
3. Provide proper guidance counseling sessions focused on aligning engineering knowledge with daily habits.
4. Conduct regular seminars on environmental sustainability, resource conservation, and the engineering ethics of infrastructure maintenance.
5. Collect and share anonymized data from high-frequency users across classes to demonstrate how individual actions impact collective campus resources.
6. Engage parents and guardians through info sessions or newsletters, educating them on supporting sustainable habits at home to reinforce campus efforts.
7. Instead of solely highlighting waste issues, promote positive reinforcement by recognizing dorms or classes with zero reported clogs or low water waste.
8. Establish an inclusive "Green Plumbing Task Force" involving students, faculty, and admin to foster accountability and ownership.
9. Promote collaboration and teamwork through student-led clean-up drives or plumbing audits in mixed groups.
10. Encourage interdisciplinary projects, like designing low-flow prototypes or waste-tracking apps, to break down habits and build unity around sustainability goals.

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