Fostering Civic Responsibility Through an Environmental Awareness Study on Littering in Malaysia

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ABSTRACT

This study explores how environmental education and public engagement foster civic responsibility and influence littering behaviour in Malaysia. Using a mixed-methods approach combining surveys (n = 43) and observations, findings show moderate awareness but limited understanding of long-term ecological impacts. Social media, formal education, and gamified learning emerged as complementary tools for promoting civic-minded behaviour. Integrating educational, behavioural, and design perspectives, the study contributes to Design for Behaviour Change (DfBC) and Education for Sustainable Development (ESD), highlighting the value of multi-platform environmental education and community participation in creating cleaner, more sustainable urban environments.

Keywords: Environmental Education; Civic Responsibility; Design for Behaviour Change; Sustainable Development

INTRODUCTION

Littering, often dismissed as minor carelessness, has developed into a persistent environmental and social issue in Malaysia. Beyond visual pollution, it contributes to urban degradation, public health risks, and the erosion of shared civic spaces. More importantly, it reflects a deeper disconnect between environmental awareness and responsible public conduct (Thotakura, 2011; Asmui, 2017). Although regulatory enforcement and national campaigns have been implemented, littering behaviour remains prevalent, suggesting that knowledge alone does not consistently translate into practice (Aziz, 2019; Mas'udah et al., 2021; Abd Rahman et al., 2024). National data illustrate this discrepancy. While environmental concern is widely expressed, sustained behavioural commitment remains limited. For instance, a 2023 national survey reported that although recycling is broadly recognised as important, only 38% of Malaysians practise it consistently (Ahmad et al., 2023). This disparity signals a persistent awareness–action divide, where individuals may understand environmental consequences yet fail to adopt corresponding habits. Addressing littering therefore requires more than information dissemination; it calls for mechanisms that cultivate civic responsibility and embed pro-environmental behaviour into daily routines. Environmental education has long been recognised as a foundational strategy for shaping ecological values and behaviours (Stapp et al., 1969; Ramsey & Hungerford, 1989). Contemporary frameworks such as Education for Sustainable Development (ESD) emphasise participatory, action-oriented, and community-based learning (UNESCO, 2023). However, the implementation of ESD principles within the Malaysian context remains uneven. Initiatives such as Eco-Schools demonstrate potential, yet face constraints related to resources, training continuity, and long-term behavioural reinforcement (Nasir & Hamzah, 2023; Lye, 2024). These challenges suggest that education alone, without contextual and behavioural support, may have limited durability. In parallel, behavioural and design-based approaches have gained attention as complementary strategies for influencing everyday decision-making. Digital platforms, gamified engagement, and

environmental design cues have been shown to enhance short-term motivation and visibility of sustainable practices (Latha & Suresh, 2020; Bansal, 2021; Khatib, 2022; Asokan Vasudevan et al., 2024). Nevertheless, empirical studies within Malaysia rarely examine how educational, digital, and environmental design elements interact collectively to influence civic responsibility. Existing research often investigates these mechanisms in isolation, leaving limited contextual evidence on their combined influence in real-world urban settings. Accordingly, this study explores how environmental awareness and educational engagement relate to civic responsibility in the context of littering behaviour in Malaysia. Rather than evaluating a single intervention, the research adopts an integrative perspective, examining awareness levels, preferred engagement channels, and observable behavioural tendencies. Specifically, the study aims to assess environmental awareness levels in relation to littering behaviour, identify educational and engagement approaches perceived as influential in encouraging responsible conduct and examine patterns linking environmental knowledge and prosocial behavioural tendencies within the sampled context. While based on an exploratory sample (n = 43), this study provides preliminary empirical insight into how awareness-based strategies may contribute to strengthening civic responsibility. By situating littering as both an educational and behavioural design challenge, the research establishes a foundation for future studies to test integrated interventions at broader institutional and community scales.

LITERATURE REVIEW

Littering is not merely a waste management issue, but a multidimensional behavioural phenomenon shaped by knowledge, social norms, environmental context, and situational convenience. Early behavioural studies characterised littering as an expression of social indifference and weak civic norms (Finnie, 1973). Initial policy responses therefore prioritised public information campaigns and enforcement mechanisms. However, contemporary scholarship increasingly demonstrates that awareness-based messaging alone rarely produces sustained behavioural change (Mas'udah et al., 2021; Abd Rahman et al., 2024). This has shifted research attention toward integrated frameworks that connect environmental literacy with behavioural reinforcement. Environmental education, particularly under the Education for Sustainable Development (ESD) framework, emphasises experiential, participatory, and action-driven learning as pathways to sustainable behaviour (UNESCO, 2023). Foundational works in environmental education (Stapp et al., 1969; Ramsey & Hungerford, 1989) argue that knowledge must be linked with investigation and community-based action to influence conduct. Across the Asia-Pacific region, ESD initiatives have been incorporated into school curricula and community programmes. Nevertheless, implementation challenges persist in Malaysia, including uneven teacher preparedness, limited long-term monitoring, and insufficient community follow-through (Nasir & Hamzah, 2023; Lye, 2024). These structural constraints may weaken the translation of environmental literacy into habitual civic practice. Complementing educational strategies, behavioural design approaches have gained traction in shaping everyday environmental decisions. Drawing from nudge theory, subtle environmental cues such as visual prompts, bin placement, and affordance-based design can influence disposal behaviour without coercion (Thaler & Sunstein, 2008). Empirical observations indicate that visibility, colour differentiation, and contextual cues can increase compliance in waste sorting and reduce casual littering when appropriately aligned with user expectations. However, the effects of such interventions may diminish over time if not supported by social norms and educational reinforcement. Digital engagement and gamification represent an additional layer of behavioural influence. Gamified systems utilise incentives, competition, and recognition to stimulate participation in sustainability initiatives (Bansal, 2021; Khatib, 2022). Reviews suggest that such mechanisms are particularly effective in mobilising youth engagement and enhancing short-term motivation (Latha & Suresh, 2020; Ouariachi et al., 2019). In Malaysia, digital activism and social media campaigns have demonstrated rapid dissemination and initial engagement spikes (Chong et al., 2024; Wu et al., 2018). Yet evidence indicates that online enthusiasm frequently declines without structured institutional support or tangible behavioural anchors. Within the Malaysian context, behavioural models such as the Theory of Planned Behaviour (TPB) have been applied to understand determinants of environmental conduct (Ajzen, 2020). These studies highlight the predictive value of attitudes, subjective norms, and perceived behavioural control in shaping pro-environmental intentions. Despite their explanatory power, most Malaysian investigations examine educational initiatives,

behavioural models, or digital strategies independently. Few studies empirically explore how these dimensions might interact collectively within a unified framework of civic responsibility.

Critical Gaps

Existing research tends to isolate educational, behavioural, or digital mechanisms when examining littering and environmental responsibility. While each strand offers valuable insights, limited empirical work assesses their combined influence within a shared contextual setting. As a result, there remains insufficient understanding of how educational exposure, environmental design cues, and digital engagement may reinforce or dilute one another in practice. Short-term improvements in environmental behaviour are frequently reported following campaigns, gamified challenges, or visual nudges. However, longitudinal continuity remains uncertain. Without reinforcement through community norms and institutional structures, behavioural gains may not persist. The literature therefore highlights a need for research that considers both immediate responses and contextual supports shaping sustained civic habits. Although environmental awareness has increased in Malaysia, empirical evidence identifying context-sensitive combinations of educational and behavioural strategies remains limited. Infrastructural variability, sociocultural dynamics, and digital engagement patterns may influence how interventions function in Malaysian urban environments. More locally grounded exploratory evidence is needed to inform scalable, design-informed approaches to civic responsibility. In summary, the literature positions environmental responsibility at the intersection of education, behavioural science, and design. However, empirical integration of these perspectives remains underdeveloped within the Malaysian setting. By examining awareness levels, engagement preferences, and observable behavioural tendencies within a single exploratory framework, the present study seeks to contribute preliminary contextual insight into how multi-platform strategies may support civic responsibility in urban Malaysia.

Research Method

This study employed a mixed-methods approach integrating quantitative survey data and qualitative observations to explore how environmental awareness relates to littering behaviour and civic responsibility in Malaysia. The combination of numerical and contextual data enabled triangulation, strengthening interpretative credibility by examining patterns across self-reported perceptions and observable behaviours (Creswell & Plano Clark, 2022; Fetters & Freshwater, 2023). The design was exploratory in nature, intended to identify behavioural tendencies and engagement patterns rather than produce population-level generalisations.

Research Design and Sampling

The research design aligned with the study objectives: assessing awareness levels, identifying perceived engagement strategies, and examining patterns between environmental knowledge and prosocial behavioural tendencies. A non-probability convenience sampling strategy was employed, yielding 43 participants. This sampling approach was selected due to accessibility and feasibility constraints and is consistent with exploratory behavioural research aimed at detecting preliminary trends (Etikan, 2023). Participants represented varied demographic backgrounds, including differences in age groups, occupations, and residential contexts. Although the sample size limits statistical generalisability, the diversity of respondents provided insight into a range of public perceptions and self-reported practices related to littering and civic responsibility. The findings are therefore interpreted as indicative patterns within the sampled context rather than as representative of the broader Malaysian population.

Data Collection

Quantitative data were collected through an online survey distributed via social media and messaging platforms, structured around three literature derived dimensions, environmental awareness and knowledge, attitudes toward littering and civic responsibility, and behavioural intentions and waste management practices with Likert-scale and multiple-choice items informed by environmental literacy and behavioural intention constructs associated with the Theory of Planned Behaviour (Icek Ajzen, 2020) and UNESCO's Education for Sustainable Development framework (2023), designed for clarity and neutrality following established social research

principles; although developed for exploratory purposes without formal psychometric validation or internal consistency testing, the structured format enabled systematic comparison across dimensions, while complementary non-participant qualitative observations guided by a structured checklist documenting location context, bin visibility and accessibility, signage presence, and behavioural outcomes (compliance, neglect, or prosocial action) recorded 20 field incidents and incorporated digital netnographic analysis of social media engagement patterns in line with digital ethnography principles (Pink et al., 2023), thereby allowing comparison between self-reported intentions and situational behaviour across physical and online contexts.

Data Analysis

Data analysis proceeded in two phases. First, quantitative survey responses were analysed using descriptive statistics to summarise awareness levels, reported behaviours, and preferred awareness channels. Frequencies and percentages were calculated to identify patterns across the three conceptual dimensions. Second, qualitative observational data were examined using thematic categorisation. Behavioural outcomes were grouped into compliance, neglect, and prosocial action categories, while digital engagement patterns were analysed based on interaction longevity and content characteristics. Integration occurred during interpretation, where survey patterns were examined alongside observational findings to identify convergences and divergences between reported awareness and situational behaviour. This triangulated approach enhanced interpretive depth while remaining consistent with the exploratory scope of the study (Fetters & Freshwater, 2023).

Ethical Considerations

All procedures adhered to ethical standards for social and behavioural research. Participants were informed of the study purpose, voluntary participation, and confidentiality prior to completing the survey. Informed consent was obtained electronically, and no personal identifiers were collected. Observational data were recorded without identifying individuals. The study complied with Universiti Teknologi MARA (UiTM) ethical guidelines for research involving human participants.

Data Analysis and Findings

This section presents findings from the online survey (n = 43) and structured observations (20 recorded incidents). The analysis addresses three guiding questions:

- What is the level of environmental awareness among participants?
- Which engagement channels are perceived as influential?
- How do reported awareness levels relate to observed or self-reported behavioural tendencies?

Findings indicate moderate awareness of littering's immediate environmental and hygiene impacts, accompanied by lower levels of understanding regarding long-term ecological consequences. Patterns observed in this sample reflect trends reported in national studies, where environmental concern is expressed more consistently than sustained behavioural practice (Ahmad et al., 2023; Abd Rahman et al., 2024). The results are presented below.

Survey Findings

On awareness levels, approximately 60% of respondents indicated familiarity with common sustainable practices such as recycling and reducing single-use plastics. However, only 23% demonstrated understanding of longer-term environmental implications associated with improper waste management. This distribution suggests that surface-level awareness may be more prevalent than deeper ecological literacy within the sampled group. The variation between basic practice recognition and long-term consequence awareness highlights differences in environmental knowledge depth rather than a complete absence of awareness. On attitude–practice pattern, 67% of respondents agreed that littering constitutes a serious societal issue, only 38% reported consistently practising proper waste disposal behaviours. This divergence between expressed concern and reported conduct suggests that acknowledgement of environmental problems does not uniformly translate into routine behavioural

adherence. Respondents cited practical barriers including convenience, limited facility access, and time constraints. These responses indicate that situational and infrastructural factors may influence behavioural consistency within the sampled context. When asked about effective awareness platforms, 42% selected social media, 33% identified formal education settings, and 25% preferred gamified or interactive activities. The distribution suggests that respondents perceive digital outreach as accessible and immediate, while formal education retains perceived credibility and reinforcement potential. The findings indicate a preference for multi-channel engagement rather than reliance on a single awareness platform. On behavioural intentions, 70% of respondents expressed willingness to participate in community clean-up initiatives, particularly when accompanied by incentives or public recognition. While this reflects positive behavioural intention, participation was reported hypothetically rather than measured longitudinally. As such, these responses indicate motivational inclination rather than confirmed sustained action.

OBSERVATION FINDINGS

Among the 20 recorded field incidents, 45% involved littering despite the presence of accessible bins, 25% involved prosocial behaviour, such as picking up litter and 30% reflected passive or indifferent responses. Behavioural outcomes appeared influenced by bin visibility and contextual factors. Incidents occurring in areas with clearly visible and accessible disposal facilities were more likely to involve compliant behaviour compared to contexts where infrastructure was less prominent. These observations capture situational responses within specific time frames and do not represent longitudinal behavioural trends. Online observations indicated that environmental posts with emotionally engaging visuals attracted immediate interaction but experienced rapid decline in engagement after approximately 24 hours. In contrast, posts incorporating humour, challenges, or gamified elements sustained user interaction for longer periods. The pattern suggests that affective and interactive design elements may extend short-term digital engagement. However, observational data did not track behavioural conversion beyond platform interaction. Across survey and observational findings, several tendencies emerge within the sampled group. Moderate levels of basic environmental awareness coexist with inconsistencies in routine behavioural practice. Expressed concern about littering does not uniformly align with reported or observed compliance. Preferences for digital and interactive awareness platforms suggest receptiveness to multi-platform engagement strategies. Additionally, situational design factors, including bin visibility and social context, appear associated with behavioural responses in public settings. Taken together, the data indicate that awareness, contextual conditions, and engagement format may interact in shaping civic responsibility within this exploratory sample. However, given the descriptive and cross-sectional nature of the data, interpretations are limited to pattern identification rather than causal inference.

DISCUSSION

The findings highlight a recurring pattern within the sampled context: general environmental awareness coexists with inconsistent behavioural practice. While most respondents recognised littering as problematic, routine compliance with proper disposal practices was considerably lower. This divergence suggests that cognitive acknowledgement alone may not ensure behavioural consistency. Within the Theory of Planned Behaviour (TPB) framework (Ajzen, 2020), such divergence may reflect variations in perceived behavioural control and the influence of situational constraints, including convenience and infrastructure accessibility. Importantly, the data indicate differences in depth of environmental understanding. Familiarity with common practices such as recycling was more prevalent than comprehension of long-term ecological consequences. From an Education for Sustainable Development (ESD) perspective (UNESCO, 2023), this distinction underscores the difference between informational exposure and transformative learning. Surface awareness may shape attitudes, yet sustained civic responsibility often requires participatory engagement and contextual reinforcement. The preference for social media and gamified engagement further suggests that awareness dissemination and motivational reinforcement may operate through distinct mechanisms. Digital platforms appear effective in generating attention and initial interest, as reflected in both survey responses and online observations. However, the rapid decline in engagement over time indicates that visibility alone may not secure enduring behavioural shifts. This pattern aligns with research indicating that digital enthusiasm often requires structured reinforcement through educational or community-based frameworks (Chong et al., 2024; Wu et al., 2018). Field observations complement these insights by illustrating how environmental context may shape behavioural expression.

Instances of compliance were more frequently associated with visible and accessible waste disposal facilities, suggesting that physical design cues may support responsible action when conditions reduce friction. While these observations do not establish causal effects, they indicate that civic behaviour may be influenced by the interaction between individual intention and environmental affordances. Taken together, the findings support a multi-layered understanding of civic responsibility. Environmental knowledge, motivational engagement, and contextual design appear interrelated rather than independent. Awareness may initiate attitudinal alignment; educational reinforcement may deepen understanding; and environmental design may facilitate behavioural enactment. The integration of these elements reflects a shift from viewing littering solely as a moral or enforcement issue toward conceptualising it as a behavioural ecosystem requiring coordinated educational, digital, and environmental supports. Nevertheless, given the exploratory scope and descriptive analysis, the relationships observed should be interpreted as indicative patterns rather than statistically verified associations. Future research employing larger samples and inferential testing would be required to determine the relative influence of each component and assess long-term behavioural sustainability.

LIMITATIONS

Several methodological considerations should be acknowledged when interpreting the findings of this study. First, the sample size (n = 43) and use of convenience sampling limit the extent to which findings may be generalised beyond the sampled participants. Although the respondents represented varied demographic backgrounds, the study was exploratory in scope and designed to identify indicative patterns rather than produce population-level conclusions. Future research employing probability sampling and larger datasets would strengthen statistical robustness and external validity. Second, the survey instrument was developed for exploratory alignment with the study objectives and relevant theoretical constructs. Formal psychometric validation, including internal consistency reliability testing, was not conducted. While the structured design allowed systematic comparison across awareness, attitudes, and behavioural tendencies, subsequent studies should undertake instrument validation procedures to enhance measurement precision and replicability.

Third, the research design was cross-sectional. Data were collected at a single point in time, capturing reported perceptions and situational behaviours within a limited temporal frame. As a result, the study does not assess behavioural persistence or long-term civic habit formation. Longitudinal or quasi-experimental designs would be necessary to examine durability and behavioural change trajectories over time. Fourth, the observational component documented situational responses in selected physical and digital contexts. Although structured checklists were used to improve consistency, observations were limited in number and duration. They provide contextual insight but do not establish causal relationships between environmental design features and behavioural outcomes. Experimental manipulation of environmental cues or extended observational monitoring would allow more precise evaluation of design-based interventions. Finally, the analysis relied primarily on descriptive statistics and thematic categorisation. While appropriate for exploratory research, the absence of inferential testing limits the ability to determine statistical associations between awareness levels and behavioural tendencies. Future studies may incorporate correlational or regression analysis to examine the strength and direction of these relationships. Despite these constraints, the study contributes preliminary empirical insight into the interaction between environmental awareness, engagement preferences, and observable behavioural patterns within a Malaysian urban context. The limitations identified herein provide a foundation for methodological refinement and scaled investigation in subsequent research.

CONCLUSION

This study explored how environmental awareness and engagement strategies relate to littering behaviour and civic responsibility within a Malaysian context using an exploratory mixed-methods design. By integrating survey responses and structured observations, the research examined awareness levels, engagement preferences, and situational behavioural tendencies among the sampled participants. Three key patterns emerged. First, respondents demonstrated moderate familiarity with basic sustainable practices, yet understanding of longer-term ecological consequences was comparatively limited. This distinction suggests variation in depth of environmental literacy rather than absence of awareness. Second, expressed concern regarding littering did not consistently align with reported behavioural adherence, indicating that attitudinal recognition alone may not

ensure routine civic practice. Third, participants indicated preference for multi-channel engagement strategies, particularly social media, formal education, and gamified initiatives, highlighting the perceived value of combining digital reach with structured reinforcement. Observational findings further suggested that contextual conditions, including visibility and accessibility of disposal facilities, may influence behavioural expression in public settings. While these patterns do not establish causal relationships, they reinforce the importance of considering environmental design alongside educational and motivational approaches. Collectively, the findings support a conceptual understanding of civic responsibility as a multi-dimensional process shaped by awareness, engagement format, and situational context. Addressing littering therefore requires coordinated educational, digital, and design-based strategies rather than isolated awareness campaigns. Given the exploratory scope and descriptive analysis, conclusions are limited to indicative patterns within the sampled group. Nevertheless, the study provides preliminary empirical insight that may inform future large-scale, longitudinal, or experimental research examining integrated approaches to environmental behaviour and sustainable urban practices in Malaysia.

RECOMMENDATIONS

Building on the study's findings and methodological limitations, future research should enhance both intervention effectiveness and empirical rigour in environmental behaviour studies. Larger, statistically representative samples using stratified or probability sampling across urban and rural Malaysia are necessary to improve generalisability and enable inferential analyses such as regression or structural equation modelling to examine causal links among awareness, attitudes, perceived behavioural control, and civic action. Survey instruments should undergo systematic validation including expert content review, pilot testing, reliability analysis (Cronbach's alpha), and factor analysis, alongside detailed demographic profiling to strengthen reproducibility and subgroup analysis. Longitudinal or quasi-experimental pre-test/post-test designs are recommended to measure behavioural change following educational, gamified, or design-based interventions. Design strategies should be empirically tested through controlled field experiments (A/B testing of bin visibility, visual cues, placement optimisation, and incentive-based gamification), with quantitative behavioural indicators such as litter counts and disposal accuracy to establish statistical significance. Educational initiatives aligned with UNESCO's Education for Sustainable Development (ESD) framework should incorporate measurable behavioural outcomes, interdisciplinary curricula, and structured evaluation systems. Policymakers and local authorities should support continuous behavioural monitoring, data-driven waste management analytics, and incentive mechanisms to ensure sustained impact. Future studies should operationalise an integrated model combining the Theory of Planned Behaviour and UNESCO's ESD framework using validated constructs and structural modelling to move beyond theoretical alignment toward predictive, empirically verified pathways linking awareness, design intervention, and sustained civic behaviour

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Paper Contribution to Related Field of Study

This study contributes to the growing body of research on environmental behaviour, sustainable design, and civic education by examining littering through an interdisciplinary lens that integrates education, behavioural science, and design. Theoretical Contribution bridges Education for Sustainable Development (ESD) and Theory of Planned Behaviour (TPB)frameworks, showing how educational interventions (ESD) and behavioural design strategies (TPB constructs of intention and control) jointly influence civic responsibility. This synthesis offers a conceptual foundation for future studies seeking to operationalise behaviour-based environmental learning. Practical Contribution for practitioners, the study provides actionable insights for policymakers, educators, and designers in developing multi-channel awareness strategies that combine curriculum design, gamified engagement, and urban design interventions. By framing littering as both a social and design problem, this

research advances the discourse on design for behaviour change and supports evidence-based environmental stewardship in Malaysia and beyond.

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