

WeAR Smart: A Pilot Study on AI-Driven Game-As-Reality (GAR) for Citizen-Centered Smart City and Urban Resilience in Indonesia

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1. INTRODUCTION

The Intention-Action Gap

Indonesia's "100 Smart Cities" initiative faces critical adoption challenges[1]. A severe gap exists: **82%** express climate concern, yet only **19%** actively engage[2]. Literatures identify this gap is driven by a lack of understanding of urban complexities[3],[4],[5], which prevents citizens from participating in circular and climate mitigation.

The current conventional program offers passive information, failing to overcome this bottleneck. This research introduces WeAR Smart as a solution, part of a pioneering Game-As-Reality (GAR), that connects the physical city with digitally enabled citizens through immersive, interactive, and educational application to educate and engage citizens in "green" actions.

Research Objective

To evaluate whether the AI-driven GAR paradigm significantly elevates Urban Climate Literacy (UCL) and catalyzes verified sustainable ecological behaviors compared to baselines.

2. METHODS : GAMERS PROTOCOL

Design: Mixed methods with a 7-day quasi-experimental pilot study

Participants: N=32 (Age 18-40) across Jakarta for pilot study. Intervention operationalized via Hybrid AI (Artificial Intelligence) and AR (Augmented Reality) with GAMERS Protocol :

Geste

Narrative framing ("Climate Guardians") embeds deep intrinsic purpose

Ambience

Hybrid AR overlays mapping climate data onto urban infrastructure

Mechanics

XP & personalized reward awarded exclusively for verified physical impact

Engine

Hybrid AI (Edge & Cloud) detects waste, transit, & civic issues with personalization of actions

Reality

Absolute behavioral lock-in via relevant modules, GPS trajectory, and photo verification

PRIMARY

Sustainability

Retention via impact dashboards & behavioral lock in

Figure 1. GAMERS Protocol

METHODS : Hybrid AR (Augmented Reality) SMART CITY MODULES

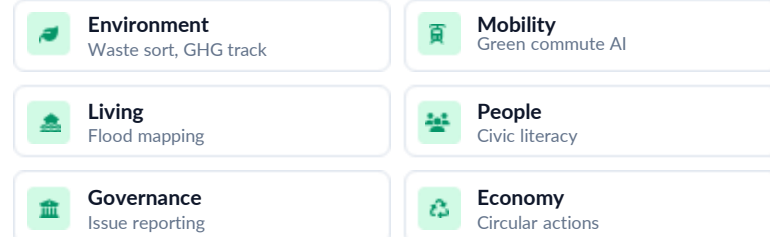


Figure 2. Six smart city AR modules

METHODS: URBAN CLIMATE LITERACY (UCL) MEASUREMENTS

Outcomes were measured using pre-post Urban Climate Literacy (UCL) surveys in KAB aspects (**knowledge** (100-point scale), **attitude** (5-point scale), and in-app **behavioral** logging (15-point scale).

3. RESULTS

The 7-day intervention yielded 91.3% completed missions in circular and climate mitigation actions. Critically, regression analysis of GAMERS components ($R^2=0.71$, $p<0.01$) proves that **Reality** ($\beta=0.47$) is the most significant aspect driving green behaviors. By encouraging AI-verified actions with interactive modules rather than passive education, the GAR paradigm also achieves high, statistically significant effect sizes across all UCL KAB (knowledge, attitude, and behavior) dimensions (Cohen's $d > 1.8$).

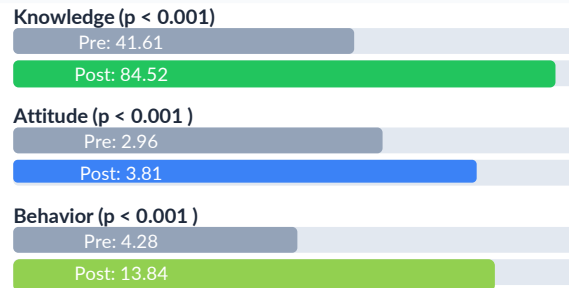


Figure 3. KAB (Knowledge, Attitude, and Behavior) Results

RESULTS : CITIZEN SENSING

WeAR Smart personalized education into actionable city intelligence:



Figure 4. Citizen Sensing

4. DISCUSSION & CONCLUSION

Bridging the Gap

This pilot study significantly elevates Urban Climate Literacy (UCL) and catalyzes verified sustainable ecological behaviors compared to baselines, by requiring AI-verified actions with relevant interactive modules (Reality) enveloped in an intrinsic purpose. WeAR Smart effectively shifts smart city frameworks from passive infrastructure to active **behavioral lock-in**.

Policy Relevance & Impact

Participants functioned as high-accuracy "citizen sensors" (487 reports, 91.3% completed all missions). Integrating this crowdsourced intelligence with the **Smart City command center** creates a scalable mechanism to achieve Indonesia's smart city and **SDG 11** resilience targets.

Limitations & Future Work

While it used a limited number of pilot study participants, it provides a justified statistical foundation for future large-scale RCT studies. It paves the way to increase its scale and integrate AI-driven solutions into formal policy management

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[4] Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change. *Journal of Risk Research*, 10(4), 445-466.
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