

Title: Unveiling the Digital Mirage: Analyzing Techno-Optimism and Environmental Perception in Taiwanese Adolescents' Media Consumption

Research Overview: This mixed-methods study investigates how digital media shapes the technological imaginaries of Taiwanese adolescents. By analyzing popular tech-content on platforms like YouTube and TikTok and surveying junior high students using an adapted New Environmental Paradigm (NEP) scale, the research explores the critical gap between digital convenience and ecological awareness. The study specifically focuses on "depoliticization" and "immateriality" within current technological narratives to understand their correlation with students' environmental attitudes.

Purpose: In the era of generative AI, technology is frequently marketed as a "clean" and "limitless" solution to global challenges. However, this "digital mirage" often obscures the heavy physical costs of infrastructure, such as data centers' energy and water consumption. The purpose of this study is threefold:

1. **Identify** characteristics of "simplification" and "depoliticization" in technological narratives consumed by adolescents in their daily media routines.
2. **Assess** adolescents' environmental attitudes, focusing on their perception of digital materiality and how they attribute responsibility for environmental degradation.
3. **Establish** an empirical foundation for a secondary education curriculum that integrates with critical media literacy to foster environmental empathy.

Methods: The study employs a two-phase mixed-methods design conducted in Pingtung, Taiwan:

- **Multimodal Content Analysis:** A pilot analysis of top-trending tech videos (YouTube/TikTok) identified by students. A self-developed coding scheme based on critical discourse analysis is used to detect "Digital Materiality Disclosure" and "Depoliticization Indicators," such as narratives that individualize systemic issues or prioritize consumer choice over ecological impact.
- **Quantitative Pilot Survey (The 16-Item Scale):** A 16-item scale, adapted from the NEP, was developed to measure four specific dimensions:
 1. **Techno-optimism:** Reliance on technological fixes for environmental crises.
 2. **Digital Materiality:** Awareness of the physical infrastructure behind virtual platforms.
 3. **Limits to Growth:** Understanding of resource scarcity in digital expansion.
 4. **Depoliticization:** The tendency to view environmental issues as personal lifestyle choices rather than structural responsibilities.

Psychometric Validation and Reliability: To ensure the rigor of the quantitative instrument, the study follows a strict validation protocol:

- **Content and Face Validity:** The scale underwent an expert review process involving three specialists in environmental education and media literacy to ensure construct alignment. A preliminary review with junior high students ensured that the language was age-appropriate and free of jargon.
- **Reliability Metrics:** In the pilot test, internal consistency is evaluated using **Cronbach's alpha (α) coefficients**. A target α value of **0.70 or higher** is set for the overall scale and each sub-dimension to confirm stable reliability. Additionally, **Item Analysis** is conducted to examine item-total correlations, ensuring each question effectively discriminates between high and low levels of environmental awareness.

Results and Discussion: Preliminary findings suggest that adolescents' imaginaries are heavily characterized by "Techno-Optimism," viewing AI as a neutral "techno-fix." Content analysis reveals a high degree of depoliticization in popular media, which correlates with students' tendency to perceive environmental protection as an individual choice rather than a corporate or systemic responsibility.

The discussion highlights the necessity of "re-materializing" the digital world in the classroom. By helping students recognize the ecological footprint of generative AI, educators can bridge the gap between virtual consumption and physical reality. This research provides a baseline for developing pedagogical strategies that promote a nuanced understanding of environmental justice in a post-digital society.

中文主題：揭開數位幻象：分析台灣青少年媒介消費中的技術樂觀主義與環境知覺

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研究概述：

本混合研究探討數位媒介如何形塑台灣青少年的科技想像。透過分析熱門科技影音內容與施測修訂版「新環境典範量表」(NEP)，研究聚焦數位便利性與生態覺知之間的落差，特別關注當代科技敘事中的「去政治化」與「無形化」傾向。

一、研究目的

在生成式 AI 與數位平台快速發展的時代，科技常被包裝為能解決全球問題的「乾淨」且「無限」方案，形成「技術修復」(Techno-fix) 論述。然而，此類「數位幻象」往往掩蓋支撐虛擬世界運作的實體成本，如數據中心的能源與水資源消耗。

本研究目的如下：

1. 分析青少年常接觸之 YouTube、TikTok 等科技影音內容，辨識其中「簡化化」與「去政治化」的敘事特徵。
2. 評估國中生對數位文明的環境知覺，包括對「數位物質性」的理解，以及環境責任是否傾向個人化歸因。
3. 建立中學媒體素養與環境教育課程的實證基礎，以培養學生之環境同理與批判思考能力。

二、研究方法

本研究以台灣南部國中生為對象，採兩階段混合研究設計：

1. 多模態內容分析 (**Multimodal Content Analysis**)
蒐集學生推薦之熱門科技影音，透過自編編碼表分析影片中的「物質性揭露」與「去政治化指標」。分析面向包含旁白、影像與聲音設計，檢視媒介如何建構科技與自然之關係，以及是否忽略工廠、礦場或數據中心等基礎設施。
2. 量化前導問卷 (**16 題量表**)
研究修訂 NEP 量表，建立數位文明情境下之測量工具，包含四個構面：
 - 技術樂觀主義：對科技解決環境問題的依賴程度。
 - 數位物質性：對虛擬平台背後實體基礎設施的認知。
 - 發展與資源極限：對數位擴張與資源有限性的理解。
 - 去政治化知覺：是否將環境問題視為個人消費選擇，而忽略制度與企業責任。
3. 信效度檢驗
量表經三位環境教育與媒體素養專家進行內容效度審查，並由國中生進行表面效度測試，以確認題項語意清晰。研究以 Cronbach's alpha(α)檢驗內部一致性，設定總量表與各構面 α 值需達 0.70 以上，並透過項目分析確認題目具良好鑑別度。

三、研究結果與討論

初步結果顯示，青少年的科技想像具有高度「技術樂觀主義」，傾向將 AI 與數位科技視為高效、低成本的「科技修復方案」。影音內容分析亦發現，多數科技敘事忽略數據中心能耗、碳排放與資源開採等結構性問題，而強調「智慧使用」與「綠色消費」。此現象與學生將環境保護視為個人生活選擇，而非企業或制度責任的態度具有相關性。

研究進一步指出，在後數位時代的教育中，應重新「物質化」數位世界，使學生理解 AI 與數位基礎設施的生態足跡。透過揭露科技背後的物質成本，學生得以從被動的數位消費者，轉變為具環境正義意識的公民。

四、結論

本前導研究顯示，當代科技敘事與青少年環境知覺之間存在明顯落差。透過量化信效度檢驗與質性內容分析，本研究為未來中學媒體素養與環境教育提供實證基礎，並有助於突破技術樂觀主義迷思，培養學生更具批判性與永續觀的世界理解。

