National Media and Scholarly Contexts of Social Stratification in AI Literacy and Acceptance Across Europe

Abstract. Using CRONOS Wave 5 (N = 7,729, 11 European countries) merged with computational indicators from GDELT, OpenAlex, and OECD, we estimate multilevel models and a generational mediation pathway (GSEM) to examine how individual characteristics and national information environments jointly shape AI literacy and acceptance of GenAI as assistant, peer, and supervisor. We find that (1) literacy and acceptance are steeply stratified by education and age, but the gradient *reverses* for supervisory roles; (2) media-dense environments compress the literacy–acceptance slope while scholarly-dense environments amplify it; and (3) generational gaps are substantially mediated through literacy—up to 77% for Boomers—yet peer acceptance retains an irreducible residual among older cohorts.

Keywords: AI literacy · AI acceptance · multilevel modelling · mediation · digital inequality · computational social science

1 Introduction

Generative AI has diffused rapidly across Europe, yet understanding of *who* accepts it—and in *which roles*—remains limited. Digital literacy is socially stratified [1], but the macro-informational environment is typically treated as background rather than mechanism [2]. We ask: **RQ1** Is AI literacy/acceptance socially stratified? **RQ2** Do national media, scholarly, and policy contexts predict literacy/acceptance above individual covariates? **RQ3** Does AI literacy bridge resources to acceptance? **RQ4** Does context moderate this link? We further test whether generational gaps operate primarily through the literacy pathway.

2 Data and Methods

Data. CRONOS Wave 5 ($N = 7{,}729$; AT, BE, CZ, FI, FR, GB, HU, IS, PL, PT, SI). AI literacy is continuous (0–1); acceptance: three binary items (GenAI as assistant, peer, supervisor). Six country-level indicators constructed computationally: media attention and tone (GDELT); scholarly publication and net impact (OpenAlex); AI talent concentration and net skill migration (OECD), processed via shrinkage, time-decayed aggregation, within-pair residualisation, and min–max rescaling.

Models. Mixed-effects linear/logistic regressions with country random intercepts, 4-specification progression (Additive → Media/Scholar/OECD Focus).

Mediation via multilevel GSEM with delta-method SEs (Pew generational cutpoints; Gen Z reference).

3 Key Findings

RQ1–2. Education and youth predict higher literacy and assistant acceptance, but MA+ respondents are *less* willing to accept GenAI as supervisor ($\beta = -0.81$, $P = 0.008$). The three focal context-pair interactions are jointly significant (Wald χ^2: 67–859, $P < 0.001$): Media Attention×Tone boosts literacy/acceptance; Scholar Pub×Impact depresses them; Talent×Skill elevates supervisor but depresses peer acceptance.

RQ3–4. Literacy predicts all acceptance outcomes (log-odds: +2.51, +3.37, +3.30; all $P < 0.001$). Media attention *compresses* this slope (−6.21, $P < 0.001$); scholarly impact *amplifies* it (+15.82, $P = 0.04$). Three-way interactions confirm: positive high-volume media substitutes for literacy; scholarly density reinforces it.

Mediation. The indirect path (Cohort→Literacy→Acceptance) is significant for every generation×outcome. Boomers vs. Gen Z: 77% of the assistant gap is literacy-mediated. Peer acceptance retains a direct residual ($c' = -0.75$, $P < 0.01$), indicating intrinsic generational resistance. Supervisor acceptance is *fully* literacy-mediated (all c' non-significant).

4 Contribution

This work contributes a multi-source computational measurement framework for national AI environments and shows that context restructures the *mechanism* linking literacy to role endorsement—a substitution–reinforcement dynamic not previously documented. Planned extensions: ESS Round 11 replication and longitudinal CRONOS Waves 4–6 design.

References

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