# Consumer Digital Literacy and the Use of AI-Based Services

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Beyond their economic impacts on the market, AI-based services increasingly shape consumers' quality of life. By leveraging algorithm-driven recommenders and automation systems, AI-based services help consumers make informed decisions with less effort and greater confidence, while providing personalized experiences (Puntoni et al., 2021). However, it has been argued that the benefits of technological advancements remain disproportionately distributed. Rising concerns related to the digital divide in the context of AI-based technologies suggest that these disparities will critically determine consumer well-being outcomes, with greater impact on vulnerable groups (Dwivedi et al., 2021).

As evidenced by the Korean government's implementation of digital education programs for consumers over the past few years (Kang et al., 2023), enhancing digital literacy has been proposed as a major solution to reducing the digital divide. However, existing studies have overlooked the multidimensional nature of digital literacy and have not examined how its components differentially affect AI-based service use, which is characterized by automated decision-making rather than user convenience and accessibility emphasized in existing digital services (Steyvers & Kumar, 2024).

Therefore, we examine how digital literacy focuses on various aspects—including daily-life literacy, rights protection literacy, critical understanding literacy, production and sharing literacy, social participation literacy, and security literacy— are distinctively related to the use of AI-based services. This study contributes by extending digital divide research to the context of AI-based services, identifying the distinct roles of digital literacy components, and offering practical guidance for digital inclusion efforts.

This study draws on data from the 2023 Intelligent Information Society User Panel Survey conducted by the Korea Communications Commission. The survey sample consists of 4,581 individuals residing in Korea between the ages of 15 and 69, providing nationally representative data to examine the relationship between individuals' levels of digital literacy and their use of AI-based services.

The dependent variables, the use of AI-based services in finance and health, were assessed as binary variables based on whether respondents reported any experience with such services over the past year in each respective domain. Digital literacy, composed of six sub-dimensions, was assessed using self-reported measures, with each item rated on a 5-point Likert scale. These dimensions included: (1) daily-life literacy—the ability to use online payment systems, transportation apps, government or public service portals, and other digital tools for daily activities; (2) rights protection literacy—knowledge of reporting mechanisms and redress procedures for online harm; (3) critical understanding literacy—the ability to discern unreliable information or sponsored content, and identify fraudulent online practices; (4) production & sharing literacy—skills related to creating and editing digital content; (5) social participation—participation in online social and political activities; and (6) security literacy—ability to manage digital security programs and privacy settings.

We estimated a binary logistic regression model including both literacy measure and its squared term to examine the relationship between digital literacy and the use of AI-based services. We further applied the three-step appropriate U-shape test proposed by Lind & Mehlum (2010) to formally assess whether the relationship for each literacy domain followed a U-shaped or an inverted U-shaped pattern. Binary logistic regression analysis shows that the relationship between digital literacy and the use of AI-based services does not always follow a simple linear pattern but instead exhibit more complex forms. For those literacy domains where the squared

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terms are statistically significant, we further applied the appropriate U-shape test to rigorously evaluate whether the observed curvature represented a U-shape or inverted U-shape. The results reveal domain-specific differences in how literacy functions in shaping AI-based service use.

In finance, daily-life, rights protection, and production & sharing literacy are positively associated with adoption, whereas security literacy shows no significant effect. In health, security and rights protection literacy are positively associated, whereas critical understanding literacy is negatively related. Notably, social participation literacy follows an inverted U-shape, with moderate levels linked to greater adoption. This study highlights that the role of digital literacy in shaping AI-based service use is both domain-specific and non-linear, implying that each sub-dimension of digital literacy operates in distinctive ways depending on the service context.

In the financial domain, daily-life and rights protection literacy jointly serve as foundational enablers, reflecting the need for both basic skills and confidence in privacy when engaging with financial AI services. Production & sharing literacy facilitates adoption by helping users interpret, create, and share information, which can be applied in using tools such as robo-advisors and stock trading apps.

In health, the patterns are more nuanced. Security and rights protection literacy positively affect adoption, underscoring the sensitivity of health-related data and the importance of users' ability to manage and safeguard such information. Yet, critical understanding literacy shows a negative association, indicating that individuals with a greater ability to assess information may also approach emerging AI-driven health services with skepticism. Most distinctively, social participation literacy demonstrates an inverted U-shaped association. Moderate levels of civic engagement are associated with greater openness to health-related AI, whereas very low or very high levels correspond to reduced adoption, pointing to a need for more research into how civic engagement interacts with technology use.

Taken together, these results demonstrate that the benefits of AI-based services are not distributed evenly but vary according to the different dimensions of digital literacy. This finding resonates with ongoing concerns about digital divides and suggests that policies centered solely on enhancing access to digital technologies may be insufficient (Lythreatis et al., 2022). Instead, educational initiatives and policy measures for digital inclusion should also take into account higher-order digital literacies such as competencies in producing and disseminating information, along with skills for safeguarding personal data.

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**Table 1**

*Logistic Regression Results for the Use of AI-based Services*

| | Finance | | | | Health | | | |
|---|---|---|---|---|---|---|---|---|
| | Based | | Squared | | Based | | Squared | |
| Domain | *β* | *(SE)* | *β* | *(SE)* | *β* | *(SE)* | *β* | *(SE)* |
| Daily-life literacy | 0.185*** | 0.052 | 0.885** | 0.309 | 0.028 | 0.057 | 0.580 | 0.370 |
| Daily-life literacy (sq) | | | -0.101** | 0.042 | | | -0.073 | 0.050 |
| Rights protection literacy | -0.088 | 0.062 | 0.803** | 0.307 | 0.144 | 0.068 | 1.297*** | 0.354 |
| Rights protection literacy (sq) | | | -0.150** | 0.050 | | | -0.190** | 0.056 |
| Critical understanding literacy | -0.160* | 0.064 | -0.242 | 0.289 | -0.446*** | 0.071 | -1.480*** | 0.332 |
| Critical understanding literacy (sq) | | | 0.013 | 0.046 | | | 0.168** | 0.052 |
| Production & sharing literacy | -0.214*** | 0.050 | -0.820*** | 0.202 | -0.169** | 0.055 | -0.094 | 0.227 |
| Production & sharing literacy (sq) | | | 0.109** | 0.035 | | | -0.008 | 0.038 |
| Social participation literacy | 0.451*** | 0.055 | 0.490 | 0.260 | 0.210*** | 0.060 | 1.374*** | 0.303 |
| Social participation literacy (sq) | | | -0.007 | 0.043 | | | -0.192*** | 0.049 |
| Security literacy | 0.003 | 0.060 | -0.491 | 0.258 | 0.344*** | 0.067 | -0.424 | 0.295 |
| Security literacy (sq) | | | 0.082* | 0.040 | | | 0.121** | 0.045 |
| Female [a] | 0.164 | 0.067 | 0.171* | 0.067 | 0.002 | 0.072 | 0.004 | 0.073 |
| High school graduate [b] | 1.086*** | 0.214 | 1.069*** | 0.217 | 0.772** | 0.255 | 0.683** | 0.259 |
| Some College [b] | 1.109*** | 0.257 | 1.084*** | 0.258 | 0.680* | 0.289 | 0.579* | 0.292 |
| College [b] | 1.387*** | 0.223 | 1.379*** | 0.225 | 0.977*** | 0.263 | 0.907** | 0.266 |
| Graduate School [b] | 1.213*** | 0.402 | 1.178** | 0.404 | 1.222** | 0.433 | 1.070* | 0.435 |
| Age 20's [c] | -0.280 | 0.241 | -0.235 | 0.244 | -0.073 | 0.266 | 0.024 | 0.270 |
| Age 30's | -0.094 | 0.243 | -0.058 | 0.246 | -0.035 | 0.269 | 0.086 | 0.273 |
| Age 40's | -0.253 | 0.242 | -0.214 | 0.244 | -0.574* | 0.269 | -0.476 | 0.272 |
| Age 50's | -0.500* | 0.239 | -0.473 | 0.242 | -1.088*** | 0.269 | -0.982*** | 0.272 |
| Age 60's + | -0.666** | 0.235 | -0.632** | 0.239 | -1.274*** | 0.266 | -1.138*** | 0.271 |
| Monthly Income 1-3M [d e] | 0.020 | 0.100 | 0.023 | 0.101 | -0.017 | | -0.028 | 0.114 |
| Monthly Income 3M-5M | -0.045 | 0.109 | -0.052 | 0.110 | 0.106 | | 0.083 | 0.122 |
| Monthly Income 5M and over | 0.235 | 0.162 | 0.227 | 0.163 | 0.503 | | 0.511** | 0.175 |
| $\chi^2$ | 302.62*** | | 334.26*** | | 422.18*** | | 465.93*** | |
| Pseudo $R^2$ | 0.048 | | 0.053 | | 0.074 | | 0.081 | |
| N | 4,581 | | 4,581 | | 4,581 | | 4,581 | |

[a] Omitted = male. [b] Omitted = less than high school. [c] Omitted = Under 20's. [d] Omitted = Less than 1M KRW. [e] Unit = KRWCurrency

*$p$ < .05, ** $p$ < .01, ***$p$ < .001

**Table 2**

*Results of Three-step Appropriate U-shape Test*

| Domain | Squared Term | Slope at $X_{low}$ | Slope at $X_{high}$ | 95% CI | Significance of (inverted) U-shape |
|---|---|---|---|---|---|
| ***Finance*** | | | | | |
| Daily-life literacy | Yes | 0.088 | 0.799* | (3.628, 5.371) | No |
| Rights protection literacy | Yes | 0.273*** | 0.517*** | (2.930, 3.906) | No |
| Critical understanding literacy | No | 0.056 | 0.700 | (-1.332, 9.313) | No |
| Production & sharing literacy | Yes | 0.015 | 0.347 | (2.666, 3.510) | No |
| Social participation literacy | No | 0.000 | 0.221*** | (-45.807, 34.158) | No |
| Security literacy | Yes | -0.053 | 0.060 | (0.701, 3.657) | No |
| ***Health*** | | | | | |
| Daily-life literacy | No | 0.122 | 0.279 | (3.480, 4.783) | No |
| Rights protection literacy | Yes | 0.496*** | -0.150 | (3.067, 3.619) | No |
| Critical understanding literacy | Yes | -2.526*** | -0.066 | (-1.132, 5.000) | No |
| Production & sharing literacy | No | 0.168 | -0.071 | (1.473, 4.267) | No |
| Social participation literacy | Yes | 0.403*** | -0.359* | (3.103, 3.969) | Yes (Inverted U-shape) |
| Security literacy | Yes | 0.000 | 0.140*** | (-41.209, 34.212) | No |

*$p < .05$, ** $p < .01$, ***$p < .001$