DIGITAL LITERACY AS A FACTOR FOR SOCIAL INCLUSION: EVIDENCE FROM AN EMPIRICAL STUDY

Lyubomira Spasova
Trakia University, Bulgaria, lyubomira.spasova@trakia-uni.bg

Abstract: The rapid digitalization of contemporary societies has transformed access to information, education, public services, and labor markets, making digital literacy a key prerequisite for social participation. However, significant inequalities persist in individuals' ability to use digital technologies in meaningful ways, particularly among adult learners and population groups exposed to digital exclusion. The present study examines digital literacy as a factor for social inclusion through an empirical survey conducted among 125 adult respondents. A quantitative cross-sectional research design was applied, using a structured questionnaire based on internationally recognized digital competence frameworks. Digital literacy and social inclusion were measured through composite indices capturing digital skills, access to technologies, use of online services, and perceived social connectedness. The results indicate moderate overall levels of digital literacy and social inclusion, with notable disparities across age groups and competence domains. Higher digital literacy is significantly associated with increased use of online public services, participation in online learning and employment-related activities, and stronger social connectedness. Correlation and regression analyses confirm that digital literacy is a significant predictor of social inclusion, even when controlling for age, education, and employment status. At the same time, respondents identified key barriers to digital participation, including lack of skills, fear of online risks, insufficient guidance, and financial constraints. The findings highlight that digital inclusion is a multidimensional process shaped by the interaction of skills, access, confidence, and supportive environments. The study contributes empirical evidence to ongoing debates on digital inequality and underscores the need for integrated policies combining adult education, accessible support mechanisms, and user-centered digital services to promote inclusive participation in digital societies.
Keywords: digital literacy, social inclusion, adult learners, digital divide, digital inclusion, e-services

1. INTRODUCTION

The rapid digital transformation of contemporary societies has reshaped access to information, education, public services, and labor markets, making digital competence essential for meaningful social, economic, and civic participation (UNESCO, 2021; OECD, 2023). Despite the widespread availability of digital technologies, significant inequalities persist in individuals' ability to use them effectively, extending beyond access to include differences in skills, confidence, and meaningful engagement (van Dijk, 2022; Ragnedda & Ruiu, 2022). As a result, individuals with low levels of digital literacy face increased risks of social exclusion, limited access to services, reduced employment opportunities, and weaker social participation. Empirical research shows that adult learners, older adults, unemployed individuals, and socioeconomically disadvantaged groups are particularly affected by digital exclusion (Seifert et al., 2021; Nguyen et al., 2022). In response, digital inclusion has become a strategic priority within international and national policy frameworks, emphasizing digital skills development, access to infrastructure, and the use of e-services (European Commission, 2022; World Bank, 2023). However, evidence indicates that access alone is insufficient and that targeted skill development and user-centred support are crucial for achieving meaningful social inclusion (Sparks & Honey, 2021). Against this background, the present study examines digital literacy as a factor for social inclusion through empirical evidence from adult learners and vulnerable social groups, contributing to current debates on digital inequality and inclusive digital policies.

2. MATERIALS AND METHODS

Research Design and Participants

The study employs a quantitative research design based on a cross-sectional survey. This approach is widely used in empirical studies examining digital literacy and social inclusion, as it allows for the systematic analysis of relationships between skills, access, and social participation (Creswell & Creswell, 2023; Nguyen et al., 2022). The survey method is particularly suitable for capturing self-reported digital competencies and perceived barriers among adult learners and vulnerable social groups. Participants were adult individuals aged 18 years and above, recruited from adult education programs, community learning centres, non-governmental organizations, and employment support services. The sampling strategy focused on including individuals from vulnerable groups, such as older adults (55+), unemployed persons, and individuals with lower levels of formal education, who are more likely to experience digital exclusion (van Dijk, 2022; Seifert et al., 2021). A total of N = 125 respondents participated in the

study. Participation was voluntary and anonymous, and informed consent was obtained from all participants prior to data collection.

Data Collection Instrument and Measurement

Data were collected using a structured questionnaire developed in accordance with internationally recognized digital competence frameworks. The design of the questionnaire was informed by the DigComp 2.2 framework (European Commission, 2022) and the UNESCO Global Framework on Digital Literacy Skills (UNESCO, 2021), ensuring content validity and comparability with previous research. The questionnaire consisted of four sections: (1) sociodemographic characteristics; (2) access to digital devices and internet connectivity; (3) digital literacy; and (4) social inclusion. Digital literacy items measured operational skills, information search, online communication, use of e-services, and cybersecurity awareness, reflecting multidimensional conceptualizations of digital competence (OECD, 2023; Ragnedda & Ruiu, 2022).

Digital literacy was measured using a composite index calculated as the mean score of multiple Likert-scale items (1 = very low competence, 5 = very high competence). This approach follows established practices in research on digital inclusion and digital capital (OECD, 2023; Ragnedda & Ruiu, 2022). Social inclusion was operationalized through a composite index measuring frequency of use of digital public services, participation in online learning and employment-related activities, and perceived social connectedness. Such indicators have been shown to capture meaningful digital engagement beyond mere access (Sparks & Honey, 2021; Nguyen et al., 2022). The internal consistency of the constructed indices was assessed using Cronbach's alpha, with values above 0.70 considered acceptable for social science research (Field, 2022).

Data Analysis

Data analysis was conducted using statistical software. Descriptive statistics were used to summarize sociodemographic characteristics and key variables. Correlation analysis was applied to examine the relationship between digital literacy and social inclusion. Furthermore, multiple regression analysis was used to assess the predictive effect of digital literacy on social inclusion while controlling for age, education level, and employment status, following standard quantitative research procedures (Field, 2022; Creswell & Creswell, 2023). The study was conducted in accordance with established ethical principles for social research. Participation was voluntary, anonymity and confidentiality were ensured, and no personally identifiable data were collected. The research design complies with international ethical guidelines for survey-based studies (Creswell & Creswell, 2023).

3. RESULTS

Sample characteristics.

The study included **125 respondents aged 18 years and above**, representing different adult age groups and reflecting the diversity of adult learners and population groups potentially exposed to digital exclusion. More than half of the participants belonged to the 45+ age categories, which are widely identified as being at higher risk of digital skill gaps, lower confidence, and limited meaningful technology use (Seifert et al., 2021; van Dijk, 2022; Ragnedda & Ruiu, 2022). Research indicates that adults in mid-to-late life stages often face cumulative disadvantages related to limited prior exposure to digital technologies, lower participation in formal education, and reduced access to targeted training opportunities (OECD, 2023). The inclusion of younger adult respondents allows for comparative analysis across age groups, highlighting generational differences in digital competence that are consistently documented in European and international policy reports (European Commission, 2022; World Bank, 2023). Overall, the age structure of the sample supports a nuanced examination of digital literacy as a factor for social inclusion across different stages of adulthood (Nguyen et al., 2022; OECD, 2023).

Table 1. Age distribution of respondents (N = 125)

Age group	n	%
18–24	12	9.6
25–34	18	14.4
35–44	26	20.8
45–54	29	23.2
55–64	24	19.2
65+	16	12.8
Total	125	100.0

Source: own compilation.

More than half of the respondents (**55.2%**) were aged 45 years or older, a demographic group consistently identified as vulnerable to digital exclusion (Seifert et al., 2021; van Dijk, 2022).

Access to digital technologies.

Access to digital devices among respondents was relatively widespread; however, notable disparities in the quality and stability of internet connectivity persisted. This finding supports recent empirical and policy-oriented research indicating that physical access to devices does not automatically translate into effective or meaningful digital participation (Sparks & Honey, 2021; van Dijk, 2022; World Bank, 2023). Studies increasingly emphasize the distinction between basic access and *meaningful connectivity*, which includes reliable internet, adequate devices, and the skills required to use them effectively (OECD, 2023; European Commission, 2022). In line with recent European and global evidence, respondents relying on shared or irregular internet access reported lower levels of digital engagement and greater difficulties in using online public services and educational platforms (Ragnedda & Ruiu, 2022; World Bank, 2023). Policy analyses further suggest that connectivity gaps disproportionately affect adult learners, older adults, and individuals in rural or socioeconomically disadvantaged contexts, reinforcing existing patterns of digital inequality (European Commission, 2022; OECD, 2023). Overall, the results confirm that access-related barriers remain a significant dimension of digital exclusion and interact closely with skill-related and motivational factors, highlighting the need for integrated approaches that address both infrastructure and digital competence development (van Dijk, 2022; Ragnedda & Ruiu, 2022).

Table 2. Access to devices and internet

Indicator	% of respondents
Access to at least one digital device	81.6
Stable internet access at home	68.0
Shared/public internet access	17.6
Limited or irregular access	14.4

Source: own compilation.

Digital literacy levels.

The Digital Literacy Index measured on a five-point scale indicated a **moderate overall level of digital competence** among respondents (M = 3.21; SD = 0.84), consistent with recent studies showing that adult learners typically demonstrate intermediate digital skills across multiple competence domains (Nguyen et al., 2022; OECD, 2023; UNESCO, 2021). Respondents reported higher confidence in basic operational skills and online communication, reflecting the widespread use of everyday digital applications, a pattern also observed in European and international research (European Commission, 2022; OECD, 2023). In contrast, lower scores were recorded for the use of e-government services and cybersecurity practices—key competence areas requiring higher levels of procedural knowledge, trust, and institutional familiarity (European Commission, 2022). Previous research suggests that limited confidence in digital safety contributes to avoidance behaviors, particularly among older adults and individuals with lower educational attainment, thereby reinforcing risks of digital and social exclusion (Seifert et al., 2021; van Dijk, 2022; Ragnedda & Ruiu, 2022). Overall, the findings support conceptualizations of digital literacy as a multidimensional construct in which uneven skill development may constrain the social inclusion potential of digital technologies (UNESCO, 2021; OECD, 2023).

Table 3. Digital literacy by skill domain (mean values)

Skill domain	Mean
Basic operational skills	3.74
Online communication	3.52
Information search	3.28
Use of e-services	2.89
Digital safety	2.63

Source: own compilation.

Older respondents (55+) demonstrated significantly lower self-assessed competence, supporting evidence on age-related digital skill gaps (Seifert et al., 2021; Ragnedda & Ruiu, 2022).

Social inclusion indicators.

The Social Inclusion Index indicated a **moderate level of digitally mediated social participation** among respondents (M = 3.08; SD = 0.79), consistent with findings showing that adult learners often demonstrate partial digital engagement while facing structural and competence-related barriers (Nguyen et al., 2022; OECD, 2023; World Bank, 2023). Higher levels of digital literacy were associated with more frequent use of online public services, greater participation in online learning and job-search activities, and stronger perceived social connectedness, supporting evidence that digital skills enhance access to institutional and social opportunities (European Commission, 2022; OECD, 2023; Seifert et al., 2021). In contrast, lower digital competence was linked to reduced engagement with digital services and reliance on third parties, a pattern commonly associated with social exclusion (van Dijk, 2022; Ragnedda & Ruiu, 2022). Overall, the results reinforce conceptualizations of social inclusion as a multidimensional process shaped by digital skills, access, and supportive contexts rather than connectivity alone (Sparks & Honey, 2021; World Bank, 2023).

Table 4. Social inclusion indicators (mean values)

Indicator	Mean
Use of e-government and e-health services	3.05
Participation in online learning	2.94
Online job search and employment-related activities	3.01
Social communication and connectedness	3.32

Source: own compilation.

Relationship between digital literacy and social inclusion.

Correlation analysis revealed a moderate positive relationship between digital literacy and social inclusion ($r = 0.47$, $p < 0.01$), indicating that higher levels of digital competence are associated with increased social participation and engagement in digitally mediated activities. This finding is consistent with recent empirical and conceptual research emphasizing digital skills as a central mechanism through which individuals gain access to social, educational, and civic opportunities in digitalized societies (van Dijk, 2022; Nguyen et al., 2022; World Bank, 2023). Further analysis using multiple regression confirmed that digital literacy remains a significant predictor of social inclusion ($\beta = 0.42$, $p < 0.001$) after controlling for age, education level, and employment status. This result suggests that digital competence exerts an independent effect on social inclusion beyond structural sociodemographic factors, supporting contemporary skills-based models of digital inclusion (OECD, 2023; European Commission, 2022). Similar findings have been reported in recent studies showing that digital skills can partially mitigate age- and education-related risks of exclusion by enabling more autonomous interaction with digital services and institutions (Ragnedda & Ruiu, 2022; UNESCO, 2021).

In addition to skill levels, respondents identified several perceived barriers that constrain their digital participation. The most frequently reported obstacles were lack of digital skills (62.4%), fear of online fraud or making mistakes (48.8%), insufficient guidance or support (41.6%), and financial constraints related to devices or internet access (36.0%). These barriers reflect patterns widely documented in recent research, which highlights the combined role of competence, confidence, support structures, and affordability in shaping meaningful digital engagement (Sparks & Honey, 2021; van Dijk, 2022; World Bank, 2023). Notably, fear of online risks and lack of trusted support were particularly salient among older respondents and individuals with lower levels of education, echoing findings that psychological and social factors often reinforce technical skill gaps and contribute to avoidance of digital services (Seifert et al., 2021; Ragnedda & Ruiu, 2022). Together, these results underline that digital exclusion is not solely the result of insufficient access or skills, but emerges from the interaction of individual capabilities, perceived risks, and the availability of supportive environments, as emphasized in recent policy and academic literature (OECD, 2023; European Commission, 2022).

4. DISCUSSION

The findings of the present study provide empirical support for the growing body of research emphasizing digital literacy as a key determinant of social inclusion in contemporary digitalized societies. Consistent with the theoretical assumptions outlined in the introduction, the results demonstrate that digital competence plays a central role in shaping individuals' ability to participate in social, educational, and civic activities mediated by digital technologies. The moderate overall levels of digital literacy observed among respondents suggest that while many adult learners possess basic operational skills and are able to engage in routine digital practices, significant gaps persist in more complex domains such as the use of e-government services and digital safety. This pattern aligns with recent European and international studies indicating that digital skill development among adults is often uneven, with advanced and institutional forms of digital engagement lagging behind everyday communication practices (European Commission, 2022; OECD, 2023). Such disparities are particularly consequential, as competencies related to e-services and cybersecurity are increasingly essential for autonomous participation in public life.

The results further highlight the importance of age as a contextual factor influencing digital competence. Older respondents demonstrated lower levels of self-assessed digital literacy, corroborating previous findings that link age-related differences in digital skills to cumulative disadvantages in education, labor market participation, and prior exposure to digital technologies (Seifert et al., 2021; Ragnedda & Ruiu, 2022). However, the regression analysis indicates that digital literacy remains a significant predictor of social inclusion even after controlling for age, education, and employment status. This finding supports skills-based models of digital inclusion, which argue that targeted competence development can mitigate, though not entirely eliminate, structural risks of exclusion (OECD, 2023; UNESCO, 2021). The moderate level of social inclusion identified in the study reflects a pattern of partial and selective digital participation. Respondents with higher digital literacy reported more frequent use of online public services, greater engagement in online learning and job-search activities, and stronger perceived social connectedness. These results are in line with empirical evidence demonstrating that digital skills enhance individuals' capacity to navigate institutional environments and maintain social ties in increasingly digital contexts (Nguyen et al., 2022; World Bank, 2023). At the same time, the findings confirm that digital engagement does not automatically translate into full social inclusion, underscoring the relevance of trust, institutional accessibility, and user-centered design of digital services (Sparks & Honey, 2021; van Dijk, 2022).

The identified barriers to digital participation provide further insight into the mechanisms underlying digital exclusion. Lack of digital skills, fear of online fraud, insufficient guidance, and financial constraints were reported as the most significant obstacles, reflecting the multidimensional nature of digital inequality. These barriers echo recent research emphasizing that psychological factors, such as fear and low confidence, interact with material and structural constraints to shape individuals' digital behavior (Ragnedda & Ruiu, 2022; World Bank, 2023). The prominence of fear-related barriers among older and lower-educated respondents suggests that digital inclusion strategies should extend beyond technical training to include trust-building measures and accessible support structures. Taken together, the findings reinforce contemporary conceptualizations of digital inclusion as a complex, layered process shaped by the interaction of access, skills, confidence, and social context. The study contributes to the literature by providing empirical evidence from adult learners and vulnerable groups, demonstrating that digital literacy functions not only as a technical competence but also as a social resource that enables participation, autonomy, and connectedness in digital societies.

5. CONCLUSIONS

The present study examined digital literacy as a factor for social inclusion through empirical evidence collected from adult learners and individuals belonging to population groups potentially exposed to digital exclusion. The findings confirm that digital competence plays a significant role in shaping individuals' ability to participate in digitally mediated social, educational, and civic activities.

The results demonstrate that respondents generally possess moderate levels of digital literacy and social inclusion, with notable disparities across age groups and skill domains. While basic operational skills and online communication are relatively well developed, more advanced competencies related to e-government services and digital safety remain limited. These gaps are particularly pronounced among older adults and individuals with lower levels of formal education, highlighting persistent inequalities in meaningful digital participation.

The study further confirms a positive and statistically significant relationship between digital literacy and social inclusion. Digital competence emerged as a strong predictor of social participation even after controlling for key sociodemographic variables, suggesting that skill development can partially mitigate structural risks of exclusion. At the same time, the identified barriers—such as lack of confidence, fear of online risks, insufficient guidance, and financial constraints—underscore that digital inclusion cannot be achieved through access or training alone.

Overall, the findings support contemporary models that conceptualize digital inclusion as a multidimensional process involving skills, access, trust, and supportive environments. From a policy perspective, the results indicate the need for integrated digital inclusion strategies that combine targeted adult education, accessible support mechanisms, and user-centered digital service design. Such approaches are essential for ensuring that digital transformation contributes to greater social inclusion rather than reinforcing existing inequalities.

Future research could build on these findings by employing longitudinal designs, expanding sample sizes, and exploring the effectiveness of specific digital literacy interventions among different adult learner groups. In doing so, further evidence can be generated to support the development of inclusive digital societies in which access to knowledge and participation truly transcend social and demographic boundaries.

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