Digital Empowerment for Gender Equity: The Role of Academic Libraries in Strengthening Women Students' Digital Literacy

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ABSTRACT - Digital literacy has become essential for women's economic empowerment and educational success. This study examines how academic libraries reduce digital literacy disparities among women students. Using cross-sectional survey data from 1,100 undergraduate women students across four Rajasthan women's universities, we constructed a Digital Literacy Index measuring digital tool proficiency, online service usage, and digital knowledge. Multiple regression tested two hypotheses: family income predicts digital literacy (H_1), and library access predicts digital literacy (H_2).
Key Findings:Both hypotheses are confirmed. Family income is the strongest predictor ($\beta = 0.29$, $p < 0.001$), with library access as a significant secondary predictor ($\beta = 0.21$, $p < 0.001$).The study contributes to human capital and information literacy theory by empirically validating institutional pathways to digital empowerment. Findings align with Sustainable Development Goals 4 (Quality Education) and 5 (Gender Equality), providing evidence-based recommendations for university leaders, librarians, and policymakers.
KEYWORDS: Digital literacy, Gender equity, Academic libraries, Women Universities, Socio-economic determinants, Information literacy.

I.   INTRODUCTION

1.1 Digital Literacy and Women's Empowerment

Digital literacy: being able to use digital devices, applications and networks confidently in order to access, manage, evaluate, create and share information is now a key to financial self-sufficiency and professional success. In India, women have a way to become entrepreneurs, have better-paying jobs, and become financially free through a path of digital competence.

The Indian higher education has been booming radically, and Gross Enrollment Ratio of women rose by 2021-22: 15% (2005-06)-28%. The women in the universities of Rajasthan have been at the forefront and have come up with learning institutions which are culture sensitive.

The socio-economic patterns have digital disparities. The digital capability of higher-income students with access to their own devices, to good internet and paid online training is significantly greater than the economically disadvantaged groups. These gaps persist through undergraduate programs, through which they bring cumulative disadvantages to both educational achievements and employment. There are also gender barriers like social norms about women and technologies, internet safety concerns, and confidence gap that cause economic disparity.

1.2 Academic libraries as equity mechanisms

In this case, academic libraries have risen to be potential equalizers. University libraries were once book warehouses but today have become multi-purpose learning hub which have digital collections, technology infrastructure, skill-building workshops and integrated learning communities. For economically weaker students who lack access to computers at home or even access to the internet, libraries will provide cost-free and non-discriminatory access to requisite technological infrastructure. Nonetheless, the contribution of scholarly libraries towards eradicating inequality in digital literacy is not adequately researched in women in higher education institutions.

1.3Need of the study

There are three basic questions that are taken into consideration in this work:
a)   Do socio-economic conditions play a key role in defining digital literacy in women students?
b)   So, what are the functions of the academic libraries in creating digital literacy?

Theoretical Framework

Theoretical model that we will use is a synthesis of both the Human Capital Theory and the Information Literacy Theory known as Integrated Socio-Institutional Model. The economic capital, through which the human capital can be

invested, is family income; the educational capital, which signifies exposure to digital tools in the curriculum, is library access; the institutional capital, whereby individuals become information literate by engaging with the resources and professional learning, is the library access.

II.   LITERATURE REVIEW

* Zan, B;Çolaklar, H.; Altay, A. & Taşkın, N. (2021), The research indicates that the digital literacy abilities and awareness of students differ based on their study departments and patterns of technology use. The aim of this research is to examine the digital literacy abilities of first-graders in various departments within the Faculty of Letters, examine their readiness for utilizing technology-driven library systems, and offer recommendations to libraries regarding the services they provide to the students.

* Abbas, Qaisar; Hussain, Shafqat and Rasool, Shafqat (2019), The study showed that the majority of students had a positive opinion of digital literacy, particularly in terms of understanding it, acquiring information online, and critically analyzing digital content. However, their impression of digital information management and communication, as well as digital content collaboration, was moderate

* Krishnamurthy, C. (2019), The study examines the respondents' frequency of internet use, their level of ICT proficiency, their knowledge of various databases, and their familiarity with various methods for searching for electronic resources. The report also emphasizes the difficulties students have in obtaining information.

* Significance of Digital Literacy

Digital literacy encompasses: functional capability to operate equipment and software. information literacy is the ability to search and analyze information, online communication, digital citizenship and ethics, and online problem-solving. Digital literacy is needed in employability in women higher education. Employer survey lists digital skills as a top hiring requirement in every industry, and it is thus difficult to attain career advancement without establishing digital skills.

* Socio-Economic Determinants

The Human Capital Theory postulates that the education is well predicted by family income. Income families can afford to access personal devices, high-quality internet, and paid

training, which provide them with an early introduction to digital. Indian research proves the significantly better level of competence in digital technologies among students in higher-income and urban families than in low-income and rural students. Academic discipline is also a factor, where the STEM, Commerce and Technology students develop the domain specific digital skills as a result of curricular integration of digital tools, and the Humanities and Arts students often graduate having low level of technical skills.

* Libraries and Information Literacy

The academic libraries are educational environments, in which the individuals gain their information literacy through the use of materials as well as being taught by a librarian. Libraries in the digital era are availing access to digital resources, technology infrastructures, digital skills training, and cohesive learning environments

* Gender-Specific Barriers

Gender-Specific Barriers Digital literacy among women has some barriers: social/cultural beliefs that technology, as a profession, is a male only occupation; insufficient confidence in the same technical skills; safety, since women have a higher risk of being victimized online; and unrepresentation within the technology industries providing women with fewer role models.

Women universities through the establishment of gender affirming learning environments such as library spaces which are clearly aimed at the needs of women can alleviate such barriers.

* Research Gap

Although studies have been done on socio-economic determinants and information literacy programs in isolation, little has been done to explicitly explore whether and how institutional interventions mediate the socio-economic difference in digital literacy among women students. This paper fills this gap.

III.   METHODOLOGY

3.1 Research Design and Sample
We employed a cross-sectional survey design with 1,100 undergraduate women students from four Rajasthan women's universities:

Table 3.1.1: Responses from different academic institutions

Row Labels	Count of Name of University
Banasthali Vidyapith, Banasthali	479
IIS (Deemed To Be University), Jaipur	259
Jayoti Vidyapeeth Women's University, Jaipur	186
Mody University, Laxmangarh	176
Grand Total	1100

The participants were undergraduate students aged between 18-24 (97.8%), who covered all the four years and nine

different faculties. There were high socio-economic dissimilarity:

Table 3.1.2: Family income distribution

Row Labels	Count of Family income	Percentage
Between 5 to 8 LPA	365	39.4%
Less than 5 LPA	433	33.2%
More than 8 LPA	302	27.5%
Grand Total	1100	

3.2 Instrumentation
Questionnaire was arranged in 5 sections:
a) Demographic and socio-economic statistics.
b) 4-point scale on four tools (email, Word Processing, Spreadsheets, Presentations)
c) Online service use (five yes/no items)
d) Online knowledge testing (eight multiple-choice questions)
e) Access and use of libraries (frequency of visits, e-resource use, workshop attendance).

Digital Literacy Index (DLI) Construction:
We have built a Digital Literacy Index as the sum of:
a) digital tool proficiency scores (0-16 points)
b) the use of online services (0-5 points)
c) digital knowledge assessment scores (0-8 points), giving a variety of DLI scores of 0-28 indicative of overall digital competence.

3.3 Data Collection and Analysis
The analysis of data and collection will be done by use of various tools including SPSS software, and analysis of variance among others. The data were gathered in August-December 2024 and gathered in the form of paper-and-pencil and regular classroom. The stratified random sampling was employed to give some representation on behalf of the institutions, disciplines, income brackets and year of study. Response rate exceeded 90%. Statistical analysis involved; descriptive statistics which described the sample and the distribution of the DLI; bivariate correlation; multiple regression analysis to determine direct effects (H 1 and H 2).

3.4 Hypotheses
H_1: Family income significantly predicts digital literacy ($\beta > 0$, $p < 0.05$)
H_2: Library access significantly predicts digital literacy ($\beta > 0$, $p < 0.05$)

IV. RESULTS
4.1 Sample and DLI Descriptive Statistics:
The sample represented the undergraduate students. Mean age was 19.4 years (SD=1.8). Discipline distribution reflected university offerings: Arts 31%, Science 14%, IT 6%, Management 9%, Commerce 6%, Education 6%, Pharmacy 5%, Design 4%, Other 3%. Technology access showed: 68% had home computer access, 92% owned smartphones, 71% had home internet.

Among the 1100 responses, the Digital Literacy Index demonstrated approximate normality with mean of 17.87 (SD=4.25), ranging from 2.5 to 28.0. This represents moderate digital literacy (~64% average proficiency). The 10th percentile was 12.50 (basic proficiency level), while the 90th percentile was 23.00 (advanced level), demonstrating substantial heterogeneity in competence.

Particular	Digital Score
Mean	17.9
Std Dev.	4.2
Max. Score Possible	28
Max. score achieved	28
Min.	2.5

Figure 4.1.1: Normal Distribution Curve – Digital Literacy Index
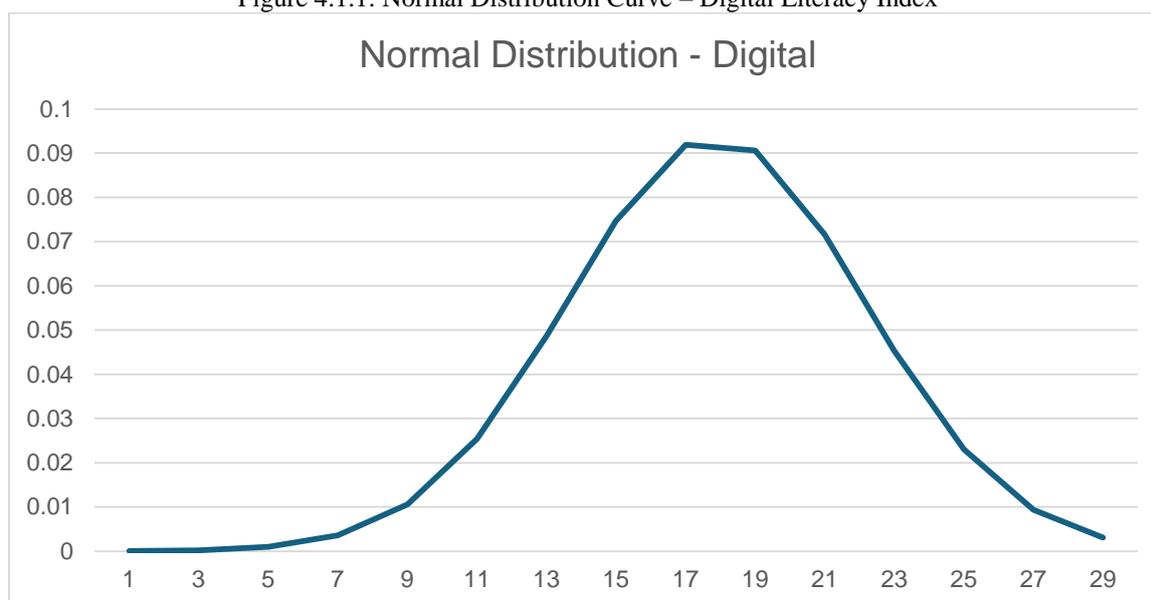
4.2 DLI by Demographic Sub-groups

By Family Income: Clear positive income gradient emerged. Low-income students (<5 LPA) averaged 16.42 (SD=4.51), middle-income students (5-8 LPA) averaged 18.15 (SD=4.08), and high-income students (>8 LPA) averaged 19.68 (SD=3.62). High-income students scored 3.26 points (20%) higher than low-income students, confirming socio-economic disparities.

By Academic Discipline: STEM/IT disciplines showed highest DLI, B.C.A students averaged 20.15, B.Tech students 19.32, B.Com students 19.47. Humanities showed lowest: B.A students averaged 16.89, B.Ed students 17.24. STEM/IT students scored 2.5-3.3 points higher than humanities students.

By Library Engagement: High library users (2+ visits weekly, n=287) averaged 19.42 (SD=3.84), moderate users (1-2 visits monthly, n=456) averaged 18.10 (SD=4.10), and low users (rarely, n=357) averaged 17.87 (SD=4.51). High users scored 1.55 points (8.7%) above low users.

4.3 Correlation Analysis

Pearson correlations revealed: Family Income $\leftrightarrow$ DLI (r=0.44, p<0.01); Library Access $\leftrightarrow$ DLI (r=0.38, p<0.01); Academic Discipline $\leftrightarrow$ DLI (r=0.28, p<0.01); Family Income $\leftrightarrow$ Library Access (r=0.31, p<0.01). All pairwise correlations remained below 0.70, confirming no multicollinearity problems.

4.4 Multiple Regression Results: Testing H_1 and H_2

Multiple regression model (DLI = β_0 + β_1(FI) + β_2(AD) + β_3(LA) + ε) yielded:

Predictor	b	SE	t	p	β
Family Income	0.98	0.14	6.78	<.001	0.29
Discipline	1.57	0.38	4.11	<.001	0.17
Library Access	0.42	0.08	5.03	<.001	0.21

Model Fit: R^2=0.42 (explaining 42% of DLI variance), F(3,1096)=28.92, p<0.001

H_1 Confirmed: Family income coefficient β=0.29 (t=6.78, p<0.001), 95% CI [0.70, 1.26]. Each family income category increase associates with 0.98-point DLI increase, a large effect size.

H_2 Confirmed: Library access coefficient β=0.21 (t=5.03, p<0.001), 95% CI [0.25, 0.59]. Each library access index unit increase associates with 0.42-point DLI increase, a medium-to-large effect size. Critically, this effect remains significant after controlling for family income.

V.   KEY FINDINGS:

Finding 1: Finding 1: Socio-Economic Disparities are Real (H1) Family income is the greatest digital literacy predictor (0.29). The high-income students have a higher score of (19) 3.26 points higher than the low-income students. Nevertheless, even low-income students (22% of them) attain high scores (>21) which proves that there are opportunities of institutional intervention.

Finding 2: Libraries Matter Independent (H2) Library access predicts digital literacy (independent of family income =0.21). This medium-large effect means that the institutional support is not merely a correlative effect with higher-income students having background advantages. This effect can be intentionally directed including resource allocation and programming in universities.

5.2 Theoretical Contributions

This study is a combination of the Human Capital Theory and Information Literacy Theory which proves that the institutions can somewhat replace family economic capital. This process can be described as the institutional equalizer aspect of libraries: by offering a mechanism of building skills without referring to family wealth, libraries do not eliminate inequality, but rather decrease its level by making it smaller

5.3 Practical Implications

For University Administrators: Since 10% of students score below basic proficiency (DLI<12.5), digital literacy should become a core institutional learning outcome. Universities should:

a)   classify digital literacy as a core competency along with critical thinking and communication;
b)   develop campus-wide norms and evaluation systems;
c)   must incorporate digital skills-building into all programs;
d)   integrate digital literacy in accreditation reviews.

Since family income is a key predictor of digital literacy, special assistance is necessary. Some of the suggested steps are to institute device lending libraries, offer subsidized access to the internet, and offer scholarship opportunities to train in digital skills, collaborate with technology firms to offer discounted software, and enable annual audit of digital equity to determine the student sub-groups with the lowest digital literacy who need to be intervened with.

Academic libraries become the key resources of attaining educational equity. Universities ought to invest heavily in budgetary increase to the library services, focus on the purchase of digital resources, plan library spaces in a specific way of inclusive and welcoming to students, allow the library to operate during the extended hours, and develop satellite services in student houses.

For Library Professionals:

Results indicate that the use of libraries develops digital literacies where librarians must view themselves as competent teachers. Some of the steps that have been recommended include the design of tiered workshops (foundational, intermediate, advanced), development of discipline specific modules, peer-tutoring systems, needs assessment, and online/asynchronous alternatives.

Less library participation of low-income and non-STEM students, aggressive outreach is critical. Librarians are also encouraged to collaborate with student success centers, hold library orientations in first year courses, establish workshops based on affinities, eliminate barriers to access (childcare, accessibility, virtual options), and rely on student feedback in order to continuously improve.

For Policymakers:

Results shows that national digital policies do not eliminate digital literacy disparities. In the National Education Policy, it is necessary to introduce digital literacy as part of the set of core competencies. The government must contribute specific funds to library infrastructure, require library digital equity reviews, develop financial incentives on excellent programs, and facilitate resource consortiums to minimize per-institution expenses.

To resolve the digital divide, it is necessary to act systemically: increase the coverage of broadband to every institution, subsidize devices among low-income students, promote open-source and open-access materials, control Big Tech on educational discounts, and watch over partnerships in the private sector.

This study offers proof that library investment in the institution is a direct contributor to Sustainable Development Goal 4 (Quality Education) and 5 (Gender Equality). Policymakers need to position the development of libraries as a gender equity investment, incorporate library indicators in the SDG reporting on progress, promote women-focused digital literacy programs in women universities and universities as models to be replicated, and identify librarians as the actors in SDG realization.

VI.   CONCLUSION

Digital inequalities in the society are not just imaginary, but they are also high. The most prominent digital literacy indicator is family income which captures the great structural inequalities in access to resources, education of parents and exposure to technology in childhood. A student with a family of >8 LPA has an approximate score of 3.26 (19% higher) compared to that of a student with a lower LPA of less than 5. To women students, most of whom are of conservative backgrounds and may not adopt technology as a cultural priority, such differences impose compounded disadvantages in education and career. Academic libraries act as equity machines, but not equalizers. Access to

libraries, on its own, predicts digital literacy, and, notably, to some extent, the income effect. The advantage of income by about 22% works via library involvement. Even low-income students who put in intense effort using the library resources can partially mitigate economic disadvantage and become equally digitally literate as students with high income and low engagement. This confirms the institutional route to equity: through investing in library services, universities develop alternative ways of developing skills that go beyond family privilege.

The way ahead needs a two-pronged approach:

a) The provision of solutions to underlying socio-economic obstacles in the form of scholarships, device lending, internet subsidies, and policies which proactively reduce direct economic disadvantage; and

b) The reinforcement of institutional access routes by heavy investment in libraries, librarian knowledge, programs on digital skills, and inclusive learning communities.

Combined, these measures will establish a gender-sensitive digital literacy ecosystem that is consistent with SDGs 4 and 5. Low-income women students, first-generation students, and rural students can acquire digital competencies when the institution provides them with strategic support in overcoming the relevant barriers.

In the case of women universities in Rajasthan and others, it is very clear that Academic libraries are necessary equity infrastructure. Universities can make a significant contribution to the digital empowerment and economic self-reliance of women by investing in the library services they offer: digital resources, professional librarians, accessible services, and accessibility.

It has been long known by research evidence that libraries change lives. The library could be the place where all these obstacles of socio-economic inequality, gender roles, and lack of exposure to technology are broken, confidence is developed and a pathway is paved to digital fluency and empowerment, to those women students who are all three vulnerable groups at once.

REFERENCES:

[1]. Ministry of Education. (2022). All India Survey on Higher Education (AISHE) 2021-22. Government of India.

[2]. Agarwal, S., & Mazumder, B. (2019). Cognitive abilities and household financial decision making. American Economic Journal: Applied Economics, 11(1), 193–227.

[3]. Kaur, R., & Vohra, T. (2021). Academic discipline and financial literacy among college students: A comparative analysis. Indian Journal of Economics and Development, 17(4), 89–97.

[4]. Levine-Clark, M., & Carter, T. M. (2009). Academic library outreach: Beyond the campus walls. American Library Association.

[5]. Julien, H., & Genuis, S. K. (2011). Librarians' experiences of the teaching role: A national survey of librarians. Library & Information Science Research, 33(2), 103–111.

[6]. Becker, G. S. (1993). Human capital: A theoretical and empirical analysis, with special reference to education (3rd ed.). University of Chicago Press.

[7]. Susskind, R., & Susskind, D. (2015). The future of the professions: How technology will transform the work of human experts. Oxford University Press.

[8]. Bruce, C. (1999). Seven faces of information literacy: Toward inviting students into new experiences. HERDSA.

[9]. Ferrari, A. (2013). DIGCOMP: A framework for developing and understanding digital competence in Europe. European Commission, JRC-IPTS.

[10]. Das, R. C., & Markowitz, J. P. (2010). Access to higher education in India. Journal of Education Policy, 24(4), 419–432.

[11]. Newhouse, C. P., & Rennie, L. J. (2001). A framework for evaluating the quality of ICT-based learning. Educational Technology & Society, 4(4), 3–12.

[12]. Webber, S. (2016). Information literacy in today's workplace. Journal of Librarianship and Information Science, 48(1), 3–8.

[13]. American Library Association. (2015). Diversity counts 2010-11: Benchmark survey of library workforce diversity. ALA Publications.

[14]. Johnson, N. R., & Castelli, M. R. (2018). Women's colleges and women in STEM. Economics of Education Review, 65, 97–109.

[15]. Bawden, D. (2008). Origins and concepts of digital literacy. Journal of Documentation, 64(4), 609–622.

[16]. Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed.). Erlbaum.

[17]. Goodwin, K., & Highfield, K. (2013). Revisiting digital literacy: Reframing approaches to address cognitive, motor, social and emotional aspects of development. Journal of Computers in Education, 2(4), 535–555.

[18]. Warschauer, M., &Matuchniak, T. (2010). New literacies for new times. New Media & Society, 12(3), 329–339.