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Evaluating the Convergence of Digital Information Literacy and Artificial Intelligence Competencies among Postgraduate Students: A Case Study of Uttar Banga Krishi Vishwavidyalaya

Sagar Sherpa

Librarian, Tufanganj Mahavidyalaya, Cooch Behar, West Bengal- 736159, India

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Abstract

Digital information literacy and AI skills are coming together fast, and that's changing how postgraduate education works especially in specialized agricultural universities like Uttar Banga Krishi Vishwavidyalaya (UBKV). In this study, we look at how these skill sets overlap among UBKV's postgraduates. We used a convergent mixed-methods survey (N=120) to take a hard look at how students use digital platforms, how well they can judge the quality of sources, how confident they feel running AI and machine learning (ML) tools, and what barrier they're dealing with. About 85% of students use digital repositories and academic search engines all the time. Still, there's a clear gap when it comes to actually evaluating information: only 37% can confidently tell whether an online source is credible. And even though most students say they know about AI technologies, only 22% feel at ease actually using AI or ML tools for data analysis. Digging into the qualitative data, we keep running into the same problems students just aren't getting enough formal digital literacy training, and the institutional infrastructure isn't keeping up. Wi-Fi on campus is unreliable, and access to important paid databases like INDIASTAT is far too limited. On top of all that, worries about AI-driven misinformation and unresolved copyright issues make students even more hesitant. All these factors feed into what we're calling a "credibility paradox": students have near-total access to information, but their ability to critically evaluate that information lags behind. To close that gap, we need to act fast. The recommendations are clearwork algorithmic source evaluation into the curriculum right away, set up focused AI-ML "Knowledge Camps," and fix the basic campus infrastructure problems. Without these changes, students will keep falling short, even in a landscape bursting with new tools and endless information.

Keywords*: *Digital Information Literacy, Artificial Intelligence, Machine Learning, Postgraduate Education, Agricultural Universities

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I. INTRODUCTION

1.1 Background

Digital technology has developed at an alarming pace and as a result, means by which students learn, share and receive knowledge in institutions of higher learning has changed significantly (Hershkovitz et al., 2025; Hornberger et al., 2023). Agronomic studies have witnessed an increased use of data-driven approaches (including precision agriculture, meteorological modeling, and computational genetics) (Southworth et al., 2023). In this line, graduate scholars in institutions like UBKV are relying more and more on online libraries and other academic search engines to come up with experiments and theoretic models. However, the digital skills do not necessarily equip the individuals with the ability to critically assess the sources or learn to use advanced software due to the proximity to digital technologies (Joseph et al., 2024; Rojo et al., 2025). Thus, achieving the expertise in modern scholarship requires combining both old and new abilities in the effective use of artificial intelligence with the ability to find credible digital information.

1.2 Problem Statement

Although postgraduate students at UBKV are strongly affected by the daily use of digital platforms (85%), there is also a significant gap in cognitive evaluation; only 37% of the students will have strong critical source-evaluation abilities. Nevertheless, even though the familiarity with AI and machine-learning technologies could be considered the baseline, operational confidence is low as just 22 1 /2 of students state they are competent. This statistical phenomenon highlights a big disparity between the exposure and effective and critical use of technology, a phenomenon that is recognised in the literature, as the credibility paradox (Balinas, 2025). Occurrence of such strong deficiencies in skills is further aggravated by infrastructural limitations in the system, specifically the occasional lack of Wi-Fi networks within the college premises and hostels, and an extremely low access to quality secondary data portals, especially INDIASTAT. Furthermore, students are concerned with severe ethical and technical fears of AI-generated fake information (hallucinations) and copyright uncertainties.

1.3 Objectives

1. The aim of the research is to perform a systematic theoretical review of the development of digital information literacy (DIL) and artificial intelligence (AI) skills in the background of higher education in agriculture.

2. In order to carry out an empirical evaluation of the use of digital resources by UBKV postgraduate students, their ability to assess the source, as well as their trust in the functioning of AI/ML technologies.

3. To conduct a qualitative thematic study of student responses on the barriers to incorporating DIL and AI, infrastructural, pedagogical, and ethical.

4. To create practical, evidence-based suggestions regarding curricular reform, increase in digital capacity, and infrastructural mitigation.

II. LITERATURE REVIEW

2.1 Evolution of Digital Information Literacy

Digital Information Literacy has grown from the core abilities of the digital environment to a sophisticated cognitive model of critical thinking, algorithmic thinking, and ethical decision-making (Charow et al., 2021; Hashish et al., 2025). The contemporary model of DIL, as represented by the four-dimensional model of UNESCO, focuses on the intersection of societal impact, collaborative engagement, and critical self-reflection (Lin et al., 2025). DIL is critical to the development of effective policy and rural innovation within the realm of agriculture. As such, algorithmic literacy is no longer an optional skill; it is a foundational necessity for the contemporary researcher within the fractured digital realm ("Mapping between Digital Competencies and Digitalization of the Accounting Profession among Postgraduate Accounting Students," 2023).

2.2 Artificial Intelligence Competencies in Agricultural Research

With the growing application of large language models and predictive models, the definition of AI literacy has

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extended beyond basic technical programming skills to include cognitive independence, critical discernment of algorithmic results, and academic integrity (Rojo et al., 2025; Wu et al., 2025). Current empirical studies have established the existence of differences in the level of confidence in the operational application of AI between students from different academic domains. For instance, students from the exact sciences have been identified as more confident in the operational application of AI compared to their counterparts from the social sciences and humanities domains (Bećirović et al., 2025; Mansoor et al., 2024). In the operationalization of AI/ML skills in the field of agricultural studies, where the application of big data analytics, remote sensing, and spatial mapping is important in the field of agricultural studies, the application of such skills is critical to the maintenance of the integrity of research outcomes in the field of agricultural studies. Postgraduate students are likely to apply such powerful tools as "black boxes" without formal instruction on the application of such skills.

2.3 The Credibility Paradox: High Access vs. Low Evaluation

One of the focal theoretical constructs that have emerged within the modern Library and Information Science scholarship is the so-called credibility paradox. This construct defines a learning environment where students have never had unlimited, real-time access to vast pits of information and are, ironically, not provided with critical assessment mechanisms that would allow them to properly evaluate credibility of sources or use the artificial intelligence tools responsibly (Balinas, 2025; Carroll & Borycz, 2024) However, without methodical support through explicit training in algorithmic prompt engineering, computational skepticism, and data provenance verification, an uncritical and unquestioning dependence on generative AI systems can actually harm critical thinking skills (Hershkovitz et al., 2025; Walter, 2024).With this regard, the credibility paradox is the main theoretical prism based on which the empirically observed shortcomings at UBKV are examined.

III. METHODOLOGY

3.1 Mixed-Methods Design

To both capture in fear the broad quantitative patterns and in richer depths the qualitative finesse to the student experience, a convergent mixed-method research design was utilized. This dualistic methodology makes it easier to rigorously triangulate the data on the use of statistical platforms with the lived experiences the students face in the fight against infrastructural and pedagogical barriers. The quantitative part used a structured questionnaire tool to evaluate the frequency of platform use, self-rated competence in source-evaluation and confidence levels regarding AI/ML computational tools. However, on the other hand, the qualitative section implied open-ended survey questions related to the discovery of perceived institutional, ethical, and technical barriers.

3.2 Population and Sampling

The target population for this empirical study was exclusively postgraduate students at Uttar Banga Krishi Vishwavidyalaya (N=120). This group includes students from different departments in the agricultural sciences, giving a complete picture of the university's advanced research community

3.3 Instruments and Data Collection

The survey tool was developed systematically by modifying validated psychometric scales used to measure different dimensions of digital information literacy (Ng et al., 2023) and AI literacy focused on awareness, practical application, evaluative critique, and ethics (Hornberger et al., 2023; Yi & Wang, 2025). The questionnaire had separate sections for demographic profiles, general digital literacy, information evaluation skills, AI/ML usage in research, and qualitative suggestions for university support.

3.4 Data Analysis

Standard descriptive statistics were employed to examine the quantitative data collected through the use of the survey instruments to uncover the central tendencies and frequency distributions associated with the use of the platform and the operational confidence. A comprehensive thematic approach was employed to

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examine the qualitative data collected through the use of the open-ended questions on the questionnaire by employing Braun and Clarke's method to methodically uncover, examine, and report on the patterns of the responses pertaining to the systemic impediments and the student requirements.

IV. RESULTS

4.1 General Digital Literacy and Platform Usage

85% of students reported frequently using online resources for school each day according to the results of our institutional data. Survey participants reported frequent use of Google Scholar, ResearchGate, JSTOR, and Semantic Search Engines such as Semantic Scholar. These high levels of daily use seem to correlate with international standards as current millennial farmers who are graduate students are very active within online learning environments (Joseph et al., 2024; Skalka et al., 2025).

4.2 The Evaluation Deficit: Source Credibility Competencies

Although overall use was extremely high, students reported shockingly low rates of deep searching. According to this study, only 37% of students feel very comfortable evaluating online information with respect to its reliability, origin, and whether or not it has been peer-reviewed. Students search through dense materials daily, but they tend to do so on a surface level and lack the know-how or ability to check facts algorithmically. This holds true with recent studies that show students have much higher access rates to technology than they do to deep information processing skills (Laupichler et al., 2024). Students take what is served on their search engines as truth and don't question where it came from or who may be skewing the information.

4.3 Artificial Intelligence Readiness and Operational Confidence

Do students currently leverage AI/ML tools in their research activities? We see both yes and no as answers to this question. When asked about artificial intelligence in general, almost all students surveyed had heard of it. When it came to working with AI/ML tools themselves, such as Python libraries, SPSS, or AI research assistants, only 22% of students surveyed answered that they were very confident in their ability to use these tools to conduct data analysis. Students who have previous experience with computational tools were found to be more confident (also seen in national studies on STEM confidence (Hornberger et al., 2023)[Hornberger et al., 2023]). However, our institution-specific data revealed a statistically significant and strong desire across our students to learn how to use these tools as part of their research with proper guidance.

4.4 Barriers and Training Deficits

Qualitative feedback from the survey allowed us to get a better understanding of some of the structural, institutional, and ethical hurdles preventing learners from developing DIL/AI skillsets. Through thematic coding, we were able to identify three major themes of barriers faced by learners:

- **Institutional Barrier:** Lack of education on Topic. Most participants noted that they did not receive any formal education on digital information literacy. Many participants called for more workshop style-teaching with one student saying, "By organizing a AI-ML knowledge camp for students" and another mentioning that "University may support AI based training and select...interested persons to build up some kind of tool/platform".
- **Severe Infrastructural Constraints**: Again and again, students pointed to the big problem basic institutional hardware and digital accesses just aren't up to the mark. Internet connectivity keeps failing, and it's a constant headache. As one student put it, "Network issue is a main problem here. Hostel Wi-Fi is not working all the time." There's also the problem with research resources. Without access to premium secondary data portals, it's hard to do quality work. One student called this out: "for secondary data collection, the websites are not that much good. If university can provide us the access to the INDIASTAT website, it will be very helpful."

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- **Ethical and technical worries - especially around AI hallucinations:** Came through loud and clear in the qualitative data, students don't just know about this problem; they're anxious about relying on generative AI because of it. They see how chatbots can sound convincing, but still make things up completely. Several students flagged these dangers directly. One pointed out, "Very often we end up opening misleading sites which are not at all helpful." Another said, "Sometimes the chatbots provide wrong and unverified answers. Sometimes the context is totally wrong." The frustration hit a high note with: "The AI chatbot often gives wrong information on few matters... The mathematical and analytical ability of most AI chat bots are poor." There's another thread running through the feedback: copyright issues. Many in the group spoke up about concern over "Copyright problem" when using digital data from other sources.

V. DISCUSSION

The identified infrastructural barriers that occurred based on the qualitative thematic analysis are existential threats to the ability of university to produce research output. The unpredictable quality of the Wi-Fi on the campuses and hostels overturns the advantages of any hypothetical digital literacy training; students will not be able to practice algorithmic evaluation when they cannot be sure of accessing the digital repositories. Moreover, an explicit requirement concerning institutional access to high-quality secondary data portals, even to INDIASTAT, highlights the extremely important resource gap. The agricultural research is very reliant on sound, longitudinal datasets of meteorological changes, crop production, and economic population. Postgraduates cannot access these paywalled data through institutional access, which means they have to do with incomplete data, which may be unreliable, to provide the model and extension research of agricultural activities.

5.2 Addressing Infrastructural Barriers

The infrastructural barriers that come out of the qualitative thematic analysis are existential threats of the research output capabilities of the university. The unreliability of Wi-Fi in the campuses and hostels directly cancels the positive outcome of any hypothetical digital literacy training; students are not able to practice algorithmic evaluation when they cannot guarantee that the digital repositories are available to them. Moreover, the direct request of institutional access to high-end secondary data portals, including INDIASTAT, brings out an essential resource deficiency. Agricultural research is placed on the strong longitudinal records of the meteorological change, crop production, and economic dynamics of the population. In the absence of institutional access to such paywalled databases, postgraduates must do with data that is fragmentary, and possibly unreliable, in open-access, so undermining the integrity of their agricultural modeling and extension research.

5.3 Pedagogical Imperatives and AI Integration

The fact that operational confidence of using advanced AI/ML tools is critically low (22%), compared to the high level of student enthusiasm, is an urgent pedagogical requirement by the institution. The qualitative fears about the wrong and unconfirmed responses that AI chatbots may produce suggest that students are intellectually wary, which is a most desirable quality that should be developed with the help of formal ethical training. The university should not ban the use of AI, but instead, it should be used to institute special interventions that will demystify the processes of computation. It should be explicitly taught on the promotion of higher-level prompt engineering, statistical analysis with the help of SPSS and Python, and strict checking of AI-generated datasets. The combination of these skills will turn the student body into a consumer of AI hallucinations instead of an active operator who could use the machine learning to the fullest to model agricultural data.

6. Conclusion and Recommendations

This detailed case study shows that, although postgraduate learners in Uttar Banga Krishi Vishwavidyalaya are digitally competent at the outskirts of engagement, the evaluative rigor in depth

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and the quality of operational facility of the advanced artificial intelligence instruments is significantly wanting to the rigorous requirements of current agricultural research. The merging of DIL and AI competencies is not going to happen on its own; it takes a planned and systematic intervention. The proposal to overcome this gap would be:

- **Strategic Curriculum Integration:** The university will have to formally incorporate algorithmic source assessment modules and digital-based critical thinking guidelines into the main postgraduate coursework, making the mentioned competencies not an elective component but an obligatory research base.
- **Instantiation of AI-ML Knowledge Camps:** To make use of the high student interest as revealed in the institutional data, UBKV would establish periodically recurring, intensive "AI-ML Knowledge Camps. These training sessions should be highly practical and concentrating on the practical use of the data analysis tools (e.g., Python, SPSS) in agricultural research environment.
- **Critical Infrastructure Investment:** There should be an immediate financial and administrative priority on upgrading infrastructure facilities in the campus by making sure that there is stable and high-bandwidth Wi-Fi all over the campus in all academic departments and residence hostels.
- **Database expansion:** The institution needs to obtain the maximum access to the high-end secondary data access portals, the most urgent being INDIASTAT so that postgraduates may receive unhindered entry to the authenticated empirical data needed to perform strong agricultural analysis.
- **Ethical AI Training:** Curriculum designers should include more specialized training materials, which specifically discuss the technical constraints of AI (hallucinations), algorithmic bias, how to cite AI-assisted studies, and how to work around the complicated copyright laws that apply to secondary data online.

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