

Digital Literacy Empowering College Students' Information Resilience: Generative Mechanisms and Cultivation Pathways

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Abstract: Educational digitalization has placed college students in a newly constituted informational condition: the expansion of information supply does not automatically enhance judgment, and the convenience of obtaining answers may even conceal the difficulty of forming understanding. Therefore, the core issue of digital literacy education can no longer remain at the level of tool mastery, resource access, or platform adaptation. It must further ask whether college students can form stable judgment, accomplish cognitive repair, and assume communicative responsibility amid algorithmic recommendation, generative content, information cocoons, online risks, and mixed value claims. Information resilience is a conceptual response to this problem. It is neither psychological endurance in a general sense nor a simple extension of traditional information literacy. Rather, it refers to the comprehensive capacity of college students to identify risks, evaluate evidence, adjust behavior, restore judgment, and reconstruct an order of action in complex digital information environments. Digital literacy empowers information resilience insofar as digital knowledge, technical skills, information evaluation, ethical awareness, and subjective reflection are reorganized within risk situations. Based on a review of relevant studies, this paper explains the generative mechanisms through which digital literacy empowers college students' information resilience and proposes cultivation pathways in terms of curriculum systems, authentic tasks, support networks, platform governance, and developmental evaluation. The paper argues that the real task of digital literacy education in higher education is not to enable students to obtain answers more quickly, but to enable them to form their own judgment in the presence of answers.

Keywords: Digital literacy, Information resilience, College students, Educational digitalization, Generative mechanism.

1. Problem Statement: The Educational Shift from Information Availability to Judgment Formation

1.1 Digital Transformation Reshapes College Students' Informational Condition

Digital transformation has first changed not the number of platforms, terminals, or resources added to university classrooms, but the way college students encounter information. Earlier educational informatization mainly responded to the problem of resource supply under conditions of information scarcity, emphasizing how students could access materials, use platforms, and expand learning channels. In the current platformized, algorithmized, and intelligent environment, however, information is no longer merely an object waiting to be retrieved. It actively enters students' learning, life, and public expression through recommendation, push notification, generation, reposting, and aggregation. The Action Plan for Improving Digital Literacy and Skills for All Citizens defines digital literacy and skills as a set of qualities and capacities involving digital acquisition, production, use, evaluation, interaction, sharing, innovation, security protection, and ethical norms [1]. The Opinions on Accelerating Educational Digitalization further proposes that teachers and students should be the key groups in improving digital literacy and skills and that a connected cultivation system should be built across primary, secondary, and higher education [2]. These policy documents indicate that digital literacy is no longer an auxiliary competence of educational informatization, but a basic condition for college students' subject growth in the digital age.

1.2 Information Abundance Does Not Automatically Generate Judgment

The enhancement of information supply does not automatically mean the improvement of judgment. College students may quickly retrieve materials, yet still be unable to judge their evidentiary quality; they may generate texts with the help of generative artificial intelligence, yet still fail to understand the factual sources behind those texts; they may use social platforms fluently, yet still fail to recognize the informational boundaries shaped by algorithmic recommendation; they may participate in online expression, yet still be unable to assume the public consequences of that expression. What needs to be reaffirmed is that technological convenience has not eliminated educational judgment; it has made educational judgment more urgent. The educational problem of the technological age is not whether answers are available, but whether answers can generate judgment. If students merely obtain materials more quickly, transfer texts more skillfully, and complete tasks more smoothly without forming an understanding of the grounds, limits, and consequences of information, digital literacy will be reduced to tool proficiency and may even become an accelerator of answer dependence.

1.3 Digital Literacy Education Needs to Move from Tool Training to Resilience Cultivation

Accordingly, college students' digital literacy education must complete a problem shift: from how to use digital tools to how to form judgment within digital information risks. The concept of information resilience is introduced precisely to

respond to this shift. Information resilience does not mean merely maintaining emotional stability under informational pressure. It refers to college students' capacity to maintain subjectivity through risk identification, evidence evaluation, situational adjustment, cognitive repair, and responsible action when they encounter misinformation, information overload, algorithmic bias, distortion in generative content, online public-opinion shocks, and confusion in value judgment. Compared with traditional information literacy, information resilience places greater emphasis on risk situations; compared with psychological resilience, it places greater emphasis on information judgment; compared with digital skills, it places greater emphasis on action restoration and value responsibility. This paper therefore focuses on two questions: how does digital literacy generate college students' information resilience, and how should universities move digital literacy education from tool training toward judgment formation?

The significance of this question lies not in inventing another broad concept, but in making visible the educational link that has been obscured in existing digital literacy education. College students do not lack entrances to information. What remains weak is whether, under conditions of excessive entrances, rapid answers, and overfull explanations, they can transform external information into internal judgment. If education cannot work at this point, it will understand digitalization as resource expansion and literacy improvement as technical adaptation, eventually making students more familiar with platforms without necessarily bringing them closer to understanding.

2. Literature Review and Conceptual Definition: Digital Literacy, Information Resilience, and Their Relationship

2.1 Digital Literacy: From Tool Ability to Comprehensive Literacy

A basic consensus in digital literacy research is that digital literacy cannot be equated with device-use ability. When Gilster introduced the concept of digital literacy, the emphasis was not simply on mastering network tools, but on the ability to understand, judge, and use information in digital environments [11]. Eshet-Alkalai further expanded digital literacy into a multidimensional set of skills, including photo-visual literacy, reproduction literacy, branching literacy, information evaluation, and socio-emotional literacy, arguing that effective action in digital environments requires cognitive, technical, social, and emotional capacities to work together [12]. Ng's study of digital natives likewise reminds us that young students' familiarity with technologies does not mean that they naturally possess digital literacy in an educational sense; digital literacy still needs to be cultivated through purposeful learning activities [13]. These studies point to the same judgment: digital literacy is an educational issue precisely because it concerns not whether tools can be used, but whether tool use can enter understanding, judgment, and responsibility.

In recent years, Chinese scholarship has also moved from a single-skill framework toward a comprehensive competence framework. Xu, Kong, and Guan proposed a gyroscopic

model of college students' digital literacy, incorporating multiple forms of knowledge, practical skills, personality traits, attitudes and motivation, and moral ethics into one competence structure, thereby indicating that the cultivation of college students' digital literacy must serve higher education's digital transformation and disciplinary construction [4]. Li's empirical survey of applied undergraduate students found that the overall level of students' digital literacy still has room for improvement and varies by grade, major, and place of origin [6]. These studies show that college students' digital literacy should no longer be understood as a single skill, but as a comprehensive literacy structure supported by knowledge, ability, attitude, ethics, and responsibility.

2.2 Information Resilience: From Psychological Recovery to Information Judgment

Information resilience is not a simple transfer of psychological resilience into the information field. In their conceptual analysis of digital resilience in school education settings, Sun et al. argue that digital resilience is a dynamic process in which individuals understand risks, know approaches, learn knowledge and skills, recover from stress, and move forward when facing digital technology-related threats [7]. From the perspective of information systems research, Tim and Leidner emphasize that digital resilience refers to the capacity of individuals or organizations to respond to external shocks and restore functioning through digital resources [9]. Lee and Hancock's educational intervention study further demonstrates that training oriented toward digital challenges can improve students' digital skills, self-efficacy, willingness to seek help, and tendency to support peers [8]. These studies show that resilience is not a static quality one simply possesses; it is a process generated through risk encounter, competence mobilization, and action reconstruction.

On this basis, college students' information resilience may be defined as the capacity, grounded in digital literacy, to identify risks, judge evidence, adjust situations, restore cognition, and act responsibly when encountering informational risks, cognitive disturbances, and value conflicts in digital information environments. This concept contains three qualifications. First, it presupposes risk: without disturbances such as information overload, misinformation, algorithmic bias, and digital pressure, resilience cannot appear. Second, it centers on judgment: information resilience is not mere adaptation to an environment, but the ability to form grounded judgments before complex information. Third, it terminates in action: if judgment does not lead to reasonable information choices, restraint in expression, help-seeking behavior, and responsible communication, it remains at the cognitive level.

2.3 The Generative Relationship between Digital Literacy and Information Resilience

Digital literacy and information resilience are not two parallel concepts, but a generative relationship between competence resources and risk performance. Digital literacy provides the basis of knowledge, skills, ethics, and reflection, while information resilience tests whether these bases can truly

function within complex information risks. A student may have retrieval ability, yet fail to recognize the limitation imposed by information cocoons on his or her field of vision; a student may master AI tools, yet fail to judge the factual basis of generated content; a student may understand cybersecurity knowledge, yet fail to maintain restraint in online conflict. Yu, Song, and Cao's study of information cocoons suggests that college students' information literacy is affected not only by individual capacity, but also by platform-based information structures and cognitive environments [5]. Therefore, for digital literacy to become information resilience, it must pass through intermediate links such as risk perception, evidence-based judgment, situational adjustment, cognitive repair, and responsibility internalization.

In this sense, this paper does not understand information resilience as another list of capacities outside digital literacy, but as the mature form of digital literacy within risk situations. Digital literacy answers what capacities students possess; information resilience asks whether these capacities remain effective under disturbance. This question shifts research from competence composition to competence generation, and also provides a clearer evaluation criterion for university digital literacy education: whether students can form grounded judgment in informational shocks and reorganize action after judgment is frustrated.

3. Generative Mechanisms through Which Digital Literacy Empowers College Students' Information Resilience

3.1 Risk Perception Mechanism: From Information Contact to Risk Identification

The risk perception mechanism moves students from information contact to informational alertness. College students face massive amounts of information every day, but the frequency of information contact is not equivalent to the capacity to identify risks. Platform pushes often appear as interest matching, affective content often appears as public concern, generative texts often appear as complete expression, and commercial marketing often appears as experience sharing or knowledge advice. If students do not understand the platform logic, interest structure, and technological mediation behind information production and circulation, they can easily mistake visibility for truthfulness, popularity for importance, and fluency of expression for reliability of argument. The role of digital literacy at this stage is to help students establish a prior awareness of information risk, so that before information enters understanding, students already recognize that it has been produced, filtered, ranked, and packaged. Risk perception does not mean doubting everything; it means refusing to regard the arrival of any information as naturally credible.

3.2 Evidence-Based Judgment Mechanism: From Content Understanding to Ground Examination

The evidence-based judgment mechanism moves students from understanding content to examining grounds. For college students, the most dangerous information is not necessarily wholly false information, but information that is partly true, logically incomplete, evidentially insufficient, and

yet smoothly expressed. Especially after generative artificial intelligence has widely entered learning activities, text generation can rapidly produce the appearance of explanation, but it cannot complete the internal process of understanding on behalf of students. Real educational judgment does not occur at the moment students obtain an answer; it occurs when students inquire into the answer's sources, scope of application, argumentative chain, and possible consequences. Through training in information retrieval, source evaluation, data comprehension, cross-source verification, and academic norms, digital literacy enables students to move from "what I have seen" to "on what grounds it stands." Jang et al. show that whether digital reading practices can become learning resilience is closely related to students' reading motivation and metacognitive strategies [10]. This indicates that students' developmental quality in digital environments depends on whether they can actively monitor their own process of understanding.

3.3 Situational Adjustment Mechanism: From Rule Memory to Contextual Action

The situational adjustment mechanism moves students from memorizing rules to acting in contexts. Information resilience is not merely the ability to distinguish true from false information in classroom tests; it is the ability to choose appropriate information behavior in different life situations. In academic retrieval, the key lies in evidentiary hierarchy and citation norms; in employment information, the key lies in source verification and privacy protection; in social media, the key lies in affective recognition and boundaries of expression; in discussions of public events, the key lies in distinguishing facts, positions, and values; and in AI-assisted writing, the key lies in fact checking, authorship responsibility, and academic integrity. If digital literacy education provides only abstract rules without requiring students to repeatedly handle conflicting information, ambiguous evidence, and action consequences in real contexts, rules can hardly become resilience. The essence of situational adjustment is that students can reorganize their knowledge, skills, and ethical judgment according to different information tasks, thereby avoiding being led by a single platform logic or immediate emotion.

3.4 Cognitive Repair Mechanism: From Informational Shock to Judgment Recovery

The cognitive repair mechanism enables students to restore judgment after informational shocks. Informational risks cause not only cognitive errors, but also attention depletion, emotional fatigue, and action paralysis. Continuous online presence, negative news, online controversy, peer comparison, employment anxiety, and public opinion may all place college students under informational pressure. Ang et al.'s review of resilience among higher education students points out that students' resilience is shaped jointly by personal resources, relational support, and institutional environments [15]. This has direct implications for information resilience: students' capacity for recovery does not depend only on individual will, but also on whether universities can provide supportive environments in which students can seek help, reflect, and reorganize experience. Here, digital literacy should not mean continuing to increase information supply; it should help

students identify the sources of informational pressure, manage attention allocation, correct misled cognition, reduce irrational comparison, and seek support from teachers, peers, or professional services when necessary. Factual discernment is not simple error correction; it brings students back from technological text to real situations.

3.5 Responsibility Internalization Mechanism: From Self-Protection to Public Action

The responsibility internalization mechanism moves students from self-protection to public action. College students are both receivers of information and reproducers of information. A repost, a comment, the submission of AI-generated content, or the dissemination of unverified information may all alter the information ecology. If digital literacy education emphasizes only efficiency, convenience, and individual protection, without guiding students to understand communicative responsibility, academic integrity, privacy protection, algorithmic bias, and online ethics, digital literacy remains at the utilitarian level. Value interpretation is not the addition of a correct conclusion; it enables students to understand why they ought to act in certain ways. Responsibility internalization means that students can transform digital ethics into self-restraint, public reason into habits of expression, and academic norms into learning action. At this point, information resilience expands from an individual's self-protection capacity in the face of risk into a subject capacity for participating in digital public life.

Taken together, these five mechanisms show that digital literacy empowering information resilience is not a linear addition, but a layered conversion from competence resources to subject capacity. Risk perception provides the entry point of the problem, evidence-based judgment forms the cognitive support, situational adjustment completes competence transfer, cognitive repair secures sustained action, and responsibility internalization gives resilience its value orientation. Without risk perception, students lose distance amid informational enclosure; without evidence-based judgment, students mistake answers for understanding; without situational adjustment, rules remain in the classroom; without cognitive repair, informational pressure erodes subject action; without responsibility internalization, technical capacity may instead amplify irresponsible communication.

4. Practical Dilemmas in the Cultivation of College Students' Information Resilience

4.1 Skill-Oriented Cultivation Goals: Emphasizing Tool Mastery while Neglecting Judgment Formation

Digital literacy education in universities is often understood as improving students' ability to use information technologies, concretely reflected in database retrieval, office software operation, learning platform use, online security knowledge, and the application of artificial intelligence tools. Such training has foundational value, but if educational goals stop there, a lower-order substitution emerges: tool proficiency substitutes for mature judgment, task completion substitutes for the formation of understanding, and platform adaptation substitutes for subject construction. What college students truly face is not only the problem of being unable to use tools,

but the problem of how to judge after they can use them. Obtaining an answer does not equal completing understanding, and tool availability does not equal the formation of capacity.

4.2 Classroom-Centered Cultivation Contexts: Emphasizing Knowledge Instruction while Neglecting Real Risk Response

Information resilience is generated within real informational risks, yet much digital literacy education still takes place mainly in relatively closed classroom environments. Classrooms can teach concepts, rules, and methods, but they do not automatically present the complex experience in which students switch among short-video platforms, social media, AI question-answering tools, employment platforms, and academic databases. If teaching materials are too clean, risk cases too typical, and judgment tasks too singular, students can hardly learn to handle gray information in reality. The difficulty of real information environments lies precisely in the interweaving of truth and falsehood, reason and emotion, concealed positions, and incomplete evidence. Apart from this complexity, information resilience can only be described, not generated.

4.3 Singular Cultivation Subjects: Emphasizing Separate Management while Neglecting Collaborative Education

The cultivation of digital literacy and information resilience involves professional teaching, library services, student affairs, mental health, cybersecurity, platform governance, and academic norms. Yet within universities these forces often operate separately. Professional teachers focus on disciplinary knowledge, librarians on retrieval training, counselors on student behavior management, psychological educators on emotional support, and technical departments on platform operation. Each subject assumes part of the responsibility, but they do not necessarily converge on the formation of students' judgment capacity. As a result, students receive scattered knowledge prompts without forming an information resilience structure that runs through learning, life, and public expression.

4.4 Outcome-Oriented Cultivation Evaluation: Emphasizing Task Completion while Neglecting Process Reflection

If digital literacy evaluation only examines whether students have completed retrieval tasks, mastered operational steps, or submitted standardized materials, it cannot reveal students' judgment process when facing complex information. The most important part of information resilience occurs precisely in the process: how students discover risks, select evidence, handle contradictory materials, revise their initial judgments, engage in cognitive repair after judgment failure, and take responsibility for their own information dissemination. Outcome-centered evaluation sees the endpoint of the task but not the formation of the subject; it sees the presentation of answers but not the generation of judgment.

Taken together, these dilemmas show that the difficulty of cultivating college students' information resilience does not lie in the absence of digital resources in universities. It lies in the fact that resources, curricula, platforms, and evaluation

have not yet formed a coherent educational structure around the question of how judgment is generated. If digital literacy education continues to proceed along the path of technological adaptation, students may enter digital systems more quickly, but they may only obey the answers, rankings, and explanations provided by those systems more efficiently. The cultivation of information resilience must ask the question in reverse: which educational arrangements allow students to step back from information dependence and reexamine the source, evidence, context, and responsibility of information, and which institutional designs allow students to revise cognition and reconstruct action after judgment failure.

5. Cultivation Pathways for Digital Literacy to Empower College Students' Information Resilience

5.1 Reconstructing the Digital Literacy Cultivation System through Curriculum Embedding

The cultivation of college students' information resilience should not be understood as adding another conceptual label to existing digital literacy education. Universities may establish general digital literacy courses, but digital literacy education should not be enclosed within a single course. Different disciplines have different information structures, evidentiary standards, and types of risk. Only when students understand, within disciplinary learning, how a field raises questions, selects evidence, forms arguments, and assumes academic responsibility can digital literacy become disciplinary judgment. General education courses should provide a foundational framework concerning digital society, platform logic, information ethics, and AI use; disciplinary courses should embed information retrieval, evidence evaluation, data interpretation, and academic integrity into teaching tasks; ideological-political education and student development courses should respond to online public expression, value discernment, and digital citizenship responsibility.

5.2 Strengthening Information Judgment Capacity through Authentic-Task Training

Information resilience cannot be acquired mainly through normative preaching; it must be trained through real or near-real information tasks. Universities can design task clusters around high-frequency informational scenarios of college students, such as multi-source verification of online hot topics, factual tracing and argumentative revision of AI-generated texts, credibility judgment of employment recruitment information, comparison of evidentiary levels in academic literature, reconstruction of risk chains in online fraud cases, and distinction between emotional mobilization and factual statements in public issues. The focus of such tasks is not to make students give a standard answer, but to present their judgment process: what they initially believed, why they began to doubt, which evidence they selected, how they handled evidentiary conflict, what judgment they revised, and what action they finally took. Only when the process is unfolded can resilience be trained.

5.3 Enhancing Information Risk Repair Capacity through Support Networks

Information resilience does not mean that students must resist all informational risks alone. Universities should establish a support system jointly involving professional teachers, counselors, librarians, mental-health educators, cybersecurity personnel, and peer organizations. Professional teachers guide disciplinary information judgment; librarians train resource retrieval and source evaluation; counselors intervene in online behavior, value confusion, and student-group dynamics; mental-health educators provide support for informational pressure and emotional shocks; cybersecurity personnel handle privacy protection and risk warning; and peer organizations provide mutual assistance mechanisms closer to students' experience. The meaning of a support network is not to make judgments on behalf of students, but to provide the conditions for renewed understanding and renewed action when students' judgment is blocked, cognition disturbed, or action frustrated.

5.4 Optimizing the Generative Environment of Information Resilience through Platform Governance

University digital platforms should not merely perform the functions of notice release, course management, resource distribution, and data collection; they should also become institutional environments in which students' information resilience is generated. Learning platforms can embed prompts concerning literature sources, AI-use statements, academic-integrity reminders, and evidence-chain annotation; library platforms can strengthen trusted-resource recommendation and retrieval-process guidance; campus information systems can improve privacy protection, risk reminders, and information traceability; and student-service platforms can provide clear entrances for online risk, psychological support, and rights protection. The core of platform governance is not to replace students' judgment with systems, but to reduce the unnecessary cost of judgment through a more transparent, credible, and traceable information environment.

5.5 Guiding Students' Subject Growth through Developmental Evaluation

The evaluation of information resilience must go beyond one-off testing. Universities can establish growth portfolios of students' digital literacy and information resilience, recording their performance in information tasks during course learning, research training, social practice, and online participation. Such records may include retrieval strategies, source selection, evidence comparison, AI-tool use statements, judgment-revision records, reflective journals, and explanations of communicative responsibility. Evaluation indicators should also move from "whether students can use" to "how students judge": whether they can explain the reliability of information sources, identify assumptions and biases in viewpoints, remain cautious when evidence is insufficient, seek support under informational pressure, and take responsibility for their own expression and communication. The true value of developmental evaluation is that it allows students to see how judgment is formed, and allows universities to see whether digital literacy education has truly reached subject growth.

These five pathways should form a closed loop rather than a disconnected list of measures. Curriculum embedding

provides the knowledge framework; authentic tasks push that framework into risk scenes; support networks secure the possibility of recovery within risk; platform governance improves the information environment on which students' judgment depends; and developmental evaluation transforms the implicit process of judgment into reflective and improvable evidence of growth. Only when these links are organized around the formation of students' judgment can digital literacy education move from the training logic of whether students can use tools to the educational logic of whether they can judge.

6. Conclusion

6.1 The Deep Task of Digital Literacy Education Is Judgment Formation

The educational paradox of the digital age is that the easier information becomes to obtain, the less judgment can be omitted; the easier answers become to generate, the more understanding needs to be protected anew. If digital literacy education for college students remains at the level of tool use, platform adaptation, and resource access, it cannot respond to the new requirements that complex information environments impose on students' subject capacities. What information resilience reveals is precisely the deeper transformation of digital literacy education: from teaching students to obtain information to helping them form judgment within information; from training students to use tools to guiding them to understand the limits of tools; and from requiring students to adapt to digital environments to supporting them in maintaining subjectivity within those environments.

6.2 Information Resilience Is an Important Measure of College Students' Digital Subject Growth

Digital literacy empowering college students' information resilience should not be treated as a simple accumulation of competences. It should be understood as a continuous generative process involving risk perception, evidence-based judgment, situational adjustment, cognitive repair, and responsibility internalization. The practical pathway of universities should likewise not remain at the level of adding courses and organizing activities. Through curriculum embedding, authentic tasks, multi-subject support, platform governance, and developmental evaluation, universities should reconstruct the educational conditions under which students' judgment is formed. Technology can provide faster answers, but education must ask how those answers are understood, how they are used, and how they are communicated responsibly. Whether college students can form judgment in the presence of answers is the key to whether digital literacy education truly stands.

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