



Digital Intelligence (DQ): Demands and Challenges in the Educational System

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Abstract

This study investigates the integration of Digital Intelligence (DQ) within the modern educational system, identifying it as both a critical demand and a significant challenge. The research explores four key dimensions: the demands and challenges of DQ, the conceptual definition and competencies of DQ, institutional preparation, and the practical integration of DQ in learning environments. Adopting a qualitative research design, the study conducted in-depth analysis through the participation of thirty (30) purposefully selected respondents. Results indicate that the demands of DQ require the embedding of digital literacy, digital creativity, and digital safety into curriculum tools and resources. DQ is defined as a holistic set of social, emotional, and cognitive abilities that empower both lecturers and students to navigate the digital world responsibly. Regarding preparation, the study highlights the necessity of institutional readiness, particularly in strengthening Information and Communication Technology (ICT) curriculum policies and digital literacy programs. However, the integration process reveals a critical "digital inequality," characterized by outdated software, inconsistent internet connectivity, and unequal access to devices, which threatens to leave certain students behind. The study concludes that while DQ is essential for pedagogical advancement, addressing infrastructure disparities is a prerequisite for its successful implementation.

Keywords: Digital intelligence, educational system, digital literacy, digital inequality, ICT.

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Introduction

DQ has emerged as a pivotal construct in the modern era, transcending basic functional literacy to encompass a holistic capacity for navigating the ethical, emotional, cognitive, and social dimensions of the digital landscape. It is defined not merely by technical proficiency but by the mental capacity for abstract reasoning and complex problem-solving within technological ecosystems (Paul et al., 2024). This intelligence involves the strategic interpretation and leveraging of data analytics and Artificial Intelligence (AI) to foster digital citizenship and innovative collaboration (Audrin et al., 2024). As global society transitions from analog systems to high-amplitude digital transmissions, the application of DQ now permeates every facet of human experience, from virtual reality and mobile ecosystems to digital arts and professional management (Pan et al., 2024).

In the educational sector, the integration of DQ is characterized by data-driven insights that inform decision-making and actionable knowledge (Gouveia et al., 2024). Beyond technical skills like cybersecurity and data science, DQ emphasizes ethical competency and "digital empathy," which are essential for navigating the social complexities of the online world (Mohamed, 2025). This intelligence allows for improved efficiency and professional adaptability, enabling individuals to optimize collaboration in a rapidly changing landscape (Van Hoang et al., 2025). Furthermore, DQ facilitates personalized learning and inclusive environments, ensuring that 21st-century skills development is accessible to diverse student populations (Vieriu & Petrea, 2025).

However, while the theoretical benefits of DQ in fostering critical thinking and academic engagement are well-documented (Mafarja et al., 2025), there remains a significant disconnect between idealized global frameworks and the practical realities of institutional implementation. Current scholarly discourse often emphasizes the cognitive potential of DQ, yet it frequently overlooks the systemic friction points—such as the deficiency in specialized teacher training and the persistent scarcity of technological resources—that hinder its integration (Sari et al., 2024). This oversight creates a pragmatic divide where high-level policy-making fails to address the "digital inequality" and infrastructure resistance encountered at the classroom level.

This study addresses these complexities by conducting a dual-perspective analysis that bridges the divide between global standards and localized pedagogical practices. Unlike conventional assessments that treat DQ as a static set of competencies, this research investigates the dynamic interaction between digital innovation and institutional readiness. By identifying the specific barriers that impede the transition from theory to practice, this study provides a diagnostic framework to evaluate how generative digital intelligence can be realistically embedded into the school system. Accordingly, the primary objective of this research is to examine the multifaceted demands of DQ and identify the systemic challenges that influence its successful integration within the contemporary educational landscape.

Methodology

This study employs a qualitative research design to systematically analyze the multifaceted landscape of DQ within the educational system. The methodology is specifically aligned with the research objectives: identifying the demands and competencies of DQ, assessing the readiness of institutional stakeholders (schools, teachers, and students), and evaluating the systemic challenges that hinder effective integration in learning environments. This qualitative approach ensures a rigorous alignment between the research problem, data collection, and the thematic analysis required to address the inquiry into digital intelligence (Audrin et al., 2024).

Research participants

The participants of this study consisted of fifty (50) professional lecturers from both public and private higher education institutions. These individuals were selected based on predefined purposive criteria, specifically their active utilization of digital intelligence tools and their direct involvement in navigating the demands and challenges of the modern educational system. Their professional insights provide a critical vantage point for evaluating the practical and pedagogical implications of DQ integration.

Scope and delimitation

The scope of this research is strictly focused on the demands and challenges of DQ within educational frameworks. The study is limited to four key areas:

1. The identification of DQ demands and challenges.
2. The definition of core DQ competencies in education.
3. The assessment of institutional preparation (schools, teachers, and students).
4. The analysis of barriers hindering effective DQ integration. This delimitation ensures a concentrated investigation into how DQ functions as a transformative yet challenging element in 21st-century learning (Sari et al., 2024).

Data gathering procedure

The data collection process followed a systematic six-stage framework to ensure validity and reliability:

1. Mapping: The initial phase involved an extensive literature mapping process. By reviewing existing materials and digital repositories, the researcher identified critical gaps and trends in DQ to establish a concrete foundation for the study.
2. Formulation of topic: Following the mapping phase, the title "Digital Intelligence (DQ): Demands and Challenges in the Educational System" was formulated. This topic was selected for its unique contribution to solving issues related to Artificial Intelligence and digital transformation in education (Floridi, 2023).
3. Formulation of research instruments: A self-structured qualitative instrument was developed, with variables extracted directly from the synthesized literature on DQ demands and challenges.
4. Validation of instruments: To ensure academic rigor, the research instruments undergo a formal validation process by experts in qualitative research, all of whom hold doctoral degrees (PhD/EdD). Their expert feedback and suggestions were meticulously integrated into the final version of the instrument before distribution.
5. Data collection (Floating of Questionnaires): Utilizing advanced technology, the validated instruments were distributed via Google Forms. To uphold ethical standards, the form included an informed consent waiver, ensuring that participation was entirely voluntary. Responses were automatically securely stored for subsequent analysis.
6. Data analysis: The gathered data were subjected to thematic analysis, where the verbatim text from participants was coded and categorized to reflect the authentic perspectives of the lecturers regarding the DQ landscape (Mafarja et al., 2025).

Result

This section presents the findings derived from the Focus Group Discussions (FGD) regarding the demands, competencies, preparation, and integration of Digital Intelligence (DQ) in the educational system. The analysis categorizes participant responses into three levels of prevalence: General (50% and above), Typical (25% to 49%), and Variant (24% and below). The thematic distribution and core ideas are summarized in Table 1 below.

Table 1. Themes, participant responses, and core ideas on DQ in education

Themes	Response frequency	Core ideas
Demands and challenges of DQ	General	Curriculum tool safety; learner responsibility; instructional innovation; widening learning gaps; stakeholder resistance.
Competency and definition of DQ	General	Ethical responsibility; technological utilization; virtual interaction platforms; digital emotional intelligence; digital creativity.
Preparation in addressing DQ	General	Literacy programs; addressing infrastructure gaps; pedagogical tool development; competency leveling; safety awareness.
Integration of digital intelligence	General	Digital inequality; strategy formulation; system maintenance; protection policies; ICT access; combating misinformation.

Theme 1: Demands and challenges of digital intelligence

The implementation of DQ within the educational framework necessitates a shift in academic paradigms, focusing heavily on ethical utilization and individual rights regarding technological development (Spante et al., 2018). The participants highlighted that the primary demands involve embedding safety and ethics into the very fabric of the curriculum. The participants stated:

"It integrates technology in learning which is embedded with school digital literacy, digital creativity, and digital safety into the curriculum tools and resources." (T1-P46 & P4).

"It develops digital citizenship to understand the responsibility of the learners' behaviors, data privacy, ethics, and respectful communication." (T1-P45 & P5).

"It helps in the professional development of lecturers to be trained effectively for engagement, assessment, and digital tool instructional innovation." (T1-P43 & P7).

"It addresses the need for reliable internet in the school, secure platforms, updated hardware and software to support digital education." (T1-P42 & P8).

"It challenges the access inequality of devices, quality digital resources, internet, and wide learning gaps among students." (T1-P39 & P11).

"It provides teacher readiness and resistance to struggle in the educational system due to lack of training, workload concerns, and fear of technology." (T1-P38 & P12).

Theme 2: Competency and Definition of DQ

The findings underscore that DQ competency is determined by the recognition of frameworks that evaluate the strengths and weaknesses of educators' policies (Haleem et al., 2022). DQ is viewed as a holistic set of abilities—social, emotional, and cognitive—that facilitate responsible interaction in a virtual environment. Regarding these competencies, the participants commented:

"It defines digital intelligence for the set of social, emotional, and cognitive abilities that enable lecturers and students to face the responsibility in the digital world effectively." (T2-P47 & P3)

"It provides digital citizenship in understanding the rights and responsibilities for the practical ethics and utilization of technology, empathy, respect, and cultural sensitivity in learning." (T2-P46 & P4)

"It enhances digital literacy and ability to utilize, evaluate, and search for digital information effectively in the biased content, fake news, and identify misinformation skills." (T2-P45 & P5)

"It explores collaboration for digital communication effectively on the utilization platforms for virtual interaction, knowledge sharing, and teamwork." (T2-P43 & P7)

"It manages digital emotional intelligence and interaction for digital communication, respect, practice empathy, building resilience against stress, negativity, and peer pressure." (T2-P42 & P8)

Theme 3: Preparation for Addressing DQ

Preparation for DQ involves fostering inclusivity, diversity, and equity within the digital transformation process. This preparation transcends simple knowledge acquisition, highlighting the need for a shift from traditional pedagogical models to modern digital literacy (Song et al., 2025). The participants shared:

"It prepares school institutional readiness to strengthen integration of information and communication technology curriculum policies in the digital literacy program." (T3-P45 & P5)

"It updates the gaps and challenges for unequal access to school, lack of reliable devices and updated software, and formal digital intelligence focused curriculum framework policy and alignment." (T3-P43 & P7)

"It provides readiness for lecturer professionals as to the increased participation of the digital literacy and based program development for the tool lesson delivery engagement and assessment." (T3-P41 & P9)

"It utilizes familiarities of gadgets for students' learners' readiness as to social media and apps in adapting high platforms of learning new tools and platforms." (T3-P37 & P13)

"It provides equal access to the challenges and gaps for strong safety awareness, ethics, and critical thinking for cyberbullying and susceptible misinformation." (T3-P35 & P15)

Theme 4: Integration of Digital Intelligence

The integration of DQ revolutionizes the teaching and learning paradigm by creating personalized experiences. However, it also exposes significant systemic vulnerabilities, such as digital inequality and resource inadequacies (Zakir et al., 2025). The participants elaborated:

"It divides digital inequality for the updated software, internet connectivity, and unequal access to devices for the students who are left behind." (T4-P46 & P4).

"It limits teacher training and readiness due to the lack of advanced skills and basic utilization for digital intelligence in adopting new teaching strategies." (T4-P44 & P6).

"It lacks infrastructure and resource inadequacies for ICT facilities in schools for insufficient digital programs and maintenance." (T4-P42 & P8).

"It identifies hacking and theft in the digital learning implementation of the data effectiveness and protection policy in the school system." (T4-P40 & P10).

"It embeds with curriculum policy gaps for digital intelligence curriculum system policy that is focused on ICT access, creativity, ethics, and digital responsibility." (T4-P38 & P12).

"It exposes information overload and misinformation for unreliability to students, biased content, fake news, and difficulty evaluating critical sources." (T4-P36 & P14).

Discussion

It shows that demands and challenges of digital intelligence in the educational system integrate technology in learning which is embedded with school digital literacy, digital creativity, and digital safety into curriculum tools and resources. It develops digital citizenship to understand the

responsibility of the learners' behaviors, data privacy, ethics, and respectful communication. It helps the professional development of lectures to be trained effectively for engagement, assessment, and digital tool instructional innovation. It cultivates the demands and challenges that are focused on the context of the educational system in teaching and learning concept framework (Mhlongo et al., 2023). It explores the development of critical thinking and perception in understanding the educational system practice. It emerges from the digital intelligence support with pedagogical adaptation for critical thinking among students as centers of learning. On the other hand, the demands and challenges of digital intelligence in the educational system include the need for reliable internet in the school, secure platforms, updated hardware and software to support digital education. It challenges the access inequity of devices, quality digital resources, internet, and widen learning gaps among students. It provides teacher readiness and resistance to struggle in the educational system due to lack of training, workload concerns, and fear of technology. It undermines the challenges and demands in the digital intelligence process of critical thinking skills and development of quality academic works. It is a tool for students to create critical thinking to equip with quality teaching and learning needed for exploration of independent problem-solving. It focuses on the critical thinking and cultivation of teaching and learning systems to capture the changes for the impact of technology development systems.

Indeed, competency has been defined by digital intelligence in the educational system as to set social ability, emotional, cognitive ability that enables lecturers and students to face the responsibility in the digital world effectively. It provides digital citizenship in understanding the rights and responsibilities for the practical ethics and utilization of technology, empathy, respect, and cultural sensitivity in learning. It enhances digital literacy on the ability to utilize, evaluate and search for digital information effectively in the biased content, fake news, and identifying misinformation skills. It integrates digital intelligence in rapid generative tools in feeding knowledge and skills for urgent educational priorities in teaching and learning for the performance of students as centers of learning. It is reflected in the various educational policy and system framework competency of skills and understanding. Hence, the competency has been defined by digital intelligence in the educational system as to explore collaboration for digital communication effectively in the utilization platforms for virtual interaction, knowledge sharing, and teamwork. It manages digital emotional intelligence and interaction for digital communication respect, practice empathy, building resilience, against stress, negativity, and peer pressure. It innovates digital creativity utilization of tools in content creation, problem solving in applying multimedia, digital storytelling, design, and coding. It analyzes and focuses on the advantages of the digital intelligence adaption process. It applies guidelines in the educational system for the contribution of advanced technology application and scientific process. It emphasizes potential benefits for emerging digital intelligence in the school system to focus on the concept and understanding of digital intelligence awareness, critical thinking, and knowledge (Marsden et al., 2025).

Notably, the preparation in addressing digital intelligence is based on the educational system's institutional readiness as to strength in the integration of information and communication technology curriculum policies in the digital literacy program to update the gaps and challenges for unequal access to school. It analyzes the lack of reliable devices and updated software and formal digital intelligence that is focused on curriculum framework policy and alignment. It provides readiness for lecturer professionals as to the increased participation of the digital literacy and based program development for the tool lesson delivery engagement and assessment. It enhances accessibility for quality education as to equitability, diversity, and inclusivity. It emerges from the application of digital intelligence in a systematic approach in shaping and molding young minds. Apparently, the preparation in addressing digital intelligence is based on the educational system to adapt quickly for

varying digital competency level in a continuous emerging tool or lack of resistance due to advanced technology of workload and confidence. It utilizes the familiarities of gadgets for students' learners' readiness as to social media and apps in adapting high platforms of learning. It provides equal access to the challenges and gaps for strong safety awareness, ethics, and critical thinking for cyberbullying and susceptible misinformation. It proposes the preparation in addressing digital intelligence in the educational system as a foundation in molding digital intelligence and adaptive change process from good, better, and best among students as centers of learning. It is the digital era in the contribution of advanced technology and application of information communication and technology (Gkrimpizi et al., 2023).

Finally, the integration of digital intelligence in the educational system divides digital inequality for the updated software, internet connectivity, unequal access to devices for the students that are left behind. It limits teacher training and readiness for the lack of advanced skills and basic utilization for digital intelligence in adopting new teaching strategies. It lacks infrastructure and resources inadequacies for ICT facilities in school for insufficient digital programs and maintenance. It presents the integration of digital intelligence and comprehensive analysis in the academic function of students. It delves with digital intelligence and technology in various aspects of decision-making process, school system automation, and personalized learning (Sain et al., 2024). It provides details for the challenges and benefits of digital intelligence in the educational environment perspective of advanced technology. Lastly, the integration of digital intelligence in the educational system identifies the hacking and theft in the digital learning implementation of the data effectiveness and protection policy in the school system. It is embedded with curriculum policy gaps for digital intelligence curriculum system policy that is focused on ICT access creativity, ethics, and digital responsibility. It exposes the information overload and misinformation for unreliable to students biased content, fake news, and difficulty evaluation for teaching critical sources. It examines the implication of philosophical integration of digital intelligence in the educational system. It holds the digital era to enhance accessibility and quality of education through task automation, data analysis, and personalized learning (Alwendi et al., 2025). It raises the concerns for digital intelligence in the educational system. It improves the learning efficiency and interaction in the classroom setting (Ofem et al., 2025).

Conflicts of Interest

The authors declare no conflict of interest.

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Author contribution

Leovigildo Lito D. Mallillin: conceptualization, methodology, software, data curation. **Sammy Q. Dolba:** writing-original draft preparation, visualization, investigation, supervision, software; validation, writing-reviewing and editing. All authors have read and agreed to the published version of the manuscript.

Declaration of generative AI in scientific writing

During the preparation of this work, the author(s) used Grammarly in order to improve

language and readability. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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