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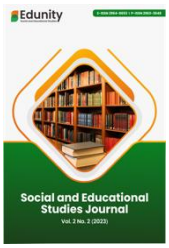

Enhancing Workforce Adaptability Through Structured Digital Literacy Skill Set and Competency Standard: A Research and Development Study

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ABSTRACT

The accelerating pace of digital transformation has reshaped workforce demands, requiring not only technical competence but also adaptability in digital environments. However, a persistent digital skills gap continues to hinder employability and productivity, as many educational frameworks lack structured and standardized digital literacy competencies aligned with industry expectations. To address this, the study employed a research and development approach using the Integrated Interface Model to formulate a digital literacy skill set and corresponding competency standards, which were validated through the RMCS system and focus group discussions with industry and academic experts. The results include eight competency units covering core and elective digital capabilities such as digital tool operation, information evaluation, ethical online communication, cybersecurity, e-commerce management, and digital content creation. This competency framework provides a modular and competency-based foundation to improve workforce adaptability and supports educational alignment with regional and global standards such as ASEAN MRA-TP and UNESCO CBET. The study calls for the adoption of these structured competencies into academic and vocational systems to enhance workforce readiness and future resilience in the digital economy.

Keywords: Digital Literacy, Workforce Adaptability, Competency Standards, Skill Set, Curriculum Development, Vocational Education

INTRODUCTION

Digital transformation has significantly reshaped global workforce demands. According to the World Economic Forum (WEF, (2023), 44% of workers' core skills are expected to change by 2027 as a result of technological disruption. Despite this urgency, the digital skills gap remains a pressing global challenge. UNESCO, (2021) reported that fewer than 40% of adults worldwide possess basic digital competencies. Research by Omol, (2024) underscores the pivotal role of digital transformation in driving innovation and competitiveness, highlighting leadership, organizational culture, and technology as key enablers. Similarly, Nadkarni & Prügl, (2021) emphasized the importance of workplace environment and organizational culture in facilitating successful digital transitions. Extending this view, Cao et al., (2025) argued that digital transformation not only enhances operational efficiency and innovation but also supports sustainable development and high-quality economic growth.

Digital literacy is essential in the modern workforce, empowering individuals to effectively access, evaluate, and apply digital tools and information across various professional contexts. The OECD (2025) defines digital literacy as the ability to use digital technologies to access, manage, integrate, evaluate, and create information. According to Bacalja et al., (2022) preparing younger generations for digital citizenship must include a focus on critical digital literacy - one that is responsive to contemporary digital forces such as platformization, artificial intelligence,

educational applications, and algorithmic systems. Trixa & Kaspar, (2024) emphasizes the importance of information literacy in today's fast-paced media environment, highlighting the need for effective evaluation strategies and pedagogical competencies among pre-service teachers. Similarly, Buchan et al., (2024) notes that the expansion of digital connectivity has granted young people broad access to digital platforms for communication, entertainment, and education.

Workforce adaptability is essential for maintaining employability and productivity, particularly in the face of rapidly evolving technological and economic landscapes. Recognized as a critical 21st-century skill, adaptability enables individuals to respond effectively to new technologies and organizational shifts (Seiler, 2021). The World Economic Forum (WEF, 2025) highlights that skill gaps in the labor market remain a major barrier to business transformation, underscoring the importance of cultivating workforce adaptability. Gürbüz et al., (2024) further emphasizes that empowering employees to realize their potential is crucial for enhancing positive work outcomes and mitigating burnout, especially in unstable work environments.

Well-defined skill set serves as the foundation for targeted training, competency development, and effective alignment between individual capabilities and occupational demands. Defined as a specific group of competencies required for a particular job or profession, skill sets enhance clarity in curriculum design and facilitate structured career progression (ILO, 2023). Bhoir & Sinha, (2024) found that human resource management (HRM) initiatives play a pivotal role in supporting employee well-being (EWB) and underscore the importance of workforce adaptability in sustaining employability and productivity.

Despite the recognized importance of digital skills, there is still a lack of standardized frameworks to effectively integrate these competencies into occupational standards and educational curricula. Weno & Anggraini, (2022) reports that skill mismatches remain widespread across the ASEAN region, contributing to underemployment among skilled workers, reduced productivity, and high employee turnover.

This study aims to enhance workforce adaptability by developing a structured framework for digital literacy through the following objectives: (1) To formulate a comprehensive digital literacy skill set that reflects the key capabilities required in both the education and workforce sectors in the context of accelerating digital transformation. (2) To develop competency standards based on the identified digital literacy skill set, which will serve as a reference for curriculum development, training implementation, and competency-based certification schemes aligned with labor market demands. And (3) To provide recommendations for integrating such skill set into academic frameworks and vocational education and training.

RESEARCH METHOD

The study employed the Research and Development (R&D) methodology as outlined by Gall et al. (2015), incorporating the Integrated Interface Model developed by Surono et al. (2020), which serves as a blueprint for aligning occupational functions with educational programs. The research process was carried out through several structured phases. In the Preliminary Research phase, the team analyzed industry demands for digital literacy and identified relevant job classifications based on KBJI/ISCO standards. During the Development Phase, digital literacy skill sets were drafted, and competency standards were designed using the Surono Integrated Interface Model. The Validation Phase

involved expert evaluation through Focus Group Discussions (FGDs), followed by necessary revisions and refinements. Subsequently, an Implementation Trial was conducted to pilot test the developed curriculum package. Finally, in the Finalization phase, competency certification schemes were formulated, and the research findings were formally published.

RESULT AND DISCUSSION

This research successfully formulated a digital literacy skill set and its corresponding competency standard through a structured research and development (R&D) approach. The process was further validated using the Regional Model Competency Standard (RMCS) validation system, followed by a focus group discussion (FGD) involving standard development practitioners and academic researchers from higher education institutions. These steps ensured the relevance, accuracy, and applicability of the developed standards to meet industry and educational needs.

Digital Literacy Skill Set

The research successfully identified and structured a Digital Literacy Skill Set that aligns with both workplace demands and educational objectives, as presented in Table 1. This skill set forms a foundational framework for enhancing workforce adaptability in an increasingly digital work environment. It encompasses not only technical competencies but also a spectrum of managerial and cultural skills reflective of 21st-century employability, such as communication, digital collaboration, problem solving, and ethical data usage. Rikala et al., (2024) underscores the importance of skills like critical thinking, problem solving, and digital literacy in addressing the challenges of modern industry. Stephany & Teutloff, (2024) highlights the persistent gap between the skills taught in universities and those required in the labor market. Babashahi et al., (2024) emphasizes the need for technical proficiency and adaptability to successfully adopt artificial intelligence across various industrial sectors. Additionally, Zamiri & Esmaeili, (2024) points to the vital role of learning communities in skill development, advocating for collaborative strategies and effective methods that foster learner growth and success. These insights reinforce the significance of collaborative learning approaches and the development of interpersonal skills in preparing a future-ready workforce.

Anchored in the Integrated Interface Model, the skill set framework connects the learner's instructional goals, workplace contexts, and job responsibilities with clearly defined core and elective competencies. The core competencies include the ability to operate digital tools, evaluate online information, conduct professional digital communication, and implement basic cybersecurity practices. Meanwhile, elective competencies accommodate more specialized needs such as managing e-commerce platforms, content creation, collaborative project execution, and personal branding through social media. This approach is supported by the Stronati, (2023), which emphasizes that digital literacy is not only about technical tool use but also about critical thinking, digital communication, and ethical participation in digital environments. The formulation of this skill set directly addresses the digital skills gap identified in UNESCO, (2021), which revealed that less than 40% of global adults demonstrate basic digital

competencies, and over 50 million Indonesian workers require digital upskilling to stay competitive.

The comprehensiveness of the skill set, ranging from technical to ethical dimensions, enables its application across diverse workplace settings, including digital MSMEs, education, startups, and public institutions, thereby fulfilling the research objective of bridging the education and industry gap through structured competency standards.

Table 1. Skill Set: Digital Literacy

Component	Description
Occupation / Cluster Title	**Digital literacy**
Instructional Goals (ABCD)	Learners (A) will be able to apply digital literacy skills (B) in a dynamic digital work environment (C) with at least 80% success rate (D).
Definition / Scope of Learning	The ability to effectively, ethically, and critically use digital technologies, including accessing, evaluating, managing, and creating digital content.
Workplace Context	Digital-based work environments in service sectors, education, digital MSMEs, startups, and public institutions utilizing ICT systems.
Managerial & Cultural Competencies (Employability Skills)	• **Communication:** Conveying digital information effectively and ethically • **Teamwork:** Collaborating in online and tech-enabled environments • **Problem Solving:** Solving problems using digital information and tools • **Planning & Organizing:** Strategizing technology use for operational efficiency • **Initiative & Entrepreneurship:** Creating innovative digital solutions • **Self-Management:** Taking responsibility for personal data and digital tools • **Technology:** Proficient use of basic software and web/cloud-based applications • **Learning:** Adapting to evolving digital technologies and platforms • **Citizen Skills:** Practicing digital ethics, privacy, and cybersecurity
Job Role Responsibility	Ensure effective and secure technology use; manage data; support digital transformation within organizations

Component	Description
Entry Behavior Line	Basic computer and internet usage; comprehension of digital instructions; basic portfolio of digital tool usage
Technical Competencies	Core Competencies: 1. Operate hardware and software efficiently to support digital tasks in the workplace. 2. Access and critically evaluate digital information for accuracy and relevance. 3. Conduct ethical and professional online communication through digital platforms 4. Apply basic cybersecurity principles to protect personal and organizational data. Elective Competencies: 1. Design simple digital content such as images, videos, or presentations using creative tools. 2. Apply digital literacy skills to manage e-commerce activities effectively. 3. Collaborate in online projects using digital work tools and platforms. 4. Optimize social media use for building professional identity and expanding professional networks.

Competency Standards

Building upon the structured skill set framework, this study successfully developed eight competency units that define the essential abilities required to apply digital literacy in the workplace. These units (Tables 2-9) represent a comprehensive mapping of knowledge, skills, and attitudes needed to support workforce adaptability in the digital era. The competencies were formulated using the Integrated Interface Model and validated through the RMCS system and stakeholder FGDs to ensure relevance across educational and occupational contexts (Surono et al., 2020).

Each unit of competency is structured with clearly defined elements**,** performance criteria**,** and contextual variables, enabling practical application in instructional design, assessment, and certification schemes. The core competencies include:

1) Operate Hardware and Software Efficiently to Support Digital Tasks - Focusing on digital tool operation and maintenance for effective job performance.
2) Access and Critically Evaluate Digital Information - Emphasizing digital information literacy, source credibility, and relevance.
3) Conduct Ethical and Professional Online Communication - Promoting responsible, secure, and effective digital communication.
4) Apply Basic Cybersecurity Principles - Ensuring personal and organizational data protection through fundamental digital security practices.

The elective competencies support domain-specific or advanced applications, including:

1) Design Simple Digital Content - Using creative tools to produce presentations, images, or videos.
2) Manage E-Commerce Activities - Applying digital platforms for online business transactions and analytics.
3) Collaborate in Online Projects - Utilizing digital tools for teamwork, task distribution, and progress tracking.
4) Optimize Social Media for Professional Identity - Enhancing employability and networking through strategic digital branding.

These competency units align with international efforts to standardize digital capabilities, such as the European DigComp Framework which highlights proficiency in information and data literacy, digital communication, content creation, safety, and problem solving (Commission, 2021). Furthermore, the World Economic Forum emphasizes that adaptability in digital contexts requires a shift toward modular, competency-based learning pathways to address job market disruptions and evolving digital roles (WEF, 2025). The competency units designed in this study not only respond to the global call for digital skills development but also support ASEAN's Mutual Recognition Arrangements (MRAs) on skills mobility and qualification transparency, thereby increasing the portability of competencies across industries and countries (ASEAN, 2018).

In summary, the competency standards developed in this research provide an actionable framework for integrating digital literacy into vocational training, higher education, and industry-based upskilling programs, reinforcing the alignment between instructional design and labor market needs.

Table 2. Unit cometency of Operate Hardware and Software Efficiently to Support Digital Tasks in the Workplace

UNIT TITLE: OPERATE HARDWARE AND SOFTWARE EFFICIENTLY TO SUPPORT DIGITAL TASKS IN THE WORKPLACE		
DESCRIPTION: THIS UNIT DESCRIBES THE COMPETENCIES REQUIRED TO OPERATE COMMONLY USED HARDWARE AND SOFTWARE EFFICIENTLY IN ACCORDANCE WITH WORKPLACE DIGITAL TASK REQUIREMENTS. IT INCLUDES CONFIGURING AND MAINTAINING DIGITAL TOOLS, EXECUTING OPERATIONAL FUNCTIONS, AND ENSURING OPTIMAL WORKING CONDITION OF EQUIPMENT.		
ELEMENTS, PERFORMANCE CRITERIA, AND CONTEXT OF VARIABLE		
Elements	Performance Criteria	Context Of Variable
1. Prepare digital tools for operational use	1.1. Hardware and software specifications are identified based on digital task requirements	These may include: memory, software compatibility, task types

		1.2. Devices and programs are configured according to user and task preferences	These may include: Language settings, accessibility options, display settings
2.	Operate hardware and software to perform work tasks	2.1. Applications and equipment are operated based on standard procedures and user manuals	These may include: Word processors, spreadsheets, printers, office tools
		2.2. Operational problems are identified and addressed using basic troubleshooting methods	These may include: Error messages, frozen screens, connection problems
3.	Maintain and update digital tools	3.1. Routine maintenance is conducted according to usage schedules and manuals	These may include: Disk cleanup, antivirus scan, cable checking
		3.2. Software updates and hardware checks are performed to ensure optimal performance	These may include: System updates, firmware installations, driver updates

Range Of Variable		
1	Context of Variable (Generic)	Tasks performed in office, remote, or hybrid work environments
2	Equipment and Supplies	PCs, laptops, monitors, printers, scanners, projectors, licensed software
3	Required Rules	IT security policies, acceptable use policies, organizational tech guidelines
4	Norms and Standards	ISO/IEC 27001, usability and safety standards, internal IT procedures

Assessment Guide		
1	Assessment Context	Assessment takes place in a real or simulated work environment with access to digital tools.
2	Competency Requirements	The individual must demonstrate the ability to efficiently operate and maintain digital tools according to task requirements.
3	Required Knowledge and Skills	Hardware/software functionality, troubleshooting techniques, setup and maintenance procedures.
4	Required Work Attitude	Diligence, accuracy, problem-solving orientation, responsibility for equipment.
5	Critical Aspects	Correct setup, operation, and maintenance of tools, safe handling, and response to issues.

Table 3. Competency Unit Of Access And Critically Evaluate Digital Information For Accuracy And Relevance

UNIT TITLE: ACCESS AND CRITICALLY EVALUATE DIGITAL INFORMATION FOR ACCURACY AND RELEVANCE		
DESCRIPTION: THIS UNIT DESCRIBES THE COMPETENCIES REQUIRED TO ACCESS, ANALYZE, AND CRITICALLY EVALUATE DIGITAL INFORMATION FROM A VARIETY OF ONLINE SOURCES TO DETERMINE ITS ACCURACY, CREDIBILITY, AND RELEVANCE IN RELATION TO WORKPLACE OR ACADEMIC TASKS.		
ELEMENTS, PERFORMANCE CRITERIA, AND CONTEXT OF VARIABLE		
Elements	Performance Criteria	Context Of Variable
1. Identify and access reliable digital sources	1.1. Search strategies are applied to locate relevant digital information efficiently	These may include: Keywords, Boolean operators, search filters
	1.2. Trusted sources and platforms are selected for information gathering	These may include: Government sites, academic journals, professional databases
2. Evaluate the credibility and accuracy of digital content	2.1. Source credibility is assessed using established criteria	These may include: Author credentials, publication date, affiliation
	2.2. Factual accuracy is verified using cross-checking methods	These may include: Comparing sources, citations, fact-checking tools
3. Assess the relevance of information to specific needs	3.1. Content is reviewed to ensure alignment with task or research objectives	These may include: Topic relevance, audience suitability, context match
	3.2. Non-relevant or misleading content is filtered and discarded	These may include: Bias detection, off-topic indicators, misinformation signs
Range Of Variable		
1 Context of Variable (Generic)	Digital information use in educational, business, or professional settings	
2 Equipment and Supplies	Computer, smartphone, internet, search engines, databases, citation tools	
3 Required Rules	Information usage policies, intellectual property rights, academic honesty	
4 Norms and Standards	APA/MLA referencing standards, information literacy frameworks, open access policies	
Assessment Guide		
1 Assessment Context	Assessment is conducted through case studies or real tasks requiring digital research and evaluation.	

2	Competency Requirements	Ability to effectively locate, analyze, and evaluate digital content for credibility and relevance.
3	Required Knowledge and Skills	Online research methods, source evaluation criteria, relevance assessment, content analysis.
4	Required Work Attitude	Objectivity, critical thinking, curiosity, attention to detail.
5	Critical Aspects	Use of accurate information, credible sources, proper evaluation process, task-relevant selection.

Table 4. Competency Unit of Conduct Ethical and Professional Online Communication through Digital Platforms

UNIT TITLE: CONDUCT ETHICAL AND PROFESSIONAL ONLINE COMMUNICATION THROUGH DIGITAL PLATFORMS		
DESCRIPTION: THIS UNIT DESCRIBES THE COMPETENCIES REQUIRED TO COMMUNICATE ETHICALLY AND PROFESSIONALLY USING VARIOUS DIGITAL PLATFORMS. IT INCLUDES ADHERING TO COMMUNICATION PROTOCOLS, DEMONSTRATING RESPECTFUL INTERACTION, PROTECTING PRIVACY, AND APPLYING APPROPRIATE DIGITAL ETIQUETTE IN WORKPLACE OR ACADEMIC SETTINGS.		
ELEMENTS, PERFORMANCE CRITERIA, AND CONTEXT OF VARIABLE		
Elements	Performance Criteria	Context Of Variable
1. Prepare for online communication	1.1. Communication tools are selected based on task needs and audience	These may include: Video conferencing platforms, messaging apps, emails, intended recipient profile
	1.2. Communication objectives are identified prior to interaction	These may include: Task type (informative, persuasive), communication context (internal/external), documentation needs
2. Apply professional digital communication practices	2.1. Messages are composed using clear, concise, and professional language	These may include: Message length, content sensitivity, writing tools (email, chats, documents)
	2.2. Communication follows appropriate tone, structure, and digital etiquette	These may include: Tone matching (formal/informal), use of greetings and closings, clarity of subject lines
3. Maintain ethical standards in digital communication	3.1. Privacy, confidentiality, and data protection principles are upheld	These may include: Use of encryption, non-disclosure contexts, personal data regulations
	3.2. Discriminatory or offensive content is avoided and addressed according to guidelines	These may include: Workplace code of conduct, zero-tolerance policies, inclusive communication principles

4.	Evaluate communication effectiveness	4.1. Feedback is gathered and used to improve future communication	These may include: Surveys, direct responses, meeting summaries
		4.2. Communication outcomes are reviewed against intended objectives	These may include: Task completion reports, communication logs, client responses
Range Of Variable			
1	Context of Variable (Generic)	Online professional or academic environments, remote teams, virtual meetings	
2	Equipment and Supplies	Computers, smartphones, video conferencing tools, messaging applications	
3	Required Rules	Company communication policy, privacy laws, code of ethics	
4	Norms and Standards	Netiquette principles, ISO/IEC 27001 (information security), GDPR compliance	
ASSESSMENT GUIDE			
1	Assessment Context	Conducted in real or simulated digital communication settings using workplace or academic scenarios.	
2	Competency Requirements	Demonstrate ethical, clear, and professional communication aligned with task and audience.	
3	Required Knowledge and Skills	Knowledge of digital tools, online communication principles, ethical frameworks, and feedback interpretation.	
4	Required Work Attitude	Respectfulness, integrity, attentiveness, accountability.	
5	Critical Aspects	Appropriate use of tone, clarity, ethical handling of information, achievement of communication purpose.	

Table 5. Competency Unit of Apply Basic Cybersecurity Principles to Protect Personal and Organizational Data

UNIT TITLE: APPLY BASIC CYBERSECURITY PRINCIPLES TO PROTECT PERSONAL AND ORGANIZATIONAL DATA			
DESCRIPTION: THIS UNIT DESCRIBES THE COMPETENCIES REQUIRED TO APPLY FUNDAMENTAL CYBERSECURITY PRACTICES TO SAFEGUARD PERSONAL AND ORGANIZATIONAL DATA. IT INCLUDES IDENTIFYING CYBER THREATS, USING SECURE ACCESS PROTOCOLS, HANDLING SENSITIVE DATA APPROPRIATELY, AND REPORTING SECURITY INCIDENTS.			
ELEMENTS, PERFORMANCE CRITERIA, AND CONTEXT OF VARIABLE			
Elements		Performance Criteria	Context Of Variable
1.	Recognize cybersecurity threats and vulnerabilities	1.1. Common cyber threats are identified from workplace or personal digital activity	These may include: Phishing, malware, social engineering examples; emails, links, devices

		1.2. Vulnerabilities in devices or systems are recognized and reported	These may include: Unpatched software, weak passwords, outdated systems
2.	Apply secure access practices	2.1. Strong passwords and authentication methods are used according to policy	These may include: Password managers, two-factor authentication, credential rules
		2.2. Devices and systems are logged out or locked when not in use	These may include: Workstation security, screen timeout settings, physical device access
3.	Handle sensitive data appropriately	3.1. Data is accessed, shared, and stored in accordance with privacy and protection protocols	These may include: Cloud storage, file encryption, organizational data handling rules
		3.2. Unauthorized disclosure or use of information is avoided and prevented	These may include: Access rights, data classification, confidentiality principles
4.	Respond to cybersecurity incidents	4.1. Suspicious activities or breaches are reported promptly via proper channels	These may include: Helpdesk systems, IT security contact, incident reporting procedures
		4.2. Basic containment actions are taken following incident response guidelines	These may include: Disconnecting compromised device, notifying IT, temporary restrictions
Range Of Variable			
1	Context of Variable (Generic)	Workplace and personal digital environments with internet access	
2	Equipment and Supplies	Computers, smartphones, passwords, security apps, antivirus tools	
3	Required Rules	Cybersecurity policies, data privacy laws, acceptable use policies	
4	Norms and Standards	ISO/IEC 27001, GDPR, NIST cybersecurity framework (basic concepts)	
ASSESSMENT GUIDE			
1	Assessment Context	Conducted in simulated or real scenarios involving digital data protection tasks.	
2	Competency Requirements	Ability to identify, respond to, and prevent common cybersecurity threats while following basic security practices.	

3	Required Knowledge and Skills	Understanding of threats, secure password management, data handling protocols, reporting procedures.
4	Required Work Attitude	Alertness, accountability, caution, ethical awareness.
5	Critical Aspects	Accurate identification of risks, secure handling of data, effective incident response, adherence to policies.

Table 6. Competency Unit of Design Simple Digital Content such as Images, Videos, or Presentations Using Creative Tools

UNIT TITLE: DESIGN SIMPLE DIGITAL CONTENT SUCH AS IMAGES, VIDEOS, OR PRESENTATIONS USING CREATIVE TOOLS		
DESCRIPTION: THIS UNIT DESCRIBES THE COMPETENCIES REQUIRED TO DESIGN SIMPLE DIGITAL CONTENT SUCH AS IMAGES, VIDEOS, AND PRESENTATIONS USING DIGITAL CREATIVE TOOLS. IT INCLUDES PLANNING CONTENT, USING EDITING SOFTWARE, AND PRODUCING MATERIALS SUITABLE FOR COMMUNICATION OR PROMOTIONAL PURPOSES.		
ELEMENTS, PERFORMANCE CRITERIA, AND CONTEXT OF VARIABLE		
Elements	Performance Criteria	Context Of Variable
1. Plan the digital content to be created	1.1. Objectives and audience of the content are identified	These may include: Target user demographics, communication goals, branding context
	1.2. Content type and format are selected based on purpose and platform	These may include: Poster, video, slideshow; for social media, presentations, or reports
2. Use digital tools to create content	2.1. Appropriate software or application is selected and configured	These may include: Canva, PowerPoint, CapCut, Photoshop; template settings
	2.2. Design elements are created or edited to fit the content requirements	These may include: Text, images, icons, transitions, effects
3. Review and finalize the content	3.1. Content is checked for visual clarity, consistency, and appropriateness	These may include: Typography, layout, branding elements, cultural sensitivity
	3.2. Final output is exported and saved in the required format	These may include: JPEG, MP4, PPT; resolution settings, file naming
Range Of Variable		
1 Context of Variable (Generic)	Professional, educational, or promotional contexts using digital tools	
2 Equipment and Supplies	Computer, smartphone, tablet, internet access, editing software, templates	

3	Required Rules	Copyright laws, usage rights for digital assets, organizational design standards
4	Norms and Standards	Visual communication standards, brand guidelines, accessibility considerations
ASSESSMENT GUIDE		
1	Assessment Context	Assessment is conducted in a simulated or actual setting where digital content is produced using creative tools.
2	Competency Requirements	The individual must demonstrate the ability to design, review, and produce simple digital content using appropriate tools.
3	Required Knowledge and Skills	Basic graphic and video design principles, software operation, planning and communication skills.
4	Required Work Attitude	Creativity, attention to detail, responsiveness to feedback, responsibility for output quality.
5	Critical Aspects	Appropriate tool usage, clarity of message, quality of design, suitability to audience and purpose.

Table 7. Competency Unit of Apply Digital Literacy Skills to Manage E-Commerce Activities Effectively.

UNIT TITLE: APPLY DIGITAL LITERACY SKILLS TO MANAGE E-COMMERCE ACTIVITIES EFFECTIVELY		
DESCRIPTION: THIS UNIT DESCRIBES THE COMPETENCIES REQUIRED TO APPLY DIGITAL LITERACY SKILLS IN MANAGING E-COMMERCE ACTIVITIES. IT INCLUDES SELECTING PLATFORMS, MANAGING PRODUCT LISTINGS, PROCESSING PAYMENTS, COMMUNICATING WITH CUSTOMERS, AND ANALYZING PERFORMANCE USING DIGITAL TOOLS.		
ELEMENTS, PERFORMANCE CRITERIA, AND CONTEXT OF VARIABLE		
Elements	Performance Criteria	Context Of Variable
1. Select and configure an e-commerce platform	1.1. Appropriate platform is selected based on business type and customer reach	These may include: Shopee, Tokopedia, Lazada, Shopify, Instagram Shop
	1.2. Seller account and store profile are configured accurately	These may include: Business name, logo, payment methods, shipping settings
2. Manage product listings and inventory	2.1. Product information is inputted accurately and updated regularly	These may include: Product name, images, descriptions, pricing, stock levels
	2.2. Inventory is tracked and restocked using digital tools	These may include: Inventory management software, low stock alerts
3. Process transactions and communicate with customers	3.1. Payments are processed securely	These may include: QRIS, e-wallets, bank transfers, payment gateways

		using approved digital channels	
		3.2. Customer inquiries and feedback are responded to professionally and promptly	These may include: Live chat, message center, auto-responders
4.	Monitor and improve e-commerce performance	4.1. Sales reports and analytics tools are used to review performance trends	These may include: Sales dashboards, platform analytics, customer behavior data
		4.2. Adjustments are made to listings or strategies based on performance data	These may include: Promotional changes, price adjustments, product bundling
Range Of Variable			
1	Context of Variable (Generic)	E-commerce activities for small businesses, online stores, freelancers	
2	Equipment and Supplies	Mobile phone, laptop, internet connection, e-commerce platform access, digital payment tools	
3	Required Rules	Consumer protection laws, e-commerce platform rules, digital payment regulations	
4	Norms and Standards	Best practices in online selling, customer service standards, digital security protocols	
Assessment Guide			
1	Assessment Context	Assessment is conducted through simulation or real-time management of an e-commerce platform.	
2	Competency Requirements	The individual must demonstrate the ability to set up, manage, and optimize e-commerce activities using digital tools.	
3	Required Knowledge and Skills	Platform setup, inventory and transaction management, digital communication, performance analysis.	
4	Required Work Attitude	Responsiveness, professionalism, attention to detail, customer orientation.	
5	Critical Aspects	Correct setup of platforms, secure transaction handling, customer communication, performance monitoring.	

Table 8. COMPETENCY UNIT – Collaborate in Online Projects Using Digital Work Tools and Platforms

UNIT TITLE: COLLABORATE IN ONLINE PROJECTS USING DIGITAL WORK TOOLS AND PLATFORMS		
DESCRIPTION: THIS UNIT DESCRIBES THE COMPETENCIES REQUIRED TO COLLABORATE EFFECTIVELY IN ONLINE PROJECTS USING DIGITAL TOOLS AND PLATFORMS. IT INCLUDES SETTING UP VIRTUAL COLLABORATION ENVIRONMENTS, SHARING RESPONSIBILITIES, COMMUNICATING REGULARLY, AND TRACKING PROJECT PROGRESS THROUGH DIGITAL MEANS.		
ELEMENTS, PERFORMANCE CRITERIA, AND CONTEXT OF VARIABLE		
Elements	Performance Criteria	Context Of Variable
1. Set up and use digital collaboration tools	1.1. Suitable platforms are selected based on team needs and project goals	These may include: Google Workspace, Microsoft Teams, Trello, Notion, Asana
	1.2. Team members are added and access permissions are configured appropriately	These may include: Project roles, shared folders, admin settings
2. Share roles and responsibilities in an online team	2.1. Roles and tasks are assigned based on team strengths and objectives	These may include: Task board tools, role descriptions, project plans
	2.2. Team agreements and workflows are documented and shared digitally	These may include: Collaboration guidelines, SOPs, shared docs
3. Communicate effectively throughout the project	3.1. Regular updates are posted using agreed channels and schedules	These may include: Group chat, message boards, email summaries
	3.2. Feedback and inputs are integrated respectfully into shared work	These may include: Comment threads, file revisions, decision logs
4. Monitor and report project progress	4.1. Progress is tracked using project management tools	These may include: Gantt charts, kanban boards, checklists
	4.2. Final outputs are reviewed and submitted according to digital project plans	These may include: Milestone folders, version control, deadline schedules
Range Of Variable		
1 Context of Variable (Generic)	Remote or hybrid teams working on collaborative digital tasks	

2	Equipment and Supplies	Laptop, internet, communication apps, cloud storage, collaboration platforms
3	Required Rules	Digital collaboration policies, netiquette, data security rules
4	Norms and Standards	Project management standards, ISO 21500, agile methodologies
Assessment Guide		
1	Assessment Context	Assessment conducted in a virtual collaboration environment during an online project.
2	Competency Requirements	Ability to work collaboratively using digital platforms, communicate effectively, and contribute to achieving team goals.
3	Required Knowledge and Skills	Understanding of collaborative tools, communication strategies, project coordination techniques.
4	Required Work Attitude	Cooperation, accountability, openness to feedback, respect for diversity.
5	Critical Aspects	Effective tool use, timely communication, shared responsibility, delivery of project outcomes.

Table 9. Competency Unit – Optimize Social Media Use For Building Professional Identity And Expanding Professional Networks

UNIT TITLE: Optimize Social Media Use For Building Professional Identity And Expanding Professional Networks

DESCRIPTION: THIS UNIT DESCRIBES THE COMPETENCIES REQUIRED TO USE SOCIAL MEDIA EFFECTIVELY TO DEVELOP A PROFESSIONAL IDENTITY AND GROW PROFESSIONAL NETWORKS. IT INCLUDES CURATING A PERSONAL BRAND, ENGAGING IN RELEVANT PROFESSIONAL DISCUSSIONS, FOLLOWING ETHICAL PRACTICES, AND LEVERAGING PLATFORMS FOR CAREER GROWTH.

ELEMENTS, PERFORMANCE CRITERIA, AND CONTEXT OF VARIABLE

Elements	Performance Criteria	Context Of Variable
1. Create and maintain a professional social media presence	1.1. Profiles are created or updated to reflect professional qualifications and interests	These may include: LinkedIn, Instagram bio, Facebook About, portfolio links
	1.2. Content shared aligns with professional goals and audience expectations	These may include: Industry articles, achievements, personal projects, educational material
2. Build and manage professional networks online	2.1. Relevant individuals and groups are followed or connected with	These may include: Industry leaders, alumni, professional groups, topic-based communities

		2.2. Online interactions are initiated and maintained respectfully	These may include: Commenting, direct messaging, endorsing, tagging
3.	Engage in professional discussions and communities	3.1. Contributions to forums or discussions are relevant, constructive, and respectful	These may include: LinkedIn posts, discussion boards, webinars, group chats
		3.2. Expertise is shared through informative and value-adding content	These may include: Tips, blogs, short videos, infographics, threads
4.	Follow ethical and responsible social media practices	4.1. Content shared respects privacy, copyright, and organizational policies	These may include: Attribution of sources, use of consented media, content disclaimers
		4.2. Digital footprint is monitored and managed for professionalism	These may include: Old posts review, security settings, keyword alerts
Range Of Variable			
1	Context of Variable (Generic)	Personal or professional online environments intended for career development	
2	Equipment and Supplies	Smartphone, PC, internet connection, social media apps, content creation tools	
3	Required Rules	Platform guidelines, digital ethics, community standards	
4	Norms and Standards	Professional communication norms, branding best practices, GDPR and copyright principles	
Assessment Guide			
1	Assessment Context	Evaluation is conducted based on digital presence, network engagement, and ethical media use on professional platforms.	
2	Competency Requirements	Demonstrate ability to represent a professional persona online, expand relevant networks, and use social media responsibly.	
3	Required Knowledge and Skills	Profile building, audience engagement, digital etiquette, personal branding strategies.	
4	Required Work Attitude	Consistency, integrity, openness to connection, proactive sharing of value-based content.	
5	Critical Aspects	Content relevance, network expansion, ethical practice, profile coherence with goals.	

Recommendations for Integrating Digital Literacy Skill Set into academic frameworks and vocational education and training.

The integration of a structured digital literacy skill set into formal education and vocational training is essential for closing the persistent gap between educational outcomes and labor market demands. As presented in Table 10, this study offers four strategic recommendation areas supported by practical implementation considerations.

First, curriculum development should embed digital literacy either as dedicated modules or integrated across various academic disciplines. This ensures coherence with expected learning outcomes and supports interdisciplinary applications. This is aligned with the recommendation from the OECD, which encourages digital competence frameworks to be part of core educational content across all levels (OECD, 2025).

Second, vocational training programs should incorporate the eight developed competency units into their learning systems using task-based and project-based learning strategies. These approaches align with UNESCO that emphasis on Competency-Based Education and Training (CBET) as a solution to real-world skills mismatches (UNESCO-UNEVOC, 2024).

Third, to ensure lifelong learning and stackable credential opportunities, institutions are encouraged to develop micro-credentials and digital badges aligned with the competency units. This supports the World Economic Forum's call for modular learning pathways that allow learners to reskill flexibly throughout their careers (WEF, 2023).

Lastly, the successful institutionalization of these standards depends on stakeholder engagement and policy alignment. Collaborative efforts involving industry representatives, educational institutions, and government agencies are crucial to validate and continuously improve these standards. This aligns with ASEAN's MRA-TP framework, which emphasizes stakeholder coordination for cross-border qualification recognition (ASEAN, 2018).

Together, these recommendations offer a roadmap to mainstream digital literacy not as a peripheral competency, but as a central pillar in preparing a resilient and adaptable workforce for the digital economy.

Table 10. Recommendations for integrating digital literacy skill set into academic frameworks and vocational education and training

Recommendation Area	Strategic Recommendation	Implementation Considerations
1. Curriculum Development	Incorporate the digital literacy skill set into academic curricula as standalone modules or integrated across disciplines, ensuring alignment with learning outcomes.	Review accreditation requirements and align with national qualifications framework (e.g., KKNI, SN-Dikti).
2. Vocational Training Integration	Embed the competency units into vocational education training programs using task-	Ensure trainer capacity-building and availability of digital infrastructure to

		based learning and project-based assessment formats.	support blended learning environments.
3.	Micro-Credentialing and Certification	Develop micro-credentials and digital badges to recognize learner progress and support stackable qualifications.	Utilize digital platforms to deliver, assess, and issue credentials; ensure interoperability with national certification systems.
4.	Stakeholder Engagement and Policy Alignment	Engage industry partners, education institutions, and policy makers in ongoing validation and updates of the competency standards through formal forums or advisory councils.	Facilitate joint working groups to bridge policy, curriculum, and workforce priorities; include feedback loops from employers.

CONCLUSION

This research effectively addresses the urgent need for structured digital literacy by developing a comprehensive skill set and competency standards designed to enhance workforce adaptability in the digital age. Utilizing the Surono Integrated Interface Model, the study combines occupational roles, instructional design, and industry requirements to create a framework that is both pedagogically robust and practically applicable. The digital literacy competencies, covering core and elective areas such as technical skills, critical information analysis, cybersecurity, digital communication, and content creation, are essential for current job demands and support lifelong learning amid accelerating labor market changes. The eight validated competency units offer concrete guidance for curriculum development, instructional practices, assessment, and certification, structured to enable modular, competency-based learning aligned with international standards like DigComp, UNESCO CBET, and ASEAN MRA-TP. By integrating these structured digital literacy competencies into education and vocational training, the research not only enhances employability but also prepares learners for future workforce disruptions. Future research could explore the longitudinal impact of implementing this competency framework across diverse sectors and regions, as well as the role of emerging technologies in continuously updating digital literacy standards to sustain workforce relevance and resilience.

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