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Digital Competence and Perceived Work Readiness: Exploratory Evidence from Selected Indonesian Vocational Hospitality Participants

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Abstract

Digital transformation is changing the competencies expected of hospitality graduates, requiring them not only to encounter industry technologies but also to use digital information, communicate through digital platforms, adapt to unfamiliar systems, and perform technology-supported tasks. This study explored the relationships among technology exposure, digital learning integration, digital competence, simulation-based learning, institutional support, perceived barriers, and perceived work readiness among participants from Indonesian vocational hospitality-related programmes. A quantitative-dominant exploratory mixed-methods design with an embedded qualitative component was employed. Quantitative survey data were obtained from 26 purposively selected participants and analysed using descriptive statistics, preliminary internal-consistency diagnostics, Spearman's rank-order correlations, bootstrap confidence intervals, and sensitivity analysis. Qualitative data from four open-ended survey questions were analysed using content analysis to contextualise the quantitative patterns. Participants reported relatively high levels of perceived work readiness, digital competence, digital learning integration, simulation-based learning, and institutional support, alongside more uneven exposure to hospitality technologies. Participants reported greater exposure to digital payment systems, online booking platforms, guest-messaging applications, and property-management systems, while exposure to business-intelligence dashboards, channel-management systems, smart-room technologies, and service robots was more limited. Digital competence, institutional support, simulation-based learning, and digital learning integration showed comparatively larger positive associations with perceived work readiness, whereas technology exposure and perceived barriers showed smaller and less precisely estimated associations. Within digital competence, digital ethics received the highest ratings, while data literacy was comparatively weaker. Open-ended responses emphasised the need for more authentic technology practice, improved access to industry-relevant systems, stronger instructor guidance, and closer alignment between educational technology use and workplace practice. Given the small purposive sample, institutional concentration, cross-sectional design, and reliance on self-report measures, these findings should be interpreted as preliminary and should not be generalised to Indonesian hospitality students more broadly. The study provides an exploratory basis for distinguishing technology exposure, self-reported digital competence, and perceived work readiness as related but conceptually distinct aspects of digital preparation in vocational hospitality education.

KEYWORDS

digital competence; perceived work readiness; hospitality education; digital transformation; simulation-based learning; institutional support.

Introduction

Digital transformation has altered the way hospitality organisations run daily operations, interact with customers, earn revenues and make service decisions.

Digital transformation has altered the way hospitality organisations run daily operations, interact with customers, earn revenues and make service decisions. Hotel employees are now expected to be working with property management systems, online booking platforms, point-of-sale applications, digital payment systems, customer databases, revenue management tools and technology-based communication channels. At the same time, AI, smart-room technologies, service automation and data analytics are being increasingly implemented within hospitality operations. Such changes are more than adding new tools to the work. They are changing jobs, service processes and how employees interpret and respond to operational information. Digital transformation in hospitality, thus, involves technology, work practices, employee roles and management in addition to managerial decision-making (Cheng et al., 2023; Nikopoulou et al., 2023; Van Der Schaft et al., 2024).

These changes are also creating new challenges in hospitality education. Communication, service orientation, teamwork and adaptability are still key but graduates are now expected to mix these skills with digital and data skills. They need to communicate through digital systems, work on industry-specific systems, interpret operational information and customer data, protect customer information when new technology is introduced in the workplace. Technology competence in hospitality is a combination of technical knowledge, operational experience and flexibility to adapt to changing service environments according to Hsu and Tseng (2022). Research on hospitality labour also indicates that technological change is changing both the nature of hospitality work and the skills required for sustainable employment in the sector (Hussain et al., 2023; Seyitoğlu et al., 2026).

Digital competence is not only a matter of being familiar with technology or being in touch with online applications. It is about selecting the right technologies, dealing with technology-related problems, communicating effectively in digital environments, making sense of information, being responsible with data and learning as systems change. Digital transformation skills therefore take technical, cognitive, interpersonal and adaptive skills on board (Bouwmans et al., 2024; Goulart et al., 2022; Rêgo et al., 2024). This is very important for hospitality education since the use of general digital technology does not necessarily mean that you are competent in the work environment. Students might feel comfortable with smartphones, social media or any other type of productivity tool but not very well with hotel operation systems, integrated digital workflows, or data-driven decision making. As Carlisle et al. (2021) argue, the digital skills gap in tourism is not only access to technology but also relevance, depth and workplace application of these skills. Evidence from organisational settings similarly suggests that the availability of digital tools does not automatically produce effective work-related outcomes. The benefits of digital technologies depend partly on employees' digital literacy and on supportive organisational conditions that facilitate effective technology use (Handiman & Adam, 2024; Tonoro & Utomo, 2026)

Tourism and hospitality education is therefore a challenge that extends beyond just making more technology available in the curriculum. How technology is incorporated into teaching, practice, assessment and industry-driven learning matters. Goh and Sigala (2020) also stress that positive technology adoption in education depends on the teachers' ability to implement digital tools in everyday teaching. Bilotta et al. (2021) similarly believe tourism students in particular need to learn to think and learn with technology rather than just learn about it. From this perspective, students need to be able to work with digital systems while tackling problems, experiencing service situations and finding alternatives, and doing work that is similar to hospitality jobs.

But there is still concern about how well hospitality curricula are keeping pace with digital change. Adeyinka-Ojo et al. (2020) argue that hospitality and tourism education in an emerging digital economy needs to be more responsive to the changing industry needs that are emerging. Busulwa et al. (2024) also question whether curriculum development will be able to keep pace with new technologies that are more rapidly evolving than traditional curriculum reviews. Similar concerns were raised in the context of data analytics. Ogbeide et al. (2020) highlight the need for a more in-depth engagement with big data and its practical application in hospitality and tourism courses. These studies together suggest that being aware of digitalisation is not enough. Students may still encounter technology through demonstrations, limited software access, or theoretically based instruction and have less time to develop self-confidence in practical settings.

Practice-based learning can help in reducing this disconnect between familiarity and capability. Internships, simulation, projects, and other forms of work-integrated learning offer students a chance to benefit from experience, and not just see the technology. Park and Jones (2021) show that how internships are delivered affects hospitality students' real-life experiences. Gamage (2022) suggests the need for a multi-dimensional approach to electronic work-integrated learning, and Green and du Plessis (2023) argue that project-based learning can support learner autonomy in hospitality vocational education. Live projects can also develop confidence and knowledge in the face of different scenarios (Rohm et al., 2021). These kinds of learning are particularly relevant in hospitality where one may not have access to live operating systems and reservations, payments, guest records, or operational data can have real consequences.

The importance of these learning experiences also depends on the context in which they take place. Access to relevant software, reliable internet connections, state-of-the-art laboratory facilities, knowledgeable instructors, and industry partnerships determine if students are actually working with technology or if it is just an abstract subject. The students' involvement in digital learning is also linked to their competence, organisational conditions, and the capacity for independent learning (Scheel et al., 2022). It is not a matter of students being ready for Industry 4.0 alone. Institutional choices on curriculum investment, educator development, facilities, assessment, and collaboration with employers can have a considerable impact (Al-Maskari et al., 2022). Digital preparation is not only based on what students can do but, in turn, on the learning opportunities to be provided by the institutions. Similar implementation difficulties have also been documented in the Indonesian context, where low digital literacy, limited infrastructure, and limited experience in technology-based marketing can constrain digital transformation among rural MSMEs (Hadikin & Wiratama, 2024) . Related evidence further indicates that limited digital literacy, infrastructure, human resources, and technical support can restrict the effective use of digital systems even when users are already familiar with the idea of digitalisation (Sulistyanto et al., 2026).

This institutional element is important when digital competence is combined with work readiness. Work readiness is a generalised term which refers to the degree to which graduates have knowledge, skills, attitudes, and personal resources that they have available to enter the workplace. And employers tend to look at more than just academic knowledge. Communication, collaboration, adaptability, problem-solving, and the ability to perform work-related tasks with limited supervision are all important to graduates (Abelha et al., 2020; Hoque et al., 2023; Tushar & Sooraksa, 2023). In vocational education, students' internship experience and digital literacy have also been associated with their work readiness (Naufalin et al., 2024; Supriyanto et al., 2022).

But work readiness in the workplace also needs to be distinguished from actual work performance. A student might be ready to get into the workplace because they feel they can communicate with other people online, learn new systems, or use commonly used technologies even when their first exposure to industry-standard technologies is limited. This distinction is particularly important in hospitality education. Fraser (2020) calls for more alignment of hospitality classrooms and hotel conditions, whilst Stylianou and Pericleous (2025) highlight the importance of hospitality and tourism graduates' digital skills. Tavitiyaman et al. (2025) show that students' perceived skills are associated with career flexibility and perceived employability, and Elshaer et al. (2025) find that technological skills, e-learning readiness, and employment prospects of hospitality management graduates are related. These studies highlight the crucial distinction between having access to technology, becoming aware of the possibility to employ it, and being prepared to use it in employment.

From this perspective, three related gaps are relevant for the present study. The first one is a conceptual gap. In the past, digital skills, technology-supported learning, curriculum integration, work-integrated learning, and employability have been shown to be important, but these are not interchangeable, which has been shown to be the case in Carlisle et al. (2021) and Bouwmans et al. (2024). They differentiate meaningful digital capability from access or knowledge of technology, whereas Goh and Sigala (2020) and Bilotta et al. (2021) focus on technology involvement in learning. Working on internships, projects, and work-integrated learning has been the focus of practice-based capability development (Gamage, 2022; Green & du Plessis, 2023; Park & Jones, 2021; Rohm et al., 2021), while employability research has focused on work readiness and broader graduate capabilities (Abelha et al., 2020; Hoque et al., 2023; Tushar & Sooraksa, 2023). What is less clear is how technology exposure, structured digital learning, competence development, simulation, and institutional support relate to one another when perceived work readiness is considered as a distinct outcome. The present study is aimed at bridging this conceptual gap by distinguishing the relationship between hospitality technology exposure and students' perceived capability to use digital technologies and their perceived readiness to enter digitally mediated hospitality work.

The second is an **empirical gap**. Existing studies illuminate different parts of this process, but they usually emphasise particular dimensions. For example, Goh and Sigala (2020) examine technology integration in teaching; Ogbeide et al. (2020) focus on curriculum engagement with data and big-data capabilities; Park and Jones (2021) and Gamage (2022) consider forms of work-integrated learning; and Tavitiyaman et al. (2025) and Elshaer et al. (2025) connect perceived skills or technological readiness with employability-related outcomes. These contributions provide an important basis for the present study, but they leave room to examine how several educational conditions appear together from the students' perspective. Rather than assuming that greater technology exposure leads to greater readiness, the present study examines whether technology exposure, digital learning integration, digital competence, simulation-based learning, institutional support, and perceived barriers show different patterns of association with perceived work readiness.

The third is a **contextual gap**. Much of the discussion around digital transformation focuses on what hospitality education should provide, yet students may study in institutions with different levels of access to software, equipment, digital infrastructure, instructor expertise, simulation opportunities, internships, and industry partnerships. These differences are particularly relevant in vocational education because students are expected to connect classroom learning with occupational practice. In the Indonesian vocational hospitality context examined here, students may therefore experience quite different opportunities to work with industry software and digitally supported learning. The present study does not attempt to represent all hospitality students or institutions in Indonesia. Instead, it uses an exploratory student-centred assessment to examine how these educational conditions are experienced within the participating sample and to identify issues that may warrant investigation in larger and more representative studies.

These three gaps lead directly to the focus of the study. First, the study examines the patterns of hospitality-technology exposure and digital competence reported by participants. Second, it investigates how technology exposure, digital learning integration, digital competence, simulation-based learning, institutional support, and perceived barriers are associated with perceived work readiness. Third, it uses open-ended survey responses to examine participants' learning experiences, institutional barriers, and improvement priorities that may help contextualise the quantitative patterns. This sequence is deliberately exploratory: the study examines associations and written participant responses rather than testing causal effects or assuming that one educational condition produces another.

Accordingly, the study addresses the following research questions:

RQ1: What patterns of technology exposure and digital competence are reported by participants from Indonesian vocational hospitality-related programmes?

RQ2: How are technology exposure, digital learning integration, digital competence, simulation-based learning, institutional support, and perceived barriers associated with perceived work readiness?

RQ3: What institutional barriers, learning experiences, and improvement priorities provide context for the quantitative patterns?

The conceptual framework brings these research questions together by distinguishing three related but non-equivalent aspects of digital preparation: exposure to technology, development of digital capability, and perceived readiness for digitally mediated work. Four complementary perspectives inform this distinction: Human Capital Theory, Social Cognitive Theory, Experiential Learning Theory, and the Work-Readiness Perspective. These perspectives are used as complementary conceptual lenses rather than as components of a single causal theory.

Human Capital Theory provides a broad rationale for viewing education, training, and competence development as investments in capabilities that may increase individuals' capacity to participate effectively in employment. From this perspective, technology exposure alone represents an opportunity for contact with relevant technologies, whereas digital competence represents a capability construct encompassing participants' perceived ability to use, interpret, adapt to, and engage responsibly with digital technologies. Exposure may contribute to capability development, but the two should not be treated as equivalent.

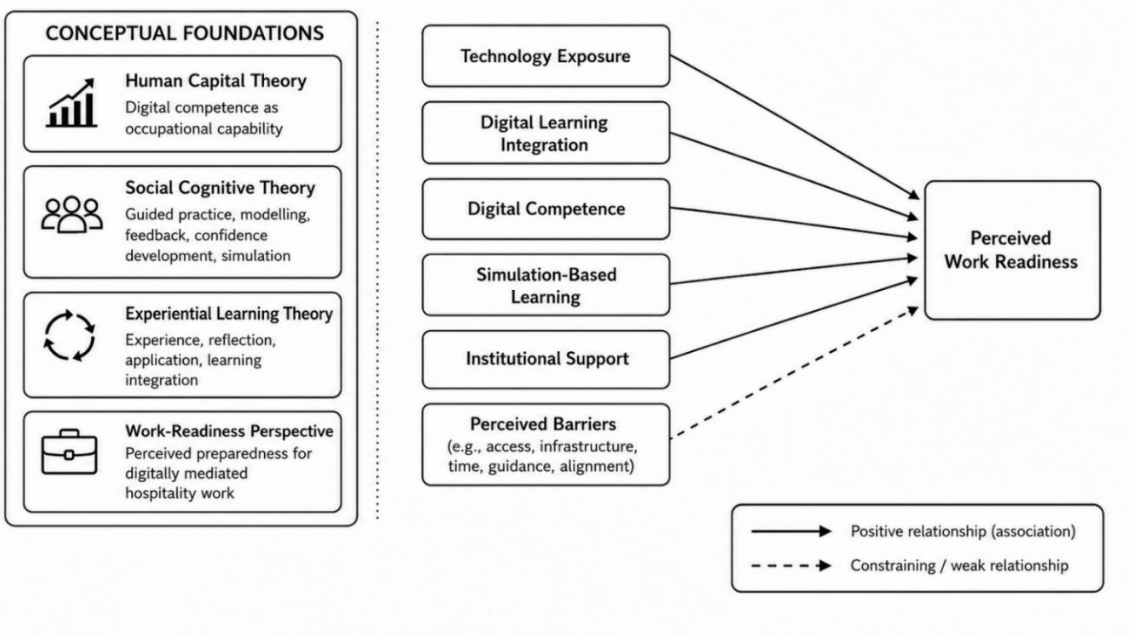
Social Cognitive Theory further explains why capability development may depend on more than simple exposure. Observation, modelling, guided practice, feedback, and the development of confidence can shape how individuals approach technology-supported tasks. In hospitality education, students may be familiar with a system without feeling capable of using it independently in an operational context. Repeated practice, feedback, and realistic learning activities may therefore contribute to the development of both perceived competence and confidence.

Experiential Learning Theory complements this perspective by emphasising learning through experience, reflection, conceptual understanding, and experimentation. Simulations, internships, technology-supported activities, projects, and other forms of practice can provide opportunities for students to connect digital knowledge with operational problems and workplace situations. From this perspective,

technology becomes educationally meaningful not merely when students encounter it, but when they use it to perform tasks, address problems, evaluate outcomes, and reflect on their experience.

The Work-Readiness Perspective provides the outcome-oriented component of the framework. In this study, perceived work readiness refers to participants' self-assessed preparedness to enter digitally mediated hospitality work, including their confidence in technology-supported tasks, willingness to learn unfamiliar systems, ability to communicate professionally through digital platforms, capacity to work with basic operational information, and perceived preparedness for digitally supported employment. Perceived work readiness is therefore distinguished from both digital competence and actual workplace performance.

Figure 1. Conceptual relationships examined between digital educational conditions and perceived work readiness.



Note. Arrows represent theoretically proposed relationships that informed construct selection; they should not be interpreted as tested causal or mediating pathways. The empirical analysis in this study examined bivariate associations between the measured constructs and perceived work readiness

These perspectives support a framework in which technology exposure represents contact with hospitality technologies; digital learning integration and simulation-based learning represent structured opportunities for capability development; institutional support represents the educational and material conditions surrounding those opportunities; digital competence represents participants' self-reported digital capability; and perceived work readiness represents their self-assessed preparedness to enter digitally mediated hospitality work. Perceived barriers capture constraints that may affect these learning experiences. The framework does not specify a causal or mediating sequence. Instead, it treats these constructs as conceptually distinct and examines their separate exploratory associations with perceived work readiness.

Figure 1 illustrates the six measured constructs for perceived work readiness in the context of the bivariate associations in our study. Digital competence is defined by digital communication, information and data literacy, problem-solving, adaptability, responsible technology use, and data security. The perceived work readiness of participants is self-reported preparedness for digitally mediated hospitality work, and perceived barriers are related to access, infrastructure, time, advice, and technology fit.

Digital competence is at the center of this framework because it is not just technical in nature, but also involves digital communication, information and data literacy, problem-solving, adaptability, responsible technology use, data security, and the learning of systems and how they are changing. Perceived work readiness is the main outcome, as the study asks whether students who report stronger competence and stronger learning support also tend to report greater readiness for digitally mediated hospitality work. We use perceived barriers as context-dependent barriers to software access, practice time, infrastructure, teacher guidance, and the relationship between campus and industry technology.

Importantly, the arrows in Fig. 1 are not causal effects, but rather are relationships to be explored. We have used cross-sectional data and exploratory correlational analysis, and this does not assess mediation or structural connections or temporal causation. So the framework should be read as a map of potentially relevant associations and not as a causal model.

The study's contribution is conceptual and contextually relevant and will have practical relevance to hospitality education. It proposes to distinguish the three concepts, which can be easily lumped together in digital preparation: hospitality technologies, learning to use digital technologies, and being able to say that you are ready for digital work. It then considers them in the context of learning integration, simulation, institutional support, and barriers within a conceptual context that is also an empirical context on a small purposive sample of students in Indonesian vocational hospitality education, where access to industry technologies and practice opportunities are not all the same. Practically, it moves our attention away from simply counting the technologies that students are taught and towards the contexts where technologies are put into practice, supported, and connected to work.

The study does not claim that this combination of constructs constitutes a new general theory of digital work readiness. Rather, it presents a model for further testing: technology exposure, self-reported digital competence, and perceived work readiness might be different aspects of digital preparation, while learning integration, simulation, and institutional support may be relevant correlates of perceived readiness. A more comprehensive study of these relationships

in larger, more diverse, and longitudinal samples would help to determine if these patterns are broader than the current exploratory study.

Methods

This study used a quantitative-dominant exploratory mixed-methods design with an embedded qualitative component to examine digital learning experiences and perceived work readiness in Indonesian vocational hospitality education. The quantitative component consisted of a cross-sectional online survey measuring technology exposure, digital learning integration, digital competence, simulation-based learning, perceived institutional barriers, institutional support, and perceived work readiness. The qualitative component consisted of four open-ended survey questions used to provide contextual illustrations of participants' experiences, barriers, and institutional improvement priorities. The qualitative analysis was limited to these written survey responses and did not seek qualitative saturation.

The study was designed as an exploratory institutional diagnosis rather than a confirmatory test of a causal model. Technology exposure was therefore distinguished from participants' perceived capability to use technology and from their perceived readiness for digitally mediated hospitality work. This distinction is consistent with research arguing that hospitality education should move beyond technology exposure and provide opportunities for authentic practice, simulation, assessment, and industry-related learning (Bilotta et al., 2021; Busulwa et al., 2024; Goh & Sigala, 2020). Given the cross-sectional design and small purposive sample, the study examined preliminary associations rather than causal effects or population-level estimates.

Participants were recruited through eligibility-based purposive sampling. Eligible respondents were individuals currently enrolled in, or who had previously participated in, vocational or higher education programmes related to hospitality, tourism, culinary studies, travel, or closely related fields in Indonesia. The sample was not intended to be nationally representative.

Data were collected online through Google Forms between 17 June and 15 July 2026. The survey was distributed online, but the exported dataset did not retain a participant-level variable identifying the specific recruitment channel through which each respondent received the survey link. The survey initially received 28 submissions. One response was excluded because the respondent did not meet the educational eligibility criterion, and one was removed during duplicate screening because its demographic profile and response pattern closely reproduced another submission. The final quantitative dataset therefore contained 26 eligible, non-duplicate responses.

The participants were not homogeneous. Twenty reported Perhotelan as their programme, four Tata Boga/Kuliner, and two Manajemen Perhotelan. Three were from Diploma I programmes, 20 from Diploma III, and three from Diploma IV/Sarjana Terapan programmes. Twenty participants had completed an internship and six had not. Sixteen participants had an affiliation with Universitas Multimedia Nusantara, while the remaining participants represented several other Indonesian institutions. Because the questionnaire did not include a separate binary item that reliably distinguished current students from graduates, this status was not used for subgroup inference.

These groups were retained in the same exploratory analysis because the study focused on digital preparation across hospitality-related vocational education rather than on programme or graduation status as explanatory variables. Nevertheless, internship experience and institutional affiliation were checked descriptively to identify any obvious subgroup differences. Formal subgroup testing was avoided because several cells were too small for stable inference.

The achieved sample of 26 was not based on an a priori power calculation and is too small for confirmatory modelling. Correlation estimates were therefore treated as provisional signals, with emphasis placed on their magnitude, direction, and confidence intervals rather than on p-values alone.

The qualitative material consisted of four open-ended survey questions. After placeholder-only entries were removed, 25 substantively usable responses remained for the questions on important technologies, learning barriers, and institutional improvements, while 17 usable responses remained for the internship-related technology question. These written responses were used only to provide contextual illustrations of the quantitative patterns; no claim of qualitative saturation or representativeness was made.

The questionnaire was administered in Indonesian and consisted of six sections. It was developed as a literature-informed, study-specific instrument, rather than adopted as a single previously validated scale. The available research records do not document a separate pre-administration expert-review, formal content-validation, translation/back-translation, or pilot-testing stage. These procedures are therefore not claimed. To improve measurement transparency, the questionnaire structure, construct domains, item numbers, and scoring procedures are reported in the Method section.

The first section collected electronic informed consent and participant characteristics. The second measured exposure to 16 hospitality-related technologies, including property management systems, point-of-sale systems, online booking platforms, channel managers, customer relationship management systems, digital payments, revenue management systems, social media tools, online reputation platforms, guest messaging applications, spreadsheets, business intelligence dashboards, virtual or augmented reality, artificial intelligence and chatbots, smart-room/Internet of Things applications, and service robots.

Technology exposure used five ordered categories: 0 = Belum pernah mendengar; 1 = Pernah mendengar, tetapi belum mempelajari; 2 = Pernah diperkenalkan; 3 = Pernah mempraktikkan; and 4 = Sering menggunakan. Because these categories are ordinal, the scores indicate increasing exposure without assuming equal distances between adjacent categories.

Digital learning integration was measured through six items addressing regular technology use, industry relevance, hands-on practice, authentic hospitality tasks, instructor guidance, and technology-based assessment (Goh & Sigala, 2020; Ogbeide et al., 2020).

Digital competence was assessed through 28 items covering operational technology use, adaptation to emerging technologies, digital communication, data literacy, and digital ethics. These domains reflected broader understandings of workplace digital competence involving technical application, communication, judgement, adaptability, data capability, and responsible technology use (Bouwmans et al., 2024; Carlisle et al., 2021; Hsu & Tseng, 2022). The measure therefore represents self-reported digital competence, not objective technology performance.

Simulation-based learning was assessed through four items. Perceived institutional barriers were measured using eight items, institutional support using six items, and perceived work readiness using seven items covering technology confidence, adaptability to unfamiliar systems, digitally supported task completion, professional digital communication, basic data use, employment opportunities, and education–workplace alignment (Elshaer et al., 2025; Naufalin et al., 2024; Potgieter et al., 2023). The latter is referred to as perceived work readiness because it captures

participants' self-assessment rather than observed workplace performance.

The agreement-scale items used a 1–5 numerical response format. No items were reverse-scored. Higher barrier scores represented stronger perceived constraints, whereas higher values on the other constructs represented stronger endorsement of the construct. Composite scores were calculated as the mean of their constituent items.

The questionnaire was administered in Indonesian and consisted of six sections. It was developed as a literature-informed, study-specific instrument rather than adopted as a single previously validated scale. The available research records do not document a separate pre-administration expert-review, formal content-validation, translation/back-translation, or pilot-testing stage. These procedures are therefore not claimed. To improve measurement transparency, the questionnaire structure, construct domains, item numbers, and scoring procedures are reported in the Method section. The absence of documented formal content validation and pilot testing limits confidence in the measurement adequacy of the study-specific constructs and should therefore be considered when interpreting the observed correlations.

Participant characteristics were summarised using frequencies and percentages. Because the technology-exposure scale was ordinal, exposure to individual technologies was described primarily through category frequencies, percentages, medians, and interquartile ranges. Means and standard deviations were retained as supplementary descriptive summaries.

Internal consistency was measured utilizing Cronbach's alpha for technology exposure (16 items), digital learning integration (6), digital competence (28), simulation-based learning (4), perceived barriers (8), institutional support (6), and perceived work readiness (7). The corrected item-total correlations were also calculated as item-level diagnostics. However, alpha and item-total correlations were taken as preliminary indicators of internal consistency rather than as a test of construct validity. Since the sample size was so small, no exploratory or confirmatory factor analysis was done, and no claim for factorial, convergent, or discriminant validity was made. The study could have been done with a much larger independent sample.

The correlations with perceived work readiness were assessed using Spearman's rank-order correlation, since the sample size was small and the response scales were mostly ordinal. We also looked at technology exposure, digital learning integration, digital competence, simulation-based learning, perceived barriers, and institutional support separately. Spearman's rho was verified with 95% confidence intervals. For completeness, P-values were also included, but were not used as the basis for interpretation. All correlations were considered exploratory to be replicated.

Our sensitivity analysis repeated the main calculation after excluding two cases with invariant response patterns across many agreement-scale items. We also performed descriptive subgroup checks for internship experience and institutional affiliation, but we did not perform any formal subgroup significance analyses as the groups were small and a bit uneven. Structural equation modeling, mediation analysis, and multivariable causal modeling were not conducted.

The qualitative content analysis was done on open-ended survey responses. Responses were coded and grouped into themes such as hospitality software, system complexity, facilities and software access, practice opportunities, instructor guidance, simulation, data literacy, internships, certification, and industry cooperation. Anonymized participant identifiers (P01–P26) were used to identify the still relevant responses in order to report short illustrative quotations. These categories are used to contextualize the quantitative findings rather than to claim saturated qualitative themes. Both quantitative and qualitative results are compared side-by-side.

Participation was voluntary and respondents were provided with electronic consent before completing the questionnaire. No direct personal identifiers were used in the analysis or reporting of the study and the results were presented in an aggregated form. The published study records do not indicate any formal institutional ethical approval or exemption. The present paper does not claim that such approval or exemption was obtained and completing a journal submission ethics declaration is not equivalent to institutional ethical review. The ethics statement is limited to procedures which can be verified from the available records.

Result and Discussion

Included 26 responses after eligibility and duplicate screening. The sample was distributed fairly equally across institutions and programmes. Only 15 participants were affiliated with Universitas Multimedia Nusantara (UMN), while one person had a dual affiliation with UMN and a university. Thus, 16 of the 26 participants (61.5%) had a UMN affiliated status. The other participants were split up into six institutions, with two institutions not being classified since the people who answered the questions entered programme information and not a clear institution name (see Table 1).

Programme representation was also uneven. Twenty participants had been in or attended Perhotelan programmes, four from Tata Boga/Kuliner, and two from Manajemen Perhotelan. Diploma III students formed the largest group (76.9%). Twenty participants had completed an internship, and 19 of them reported a hotel as their internship setting. Due to this concentration and the purposive sampling strategy, the profile in this paper describes the participants in this study rather than Indonesian hospitality students as a whole.

The semester/status field did not allow all participants to be reliably identified as current students or graduates. Nineteen respondents clearly reported a current semester, two explicitly identified themselves as alumni or having completed their programme, and five provided entries that did not allow for confident classification. These cases were not reassigned on the basis of assumption.

Exposure to Hospitality Technologies

Technology exposure was measured on a five-category ordinal scale where 0 indicated "Belum pernah mendengar" (never heard of the technology) and 4 indicated "Sering menggunakan" (frequent use). The intermediate categories were having heard of the technology but not studied it (1), having been introduced to it (2), and having practised using it (3). Since these categories are ordinal, the distributions are reported directly rather than assuming mean scores as a progression of increasing length.

Exposure was quite different for different technologies. Practical or frequent use (categories 3-4) was reported most frequently for online booking platforms (19 out of 26 participants), followed by digital payment systems and point-of-sale systems (17 out of 26 participants). In contrast, only five participants reported using channel-management systems and four reported having had this level of exposure to business intelligence dashboards (see Table 2).

The overall technology exposure composite had a mean of 2.24 (SD = 0.73), but the item-level distributions indicate that this average should be treated cautiously. The exposure in this sample tends to be more concentrated in transaction, reservation and guest-service technologies. Channel managers reported less practical or frequent exposure (5/26), business

intelligence dashboards (4/26), virtual or augmented reality (6/26), IoT or smart room technologies (9/26) and service robots or automated service systems (9/26). From this, it is apparent that the sample was not exposed to distribution integration, advanced analytics, smart environments, and automation more than the regular operational technologies.

Table 1. Participant characteristics and institutional distribution

Panel A. Participant characteristics

Characteristic	Category	n	%
Gender	Women	16	61.5
	Men	10	38.5
Age	18–20 years	10	38.5
	21–23 years	9	34.6
	Above 23 years	7	26.9
Programme	Perhotelan	20	76.9
	Tata Boga/Kuliner	4	15.4
	Manajemen Perhotelan	2	7.7
Education	Diploma I	3	11.5
	Diploma III	20	76.9
	Diploma IV/Applied Bachelor	3	11.5
Reported study status	Current semester clearly reported	19	73.1
	Completed/alumni explicitly reported	2	7.7
	Not reliably classifiable	5	19.2
Internship experience	Completed an internship	20	76.9
	No internship experience	6	23.1
Internship duration	Three to six months	9	34.6
	More than six months	11	42.3
	No internship	6	23.1

Panel B. Institution-by-programme distribution

Institution	Programme	n	%
Universitas Multimedia Nusantara	Perhotelan	15	57.7
Institut Pariwisata Trisakti / Universitas Multimedia Nusantara*	Manajemen Perhotelan	1	3.8
Politeknik Pariwisata NHI Bandung	Tata Boga/Kuliner	3	11.5
Politeknik Negeri Media Kreatif Jakarta	Perhotelan	1	3.8
Universitas Asa Indonesia	Perhotelan	1	3.8
Universitas Merdeka Malang	Perhotelan	1	3.8
Institut Pariwisata Trisakti	Manajemen Perhotelan	1	3.8
Politeknik Pariwisata Palembang	Tata Boga/Kuliner	1	3.8
Institution not classifiable from response	Perhotelan	2	7.7
Total		**26**	**100.0**

*One participant reported a dual institutional affiliation.

Table 2. Distribution of reported technology exposure (n = 26)

Technology	0	1	2	3	4	Median [Q1–Q3]	Mean
Property management system	2	3	4	13	4	3 [2–3]	2.54
Point-of-sale system	4	0	5	16	1	3 [2–3]	2.38
Online booking platform	1	2	4	14	5	3 [2–3]	2.77
Channel-management system	7	6	8	5	0	1.5 [0–2]	1.42
Customer relationship management	2	5	10	7	2	2 [1–3]	2.08
Digital payment system	0	2	7	8	9	3 [2–4]	2.92
Revenue management system	2	3	10	8	3	2 [2–3]	2.27
Social media management tools	1	3	10	6	6	2 [2–3]	2.50
Online review/reputation platform	1	1	11	9	4	2.5 [2–3]	2.54
Guest messaging application	1	1	10	10	4	3 [2–3]	2.58
Spreadsheet	2	3	8	8	5	2.5 [2–3]	2.42
Business intelligence dashboard	7	4	11	3	1	2 [0–2]	1.50
Virtual/augmented reality	5	3	12	5	1	2 [1–2]	1.77
Artificial intelligence/chatbot	3	4	6	7	6	2.5 [1–3]	2.35
IoT/smart-room technology	3	7	7	8	1	2 [1–3]	1.88
Service robots/automated services	3	7	7	6	3	2 [1–3]	1.96

Note. Values in columns 0–4 are participant counts. 0 = never heard of the technology; 1 = heard of but not studied; 2 = introduced; 3 = practised; 4 = frequent use.

Table 3. Descriptive statistics and preliminary internal-consistency diagnostics

Construct	Items	Scale	Mean	SD	Cronbach's α	Corrected item-total r
Technology exposure	16	0–4	2.24	0.73	.916	.287–.801
Digital learning integration	6	1–5	4.19	0.76	.927	.563–.886
Overall digital competence	28	1–5	4.11	0.56	.944	.335–.797
Simulation-based learning	4	1–5	4.18	0.74	.872	.601–.869

Perceived barriers	8	1–5	3.49	0.98	.911	.369–.890
Institutional support	6	1–5	4.12	0.91	.943	.712–.896
Perceived work readiness	7	1–5	4.33	0.82	.945	.761–.869

Table 4. Spearman correlations with perceived work readiness

Variable	Spearman's ρ	95% bootstrap CI	p
Technology exposure	.209	[−.228, .594]	.307
Digital learning integration	.576	[.181, .834]	.002
Overall digital competence	.712	[.383, .909]	< .001
Simulation-based learning	.675	[.349, .871]	< .001
Perceived barriers	.025	[−.414, .455]	.902
Institutional support	.704	[.375, .903]	< .001

Construct Scores and Internal Consistency

Table 3 summarizes the construct results. We find the perceived level of work readiness had the highest mean (M = 4.33, SD = 0.82), followed by digital learning integration, simulation-based learning, institutional support, and overall digital competence. Cronbach's alpha coefficients range from .872 to .945. However, we tend to regard these coefficients as preliminary evidence of internal consistency and not evidence of construct validity (see Table 3).

Digital learning integration was generally rated positively. Opportunities to practise technology and instructor guidance both had means of 4.31, while regular use of digital technology across hospitality courses received the lowest integration-item mean (M = 3.92).

Within digital competence, digital ethics received the highest dimension mean (M = 4.57). The strongest individual rating concerned maintaining the confidentiality of guest information (M = 4.73), followed by awareness of risks associated with sharing guest information through social media or messaging applications (M = 4.65). Data literacy was comparatively lower (M = 3.90). In particular, confidence in reading hospitality-related tables, graphs, or dashboards had a mean of 3.62, while identifying patterns in reservation, sales, or guest-feedback data had a mean of 3.69.

Perceived work readiness was highest for willingness to learn new organisational systems (M = 4.54) and professional communication through digital platforms (M = 4.50). The lowest item concerned the perception that digital competence increased employment opportunities (M = 4.15). These scores represent participants' self-assessments and should not be interpreted as observed workplace performance.

Descriptive Subgroup Checks

Descriptive subgroup checks did not reveal a simple pattern linking internship experience with higher scores. Participants who had completed an internship (n = 20) reported a mean technology-exposure score of 2.07 and perceived work-readiness score of 4.28, compared with 2.81 and 4.50, respectively, among those without internship experience (n = 6). Institutional support was also rated higher by the no-internship group (4.69 versus 3.94).

A similar descriptive check was conducted for institutional concentration. Participants with a UMN affiliation (n = 16) and those from other or unclassified institutions (n = 10) reported broadly similar technology exposure (2.29 versus 2.16), but the latter group reported higher institutional support (4.45 versus 3.91) and perceived work readiness (4.57 versus 4.18). These comparisons are descriptive only; the small and uneven subgroup sizes do not support formal group-effect conclusions.

Associations with Perceived Work Readiness

Spearman's rank-order correlations were used to examine the associations between the study constructs and perceived work readiness. The largest positive coefficients were observed for overall digital competence (ρ = .712, 95% bootstrap CI [.383, .909]) and institutional support (ρ = .704, 95% CI [.375, .903]). Simulation-based learning (ρ = .675) and digital learning integration (ρ = .576) also showed positive associations.

Technology exposure showed only a small positive coefficient with perceived work readiness (ρ = .209), and its confidence interval included both negative and positive values. Perceived barriers showed almost no association with readiness (ρ = .025), with a similarly wide interval. These estimates are therefore less precise than the coefficients observed for competence, institutional support, simulation, and learning integration.

The results should nevertheless be treated as exploratory. The confidence intervals remain relatively wide, reflecting the small sample. P-values are included in Table 4 for completeness, but the magnitude, direction, and uncertainty of the coefficients are more informative for the present analysis.

The sensitivity analysis excluded two participants who gave invariant responses across the agreement-scale items. The main pattern remained similar: digital competence (ρ = .649), institutional support (ρ = .653), simulation-based learning (ρ = .611), and digital learning integration (ρ = .493) remained positively associated with perceived work readiness, whereas technology exposure (ρ = .144) and perceived barriers (ρ = −.098) remained comparatively small. This suggests that the overall ordering of the associations was not driven solely by the two invariant response profiles, although the estimates remain provisional.

Open-Ended Findings

The qualitative data are based only on the four open-ended questions in the main survey. We excluded responses containing placeholders from qualitative coding, and we got 25 usable responses for important technologies, learning barriers and institutional improvements and 17 usable responses for the internship-related technology question. Counts below show the number of participants whose answers contained a type of category; the categories are not mutually exclusive, so one can contribute to more than one category.

Of the 25 usable responses about important technologies, 14 of them were for PMS or a closely related hotel operating system. Five mentioned POS or EDC-related systems, three mentioned artificial intelligence, and two mentioned Excel or revenue-management applications. The majority of participants described PMS in terms of core hotel operations (P06, translated).

For example, one respondent mentioned it as "reservations, check-in and check-out, room management, payments and operational reports." Of the 25 usable responses regarding learning barriers, there were a number of common concerns. Eight participants mentioned system complexity, differences between software versions, rapid technological change or the need to adapt to different systems. Six of the respondents had limited access to facilities, devices or industry software; six also said they had little to no practice,

experience or time to explore systems in depth. Five said they had no guidance or basic knowledge, and four cited unstable internet or network connections. One respondent described the problem as "limited direct access to systems used in the industry" (P23, translated).

Their recommendations were also practice-oriented. Of the 25 responses that were valid, 13 said more hands-on practice, simulation, case-based activities, or using systems like those used in industry. Six said that some facilities, software, or technology would be better and six recommended industry collaboration, participation of practitioners, workshops or certification. Five mentioned stronger curriculum integration or guidance in which better teaching was provided. As one participant put it, institutions should "provide more direct practice with systems actually used in the hospitality industry" (P16).

Seventeen responses were available for the question about technologies encountered during internships but not well discussed during previous learning. Seven respondents mentioned PMS, POS, Opera or EDC-based operational systems. Other responses referred to stock or procurement systems, CRM, attendance systems, vendor-specific applications like INFRASYS or MICROS, and an AI assistant. Four participants said they didn't encounter major technology gaps because the relevant systems had already been introduced during their education. These different responses were then used in our survey and not taken as a universal view of the campus-industry gap as a result.

In general, the open-ended responses are representative of qualitative components, but not the whole qualitative picture. In this study, the participants have relatively good perceived work readiness and digital skills and experience with specific hospitality technologies is a bit different. Their written comments were particularly focused on authentic practice, access to current systems, instructor guidance, and greater integration of educational technology and workplace use.

This study examined how technology exposure, digital learning integration, digital competence, simulation-based learning, institutional support, perceived barriers, and perceived work readiness were related within a small purposive sample of students and former students from Indonesian vocational hospitality-related programmes. The overall pattern suggests that perceived work readiness was more closely aligned with self-reported competence and educational support than with the breadth of technology exposure. Digital competence, institutional support, simulation-based learning, and digital learning integration showed comparatively stronger positive associations with perceived work readiness, whereas technology exposure and perceived barriers produced smaller and less precise estimates. These findings should be read as exploratory patterns rather than stable estimates of relationships among Indonesian hospitality students more broadly.

Interpretation of Key Findings

One noteworthy preliminary pattern concerned technology exposure. Its association with perceived work readiness was small (Spearman's ρ = .209), but the 95% bootstrap confidence interval was wide and crossed zero [−.228, .594]. The estimate is therefore compatible with effects ranging from a modest negative relationship to a moderately positive one. It would consequently be inappropriate to interpret the non-significant result as evidence that technology exposure is unrelated to readiness. Rather, the present sample did not provide a sufficiently precise estimate to establish the direction or strength of that relationship with confidence.

The descriptive results nevertheless show that exposure was uneven. Participants reported greater practical or frequent experience with online booking platforms, digital payments, property management systems, and point-of-sale systems, while practical exposure to channel-management systems and business intelligence dashboards was much less common. Within this sample, technology contact therefore appeared to be concentrated around routine operational and guest-service systems, with more limited reported experience of distribution integration, advanced analytics, smart environments, and automation.

This pattern is consistent with Carlisle et al.'s (2021) argument that the tourism-sector digital divide involves not only whether technology is accessible, but also the depth, relevance, and workplace applicability of digital experience. Encountering a system, watching it being demonstrated, and using it independently in an operational setting represent different levels of experience. The present results cannot determine whether greater exposure eventually produces stronger work readiness, but they do reinforce the value of distinguishing exposure from capability.

Bouwmans et al. (2024) describe digital-transformation skills as combining technical, cognitive, interpersonal, and adaptive capabilities, while Rêgo et al. (2024) emphasise preparation for changing digital work environments rather than familiarity with a fixed set of applications. From this perspective, technology exposure may provide an entry point for learning, but it should not automatically be treated as equivalent to competence or readiness.

Digital competence showed the largest observed association with perceived work readiness (ρ = .712, 95% CI [.383, .909]). Participants who rated themselves more highly in operating digital systems, adapting to unfamiliar technologies, communicating digitally, working with basic data, and handling information responsibly also tended to give higher ratings to their own work readiness. This pattern is broadly consistent with Hsu and Tseng's (2022) view that hospitality technology competence combines technical understanding, practical application, and adaptability. It also corresponds with Elshaer et al. (2025), who reported links among technological skills, e-learning readiness, and employability-related outcomes among hospitality-management graduates.

This relationship must, however, be interpreted carefully. Both digital competence and perceived work readiness were measured through the same self-report questionnaire at the same time. Part of the strong correlation may therefore reflect common-method variance, overlap between the content of the two constructs, or a more general tendency for confident participants to rate several aspects of themselves positively. For example, confidence in using technology appears conceptually close to feeling ready for digitally mediated work. The observed correlation cannot establish that greater digital competence caused greater work readiness, nor can it show how closely either self-report measure corresponds to actual workplace performance.

The internal pattern of digital competence adds further context. Digital ethics received the highest ratings, particularly in relation to guest-data confidentiality and responsible information sharing, whereas data literacy was the lowest-rated competence dimension. Participants were less confident in reading dashboards, recognising patterns in reservation or guest-feedback data, and turning operational information into recommendations.

This difference is relevant because contemporary hospitality work increasingly involves data-informed decision-making. Revenue management, customer relationship management, distribution, online reputation monitoring, and demand forecasting require employees to interpret information rather than simply operate a software interface. Ogbeide et al. (2020) similarly questioned whether hospitality and tourism curricula were sufficiently prepared for big-data applications, while Busulwa et al. (2024) argued for curriculum renewal in

response to digital transformation. The relatively low data-literacy ratings and limited exposure to business intelligence and channel-management systems in the present sample suggest that this area deserves closer examination in future studies.

Digital learning integration also showed a positive association with perceived work readiness (ρ = .576, 95% CI [.181, .834]). Participants who reported greater integration of technology into courses, authentic tasks, instructor guidance, and assessment generally reported greater readiness as well. This pattern is consistent with Goh and Sigala's (2020) argument that meaningful educational technology use depends on its integration into normal teaching practice rather than occasional demonstrations.

Bilotta et al. (2021) similarly argue that students need opportunities to think with technology rather than simply learn about it. The open-ended responses support the practical relevance of this argument within the present sample. Participants frequently asked for more direct practice, realistic cases, software-based exercises, and greater use of technologies resembling those encountered in hospitality workplaces. Their comments do not establish the effectiveness of these approaches, but they indicate that students themselves perceived a need for more applied learning.

Simulation-based learning showed another comparatively large positive association with perceived work readiness (ρ = .675, 95% CI [.349, .871]). This pattern is compatible with practice-oriented approaches to vocational preparation. Green and du Plessis (2023) show how project-based learning can support learner autonomy, Rohm et al. (2021) highlight the contribution of live projects to real-world preparation, and Gamage (2022) emphasises work-integrated learning that connects academic learning with professional practice.

For hospitality education, simulation may be particularly useful when students cannot practise freely on live operational systems. Errors involving reservations, payments, guest information, or room allocation can have real consequences in workplace settings. Simulated tasks can therefore provide a controlled setting in which students practise procedures and receive feedback. The present study cannot determine whether simulation itself improves work readiness, but the association observed here and the participants' written comments provide a reasonable basis for examining this possibility more rigorously.

Institutional support was also strongly associated with perceived work readiness (ρ = .704, 95% CI [.375, .903]). Participants who gave higher ratings to facilities, instructor capability, curriculum updating, industry collaboration, certification opportunities, and internship support tended to report higher readiness. This pattern is consistent with Al-Maskari et al. (2022), who emphasise the interaction between personal and institutional conditions in preparation for Industry 4.0.

The relationship should again be viewed as associative rather than causal. Participants who were generally positive about their education may also have rated both institutional support and their own readiness more favourably. Nevertheless, the pattern is consistent with work showing that digital readiness is partly situated within organisational environments. Gfrerer et al. (2021) distinguish individual capability from the conditions surrounding digital transformation, while Van der Schaft et al. (2024) describe digital transformation as a process shaped by how people experience and respond to technological change within organisations.

Perceived barriers had an almost zero correlation with perceived work readiness (ρ = 0), but its confidence interval was also large [−.414, .455]. This can not be interpreted as a message that barriers do not matter. The data are consistent with moderately negative and moderately positive relationships and the sample is too small to show exactly how they were related.

The open-ended responses also suggest that the participants were challenged with software access, facilities, internet reliability, limited practice, system differences and guidance. Prikshat et al. (2020) argue that work-readiness problems can arise due to a gap between higher education and the standards of work and job expectations, while Naufalin et al. (2024) and Supriyanto et al. (2022) emphasize digital literacy and internship experience in vocational preparation. These qualitative responses are more than a sufficient basis to consider such problems in the study because they were reported by some participants and not because the barriers reduced readiness.

The relatively high work readiness score across the group is also a bit concerning. There were high levels of willingness to learn new systems and confidence in digital communication among participants. These may be useful but readiness is not equivalent to competence. Potgieter et al. (2023) distinguish digital world-of-work readiness from general employability competence, whilst Tavitiyaman et al. (2025) link perceived skills to career adaptability and perceived employability.

The relatively high self-reported work readiness, combined with uneven technology exposure and comparatively lower data-literacy scores, suggests a possible discrepancy between participants' perceived readiness and the breadth or depth of their technology-related experience. This pattern warrants further examination but should not be interpreted as evidence of an established confidence–exposure gap. Future studies incorporating objective performance measures could examine whether participants who perceive themselves as ready for digitally mediated hospitality work can demonstrate comparable competence when completing authentic technology-supported tasks.

The findings are broadly consistent with studies that distinguish meaningful digital capability from basic technology access or familiarity. Carlisle et al. (2021), Bouwmans et al. (2024), and Rêgo et al. (2024) all suggest that digital preparation involves more than contact with digital tools. The present study provides a small-sample illustration of this distinction within vocational hospitality-related education: technology exposure showed an imprecisely estimated relationship with perceived readiness, while self-reported competence and educational-support measures showed larger positive coefficients.

The results are also compatible with research calling for deeper integration of technology into hospitality curricula. Goh and Sigala (2020) emphasise the role of educators in embedding technology within normal teaching practices, and Bilotta et al. (2021) advocate learning activities in which students use technology for problem-solving and decision-making. Busulwa et al. (2024) and Ogbeide et al. (2020) further identify concerns around curriculum readiness for digital transformation and data analytics. The relatively low data-literacy ratings and limited reported exposure to analytical and distribution technologies in the present sample suggest that these concerns remain worth investigating.

The observed associations involving simulation and institutional support are similarly consistent with practice-based and work-integrated learning research. Gamage (2022), Green and du Plessis (2023), and Rohm et al. (2021) show how authentic tasks, projects, and work-related learning may contribute to students' confidence and ability to apply knowledge. However, the present cross-sectional self-report data cannot establish whether simulation or institutional support actually produces higher readiness. Their role should be tested using stronger designs and more direct performance evidence.

The practical implications should be kept proportionate to

the exploratory nature of the evidence. Two priorities emerge most directly from the present data.

First, participating students repeatedly called for more authentic technology practice, and their reported exposure was particularly limited for some analytical and integrated systems. Institutions serving similar programmes could therefore pilot a limited number of authentic technology tasks rather than simply increasing the number of technologies introduced. For example, students might complete a PMS reservation workflow, resolve a simulated booking or payment problem, or interpret information from a simplified hotel dashboard.

Second, data literacy needs to be very much in the focus. It was the lowest digital competency dimension, and business intelligence dashboards were not available. An answer might be to add a few tasks based on data to current operational or managerial subjects from a small class or even just to an existing curriculum rather than make a big learning initiative. Students would be able to understand occupancy, booking, sales or guest feedback data and use it as motivation for an operational recommendation.

Implementation should be measured on the basis of real-life learning results. Institutions could also use short pre- and post-task assessments on procedural correctness, digital workflow completion, operational data, security threats and user-facing issues, as well as a new interface to be used. Internships would be integrated with supervisor ratings and a structured performance measure. If this is the case, the level of technology practice would help to determine whether additional technology practice increases capability and not merely exposure.

More long-term strategies (academic mapping, lecturer development, updated laboratories, certified professionals, vendor-supported training, and hotel-based partnerships) are also possible and in line with the literature. But this is literature-biased and should not be interpreted solely from this sample of data. Their value should be tested locally before they are implemented on a large scale.

There may have been a number of limitations to both the size and direction of the findings. The study had a small purposive sample of 26 participants and the majority were in one institution. For example, recruitment was done online and the available data does not indicate which channel each person received the survey. Network-based or convenience recruitment might have favoured students who were easier to reach, more involved in digital learning, or more connected with the researchers' institutional networks. And it could have led to relatively positive ratings of competence, support, and readiness among participants, which can reduce the transferability of the findings.

Second, all major constructs were measured with the same questionnaire at the same time point. Common-method variance might have amplified positive associations between digital competence, institutional support, simulation, learning integration and perceived work readiness. Some items might also share conceptual content, such as confidence with digital technology and confidence about workplace readiness. If we do believe in a general positive response we may be able to improve correlations without the same strong relationship between the objectively measured capabilities.

Third, there were some constructs with quite high mean scores. The ceiling effect could have reduced the variation of participants at the upper end of the scales. More limited variation might undermine, or even obscure, relationships that might be more apparent in a more heterogeneous sample. But high self-ratings may also give an overly favourable picture of the absolute competence or readiness of participants. The cross-sectional design does not provide any temporal order.

Fourth, the cross-sectional design does not establish temporal order or causal direction. Although digital competence, simulation-based learning, and institutional support showed positive associations with perceived work readiness in this sample, the study cannot determine whether higher levels of these constructs lead to greater perceived work readiness. Reverse or reciprocal interpretations are also possible. For example, participants who already felt more confident about entering employment may have evaluated their own digital competence and educational experiences more positively. Longitudinal, experimental, or temporally separated designs would be required to examine developmental or causal relationships more convincingly.

Fifth, the qualitative component was limited to brief written responses to four open-ended survey questions. These responses were helpful for understanding the participants' concerns and quantitative patterns, but they do not provide the depth of interviews, focus groups or work observations. No qualitative saturation or full representation is claimed.

Sixth, the bootstrap confidence intervals are only obtained from 26 cases. Though bootstrapping has been a helpful indication of uncertainty, such a small sample of observations can repeat the same observations over and over again and the intervals may be unstable. This is especially true in technology exposure and perceived barriers where the intervals were wide and can be considered in more than one direction.

Finally, several bivariate correlations were looked at. With no large confirmatory sample or a predefined multiplicity adjustment of the data, multiple testing may take more risk of the result being interpreted as a result of chance variations. P-values should, therefore, not be taken as independent of effect sizes, confidence intervals, study design and theoretical plausibility. The correlations presented here are best considered provisional signals for replication.

Future studies should recruit more and more diverse samples from vocational colleges, polytechnics, universities, and regions. More probability-based or more stratified recruitment would reduce the network-based sampling bias and better reflect the diversity of programmes, institutions, educational levels and internship experiences. Measurement should also move beyond a single self-report source. Students could apply objective tasks at PMS/POS, booking systems, spreadsheets/dashboards, revenue management scenarios, or in simulated guest service applications. It is also possible to provide external measures of competence and work readiness with the evaluation of a mentor, internship-supervisor ratings, and employers.

To compare these measures with self-reported confidence would allow the proposed confidence-exposure gap to be directly assessed. Future designs should also separate measurements over time. Digital competence, educational experiences and work readiness could be evaluated at different points in the semester, prior to and after simulation training, or prior to and after internship placement. Temporally separated measurements would alleviate some common-method concerns and more clearly demonstrate developmental relationships.

Longitudinal studies could explore if digital competence was predictive of later internship performance, supervisor ratings, employment outcomes, or early career adaptability. More extensive mixed methods studies might also incorporate interviews or focus groups with students, lecturers, internship supervisors, hotel staff and technology providers to explore the differences between what institutions teach, what students think they can do and what work environments are expected from students.

Future research will investigate whether digital competence is a driver of the learning integration, simulation, institutional support, and work readiness relationship, or if the internship quality, teacher competence, self-efficacy, previous experience with technology and institution type moderates that

relationship. Such analyses would involve much larger samples and more rigorous measurement models to analyze the study findings.

And so far we believe that technology exposure, self-reported digital competence, and perceived work readiness are distinct concepts. Exposure is that we are interacting with technology that matters to us, digital competence is what we know how well we can use it, and perceived readiness is what we know how well we can work in a digitally mediated work environment. In this small sample, we found greater associations with competence and educational support than with technology exposure as a factor but the estimates are still subject to sampling, measurement, and common-method limitations. The findings lend support for further testing of a capability-based approach as a general model of vocational hospitality education rather than as a model of educational and training-based training.

Conclusion

This study examined digital preparation and perceived work readiness among a small purposive sample of participants from Indonesian vocational hospitality-related programmes. Regarding the first research question, participants reported uneven exposure to hospitality technologies. Practical experience was more common with online booking platforms, digital payment systems, property-management systems, point-of-sale systems, and other routine operational technologies, whereas exposure to business-intelligence dashboards, channel-management systems, smart-room technologies, and service automation was more limited. Participants generally rated their digital competence positively, although data literacy was comparatively lower than digital ethics and several other competence dimensions.

Regarding the second research question, digital competence, institutional support, simulation-based learning, and digital learning integration showed comparatively larger positive associations with perceived work readiness. Technology exposure showed a smaller and imprecisely estimated association, while perceived barriers showed a very small and imprecisely estimated association with perceived work readiness in this sample. These findings should not be interpreted as evidence that digital competence, simulation-based learning, learning integration, or institutional support causes greater work readiness. All major constructs were measured through self-report at a single time point, and confidence intervals were relatively wide because of the small sample. The observed relationships should therefore be regarded as preliminary associations requiring replication.

Regarding the third research question, the open-ended responses provided contextual information about participants' digital learning experiences. Participants frequently identified the need for more authentic technology practice, greater access to industry-relevant systems, stronger instructor guidance, improved facilities, and closer alignment between campus learning and hospitality-industry practice. These responses identify areas that may merit institutional attention, but they do not demonstrate that any particular intervention would improve work readiness. Authentic software practice and data-literacy development should therefore be examined through future intervention and performance-based research rather than assumed to be effective on the basis of the present findings alone.

The study's main contribution is conceptual and exploratory. It highlights the importance of distinguishing technology exposure, self-reported digital competence, and perceived work readiness rather than treating them as interchangeable dimensions of digital preparation. However, the present study does not establish these constructs as empirically distinct measurement dimensions or validate the proposed conceptual framework. Such claims would require larger independent samples, formal measurement validation, factor-analytic examination of construct structure, assessment of convergent and discriminant validity, and subsequent confirmatory modelling.

The findings are subject to important limitations, including the small purposive sample, institutional concentration, possible recruitment-related selection effects, reliance on a single self-report questionnaire, possible common-method variance and ceiling effects, the absence of documented formal content validation and pilot testing, and the cross-sectional design. The qualitative component was also limited to brief written responses. Future studies should therefore use larger and more diverse samples, validated measurement instruments, objective technology-performance assessments, external evaluations by lecturers or workplace supervisors, and longitudinal or temporally separated designs. Such research would allow the relationships among technology exposure, digital capability, and perceived work readiness to be examined more rigorously and would provide stronger evidence regarding the roles of authentic practice, simulation, data-literacy development, and institutional support in vocational hospitality education.

Author's Contribution Statement

Oqke Prawira contributed to the conceptualisation of the study, research design, methodology, questionnaire development, data collection, quantitative analysis, interpretation of the findings, project administration, and preparation of the original manuscript. Adestya Ayu Armielia contributed to the literature review, data curation, analysis of the open-ended responses, development of the conceptual framework, interpretation of the findings, and critical review and editing of the manuscript. Both authors reviewed and approved the final version of the manuscript and agreed to be accountable for the integrity of the work.

Conflicts Of Interest

The authors declare that they have no financial, professional, institutional, or personal conflicts of interest that could have influenced the design, implementation, analysis, interpretation, or reporting of this study.

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