

Mapping Organizational ICT Training Needs: An Empirical Assessment of Digital Competencies

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ABSTRACT

The rapid digitalization of public sector operations has intensified the need for systematic and evidence-based ICT training to ensure workforce readiness and organizational effectiveness. However, misalignment between training provision and actual competency gaps often limits the impact of ICT capacity-building initiatives. This study aims to map organizational ICT training needs through an empirical assessment of digital competencies among public sector employees associated with Institut Latihan Darul Naim (ILDAN), Kelantan, Malaysia. A quantitative research design was employed using an online questionnaire administered to 360 respondents selected through convenience sampling. The survey captured demographic characteristics, ICT usage frequency, barriers to training participation, training preferences, perceived effectiveness of ICT training on job performance, and domain-specific ICT training needs. Descriptive statistical analyses, including frequencies and percentages, were applied. The results indicate high ICT engagement, with 60.8% of respondents using ICT more than five times daily. ICT training was perceived as effective, with 92.8% reporting improvements in job performance. Key barriers to training participation included lack of time and limited exposure to available programs. Domain-level analysis revealed strong demand for both foundational skills namely Microsoft Office and basic computing and advanced competencies namely data analytics, cybersecurity and IoT. The findings demonstrate that integrating training effectiveness outcomes with domain-specific demand enables systematic mapping of ICT training needs. This study concludes that a tiered, evidence-based ICT training framework is essential to support sustainable digital capability development in public sector organizations.

Overview of ICT Training

Information and Communication Technology (ICT) training has become an essential component of organizational development, as the rapid evolution of digital tools requires employees to continuously update their competencies to support efficient day-to-day operations. Effective ICT training enhances digital literacy, improves workflow productivity, and strengthens an organization's capacity to adopt new systems and technologies aligned with strategic goals. Within organizational contexts, ICT training typically encompasses various technical skills for operational platforms and digital transformation training aimed at fostering innovation and adaptability. However, organizations continue to face several challenges in implementing ICT training, including varying levels of digital readiness among employees, budget constraints, limited access to high-quality training resources, and disparities between rural and urban ICT infrastructure. These challenges underscore the critical need for organizations to map ICT training needs in ensuring alignment between actual employee skill gaps and the ICT competencies required for organizational performance. Mapping ICT training to the staff not only prevents resource misallocation but also ensures that training interventions produce measurable outcomes that support operational efficiency, organizational resilience, and long-term digital advancement. In Kelantan state of Malaysia, the growing demand for digital competency among public servants heightens the need for evidence-based approaches in planning ICT training programs. Digitalization initiatives require civil servants to adapt to evolving systems and workflows and without adequate training, the workforce

may experience productivity challenges and digital-related stress. This paper aims to map organizational ICT training needs based on the empirical assessment of digital competencies which has been conducted under public training institute established by the Kelantan State Government known as *Institut Latihan Kelantan Darul Naim (ILDAN)*. The suitability and the impact of training programs offered by ILDAN to its stakeholders can be identified from the empirical assessment in this paper. This study is guided by several key questions concerning the types of ICT-related training currently organized by ILDAN, the extent to which these programs have achieved their intended outcomes, and the strategic direction of ILDAN's future training initiatives. Addressing these questions is crucial for ensuring that training programs remain relevant, responsive, and aligned with organizational goals. This paper aims to provide insights that can support continuous improvement in ICT capacity-building efforts within the organization. Next section elaborates on the related literature regarding mapping organizational ICT training needs.

Related Literature

ICT training is increasingly recognized as a critical component of organizational development as digital technologies fundamentally reshape how work is performed across sectors. According to the Future Skills Organisation (2025), digital skills are now essential not only in technology-driven roles but across all functional areas of modern organizations, making ICT training indispensable for ensuring that employees can meet current and future workforce demands. Effective ICT training enhances employees' capacity to use digital tools efficiently, supports informed decision-making, and improves organizational agility in responding to rapid technological changes. Serrat (2022) further argues that ICT is a major driver of organizational transformation, influencing work structures, leadership dynamics, and operational models, thus underscoring the need for organizations to continually invest in ICT skills to remain adaptive and competitive. Various forms of ICT training are commonly implemented in organizations to strengthen digital competencies. These include foundational digital literacy programs such as training in word processing, spreadsheet use, email communication, and internet navigation, which are essential for day-to-day administrative tasks. More advanced ICT training includes modules on cybersecurity awareness, data analytics, cloud computing, digital collaboration tools, and system-specific training relevant to organizational workflows (Tyagi, 2025). For example, ICT training initiatives described by the Iwukem Development Foundation (2024) include digital communication skills, internet safety, web development, digital marketing, and data analysis skills that significantly enhance both employability and workplace performance. Emerging technologies are also increasingly incorporated into corporate training, such as virtual reality (VR), augmented reality (AR), and adaptive learning platforms, which can deliver interactive and personalized learning experiences that improve skill acquisition and retention (Madhumitha & Asrafi, 2024).

The demand for ICT training is driven by rapid digitalization across industries and the global shift toward data-driven decision-making (On-Piu, 2020; Dalal, 2025 and Sharmin et. al, 2025). Contemporary trends highlight a growing need for flexible, industry-aligned ICT training programs that respond to evolving digital skill requirements. The Future Skills Organisation (2025) notes that stakeholders increasingly expect training packages to be modernized, responsive, and capable of addressing emerging skills gaps in the digital economy, including those related to automation, cloud technologies, and data governance. Additionally, advancements in educational technology such as gamified learning, mobile learning platforms, and AI-assisted instruction are reshaping how ICT training is designed and delivered (Madhumitha & Asrafi, 2024). These trends reflect a broader global shift toward continuous digital upskilling, emphasizing the necessity for organizations to adopt dynamic, scalable ICT training models to sustain workforce readiness and maintain organizational competitiveness. Next section explains the research methodology of this study.

RESEARCH METHODOLOGY

This study adopts a structured methodological approach to assess the ICT training needs of administrators, staff, and teachers under ILDAN. Given the increasing reliance on digital applications for completing tasks both inside and outside the workplace, it is essential to evaluate the suitability and effectiveness of existing and proposed ICT training programs. This part discusses the research methodology applied in this study. The methodology is therefore designed to systematically identify skills gaps, current ICT training effectiveness on job performance and mapping organizational ICT training needs with ICT training domain. The quantitative research design is

used to answer all the research questions. The questionnaire captured respondents' demographic profiles, their frequency and purpose of ICT usage, perceived competency levels, challenges encountered while using digital applications, and their expectations for future training. In this study, convenience sampling techniques were used to select samples from population. The reason for choosing this method is due to low cost and ease use. Therefore, a total of 360 respondents participated in this study. This study was conducted to map organizations' ICT training needs among employees.

An online survey was created through Google Forms to get the information from respondents. One of the benefits included a lower budget requirement since this survey was sent via email. A set of questionnaires was created based on objectives of this study. There are two (2) main sections in this questionnaire which are Section A for demographic profile of the respondents consists of seven (7) items and Section B for ICT Training Needs consists of eight (8) items. The survey data were analyzed using frequency distributions, percentages, and graphical visualization techniques to highlight key patterns and training gaps. In addition to identifying training requirements, the methodology also incorporates an evaluation component to examine the effectiveness of existing ICT training initiatives. This will enable IL DAN to determine whether past programs have successfully enhanced user competencies and whether adjustments are necessary to improve future training outcomes. Through this dual focus such as needs assessment and training effectiveness, the methodology aims to provide a comprehensive and informed basis for guiding IL DAN's strategic direction in ICT capacity building. Next section elaborates on results and discussion.

RESULTS AND DISCUSSION

This section reveals results and discussion on the training needs, the suitability and impact of training programs offered by IL DAN to its stakeholders. Table 1 depicts the characteristics of the entire sample in terms of gender, age, education level, agency, position, length of service, and daily use of ICT. Respondents of this study consist of 60.6% males (218 respondents) and 39.4% (142 respondents). The highest respondents for age groups are 36 to 40 years, which is 20.3% (73 respondents) and the lowest come from groups of 18 to 25 years (2.5%, n = 9 respondents). Most of the respondents are the degree holders for their highest education level which is 30.65 (110 respondents). Relating to the agency of respondents, 82.2% (296 respondents) are from 'Agensi/ Pejabat Kerajaan Negeri'. There are 70.0% (252 respondents) from support staff and 30.0% (108 respondents) from Management and Professionals level. The findings of this study also found that 25.0% (90 respondents) already in service more than 15 years and only 10.0% (36 respondents) less than 1 year. Most of the respondents used ICT more than 5 times per day (60.8%, n = 219), it indicates that the significant training needs among respondents. These characteristics will help to provide a comprehensive and informed basis for guiding IL DAN's strategic direction in ICT capacity building.

Table 1: Characteristics of Respondents

Item	Frequency (n = 360)	Percentage (%)
Gender		
Male	218	60.6
Female	142	39.4
Age		
18-25 years	9	2.5
26-30 years	53	14.7
31-35 years	72	20.0
36-40 years	73	20.3
41-45 years	62	17.2
46-50 years	38	10.6
51-55 years	31	8.6
56-60 years	22	6.1
Education Level		
Certificate	96	26.7
Diploma	86	23.9
Degree	110	30.6

Master	24	6.7
Ph.D.	4	1.1
Lain-lain	40	11.1
Agency		
Agensi/ Pejabat Kerajaan Negeri	296	82.2
Agensi/ Pejabat Kerajaan Persekutuan	27	7.5
Guru Sekolah/ Pentadbir Yayasan Islam Kelantan	1	0.3
Pusat Khidmat Dun	1	0.3
Urus setia Kerajaan Negeri	35	9.7
Position		
Support Staff	252	70.0
Management and Professionals	108	30.0
Length of Service		
Less than 1 year	36	10.0
1-3 years	61	16.9
4-5 years	50	13.9
6-10 years	62	17.2
11-15 years	61	16.9
More than 15 years	90	25.0
Daily use of ICT		
Never	12	3.3
Once a month	19	5.3
1-2 times per week	54	15.0
3-4 times per week	56	15.6
More than 5 times per day	219	60.8

Next analysis is regarding the current ICT usage for all 360 respondents.

Table 2: Frequency of ICT Usage

Frequency of ICT Use	n	%
Never	12	3.3
Once a month	19	5.3
1–2 times per week	54	15.0
3–4 times per week	56	15.6
More than 5 times per day	219	60.8

Table 2 presents the distribution of respondents according to their frequency of ICT use ($n = 360$). The data indicates that ICT engagement is widespread, with usage concentrated on the highest frequency category. A majority of respondents (60.8%, $n = 219$) reported using ICT more than five times per day, demonstrating that digital technologies are deeply embedded in participants' daily routines. This suggests a population that is highly exposed to and likely reliant on digital tools for communication, information access, academic, or professional activities. A moderate proportion of respondents reported regular but less intensive use. Specifically, 15.6% ($n = 56$) used ICT three to four times per week, while 15.0% ($n = 54$) used it one to two times per week. Together, these groups account for 30.6% ($n = 110$) of the sample, indicating that nearly one-third of participants engage with ICT on a consistent weekly basis, though not at the very high daily frequency observed in the largest group. In contrast, low-frequency use was relatively uncommon. Only 5.3% ($n = 19$) of respondents reported using ICT once a month, and an even smaller proportion, 3.3% ($n = 12$), indicated they never use ICT. Combined, these categories represent 8.6% ($n = 31$) of the total sample, highlighting that limited or non-use of ICT is confined to a small minority. Overall, the distribution shows a clear skew toward high-frequency ICT engagement, with the largest proportion of respondents clustered in the most intensive use category. This pattern reflects a digitally active population while also identifying a small segment that may require targeted support to enhance digital access and participation.

Next findings is on the possible barriers of current ICT training participation.

Barriers of Current ICT Training Participation

Next section discusses on barriers of current ICT training participation highlighted by 360 respondents. Identifying barriers to ICT training participation is essential to ensure that training programs remain relevant and effectively address learners' actual needs. Understanding these constraints also helps organizations promote equitable access, reduce digital inequalities, and strengthen overall digital readiness. Moreover, recognizing participation barriers allows institutions to optimize resource allocation and enhance learner engagement, leading to more sustainable capacity-building outcomes. Table 3 presents the results of a multiple response analysis regarding possible barriers to current ICT training participation.

Table 3: Possible Barriers to Current ICT Training Participation

Barriers in Current ICT Training Participation	Frequency (n=360)	Percentage (%)
Lack of time	213	37.63
Lack of exposure to available ICT training	189	33.39
Self-learning via online tutorials / YouTube	69	12.19
Lack of support from management	52	9.19
No perceived need	25	4.42
Others	18	3.18

Table 3 reveals lack of time was the most frequently reported constraint (n = 213; 37.63%), followed by insufficient exposure to available training opportunities (n = 189; 33.39%), suggesting that work demands and communication gaps limit participation. The preference for self-directed online learning (n = 69; 12.19%) reflects a shift towards flexible alternatives to formal training, while limited managerial support (n = 52; 9.19%) highlights the role of organizational context. The relatively low proportion of respondents indicating no perceived need for ICT training (n = 25; 4.42%) suggests a generally high awareness of the importance of ICT competencies. Overall, the findings emphasize the need for flexible training delivery, improved dissemination strategies, and stronger managerial support to enhance ICT training uptake. After identifying all the possible barriers, this study also has come out with the analysis of respondents' preferences for participating ICT training in the future.

Respondents' Preferences in future ICT Training

The survey also investigates respondents' insights regarding their preferences in future ICT training. These findings are essential for informing the design of flexible, learner-centered training approaches that align with barriers in current ICT training participation. The emphasis on flexibility is consistent with recent literature, which highlights that ICT-enhanced learning environments must accommodate diverse learner needs, varying levels of digital competence, and multiple modes of engagement to ensure effective skill development (Maiti & Priyaadharshini, 2024). Table 4 describes training preferences by the respondents and it has provided an empirical support for designing ICT training that incorporates both structured guidance and opportunities for learner autonomy, reflecting broader trends in flexible and blended learning delivery. The need for adaptable ICT training is also substantiated by research showing that competency levels, technological readiness, and contextual factors vary widely among learners. Respondents were allowed to select more than one option when indicating their ICT training preferences. Therefore, the data were treated as multiple-response variables, and the reported frequencies and percentages represent the proportion of respondents selecting each training mode rather than mutually exclusive categories. The findings show that face-to-face ICT training is the preferred mode, selected by 66.1% of respondents (n = 238), highlighting the continued importance of direct interaction and hands-on learning. Blended (hybrid) training was preferred by 42.2% of respondents (n = 152), indicating substantial support for flexible learning models that combine physical and online elements. In contrast, fully online training was selected by 21.9% of respondents (n = 79), suggesting that while digital delivery is accepted, it is perceived as less effective for ICT skill development when used alone.

Table 4: Training Preferences by the Respondents

Item on Training Preferences	Frequency (n=360)	Percentage (%)
Face-to-face training	238	66.1%
Blended (Hybrid) training	152	42.2%
Online training	79	21.9%

This study also produced an analysis of effectiveness of current ICT training on job performance. Table 5 presents respondents' perceptions of the extent to which ICT training has improved their job performance. The results indicate a positive evaluation of the training programs. More than half of the respondents (52.5%, n = 189) reported that the ICT training was very helpful in enhancing their job performance. A further 40.3% (n = 145) indicated that the training was helpful. Overall, 92.8% of respondents perceived the ICT training as having a beneficial impact on their work performance. In contrast, a small proportion of respondents reported limited or no benefit from the training, with 3.1% (n = 11) indicating that it was less helpful and 4.2% (n = 15) stating that it was not helpful. Nevertheless, the presence of respondents who perceived the training as less helpful or not helpful suggests the need for further refinement of ICT training initiatives. Variations in job roles, existing competency levels, and opportunities to apply ICT skills in the workplace may influence the perceived effectiveness of training. These findings underscore the importance of adopting a more targeted and adaptive approach to ICT training design.

Table 5: Effectiveness of ICT Training on Job Performance

Response Category	Frequency (n=360)	Percentage (%)
Very Helpful	189	52.5
Helpful	145	40.3
Less Helpful	11	3.1
Not Helpful	15	4.2

From this study standpoint, the positive evaluation of ICT training effectiveness where 92.8% of respondents reported that the training was helpful or very helpful in improving job performance has provided a good empirical justification for using ICT training domains as the basis for systematic training needs mapping. The demonstrated linkage between ICT training and performance outcomes indicates that domain-specific competencies are transferable to workplace practice, thereby validating the prioritization of high-demand domains identified in the training domain analysis. By integrating training effectiveness outcomes with domain-level demand patterns, the organization can adopt an evidence-based approach to ICT training planning that aligns domain prioritization, training depth, and delivery strategies with measurable job performance improvements and broader digital capability objectives. The respondents in this study have provided their input of possible ICT training domain which may help them to increase their job performance. The analysis can be referred to Table 6.

Table 6: Mapping of ICT Training Needs

ICT Training Domain	Frequency (multiple response, n = 360)	Percentage (%)
Microsoft Office (Word, Excel, PowerPoint)	179	49.7
Data Management	171	47.5
Data Processing and Analysis	140	38.9
Graphic/Multimedia Design	137	38.1
Basic Computer Usage	134	37.2
ICT-Based Teaching and Learning	132	36.7
Mobile Applications	124	34.4
Internet of Things (IoT)	121	33.6
Specialized Software	120	33.3
Cybersecurity	119	33.1
Web Development	107	29.7

Based on the multiple-response analysis ($n = 360$) in Table 6, the most salient ICT training need is proficiency in Microsoft Office applications, selected by 179 respondents (49.7%). This indicates that almost one in two participants still require strengthening of fundamental productivity software skills, underscoring that core digital operational competence remains a critical baseline despite the increasing availability of advanced technologies. Closely following is data management ($n=171$; 47.5%), suggesting a professional demand for systematic handling, storage, and organization of digital information. The relatively high endorsement of data processing and analysis ($n=140$; 38.9%) further reflects an emerging shift toward evidence-based practices and data-driven decision making, where users are expected not only to manage data but also to interpret and utilize it effectively. Needs related to content creation and instructional integration are also prominent. Training in graphic and multimedia design ($n=137$; 38.1%) and ICT-based teaching and learning ($n=132$; 36.7%) indicates that more than one-third of respondents recognize the importance of developing engaging digital materials and integrating technology pedagogically, particularly in environments that emphasize blended or technology-enhanced learning.

At the same time, the substantial proportion requesting training in basic computer usage ($n=134$; 37.2%) suggests heterogeneity in digital competence levels, where foundational skills have not yet been fully mastered by a significant segment of users. Furthermore, approximately one-third of respondents expressed need in emerging and applied ICT domains, including mobile applications ($n=124$; 34.4%), Internet of Things ($n=121$; 33.6%), specialized software (120; 33.3%), and cybersecurity ($n=119$; 33.1%). These figures indicate growing awareness of digital transformation trends and associated security challenges, implying that users are increasingly required to operate within technologically complex and risk-prone environments. Collectively, the quantified pattern of responses demonstrates that ICT training needs span three interrelated levels such as foundational digital literacy such as basic computing and office applications, functional and pedagogical competencies such as data analysis, multimedia, ICT-based instruction and advanced and strategic domains such as IoT, mobile technologies and cybersecurity. This layered demand structure highlights the necessity for a comprehensive and tiered ICT training framework that progressively builds from basic skills to advanced, application-oriented and future-ready competencies.

CONCLUSION

This study provides empirical evidence on ICT training needs and effectiveness within a public sector training context, highlighting the central role of digital competencies in supporting contemporary work practices. The findings indicate that ICT usage is highly prevalent among respondents, underscoring the necessity for continuous and structured ICT training to sustain job performance and operational efficiency. The results demonstrate that ICT training initiatives offered by ILDAN have been largely effective, with 92.8% of respondents reporting improvements in job performance. This confirms that well-designed ICT training can produce meaningful workplace outcomes. However, the identification of participation barriers, particularly time constraints and limited exposure to training opportunities, suggests the need for more flexible delivery modes, improved communication, and stronger organizational support. Domain-level analysis reveals that ICT training needs span foundational, functional, and advanced competencies. While strong demand for basic applications such as Microsoft Office indicates the continued importance of core digital literacy, substantial interest in data-related and emerging technologies reflects growing digital transformation demands. These findings highlight the importance of adopting a tiered and targeted ICT training framework that aligns training content and depth with varying competency levels and organizational priorities. Overall, the study supports an evidence-based approach to ICT training planning that integrates training effectiveness with domain-specific demand. Such an approach enables training providers to optimize resource allocation, enhance digital capability development, and strengthen organizational readiness for sustained digital transformation.

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