

Research Article

## AI Literacy for an Ageing Workforce: Leveraging the Experience of Older Workers

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### Abstract

This study delves into the potential benefits of Artificial Intelligence (AI) literacy training for late-career-stage workers approaching retirement. These workers often possess extensive experience but may lack the necessary digital and AI skills. AI literacy training can empower them to leverage their experience and become proficient contributors to the digital economy. Furthermore, the article describes how these workers might benefit from AI training, particularly when employing practical applications of AI in their specific field or industry. The article argues that these workers' knowledge, insights and experience are valuable assets that can be exploited to benefit the business. Their abilities allow them to calibrate the prompts used in Generative-AI systems, maximizing the quality of the AI-generated content. Prompt engineering is a new career path that has followed the rapid emergence of Generative AI content creation. Late-career-stage workers are well suited to act in this role, leveraging their business knowledge to produce quality outputs. The study argues that employers should integrate domain-specific knowledge into the training program's structure, allowing late-career-stage workers to understand the relevance of Generative AI systems and calibrate



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prompts based on their experience and knowledge. Developing their AI skills can ultimately lead to increased productivity and efficiency. Moreover, this article emphasizes the potential benefits for these workers and businesses in providing AI literacy training. It not only enables late-career-stage workers to enhance their skills, but it can also bring valuable insights and experience to the business, ultimately leading to the growth and success of the business. These opportunities empower such workers to access more strategic positions in their institutions and gain a sense of fulfillment in their roles. The methodology for this study will follow a scoping literature review of academic articles. This approach allows for examining existing research on AI literacy training for late-career-stage workers. Articles were sourced through a comprehensive search of academic databases such as ScienceDirect, EbscoHost and Scopus. Search terms included AI literacy, digital literacy, aging workforce and prompt engineering.

### **Keywords**

AI literacy; generative AI; prompt engineering; digital literacy; aging and technology; aging workforce

## **1. Introduction**

New Artificial intelligence (AI) technologies such as ChatGPT have emerged, impacting the labor market and creating new forms of work. ChatGPT is a large language model (LLM) subset of Generative AI systems. These systems can generate content based on billions of parameters describing a massive database of information. The model is fine-tuned to provide logical answers to questions informed by its extensive database [1]. Generative AI models like ChatGPT are forcing employers, employees, students and policymakers to reevaluate how one predicts the future of work.

Generative AI could unlock creativity and make knowledge more accessible [2]. However, these advances will likely impact jobs and industries, disrupting traditional career paths. Some jobs may become obsolete, while others that embrace technology could boost their productivity, making themselves indispensable. It is thus difficult to predict the long-term implications on the labor market. Interestingly, several white-collar jobs are now threatened by AI, as previously, many believed that automation would most likely affect routine low-skilled tasks [3]. Jobs like doctors, lawyers, programmers, and other professionals have now found that ChatGPT can replicate much of their day-to-day tasks, leaving these workers uncertain about the future of their profession [4].

With the rapid advancements in technology, it is no surprise that many individuals in the workforce feel a sense of unease regarding the potential impact of artificial intelligence on their career prospects. They fear that AI will diminish the demand for human labor by utilizing this new form of infrastructure [5]. Historically, companies have evaluated their accomplishments based on the efficacy of the relationship between capital and labor, emphasizing productivity and profit. Nevertheless, some argue that AI may provide opportunities to create new jobs and expand the workforce [6]. For example, the surge in social media's popularity gave rise to new job opportunities,

such as Social Media Managers. Such roles did not exist previously. Likewise, the emergence of Generative AI has led social scientists to investigate new potential career paths that may emerge.

Many elderly workers in the late stages of their careers, approaching retirement (late-career-stage workers), find participating in the digital economy challenging. Technology is becoming specialized, and one's productivity and competitiveness depend on their ability to employ digital tools [7]. Some studies describe the hesitancy of some late-career-stage workers to work with technology, highlighting anxieties when exploring new devices and their anxieties linked to the dangers of online activity. They also report the difficulties in engaging 'clean' interfaces that are complicated to understand and highlight the challenges in understanding system functionality across different devices [7-9]. These barriers have made it difficult for some adults to apply their knowledge and business experience when using these technologies. However, over time, these barriers may be declining.

Hargittai and Dobransky examined a national survey of online skills. They found increasing internet skills and skills among late-career-stage workers, noting that the divergence in digital skills based on age may be declining [10]. Thus, one must recognize that the late-career-stage worker should not be treated as one homogenous group and that there is diversity in their technological usage [11]. In addition, as the population ages, there is an expectation that technologically capable individuals will develop into entirely new digital markets that must be serviced [12]. Given the novelty of AI and Generative AI, these skills need to be fostered among late-career-stage workers. Recognizing that these workers' digital skills exist on a spectrum, it is noted that basic digital skills are prevalent among them. Low-level web-use skills, such as browsing, are often not noted for contributing to beneficial online activities [10]. However, these basic skills are crucial building blocks for AI literacy. As noted earlier, these basic skills are recognized as foundational for AI literacy training.

Late-career-stage employees have typically experienced more difficulties developing the digital skills needed to manage their firm's operations in a digital age. As employers transition into a digital age, they seek new skills to fulfill the new jobs created through changing technologies. These were skills the younger workforce was more likely to possess, given access to digital and, more recently, AI literacy training in schools [13]. It becomes more difficult and expensive to retrain these workers to amass these skills [14]. However, Generative AI systems like ChatGPT are simpler to use when compared to other tools involved in Entity Resource Planning (ERP) or accounting management. The system works using natural language, making it easier for non-technology natives to be proficient in its use [15].

One of the new professions which have emerged is called Prompt Engineering. Prompt Engineers use natural language to prompt a Generative AI system like ChatGPT to produce an image, prepare a story or develop a business plan (among countless other outputs). Preparing the right prompt, however, is a skill informed by business knowledge and experience. One needs to understand the problem before attempting to develop a solution. Preparing the correct prompt shapes the output production, allowing the user to act as a teacher and a learner in the same action [16]. These jobs are starting to be listed on career platforms like Indeed, but almost no training is available to be proficient in this role. The role exists at a senior strategic level, and the successful candidate is paid well, recognizing their expected contribution to the firm [17].

Recognizing this background, this paper argues that the late-career-stage workforce is best suited for prompt engineering positions. The prompt engineer's typical digital skills are minimal, and

their proficiency is a product of their experience and knowledge. These roles allow late-career-stage workers to leverage their extensive context-specific knowledge and experience to become proficient contributors to the digital economy. Empowering these workers with basic AI literacy will enable them to use new Generative AI systems such as ChatGPT effectively. In this light, this paper answers the following questions:

- What are the key AI literacy competencies that must be developed among late-career-stage workers?
- How should AI literacy training programs be structured to benefit late-career-stage workers?
- What might the potential impact of AI literacy training be on late-career-stage workers?

## 2. Materials and Methods

This article presents a reproducible and transparent scoping literature review, which follows a structured approach to searching, screening, and selecting literature on AI literacy, digital literacy, an aging workforce and prompt engineering. The methodology is adapted from Briner & Denyer’s process and incorporates features from the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) statement by Moher et al. [18, 19]. The scoping review approach was preferred, as it allows one to gain a broad understanding of the research topic, relevant concepts, main sources and gaps in the literature [20].

The review process involved a broad search of the ScienceDirect, Ebscohost and Scopus academic databases. These databases were chosen to source papers that take a multidisciplinary approach to find studies that intersect across education, computer science and gerontology. In addition, these databases offer advanced search and selection criteria to assist in screening relevant literature for this article. The sourced paper’s findings are further contextualized with supplementary grey literature, including institutional news reports, highlighting recent activities influencing AI and Generative-AI.

Three sets of keywords were chosen for this literature, namely, “AI literacy,” “prompt engineering,” and “digital literacy” in combination with “aging workforce.” Each set of keywords represents an important aspect of the study. The relation of these terms is discussed in Table 1:

**Table 1** Rationale for keyword selection.

<b>Keyword</b>	<b>Rationale</b>
AI Literacy	To identify the essential competencies related to an effective use of artificial intelligence.
Prompt Engineering	As an emerging profession in 2023, the nature of prompt engineering allows the system user to use natural language to boost their productivity.
Digital Literacy + Ageing Workforce	The combination of these terms were chosen to explore how late-career-stage workers have experienced digital literacy training, and if any lessons from such studies could inform this review.

The ScienceDirect search involved searching papers linked to the intersection of keywords: “AI literacy,” “prompt engineering,” “digital literacy,” and an “aging workforce.” The first attempt at sourcing literature that intersected these themes revealed no results on the ScienceDirect,

Ebscohost and Scopus academic databases, perhaps highlighting the study’s novelty. To overcome this limitation, the study examines the literature on AI literacy training as a single search. It is complemented with a second scan concentrating on digital literacy as it intersects with an aging workforce. In addition, the study examines research into “prompt engineering,” which refers to the knowledge needed to provide suitable instructions to a generative AI system.

When searching the EbscoHost platform, no results were returned for keyword searches related to “AI Literacy” or “Digital Literacy” + “Ageing Workforce.” However, three articles were identified related to “Prompt Engineering. Two of these articles were relevant based on a review of their abstracts.

For the first search (“AI literacy”) on the Scopus database, 53 papers were noted as available. On review of the article’s title and abstract, 19 articles had a relevant title, and after further review of their abstracts, 11 were selected. Ten papers were available for review for the second search (“Prompt Engineering”) on Scopus. Seven presented a seemingly useful title, but only two were found to be relevant after reviewing their abstracts. For the third search (“Digital Literacy” + “Ageing Work Force”), 55 papers were available linked to the keywords “Digital Literacy” + “Ageing Workforce.” Thirty-four articles were selected after a review of the articles’ titles. After reviewing the respective abstract, 22 papers were selected for this review.

Similarly, the first search on the Science Direct academic database identified 31 available articles linked to AI literacy. Twelve articles were found to have relevant titles and abstracts. After reviewing the article’s titles and abstract, eight papers had relevant titles, and seven were selected after finding a relevant abstract. Concerning the “Prompt Engineering” scan, one article was found, but it did not present a relevant abstract. Lastly, twenty-eight articles related to the “digital literacy”/“aging workforce” literature intersection were available for the final search.

The selection and exclusion criteria for identifying relevant literature followed the study’s objectives. The sourced articles were titles and abstracts were reviewed to identify the paper’s alignment with key AI literacy competencies, the structuring of AI literacy training programs and the potential impact of AI literacy training.

In total, 56 academic articles were sourced that inform this study (see Table 2).

**Table 2** Results of the Scoping Literature Review.

	Available	Selected (Title)	Selected (Abstract)
<b>EBSCOhost</b>			
“AI Literacy”	0	0	0
“Prompt Engineering”	5	3	2
“Digital Literacy” + “Ageing Workforce”	0	0	0
<b>Scopus</b>			
“AI Literacy”	53	19	11
“Prompt Engineering”	10	7	2
“Digital Literacy” + “Ageing Workforce”	55	34	22

Science Direct (Open Access)			
“AI Literacy”	31	12	12
“Prompt Engineering”	1	0	0
“Digital Literacy” + “Ageing Workforce”	28	8	7
<b>Total</b>	<b>183</b>	<b>83</b>	<b>56</b>

Given the novelty of this subject, the scoping literature review may be too early to identify emerging trends from the literature. However, given the wide interest in the topic, the above scan has surfaced several relevant papers. Another limitation of the study follows from its concentration on multidisciplinary studies. As indicated in Table 2, Ebscohost and Science Direct have published limited papers related to AI literacy or Prompt Engineering, further emphasizing the topic's novelty. Scanning technology-focused academic databases might potentially elicit additional relevant papers linked to these keywords. However, these studies may lack relevance in an educational context. Lastly, while providing a broad understanding of the research topic, the scoping review may not offer the same level of rigour as a comprehensive systematic review.

As the study is prepared as a scoping literature review of secondary data, no application for research ethics approval was required.

### 3. Literature Review

#### 3.1 Key AI Literacy Competencies

AI literacy refers to one’s ability to understand and apply AI technologies. While AI is becoming increasingly prevalent in the workspace, many workers have not understood its key competencies [13]. As technology has developed, there has not been an extensive drive to define AI Literacy properly. However, defining the necessary competencies is crucial as these technologies are immersed in the workspace [21]. Yi argues that AI literacy provides a basis for constructing the educational goals and content behind the AI training needed by the workforce [22]. This training builds upon basic digital literacy training but not necessarily upon computational literacy, as the user of the AI system need not be aware of the computational design of the system to be proficient. Within the higher education space, it has been noted that some universities have developed AI literacy training programs, but these programs have not been simplified for a general user [23]. Laupichler *et al.* confirm this view by describing the infancy of AI literacy training in adult education [24]. Their analysis of the training offered highlighted the incorporation of non-essential components focusing on issues such as the mechanics of machine learning, which may not be crucial for developing a basic understanding of AI literacy.

The below table (Table 3) summarises the key concepts identified by authors who described AI literacy competencies. These competencies provide trainers with a framework to develop AI literacy training materials, potentially overcoming the difficulties noted by Laupichler *et al.* [24]. The Ng, Leung, Chu, *et al.* and Long and Magerko [13] definitions dominate the literature, with several other authors reflecting on these competencies [13, 21]. Their competencies are related considering Long and Magerko’s question, ‘What is AI [13]?’ This question connects to knowing and understanding

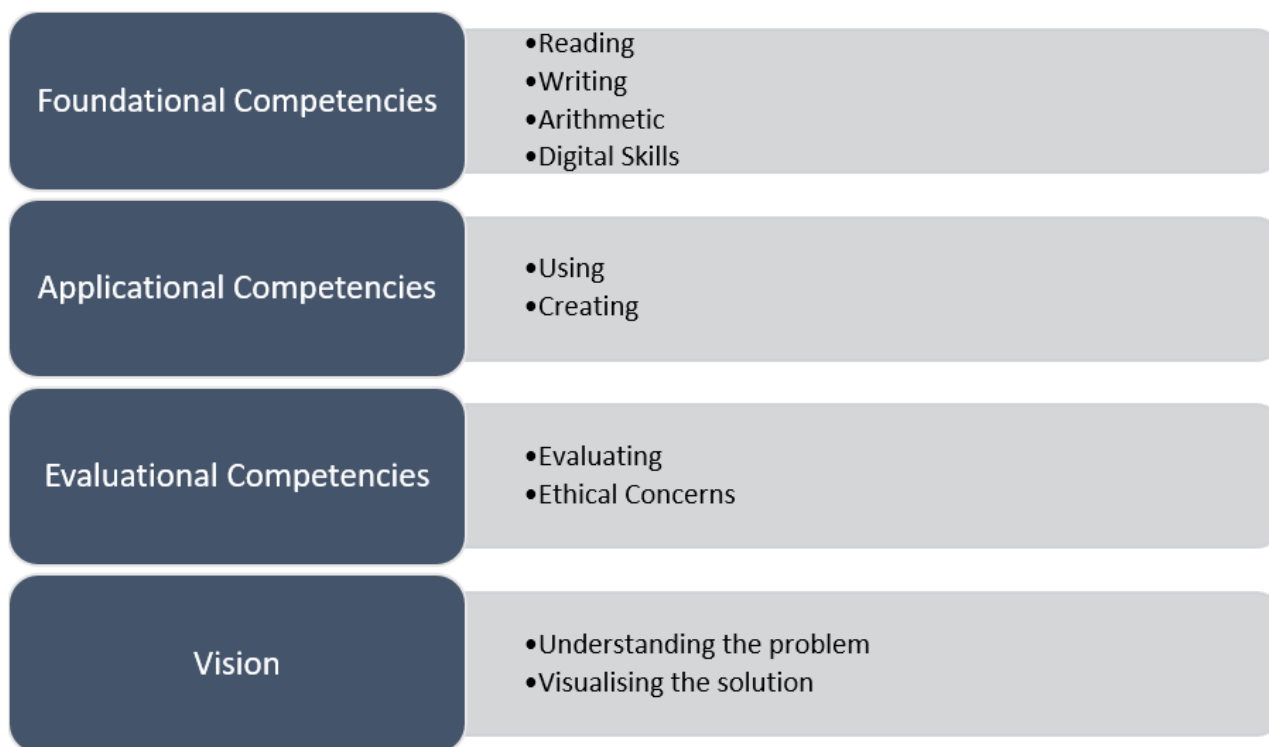
from Ng, Leung, Chu, *et al.* [21]. Similarly, how one applies AI relates to what one can do with it. Understanding how AI works connects to Ng, Leung, Chu, *et al.* knowing and understanding, while the question about how it should be used links to understanding the ethics of AI [21]. Ng, Leung, Chu, *et al.* bring in how one evaluates an AI system and creates content using the system [21]. Southworth *et al.* build upon the Ng, Leung, Chu, *et al.* competencies and add a notion about ‘enabling AI’ [21, 23, 25]. This competency refers to understanding the knowledge and skills underpinning the four previous AI literacy competencies. Thus to understand the AI literacy competency, the learner may require basic digital literacy to consume the content needed to develop knowledge about AI. Certain applications of AI might also require coding and data analysis, and thus the learner may require an understanding of these concepts. Laupichler *et al.* introduce a point related to critical reflection, which connects with evaluating the AI system as described by Ng, Leung, Chu, *et al.* [21, 24, 25].

**Table 3** Summary of AI Literacy Competencies.

Author	Key Competencies
Long and Magerko (2020)	What is AI? What can AI Do? How does AI work? How should AI be used? [13]
Ng, Leung, S. K. W. Chu, <i>et al.</i> (2021)	Know & Understand, Apply AI, Evaluate and Create AI, AI Ethics [21, 25]
Yi (2021)	Functional Literacy (reading, writing, arithmetic), Social Literacy (Critical thinking, Social Practice), Technology Literacy (technological intimacy, designing social future) [22]
Southworth <i>et al.</i> (2023)	Understand, Use, Evaluate, Ethically Navigate, and Enable AI [23]
Laupichler <i>et al.</i> (2022)	“understand, use, monitor, and critically reflect on AI applications without necessarily being able to develop AI models themselves.” [24]

However, Yi's framework differs from the other authors' approach to AI literacy but shares certain similarities [22]. Yi advocates for learners to possess the basic foundations of reading, writing and arithmetic [22]. This foundation is linked to the enabling context referred to by Southworth *et al.* [23]. Yi also describes the need for critical thinking related to Ng, Leung, Chu, *et al.* evaluation competency [21, 22, 25]. In addition, Ng, Leung, Chu, *et al.* discuss needing the ability to create new information, and Yi argues that ‘social practice’ involves understanding the social nature and norms needed to judge the value of a system or output and then create new outputs [21, 22, 25]. Yi's analysis of technological intimacy relates to having the digital literacy needed to be proficient [22]. While Yi does not recognize this as a foundational requirement, it does relate to the point referred to by Southworth *et al.* regarding enabling AI. Yi's last point about the capability to design a social future is novel and not discussed by the other authors [22, 23]. Yi's addition requires the learner to envision a desired future, thereby understanding how a particular problem could be solved if the AI system is employed appropriately. These competencies are summarised in Table 3.

In summarising these competencies, the Figure 1 synthesises these views.



**Figure 1** Synthesis of AI literacy competencies.

While digital skills are a foundational AI literacy competency, the crucial competencies needed to be a proficient Generative AI user involve domain-specific creativity and knowledge. To be proficient in using Generative AI systems, the user must understand such systems' principles, limitations and implications. This knowledge informs their ability to generate novel content. The quality of the content depends on the quality and diversity of the input data used to prompt its creation. A highly skilled prompter can evaluate the output and understand the ethical and legal issues about data ownership, privacy and intellectual property [26]. In addition, the prompt engineer needs industry and technical knowledge. They must also communicate well, analyze problems, and design solutions constrained by available resources and personnel skills [27, 28]. It was also noted that judging quality AI-generated output can be challenging. Content generated through ChatGPT, for example, is often quite convincing and presented in an authoritative voice. A good prompt engineer must be able to discern the quality of the output. The prompt engineer must calibrate the prompt to better direct the large language model to produce reliable outputs [29].

### **3.2 Developing an AI Literacy Training Programme for Employees in the Late Stage of Their Careers**

The launch of ChatGPT and other AI services will likely be the start of new AI services permeating all aspects of our lives. AI systems are believed to augment the capabilities of all people who can access these services, allowing them to achieve their aspirations [30]. AI is also defined as a science or engineering capability that can be applied to solve problems across multiple sectors of the economy. Given this opportunity, expanding AI literacy is crucial for the education sector, requiring the development of AI education programs [31]. The limited literature on AI literacy and education, covering its definition, optimal teaching methods and evaluation criteria, impedes how education



systems can benefit from these tools. In addition, the school system cannot adapt its curricula to the new technology without this analysis [32].

In basic education streams, like the K-12 education system in the United States, AI literacy has started to be integrated through the “AI for K-12” program, which develops guidelines on students in each grade should be exposed to and taught AI literacy [13]. This program has highlighted the value of such training, providing students with an opportunity to imagine future applications of AI. However, similar programs are needed in adult and higher education. These gaps in AI literacy definitions translate into weaknesses in higher and adult education, creating confusion on how to teach such matters to non-experts. These challenges point to a need for future research on how to craft such programs to allow learners to grapple with AI technologies in a meaningful way [32]. Given the synthesis above of AI literacy competencies in *Figure 1*, these programs must integrate technical knowledge, critical thinking and metacognitive skills, where the AI system user understands the mechanics of prompting the system to produce the desired outputs [22]. This variety of skills will require AI literacy training programming to adopt various pedagogical strategies. Authors have described inquiry-based approaches, digital story writing, and student-AI collaboration [31, 33, 34]. Digital story writing is an effective pedagogical approach that integrates multiple media streams and employs disciplines from the arts and sciences [33]. A crucial element of working with these tools involves utilizing creativity and emotional control to produce the most effective results. Such training may be more complicated for younger learners, but adults may have a better sense of self and control when applying such tools [34].

Outputs produced through Generative AI systems are also affected by one’s bias and sense of fairness. Integrating lessons on the ethical usage of such tools is crucial, requiring AI literacy program producers to integrate ideas on how AI can contribute to the social good. When producing new content, learners must understand what constitutes poor usage, legal responsibilities and intellectual property concerns [21]. In early 2023, these issues were widely debated and under legal review in the United States. For instance, AI tools Stable Diffusion and Midjourney are engaged in a copyright lawsuit from artists, claiming that these systems scraped art from online repositories without their consent and trained their systems to mimic their artistic style [35]. This lawsuit grapples with the meaning of artistic inspiration, which is difficult to define in legal terms. Future research must explore the ethics of Generative AI, unpacking these ethical concerns.

Designing an AI literacy program also requires a deep understanding of what system users need and expect and the limitations of the AI system in question. These systems need to integrate the basics of AI, recognize the needs of the target group affected and present the program in a manner that reduces anxieties about AI [36]. The skills needed for lesson design follow from digital story writing skills, highlighting the need for the trainer to be proficient in creating digital content [33]. Further research is needed to explore the design considerations linked to AI literacy and tailor these to the needs of late-career-stage workers.

In developing suitable AI literacy programs, there is a need to produce adequate learning materials which users can access. Creating suitable scenarios to engage with an AI system can be complex. The trainer must deeply understand the problem and recognize how to adapt the program to the student’s needs. The trainer needs the ability to find relevant and suitable information sources, synthesize the materials and evaluate their credibility. In addition, the trainer must be able to pass on these skills to their learners [23, 31, 37].

Ultimately, the skills needed to train learners in the intricacies of AI are nuanced. Passing these abilities to a digitally averse generation of workers could be challenging. However, drawing from literature on promoting digital literacy among a late-career-stage workforce, one can find strategies to achieve this goal.

### **3.3 Strategies for Promoting AI Literacy among Late-Career-Stage Workers**

Given that digital skills among the late-career-stage worker workforce exist on a spectrum, there is a need to draw from digital literacy programs to develop a strategy for their adoption. A series of strategies from the literature has emerged that could be employed to promote digital literacy and may be adapted to developing AI literacy. Firstly, providing access to relevant technology and equipment is a crucial first step [9, 38]. To amass basic digital skills, the learner needs the opportunity to engage with the tool and build familiarity. Concerning Generative AI, the learner will require an account to access the relevant service via the appropriate platform.

A second requirement for digital literacy provision involves formal training programs supported by suitable mentors and coaches that enable late-career-stage workers to develop their digital skills [39, 40]. Among low-income adults in the United States, it was found that providing mentors from a similar socio-economic background to the learner helped build commitment to the training program [41]. One-on-one mentoring was also helpful in contextualizing the training and allowed trainers to break down digital training into different tiers that matched the late-career-stage worker's capabilities [42]. There was also merit in establishing formal training sessions with late-career-stage workers who appreciated the structure offered by the trainers [43]. Such a structure should remain beneficial in offering AI literacy training. However, it is unclear if offering training using a non-human AI guide may be a hindrance or beneficial.

Creating a safe learning environment (the third strategy) is also essential in providing a supportive environment that encourages learning and experimentation [38, 44]. Such spaces foster a healthy environment conducive to completing assigned learning activities. Such an environment allows the learners to trust the space and discuss shared experiences. This feeling of safety must also transcend the digital boundary, allowing the learner to test ideas without concerns of failure or ridicule [45]. Training scenarios that foster consequence-free play, help build the learner's confidence.

Another strategy that emerges from the literature involves co-creating ICT risk strategies with the late-career-stage learner. Co-creation allows the learner to identify potential risks during the training exercise and identify suitable mitigation strategies. Such strategizing builds confidence in their digital tool use [9]. These risks are related to perceived technology risks and the social norms associated with failure. However, by developing fictitious personas and scenarios, the learners could work through problems and realize solutions [9].

As a fifth strategy, it becomes apparent that training programs must account for diversity. Programs must be adapted to the needs and preferences of different learners [9]. In addition, knowledge sharing is improved where there is greater diversity in the group [9]. This diversity relates to socio-economic and cultural backgrounds and digital proficiency [46]. This strategy also ties in with the first strategy related to digital access. Thus, inclusive practices are needed to ensure these learners have consistent access to the AI system [47-49].

Beyond organizational strategies, there is also a need to examine the relevant structural and content-related requirements for an AI literacy training program. Fostering problem-solving skills is crucial, which requires developing their ability to identify, analyze and resolve problems [50]. Developing these skills builds analytical thinking and helps the late-career-stage learner identify how to apply the tool to solve their problem [48]. Within a Generative AI context, the late-career-stage learner may need to confront large amounts of information and practical problem-solving abilities to find a solution.

In addition, these training programs must foster critical thinking skills. When contending with large quantities of information, the learner must apply their mind to evaluate the returned content and make assessments based on the ethical implications of the content. Thus, the training program needs to teach or leverage the late-career-stage learner's socio-technical framing of the complexity of the subject matter [32]. This framing is a central concern and is difficult to teach. Rigid training programs may be unable to construct such an ability. Such abilities are developed over years of experience in a particular field. Crucially, the trainer must recognize that the training program cannot supersede the lived bodily experiences that allow late-career-stage employees to make well-informed decisions [41].

Lastly, technology rapidly evolves, requiring the workforce to adapt to it. Stereotypical views on late-career-stage workers suggest that they are resistant to rapid change. The AI space is likely to evolve more rapidly than the technology space, and the workforce is encouraged to keep pace with it and develop a relationship with it. This view opposes treating the AI service as a tool [51]. Recognizing these changes, AI training programs must foster learning agility that promotes adaptability and familiarity with new technological environments [48, 52, 53].

#### **4. Discussion**

AI and Generative AI, in particular, are expected to become more pervasive across industries impacting technology and non-technology sectors. The above literature review reveals the key AI literacy competencies, crucial components of AI literacy training programs, key strategies for rolling out such programs among late-career-stage workers and the potential impact that AI literacy training may have on this population group. The challenges and successes that late-career-stage workers experienced concerning digital literacy training offer some insights into offering them AI literacy training. The key difference is the value such training may offer the experienced late-career-stage worker.

The literature review also confirms the alignment between the competencies needed to act as a prompt engineer and the skills developed by experienced and late-career-stage workforce members. With greater experience, these workers have developed deep insights into their industry and particular domain. Domain-specific knowledge is crucial when calibrating the relevant prompt to produce content using a Generative-AI system. Digital skills training can provide these workers with the foundational competencies to operate Generative-AI systems. However, in addition to these skills, there is a need for applicational and evaluation competencies whereby the worker can use these systems, generate content and then evaluate the results' usefulness, relevance and reliability. In this regard, the worker requires a vision of the desired output and can craft the necessary prompts to produce this visualization.

Developing and nurturing the relevant competencies for Generative AI has been a challenge. This challenge stems from an unclear AI literacy definition, let alone an unclear Generative AI literacy definition. Different authors have attempted to define AI literacy and identify the relevant competencies. The Ng, Leung, Chu, *et al.* and Long and Magerko definitions are the most commonly cited, while Yi's framework differs but shares certain similarities [13, 21, 22]. While the definitions of AI literacy vary, there may be an assumption of what constitutes AI literacy, with little reference to the literature.

The review of digital literacy training impacting the late-career-stage workforce literature reveals a positive relationship. The increased knowledge of technology and digital skills promotes their contribution to the digital economy. Their training and access to digital infrastructure have provided the late-career-stage digital user greater autonomy in their participation in the digital economy [11]. Accordingly, state investments in digital infrastructure allow early and late-career-stage digital users to strengthen their digital competencies [39]. Public facilities, like libraries, have also been found to offer safe spaces for digital literacy training, allowing trainers and learners access to public digital infrastructure. Libraries were also appreciated by these learners who had frequently visited such locations [44]. To advance AI literacy, digital users require access to AI infrastructure, such as cloud infrastructure, basic digital infrastructure and online AI learning platforms, to become proficient in using AI services. These platforms allow late-career-stage learners to access AI learning materials and provide a collaborative and supportive environment that teaches learning [52].

Older beneficiaries of digital literacy training recount the value of their training, noting that various services can only be accessed online. More often, their digital literacy becomes necessary to be productive in the modern age [44]. Digital literacy training has also taught late-career-stage learners to find and evaluate information. These are crucial professional skills required in most industries, not just the information technology sector [39]. By improving the digital literacy of late-career-stage workers, the training also boosted their life satisfaction, as the worker could play a more crucial role in their respective organizations [40, 54].

The AI age may already be upon us, particularly as we note how AI technology and services have become more pervasive and influential in society. This transition toward AI will require a new set of professional skills needed to create and share AI-generated content [55]. The impacts experienced by late-career-stage workers as they underwent digital literacy training could apply to AI literacy provision. AI literacy training could further contribute to the life satisfaction of late-career-stage workers if their proficiency with Generative AI tools allows them to play more strategic roles within their respective firms. These tools could automate repetitive tasks, allowing them to focus on higher-level strategic thinking and decision-making, thereby aiding their sense of fulfillment [56].

Given this discussion, the key findings related to the study's research questions are outlined in Table 4.

**Table 4** Main findings of the study per research question.

<b>Research Questions</b>	<b>Main Findings</b>
What are the key AI literacy competencies that must be developed among late-career-stage workers?	<ul style="list-style-type: none"> <li>Employers should integrate domain-specific knowledge into their AI literacy training programmes, helping late-career-stage workers to calibrate their prompts in a training environment.</li> </ul>

How should AI literacy training programs be structured to benefit late-career-stage workers?

What might the potential impact of AI literacy training be on late-career-stage workers?

- Late-career-stage workers need opportunities to engage Generative AI systems, developing their application and evaluation competencies during training. Such opportunities will develop their ability to generate content and determine the reliability of the output.
  - AI literacy programmes must integrate domain-specific knowledge, critical thinking and metacognitive skills.
  - Workers need an opportunity to reflect and critically evaluate the output content.
  - AI literacy programme structuring can draw from digital literacy programmes on developing appropriate learning platforms and collaborative environments.
  - Late-career-stage workers will benefit from an enhanced strategic role within their companies, contributing to higher-level strategic decision-making.
  - These workers will gain a sense of fulfilment, seeing the product of their life experience, guiding the utilisation of AI tools.
  - Through Natural Language Processing, the late-career-stage worker is a more direct participant in the digital economy.
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## 5. Conclusions

As the digital economy expands, businesses realize the growing significance of AI literacy training. However, many industries have yet to fully grasp the rapid emergence of Generative AI technologies and their potential benefits for their workforce. While some employees are apprehensive that AI technologies may render their skills outdated, inadequate attention has been given to the valuable insights and knowledge these tools can provide businesses.

Late-career-stage workers are often overshadowed by their younger counterparts, who possess more recent qualifications or knowledge of the latest popular tools. However, Generative-AI tools have become intuitive and respond well to natural language. The reduced technical complexity makes basic literacy, digital literacy, and business knowledge powerful enablers to extract desired content from Generative-AI systems.

Previously, digital literacy may have been a barrier to the older workforce's participation in the digital economy. But with the advent of Generative-AI systems, AI literacy training can empower the late-career-stage worker, enabling them to participate more strategically in the digital economy. This change emphasizes the importance of business knowledge in the labor market, allowing late-career-stage workers to develop their AI literacy and take advantage of this moment.

This study reveals that the AI literacy programs for late-career-stage workers must include domain-specific knowledge, requiring employers to devise custom programs unique to their environment. Integrating such knowledge will teach workers to apply generative AI tools and evaluate the subsequent output. These programs must also develop critical thinking and metacognitive skills. Such AI literacy training for the late-career-stage worker yields benefits beyond

career advancement. Empowered with this training, late-career-stage workers will have added opportunities to access strategic roles in their companies, further contributing to their sense of fulfillment. Their increased participation in the digital economy can benefit society as a whole. As more late-career-stage workers contribute to the digital economy, their diverse perspectives can lead to innovative business solutions and outcomes, contributing to economic growth.

Despite these benefits, further research is needed to identify the most effective ways of delivering AI literacy training to late-career-stage workers. Additionally, new research should explore the barriers preventing older workers from accessing AI literacy training and how to overcome them.

With AI literacy, late-career-stage workers can become strategic participants in the digital economy, benefiting themselves, their employers, and the economy as a whole. Ultimately, AI literacy training can rejuvenate the contribution of the older workforce to the digital economy. Future research should continue to explore this area to optimize the benefits of AI literacy training for the older workforce.

### **Author Contributions**

The author is the sole contributor to this article.

### **Competing Interests**

The author declares that no competing interests exist.

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