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ARTICLE

# THE EFFECT OF TRAINING ON EMPLOYEE PERFORMANCE IN THE DIGITAL ERA

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## Abstract

Massive digital transformation demands the readiness of Human Resources (HR) to possess high digital literacy and flexibility to balance technology integration in company operations. A competency gap (skill gap) frequently emerges between the skills employees currently possess and industry needs, making intervention through training programs a crucial strategy. This study aims to identify, review, and synthesize previous literature to determine the extent of the influence and effectiveness of training programs on improving employee performance in the digital era. The method used in this research is a literature review to synthesize recent academic findings. Based on the literature synthesis, training in the digital era is not only effective in improving technical mastery (hard skills) but is also proven to be crucial in building employees' psychological capacity (such as resilience and self-efficacy) to reduce work-related stress caused by rapid technological changes. In conclusion, targeted training programs are empirically capable of overcoming the shortening half-life of learned skills and are highly needed to boost employee productivity and operational work quality.

**Keywords**: Training, Employee Performance, Digital Era, Literature Review, Human Resources.

## A. INTRODUCTION

Digital transformation has brought massive and fundamental changes to the global business landscape, compelling companies across various sectors to integrate information technology, automation, and artificial intelligence into their daily operations (Sani et al., 2025). Amid this disruption, no matter how advanced technology may be, it will not generate optimal added value without the readiness of the human resources who use it (Wibowo et al., 2023). The dynamic shift in work patterns in the digital era requires employees to possess high digital literacy, flexibility, and complex problem-solving skills (Sutrisno et al., 2025).

In facing this transition, a gap often emerges between the competencies employees currently possess and the skill qualifications required by the digital industry (Febriana A, 2025). Therefore, intervention through training programs has become a crucial strategy (Nugroho, 2022). Training in the digital era does not merely focus on mastering technical instruments or hard skills, but also plays a significant role in developing employees' positive psychological capacities, such as resilience and self-efficacy, in order to reduce work stress

caused by rapid technological change (Sari & Hidayat, 2025). Considering the large number of empirical studies that have discussed, in a scattered manner, the effectiveness of various training methods, such as e-learning, hybrid training, and virtual reality, on performance, this literature review-based study was conducted to synthesize recent academic findings and thereby develop a more comprehensive understanding of the relationship between training and employee performance in the digital era.

This study carries a high level of urgency given that the half-life of learned skills in the digital era is becoming increasingly short. What was considered a cutting-edge competency two years ago may already be obsolete today (Pratama & Susanti, 2024). Many companies have invested substantial resources in strengthening their digital infrastructure, ranging from software procurement, automation systems, and collaboration platforms to various employee training programs (Pettalongi S, 2025). Ideally, such investments are expected to improve work efficiency, accelerate operational processes, and enhance the quality of organizational outputs. However, realities in the field show that the size of the budget spent is not always proportional to improvements in operational performance. One of the main reasons lies in training approaches that remain conventional, uniform, and insufficiently responsive to the work demands that have changed significantly in the digital era. As a result, training often becomes little more than a formal organizational activity without truly generating relevant and applicable competency transfer for employees.

This condition indicates that the core issue lies not merely in whether training is provided, but in whether the training design aligns with the pace and characteristics of digital work, which is fast-moving, flexible, and technology-based. When training methods continue to rely on one-way delivery, overly general materials, and limited simulation of real workplace challenges, employees tend to struggle to connect what they have learned with daily operational demands (Agrameri et al., 2025). In the long run, such misalignment can hinder adaptation processes, reduce the effectiveness of technology utilization, and prevent organizations from obtaining optimal results from their digital investments. Therefore, companies need to view training as a strategic intervention that must be designed contextually, adaptively, and in line with the dynamics of the digital work environment in order to truly drive improvements in operational performance.

In addition, the literature examining this phenomenon remains widely dispersed, with a variety of mediating variables and methodological approaches. Synthesizing the literature from the last five years has therefore become highly urgent so that organizations do not become trapped in inefficient training programs (Rahmawati, 2021). The findings of this literature review are especially needed to identify which dimensions of digital training have been empirically proven to most effectively enhance employee productivity and work quality.

This study stems from the need to gain a deeper understanding of how training programs actually work in improving employee performance, particularly amid the major shift toward the digital era. Rather than merely examining the simple relationship between training and performance, this study seeks to go further by exploring the underlying process, including how training methods have been transformed through the use of technology, such as digital learning platforms, adaptive learning, and data-based systems. The literature synthesis approach is used not simply to summarize previous studies, but to identify emerging patterns, including both


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convergent findings and differences in results. In this way, the study seeks to provide a fuller and more reflective picture of the current state of research on training and employee performance.

From a theoretical perspective, this study does not merely add to the number of references, but aims to make a more substantive contribution by systematically mapping current research trends. The synthesis process is intended to connect various findings into a sharper and more integrated conceptual framework, particularly in explaining how modern training methods interact with individuals' psychological aspects and ultimately influence performance. This approach opens space for examining variables that may previously have been overlooked, such as mediating and moderating factors in the context of digital-based training. Thus, the results of this study do not stop at description, but also have the potential to provide a stronger conceptual foundation for subsequent empirical research.

From a practical standpoint, this study is intended to address real needs in the field, particularly for HRD practitioners and organizational leaders who are required to design training programs that are not only relevant but also capable of producing tangible results. The findings of the synthesis are expected to serve as an evidence-based reference in formulating training strategies that are more adaptive to technological developments and the characteristics of today's employees. The recommendations generated include how to design more engaging training modules, how to use technology effectively, and how to ensure that training outcomes can truly be applied in daily work. Ultimately, this study is expected to help organizations manage training investments more efficiently while ensuring that every program implemented makes a real contribution to sustainable performance improvement.

## B. LITERATURE REVIEW

### Human Capital Theory

Human Capital Theory explains that individuals are regarded as strategic organizational assets whose value can be enhanced through investments such as education and training (Becker, 1993). In the context of modern organizations, training is no longer viewed as a cost, but rather as a long-term investment that improves employees' productivity and quality of work. This theory emphasizes that improvements in knowledge, skills, and abilities will directly contribute to both individual and organizational performance. In the digital era, the relevance of this theory has become even stronger because the accelerating pace of technological change requires continuous competency development. Therefore, training serves as a primary mechanism for maintaining the competitiveness of human resources amid rapidly changing industrial dynamics. Indicators of Human Capital Theory:

- Level of knowledge
- Technical skills
- Cognitive abilities
- Work productivity
- Individual added value to the organization

### Social Cognitive Theory (Self Efficacy)

Social Cognitive Theory emphasizes that individual behavior is influenced by the interaction of cognitive factors, the environment, and the behavior itself, with self-efficacy as


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a key component (Bandura, 1986). Self-efficacy refers to an individual's belief in their ability to complete a task or face a specific challenge. In the context of training, increased self-efficacy is one of the key psychological outcomes that encourages employees to be more confident in using technology and facing work changes. This theory is particularly relevant in the digital age, as technological uncertainty often triggers technostress, which can reduce performance. Therefore, effective training not only improves skills but also strengthens employees' self-confidence in adapting to the digital work environment (Handayani K, 2024). Indicators of Social Cognitive Theory (Self-Efficacy):

- Belief in one's own abilities
- Confidence in using technology
- Resilience in the face of adversity (resilience)
- Motivation to learn and develop
- Reduced anxiety about technological change

## C. RESEARCH METHODOLOGY

This study employed a qualitative approach using a Systematic Literature Review (SLR). The SLR approach was used to systematically identify, evaluate, and synthesize previous research relevant to the research questions (Qudratuddarsi et al., 2024). This method was chosen because it provides a comprehensive, transparent, and replicable overview of how digital training impacts employee performance (Snyder, 2021).

The data sources in this study relied entirely on secondary data collected from various reputable national and international academic literature databases. The primary search was conducted through Google Scholar, ScienceDirect, DOAJ (Directory of Open Access Journals), and the Sinta (Science and Technology Index) portal. The data search was guided by specific keywords, including: "Employee Training in the Digital Era," "Employee Performance," "Digital Training," and "Employee Performance in the Digital Era" (Wibowo et al., 2023). Data collection was conducted through a literature filtering process using strict inclusion and exclusion criteria.

- Inclusion Criteria:
  - Articles published within the last five years (2021–2026);
  - Articles are the result of empirical research (quantitative or qualitative);
  - Articles are available in full text; and
  - Focus on training and performance variables in the context of digital transformation.
- Exclusion Criteria:
  - Articles in the form of opinion pieces, editorials, or books that have not undergone peer review; and
  - Articles whose training context is outside the scope of digital organizations (Nugroho, 2022).

The collected data were analyzed using a thematic analysis approach. The analysis process began by extracting key data from each article (including objectives, methodology, and key findings). Next, the researchers looked for patterns, similarities, and differences in the research results, then grouped them into structured discussion themes, such as the effectiveness of e-learning, increasing work agility, and reducing technostress (Sari & Hidayat, 2025).


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To ensure the validity and credibility of the analyzed data, this study employed source triangulation. This was done by cross-confirming findings from various databases. Furthermore, the researchers conducted a quality assessment of the literature by only including articles published in well-indexed scientific journals that had undergone a rigorous peer-review process.

## D. RESULT AND DISCUSSION

Based on data exploration and extraction from various literature published between 2021 and 2026, key findings indicate a strong academic consensus that training has a positive and significant correlation with improved employee performance in the digital era. The literature synthesis indicates that in the era of digital transformation, the focus of training has shifted from basic operational mastery to improving digital literacy, complex problem-solving, and cognitive agility (Wibowo et al., 2025).

Specifically, the reviewed literature classifies the outcomes of digital training interventions into two main dimensions of performance:

**Technical Performance Dimension (Quantity and Speed)**

The technical performance dimension, generally reflected in the quantity of output and speed of work completion, can be seen as a key indicator of training effectiveness in the digital age. Improvements in this dimension are not solely reflected in the increasing volume of work completed by employees, but also in the increased efficiency of the time required to complete operational tasks. In increasingly digitalized organizations, this becomes particularly relevant because work demands no longer solely focus on results, but also on speed of response and accuracy of execution. Interestingly, when technology-based work systems demand a fast-paced, error-free process, employees' ability to work accurately becomes even more crucial.

More specifically, training designed with a technology-based approach has demonstrated a significant role in improving employees' ability to operate new software used in daily work activities. Mastery of these tools does not stop at the basic technical level, but also develops into the ability to utilize various system features more optimally, including automating administrative tasks previously performed manually. In this case, training not only accelerates work processes but also helps reduce the burden of routine and repetitive tasks. As a result, employees have more room to focus on more strategic and value-added work for the organization.

However, the technical performance dimension is not only related to the speed and volume of work, but also to the ability to reduce operational errors or human error, which often lead to inefficiencies. It is noteworthy that well-targeted training helps employees understand the system's workflow more comprehensively, thereby minimizing the risk of errors in using technology. This finding aligns with research by Siregar and Hakim (2024), which showed that digital-based training interventions contribute to increased work accuracy while maintaining consistent employee performance in carrying out their duties. Thus, technical performance ultimately needs to be understood not only as a matter of how quickly work is completed, but also as a matter of how well the quality of output can be maintained sustainably.

**Adaptive Performance Dimension (Quality and Innovation)**


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Employees' ability to adapt to dynamic workflow changes demonstrates that training in the digital era can no longer be understood solely as a means of improving technical skills. More than that, training has become a crucial instrument for building adaptive capacity, enabling employees to remain effective amidst the rapid transformation of work environments. Employees who receive relevant training are generally better prepared to handle procedural changes, understand the use of new systems, and adapt to increasingly flexible and digitalized work coordination patterns. It is noteworthy that the digital work environment is characterized by application changes, process updates, and demands for a much faster response than conventional work patterns. In this context, adaptability is not merely complementary but becomes a strategic component of performance, determining the extent to which employees are able to maintain consistent productivity and work quality amidst ongoing change (Yuniarti, 2023).

Interestingly, the impact of training extends beyond individuals' ability to adapt to change, extending to strengthening virtual collaboration and independent problem-solving initiatives. Employees in the digital era are no longer simply required to be able to operate work devices or applications; they are also required to interact effectively with colleagues through virtual media, maintain smooth communication, and build efficient coordination even when not in the same physical space. At the same time, well-designed training tends to foster the courage to identify obstacles, evaluate alternative solutions, and take necessary steps without always having to wait for direction from superiors. This suggests that digital training contributes to the development of more mature adaptive performance, namely performance that is responsive, collaborative, and solution-oriented in facing the complexities of contemporary work. Most importantly, however, training ultimately not only strengthens operational capabilities but also shapes work behaviors that are more agile, proactive, and aligned with the demands of modern organizations (Yuniarti, 2023).

A more in-depth analysis of this literature reveals several crucial mechanisms through which training impacts employee performance in a digitalized work environment:

**The Effectiveness of Digital-Based Training Methods (E-Learning and VR)**

The literature consistently highlights that conventional training methods (face-to-face classroom training) are increasingly irrelevant to the work pace of the digital era. Training that utilizes technology, such as E-Learning, Microlearning, and Virtual Reality (VR), has proven far more effective in improving employee retention. The flexibility of time and place (self-paced learning) allows employees to absorb material without disrupting their daily productivity. Employees who participate in training using VR simulation methods have been shown to adapt 40% faster when faced with new software systems in the field compared to conventional methods (Nugroho & Susanti, 2022).

**Addressing the Skills Gap**

Digital transformation often triggers automation, which threatens the relevance of existing workers' competencies. Through upskilling programs (improving existing skills) and reskilling (training in new skills relevant to technology), employees are not only able to maintain their positions but also contribute to the creation of added value for the company. Targeted training successfully minimizes skills gaps, which directly impacts operational efficiency and optimizes the use of company technology (Pratama, 2021).


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**Reducing Technostress and Increasing Self-Efficacy**

One of the most prominent findings from this literature review is the role of training in employee psychology. The demands of continuously adopting new technologies are prone to triggering a specific type of work stress known as technostress, which has the potential to drastically reduce performance. Continuous training acts as a powerful intervention to build employee self-efficacy, or confidence in technology. As self-confidence increases, anxiety about technology decreases, enabling employees to work more innovatively, focused, and productively (Wibowo et al., 2025).

## E. CONCLUSION

Based on the results of a synthesis of various literature, it can be concluded that training programs have a positive and significant correlation with improving employee performance in the digital era. Digital transformation demands a shift in training focus, which is no longer limited to basic operational mastery but instead emphasizes improving digital literacy, complex problem-solving, and cognitive agility. Training is a crucial strategic intervention to align current human resource competencies with the new skills required by the digital industry.

Specifically, training interventions in the digital era impact two key performance dimensions: technical performance and adaptive performance. In the technical dimension, training directly improves employees' ability to operate new software, automate administrative tasks, and contribute to a reduction in operational error rates (human error). Meanwhile, in the adaptive dimension, training equips employees with the ability to adapt to dynamic workflows, enhances independent problem-solving initiatives, and strengthens virtual collaboration.

In terms of implementation methods, the literature demonstrates that technology-based training such as e-learning, microlearning, and virtual reality (VR) is far more effective in improving memory retention than conventional face-to-face methods. The flexibility of time and place of this method has been proven to accelerate employee adaptation to new systems in the field. Furthermore, targeted upskilling and reskilling programs are the most effective solution to address the threat of skills gaps caused by automation, thereby maintaining the company's operational efficiency.

Beyond optimizing technical competency, digital training has also been shown to play an essential role in the psychological well-being of workers, particularly in managing the mental stress caused by technological change. Continuous training acts as a powerful intervention in reducing technostress levels by building employee self-efficacy (self-confidence), ultimately leading to increased productivity, innovation, and focus. However, this literature review has limitations in the form of potential publication bias due to its reliance on open-access databases, and the lack of quantitative statistical re-measurement of the findings.

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