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A Study on Emerging Trends in Training and Development on Information Technology and Manufacturing Sector in Bengaluru

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ABSTRACT:

Training and development in today's fast changing world, training and development have become vital for organizations to thrive. With globalization, tech advancements, and shifting workforce expectations, companies are rethinking how people learn at work. This study explores how digital tools like e-learning, AI, and simulations are shaping training, especially in IT and manufacturing. It shows a clear shift toward individualized, experiential, and adaptable learning via internships, gamified experiences, and mobile apps. But issues like insufficient support for diverse learners, digital fatigue, and skill mismatches still exist. The research calls for a more inclusive, practical, and human-centred approach to prepare workers for the future.

Keywords: *Digital Learning, Personalized Training, Experiential Learning, Inclusivity, Workforce Readiness*

INTRODUCTION:

Training and development are processes used to improve the knowledge, skills, talents, and competencies of workers of an organization in the area of human resource management (HRM). The practices are designed to enhance the welfare and development of employees, enhance organizational and individual performance, and align the labour force with the strategic goals of the firm.

An organization's overall strategy to improve employee performance, skills, and knowledge must include training and development as key elements. They include systematic initiatives to raise personnel abilities, guarantee their professional development, and match their aptitudes with the aims and purpose of the company. While development focuses on more general personal and professional growth, training refers to the process of obtaining specific skills, information, or competencies required for a given job or task.

Programmers for training and development are designed to fill skill gaps, improve performance, encourage employee engagement and retention, and support organizational success. These programs can be conducted in a number of ways, such as conventional classroom instruction, on-the-job training, online learning modules, workshops, seminars, mentoring, coaching, and more.

RESEARCH OBJECTIVES:

- To explore recent and emerging trends in organizational training and development practices.
- To determine how technology is changing training approaches. (modern v/s traditional training methods)
- To analyze employee and managerial perceptions of modern training tools and techniques.
- To evaluate the effectiveness of digital training tools in enhancing employee skills and performance.
- To suggest strategies for implementing innovative training approaches in organizations.

REVIEW OF LITERATURE:

Eduardo Sales, Jains A, et.al (1997) - "The Science and Practice of Training Current Trends and Emerging Themes." Organizations invest heavily in both formal and on-the-job training, spending billions annually. To justify this investment, it's essential to evaluate training's impact on business outcomes, effectiveness, and design. Key questions include how to ensure learning is retained, applied, and aligned with organizational goals. Addressing these concerns requires thoughtful planning, purpose-driven content, and effective learning environments.

Tanuja Agarwala, et.al (2002) - "Human Resource Management, The Emerging Trends." The article highlights the evolving role of Human Resources in today's competitive environment, driven by technological advances, new work models, and cost pressures. It explores the need for innovation across HR functions like recruitment, training, and rewards, and identifies outcomes linked to these innovations. The study also presents examples of emerging HR practices and emphasizes the growing need to measure HR effectiveness. Published in The Indian Journal of Industrial Relations, the journal is a respected, peer-reviewed platform for HR research and policy discussions.

Elizabeth T, Welsh, et.al (2003) – "E- learning emerging uses, empirical results and future directions." This study reviews both research and practitioner perspectives on learning in training and development. It's potential challenges and insights from industry experts, offering a glimpse into its future role in organizational learning.

Subedi, et.al (2004) – "Emerging Trends of Research on Transfer Learning" The concept of transfer of training, applying learned knowledge, skills, and attitudes from training to the workplace, is central to adult learning and human performance. Despite growing interest, especially in Western industrialized contexts, research on effective strategies for facilitating transfer remains limited. Existing studies categorize influencing factors into three main areas: trainee characteristics, training design and delivery, and the organizational environment.

Portz, et.al (2021) – "Next Generation" This study examines the shift from traditional test score-based accountability to "next generation" models that use broader learning goals and multiple metrics. Using a policy design framework, it compares accountability systems in New York City, Los Angeles, and Chicago across four elements: goals, actors, metrics, and consequences. The trend highlights a move toward school improvement and diverse data use.

LRK Krishnan, et.al (2022) – "Emerging Trends in Training Knowledge Workers New Economy." The study explores emerging training trends for knowledge workers in a fast-paced, multigenerational workforce. It emphasizes the importance of customized learning to meet millennial needs, enhance performance, and boost engagement. Globalization and technological shifts demand strategic, cost-effective training approaches. A three-month qualitative study confirmed these trends and aligned with existing research, highlighting the link between tailored training and workforce effectiveness in emerging economies.

Ng, et.al. (2022) – "Higher Education and Job Employability, Knowledge Studies in Higher Education." This book explores emerging trends in higher education across the Asia Pacific, focusing on graduate attributes, work readiness, employability, and career development. It combines theoretical and empirical insights to guide institutions in enhancing employability through vocational training, internships, and skill development aligned with real-world demands.

Kelly O'Donnell, et.al (2023) – "Training Trends Signal a Middle Skills Gap, A Quantitative Study of Training Dollars Spent in Central Ohio". This study examined whether Central Ohio employers' training investments between 2017 and 2022 helped to close the middle skill gap. Middle-skill jobs require some college, certifications, or hands-on training, but not a 4-year degree. Despite growing demand and expansion by major tech companies like Google and Amazon, the analysis showed training investments remained unchanged. This indicates a lack of adequate preparation to meet the rising need for middle-skill workers in the region.

Liu Di, et.al (2023)- "The use of steam education in the training of music teachers." The article emphasizes that integrating STEM education into economics curricula equips future economists with essential analytical, technological, and problem-solving skills for the digital economy. It highlights the importance of digital tools, interdisciplinary learning, and stakeholder collaboration in fostering innovation and economic growth.

Mustafizur Rahman Masum, et.al (2023)- "Emerging Technologies Training Courses & Consulting services" The Emerging Technologies Training Course by Tones offers a comprehensive overview of cutting-edge technologies like AI, blockchain, Internet of Things, Virtual Reality/Augmented Reality, and quantum computing. Aimed at professionals and decision makers, it equips participants with strategic insights, practical applications, and tools to drive innovation and digital transformation. Delivered through interactive lectures and case studies, the course fosters a forward-thinking mindset essential for thriving in the digital age.

Ms Bhumika, et.al (2024) – Employee Training and Development in the 21st Century, Trends and Innovation." The evolution of employee training from traditional classroom models to modern, tech-driven approaches has been shaped by globalization and digital transformation. It reviews key training theories, including Kirkpatrick's evaluation model and Bandura's Social Learning Theory. Current trends that are emphasized for their ability to increase engagement and adaptability include gamification, VR, microlearning, mobile learning, and AI-driven personalization. The paper emphasizes the shift toward continuous, agile learning cultures, offering a strategic roadmap for organizations in the 21st century.

Shelley l, et.al (2024) – "Promoting Community and Competence, The Development and Evaluation of an International Research Training Network of Sexual and Gender Diverse (SGD)" This article evaluates the International Student Training Network (ISTN), a bilingual two-year program aimed at enhancing research skills among sexual and gender diverse (SGD) emerging scholars across Canada, the USA, Mexico, and the UK. The program significantly improved participants' research competence and academic confidence. Thematic analysis highlighted three key benefits: fostering an inclusive scholarly community, bridging disciplinary and geographic divides, and transforming academic self-concept. The study underscores the importance of specialized, inclusive research training for underrepresented SGD scholars.

Gail Burrill, etc. al (2024) – "Emerging Trends in Statistics Education." This narrative review explores emerging trends in statistics education driven by technological advances in data collection and communication. Analyzing 50 key papers, the study identifies four major themes shaping future

research: Data Science, Vassalizing Statistical Concepts, Social Statistics, and New Learning Contexts, emphasizing the need to rethink what and how statistics is taught.

Lorenzaj Harris, et.al (2025) – "How Emerging trends in AI Are Shaping the Future of Health Care Quality and Safety." AI is transforming healthcare by improving diagnostics, reducing errors, and enabling personalized treatments through data-driven tools like machine learning and automation. While these advancements enhance patient safety and clinical efficiency, they also raise ethical concerns around data privacy, bias, and the need for proper clinician training. Responsible integration is key to building a more intelligent and equitable healthcare system.

Wen Zhang, et.al (2025) - "Research of trends in demand for STEM skills in the economic sectors." The study highlights the growing global demand for STEM skills in economics, driven by digitalization across sectors. It finds that many economic roles now require programming or AI knowledge, with regional variations in skill focus. Ukraine, in particular, must enhance STEM education and align training with global trends to remain competitive. Recommendations include teaching Python and SQL, interdisciplinary courses, and partnerships with the IT sector.

John Motsamai Modise, etc. al (2025) – "Emerging trends in crime, exploring new and evolving crime trends and their implications for prevention strategies." The article examines the rise of cybercrime, financial crime, and dark web activity driven by globalization, technological advances, and social change. It emphasizes the urgent need for public awareness, international cooperation, and adaptive law enforcement strategies. A collaborative, multi-sector approach is essential to ensure security and stability in the digital age.

Arika Palapa, et.al (2025) – "Mapping Research Trends in Maritime Education and Training, A Bibliometric Analysis." The study analyzes recent trends in Maritime Education and Training (MET), highlighting a strong focus on regulatory compliance and digital learning. However, it identifies key gaps in areas like simulation-based training, active learning, and cybersecurity. Future research should prioritize innovative, tech-enhanced approaches to better prepare maritime professionals for evolving industry demands.

Jay Fie Paler Luzano, et.al (2025) – "New Frontier in Mathematics Education, A Review of Emerging Trends and Critical Issues on Artificial Intelligence." This study examines the use of ChatGPT in mathematics education through a systematic literature review, identifying three emerging trends: personalized learning, integration with virtual environments, and collaborative learning. It also highlights critical issues such as algorithmic bias, data privacy, and ethical use. The study recommends collaboration among educators, policymakers, and developers to address these challenges while leveraging ChatGPT's potential to enhance math instruction.

RESEARCH GAP

	CITATION	DESIGN OF RESEARCH	OBJECTIVE OF RESEARCH	FINDINGS OF RESEARCH
01	Eduardo Salas (1997)	Conceptual and Exploratory research design	To explore the value, effectiveness, and optimization of training programs within organizations.	Effective training requires strategic alignment with organizational goals, thoughtful design, and mechanisms to evaluate learning transfer and performance impact.
02	Tanuja Agarwala, et.al (2002)	Qualitative analysis research design	To identify drivers and trends influencing innovation in HR practices and assess their impact on employee and organizational outcomes.	Innovative HR practices, driven by technological, economic, and structural changes, enhance employee engagement and organizational performance.
03	Elizabeth T, Welsh (2003)	Qualitative	To explore the adoption, effectiveness, and future of e-learning in organizational training and development.	E-learning offers flexible and scalable training solutions, but faces challenges in learner engagement and content effectiveness.
04	Subedi (2004)	systematic literature	To examine the concept of transfer of training and identify key factors and strategies that support the application of learning from training to real workplace settings.	Successful transfer of training is influenced by three main factors: trained attributes, training design, and the workplace environment, highlighting the need for an integrated approach to maximize training

				effectiveness.
05	Portz (2021)	Qualitative and Quantitative research design	To explore how higher education in the Asia Pacific can better prepare graduates for the workforce by aligning education with real-world job demands.	Effective employability development relies on integrating practical experiences like internships and vocational training with academic learning to help graduates transition smoothly into the job market.
06	LRK Krishnan (2023)	Qualitative research design	To examine emerging training trends for knowledge workers, focusing on millennial learning needs and workplace performance.	Customized, tech-based training enhances millennial engagement, linking learning needs to improved job performance.
07	Ng (2022)	Mixed-methods research design	To examine how higher education institutions in the Asia Pacific can improve graduate employability through skill-based and industry-aligned education.	Integrating vocational training and real-world experiences into higher education significantly boosts graduates' job readiness and career success.
08	Kelly O'Donnell	Quantitative research design	To evaluate if employers in Central Ohio increased training investments to bridge the middle-skills gap between 2017 and 2022	Despite rising demand, employers did not significantly increase training investments, leaving the middle-skills gap unaddressed.
09	Liu Di, (2023)	Qualitative	To investigate how STEAM education impacts the development of critical and creative skills in future music teachers.	STEAM education enhances music teacher training by fostering critical thinking, creativity, and interdisciplinary understanding.
10	Mustafizur Rahman Masum (2023)	Exploratory and Descriptive research design	To provide professionals with strategic knowledge and practical insights into the latest emerging technologies and their applications.	Emerging technologies like AI, IoT, and blockchain are critical drivers of innovation and offer significant competitive advantages across industries.
11	Ms. Bhumika (2024)	Qualitative	To examine the evolution and emerging trends in employee training and development in response to technological and organizational changes.	Modern training approaches are increasingly agile, personalized, and technology-driven, aligning with the dynamic needs of today's workforce.
12	Shelley L (2024)	Qualitative and Quantitative	To enhance research skills and academic confidence among sexual and gender diverse (SGD) emerging scholars through an inclusive international training program.	The program significantly improved participants' research competence, fostered an inclusive academic community, and transformed their self-perception as scholars.
13	Gail Burrill (2024)	Delphi methodology	To explore and highlight future directions and innovative themes shaping the teaching and learning of statistics.	Four key themes, Data Science, Visualizing Statistical Concepts, Social Statistics, and New Learning Contexts, are reshaping how statistics education is approached and

				understood.
14	Lorenzaj Harris (2025)	Qualitative research design	To explore how emerging AI technologies enhance health care quality, ensure patient safety, and address implementation challenges.	AI significantly improves diagnostics, reduces errors, and personalizes care, though ethical concerns and clinician readiness remain key challenges.
15	Wen Zhang (2025)	Qualitative and Quantitative research design	To analyse global and regional trends in demand for STEM skills in the economic sector and assess implications for economic training	The study reveals that mastering tech skills like Python, AI, and data analysis is now essential for economists to thrive in a digital-first job market.
16	Dr. John Motsamai Modise (2025)	Qualitative research design	To explore and evaluate the causes, nature, and impact of emerging crime trends and propose comprehensive prevention strategies.	Rising cyber and financial crimes fueled by tech, globalization, and societal change demand urgent, joint action to protect public safety and economic stability.
17	Arika Palapa, (2025)	Bibliometric analysis	To analyse current research trends in MET and identify underexplored areas needing further investigation.	While MET research focuses on compliance and digital learning, it lacks attention to active learning, simulation training, and cybersecurity, key areas for future-ready maritime education.
18	Jay Fie P. Luzano, (2025)	systematic literature	To investigate how ChatGPT is being used in mathematics education, focusing on both its emerging benefits and the challenges it presents.	ChatGPT offers personalized, collaborative, and integrated learning opportunities, but concerns like algorithmic bias, data privacy, and ethical use must be carefully addressed for its responsible implementation.

Table no .1 Research Gap

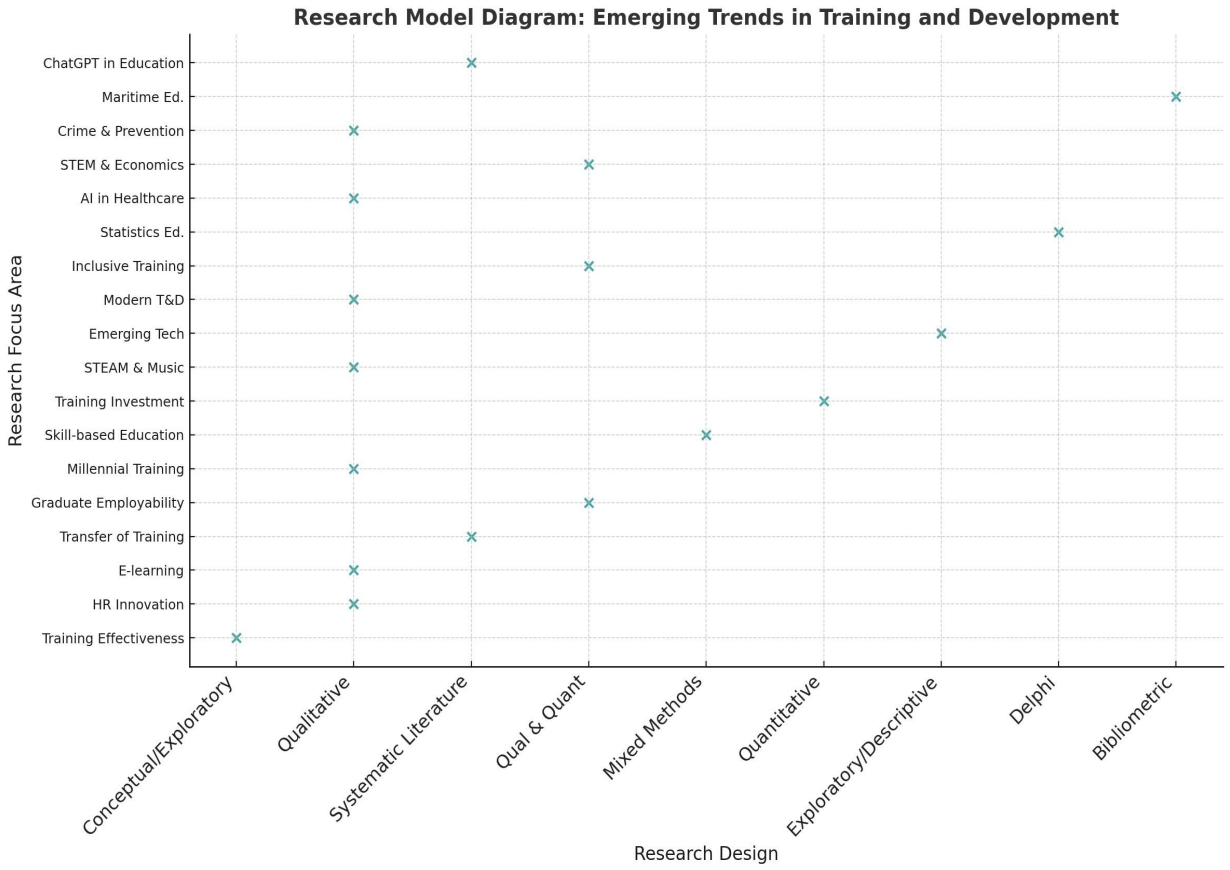

Figure 1: Research model diagram

PROBLEM STATEMENT

In today's fast-paced and constantly evolving work environment, organizations are under growing pressure to keep their employees skilled, adaptable, and ready for the future. Traditional training methods, like classroom sessions or static e-learning, often fall short in meeting the needs of a modern, digital-first workforce. As employees are expected to quickly adapt to new technologies and hybrid work setups, organizations are exploring more flexible and engaging ways to train their teams.

Technology is playing a major role, with tools like AI, virtual reality, and mobile learning creating opportunities for personalized, on-demand learning. At the same time, there's a strong shift toward soft skill development. Like communication, leadership, and emotional intelligence, which are becoming more valuable as automation handles technical tasks. Microlearning and continuous learning are also gaining popularity, offering bite-sized lessons that fit into busy schedules.

RESEARCH METHODOLOGY

This study adopts a mixed-methods approach to explore the emerging trends in training and development (T&D), combining both qualitative and quantitative research techniques to gain a holistic understanding of current practices, challenges, and innovations in the field.

Research Design

A descriptive and exploratory research design is used. The descriptive part helps in outlining the current T&D practices, while the exploratory approach allows for deeper insights into new and evolving trends.

Primary Data:

Primary data is collected through a structured questionnaire distributed to HR professionals, L&D managers, and employees IT and manufacturing sectors. The questionnaire includes both closed-ended (Likert scale, multiple choice) and open-ended questions to capture both measurable responses and detailed opinions.

Secondary Data:

Secondary data is gathered from academic journals, industry reports, white papers, online databases, and published articles related to training and development. Sources such as Harvard Business Review, McKinsey reports, and research papers from Google Scholar are referenced.

Sampling Method

A purposive sampling technique is used to target professionals who are directly involved in T&D functions. The sample includes respondents from diverse organizations, ensuring variation in size, sector (IT and manufacturing), and geographic location.

Data Analysis Techniques

- Quantitative data is analyzed using statistical tools such as percentages, averages, and graphs for better visualization.
- Qualitative data from open-ended responses is thematically analyzed to identify common patterns and insights related to technological adoption, soft skills development, hybrid learning formats, and inclusivity in training.

Description of Variables

Type	Variable	Brief Description	Measurement
Independent	Microlearning	Involves delivering content in short, focused bursts that target specific learning goals	Completion rates, learner feedback
Independent	Gamification	The integration of game-based elements into training programs to enhance engagement.	Engagement scores, participation levels
Dependent	Employee Performance	The extent to which employees apply learned skills to improve job performance.	Changes in key performance indicators (KPIs), supervisor evaluations
Dependent	Training Effectiveness	Overall impact and value of training programs as perceived and measured by outcomes.	Survey responses, post-training evaluations
Moderating	Employee Demographics	Characteristics such as age, education, and digital literacy may influence learning outcomes.	Age brackets, educational background
Control	Previous Training Exposure	The amount and type of training an employee has received in the past.	Training history or records

Table Name: Variable description

SAMPLING TECHNIQUES

The study used a stratified random sampling method. This means the sample was chosen by dividing the companies into groups based on type (like IT, manufacturing, service) and then randomly selecting employees from each group.

Sampling Size & Location

A total of 50 respondents participated in the study, providing diverse perspectives on the impact of mental health support in the workplace.

5 companies were included from Bangalore

50 employees responded to the survey

ANALYSIS AND DISCUSSION:

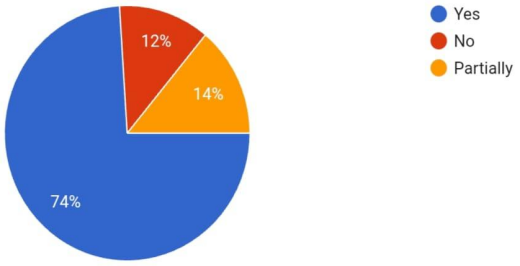

Figure 2. Job-relevant field.

Response option	Percentage
Yes	74%
No	12%
Partially	14%

Table No. 2

Interpretation

The chart shows that most participants found the training relevant to their work. About 74% felt it directly applied to their job, while 14% said it was only partially useful. A smaller group, 12%, didn't find it relevant at all. Overall, the training seems to have met the needs of the majority.

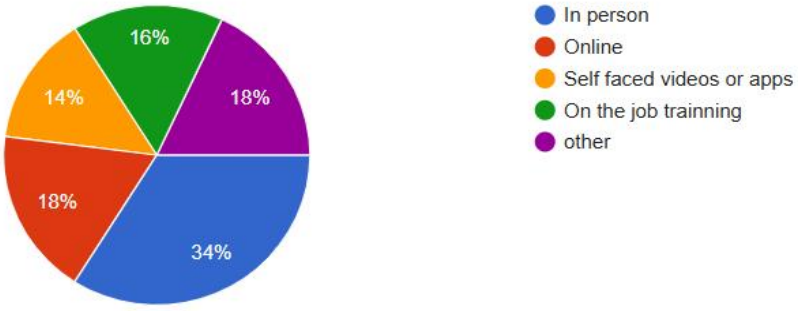

Figure 3. Types of Training.

Response option	**Percentage**
In person	34%
Online	18%
Self-faced videos or apps	14%
On-the-job training	16%
Others	18%

Table no. 3

Interpretation

The chart highlights the different types of training attended. In-person training was the most popular, with 34% of participants choosing this format. Online training and other forms of training each made up 18%, showing a balanced interest in alternative methods. On-the-job training was chosen by 16%, and 14% used self-paced videos or apps. Overall, while in-person sessions were the top choice, it's clear that people have experienced a mix of training styles to support their learning.

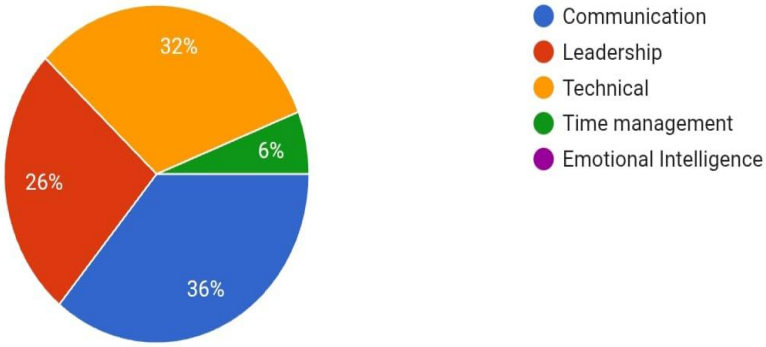

Figure no 4. Focus on future training skills.

Interpretation

The chart shows that most participants want future training to focus on communication, technical, and leadership skills. Communication was the top choice at 36%, followed by technical skills at 32%, and leadership at 26%. Time management saw minimal interest, and emotional intelligence wasn't selected at all. Overall, there's a clear demand for practical and people-focused skill development.

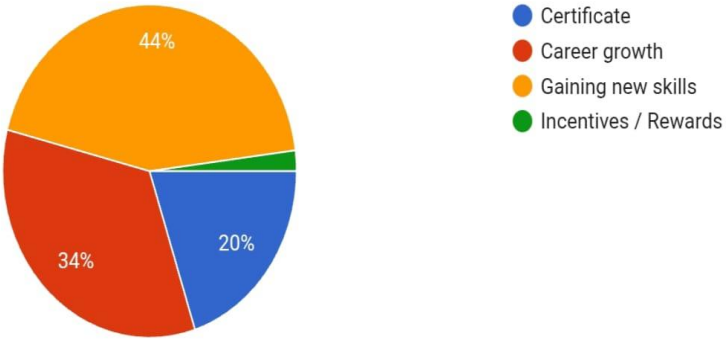

Figure 5. Motivation

Interpretation

The chart highlights what drives participants to complete training, based on feedback from 50 people. The biggest motivator was gaining new skills, chosen by 44%, showing that many are eager to learn and grow. Career growth came next at 34%, followed by certificates at 20%, which still hold value for some. Very few, just 2% were motivated by incentives or rewards. Overall, it's clear that most people are driven by a genuine interest in learning and progressing in their careers.

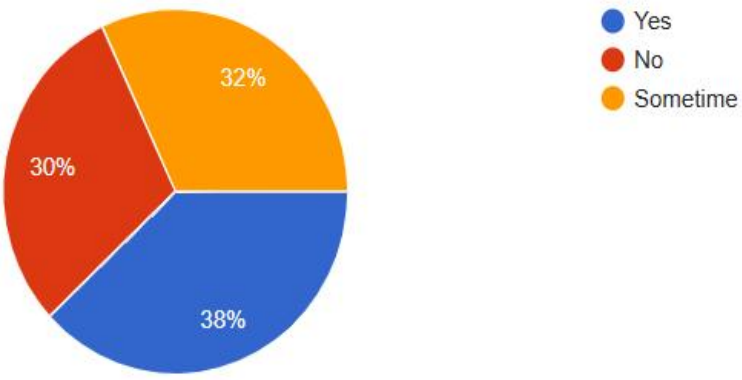

Figure 6. Lack of digital knowledge.

Response	Percentage
Yes	38%
No	30%
Sometimes	32%

Interpretation

The chart shows that many participants feel left out in training due to limited digital knowledge. While 38% said "Yes" and 32% said "Sometimes," only 30% felt fully comfortable. This suggests that a large portion of people face challenges with digital tools and could benefit from more support in building digital skills.

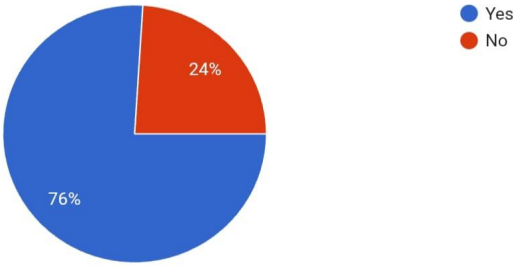

Figure 7. Used chatbots or AI assistants.

Interpretation

The chart shows that most participants have experience using chatbots or AI assistants during training. The responses, 76% said "Yes", while 24% said "No." This shows that AI tools are already playing a big role in training, with many learners turning to them for support and guidance throughout the process.

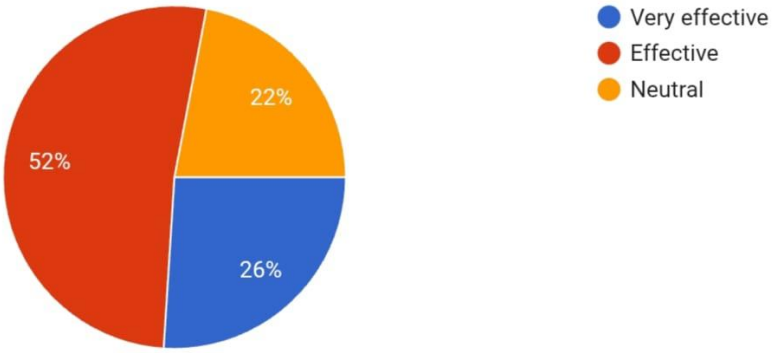

Figure 8. Effectiveness of the training.

Interpretation

The chart reveals that most participants felt the training they received was beneficial. More than half, 52%, said it was effective, while 26% thought it was very effective. About 22% felt neutral and didn't have strong feelings either way. This means that over three-quarters of people found the training useful in some way. Overall, the feedback shows a generally positive response to the training experience.

CONCLUSION, LIMITATION, IMPLICATIONS, FUTURE RECOMMENDATION

- **Conclusion**

This study sheds light on how training and development (T&D) is transforming in today's fast-moving work environment. As businesses work harder to keep their employees skilled, flexible, and future-ready, new approaches like tech-enabled learning, soft skill development, microlearning, and inclusive training are becoming more important than ever. While these trends offer exciting opportunities, putting them into practice is not always easy.

The findings suggest that organizations must think strategically and stay flexible, adopting training methods that align with digital shifts, diverse employee needs, and measurable business goals.

- **Limitations**

While the insights are valuable, this study does have a few limitations. The sample was relatively small, just 50 employees from five companies, which may not fully represent the broader industry landscape. Since the study focused only on Bengaluru, its findings might not apply everywhere. Also, because it relies on participants' self-reported experiences, there's a chance of bias or overly positive responses. The study only captured feedback at one point in time, so we don't know how opinions or training outcomes might evolve. Finally, the IT and manufacturing sectors include many subfields, and we didn't go deep into how training needs might differ across them.

- **Implications**

The results suggest that companies need to rethink how they approach employee development. Digital literacy remains a big gap many employees still feel left behind when it comes to using online tools. This calls for targeted digital upskilling efforts. Blended learning models that combine in-person sessions with flexible online or mobile formats can meet diverse learning styles. The increasing use of chatbots and AI in training is promising, but these tools need to be intuitive and inclusive. Most importantly, soft skills like leadership and communication are in high demand, and training programs should reflect that. Organizations also need solid ways to measure the real impact of training, not just participation rates, but actual performance outcomes.

- **Future Recommendations**

Looking ahead, future studies should cast a wider net, reaching more companies of various sizes and from other cities to get a more balanced view. It would also help to follow employees over time to see how training affects their performance and career growth. Including perspectives from HR professionals, team leads, and trainers could offer a fuller picture. There's a growing need to understand the return on investment in modern training methods like AI tools and immersive learning. Additionally, companies should ensure that training is inclusive, especially for older employees, people with disabilities, and those without a tech background. With mental well-being becoming a key workplace focus, future research should also explore how training can build emotional resilience and support psychological health.

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