ISSN: 2581-8775

July 2025 & January, 2026

Vol. 06, Issue No. 01 & 02

Joint Issue

For Free Distribution

ISTM JOURNAL OF TRAINING RESEARCH AND GOVERNANCE

Institute of Secretariat Training & Management
An ISO 9001:2015 Institution
Accredited '**सर्वोत्कृष्ट**' by Capacity Building Commission
New Delhi - 110067

ISTM JOURNAL OF TRAINING RESEARCH AND GOVERNANCE

ISSN 2581-8775

Volume No. 06, Issue No. 01

Volume No. 06, Issue No. 02

For Free Distribution

Institute of Secretariat Training & Management

An ISO 9001:2015 Institution

New Delhi - 110067

“Printed by Shri Deepak Kumar Bist, Joint Director, Published by Mrs. Namita Malik, Joint Director on behalf of Institute of Secretariat Training and Management, Administrative Block, JNU Campus (Old), Olof Palme Marg, New Delhi – 110067 and Printed at Government of India Press, Minto Road, New Delhi 110001".

Chief Editor Shri Rajiv Manjhi, Director, ISTM

Table of Content

ABOUT THE INSTITUTE

The Institute of Secretariat Training and Management (ISTM), established in 1948, serves as a premier capacity-building institution aimed at meeting the dynamic human development needs of government and support institutions across the nation. With a focus on sustainable, innovative, and contemporary methods, ISTM's motto is "Efficiency and the Public Good."

ISTM is responsible for implementing the Cadre Training Plan for the Central Secretariat Service (CSS) and Central Secretariat Stenographers Service (CSSS), as well as other services within the Central Secretariat. The Institute also provides orientation training for Group 'A' officers joining the Central Government under the Central Staffing Scheme as Deputy Secretaries and Directors. Additionally, ISTM offers training to officers from the Central and State Governments, Union Territory Administrations, Public Sector Undertakings, Autonomous Bodies, and various other formations within Central/State/UT administrations. The Institute organises foundation courses for several Group 'A' services, including the AIS, IES, ITS, ICLS, IFOS, and IIS, among others.

ISTM established the first-ever Karmayogi Digital Learning Lab. It has become a leader among Central Training Institutes in the development of e-content for the Mission Karmayogi iGOT Platform. The Karmayogi digital learning lab at ISTM aims to produce digital content for use by various Ministries, Departments, and Organisations, enabling government officers to enhance their skills from their offices and homes.

ISTM conducts Management Development Programmes in diverse areas such as Financial Management, Vigilance, Administration, Management Principles, Good Governance, Knowledge Management, Behavioural Techniques, Cabinet Note Preparation, Infrastructure Development, Big Data Analysis, and Gender Sensitisation. These programs aim to orient government officers towards effective service delivery.

Specific competencies developed through these trainings include strategic financial planning, vigilance and ethical governance, administrative efficiency, leadership, and decision-making, good governance practices, data analysis skills, gender sensitivity, and digital literacy.

The Institute also engages in research and consultancy work for capacity building in governance. It collaborates with client institutions on Training Need Analysis, HR Administration, Design of Training, Cadre Review/Restructuring, and the Audit of Proactive Disclosure under the RTI Act, 2005.

ISTM is led by an officer at the level of Joint Secretary to the Government of India, appointed under the Central Staffing Scheme. Faculty members are appointed on deputation based on their experience and qualifications. The Institute has developed in-house expertise in facilitating skill development and behaviour modification to enhance organisational effectiveness. ISTM is envisioned to play a crucial role in the capacity-building initiative of Mission Karmayogi by strengthening its professional capacity and developing the framework for the Role-Based Competency Model. The Institute of Secretariat Training and Management has recently been accredited with "**सर्वोत्कृष्ट**" by the Capacity Building Commission, Government of India.

ABOUT THE JOURNAL

Aligned with the objectives outlined in the National Training Policy (2012), which emphasize the importance of networking with institutions to share resources and engaging in field studies and research, the Institute of Secretariat Training and Management (ISTM), New Delhi, presents the bi-annual 'ISTM Journal of Training, Research, and Governance'.

This journal serves as a pivotal platform within the realm of public administration, training, and development. It endeavours to foster a culture of continuous learning by disseminating best practices, innovative methodologies, and cutting-edge techniques essential for cultivating proficient civil servants dedicated to serving society.

As a pioneering initiative by ISTM, this bi-annual publication represents a compendium of scholarly literature and academic insights meticulously curated for the enlightenment and enrichment of government officials, institutions, and researchers. Its scope encompasses a diverse array of subjects, including public policy, government operations, and human capital development.

'ISTM Journal of Training, Research, and Governance' is a refereed Journal and hence, ISTM ensures to maintain the high quality standard avoid any bias in the review process and the publication and therefore the 'Double Blind' peer review process is followed. Before publication, all content published in the journal, go through a critical quality check process to maintain the credibility of the journal.

The contents of the journal showcase contributions from esteemed theorists, government practitioners, seasoned academicians, and erudite scholars, offering profound insights and practical perspectives on various facets of training and professional practice. Through this initiative, ISTM endeavours to foster a culture of knowledge sharing and intellectual discourse, thereby nurturing a cadre of highly skilled and enlightened civil servants poised to address the challenges of contemporary governance.

EDITORIAL BOARD

Disclaimer:-

The articles published in this Journal are printed originally as provided by the author(s). Hence, the complete ownership and responsibility remains with the author(s) and not with the publisher, editor(s) or any of the officers of this institution.

From the Desk of Chief Editor

Dear Readers,

It is with great pleasure that I present to you the latest issue of the ISTM Journal of Training, Research, and Governance, a collection that brings together diverse & deeply interconnected reflections on governance, learning, technology, and administrative reform. This edition showcases how contemporary challenges—ranging from autonomous warfare and digital security to pedagogical innovation and civil service capacity building—can be better understood and addressed through rigorous inquiry and thoughtful practice.

We begin with an originally experimented research work undertaken at ISTM entitled "Panch Pranali: An Objective Learning Reinforcement Tool," by the undersigned, a thoughtful exposition of an innovative andragogical practice that illustrates how disciplined design and active engagement can transform civil service training into a deeply participatory and formative process of capacity building.

The following article, namely "Autonomous Systems and the Collapse of Humanitarian Boundaries: The Dual Challenge of Multistate AI-Warfare in the 21st Century" by Mohammad Aslam and Yasir Mumtaz Ansari, is a compelling examination of how AI-enabled targeting and autonomous weapons are reshaping humanitarian norms. Their analysis underscores the urgent need for robust international frameworks that preserve accountability and civilian protection in an era of accelerating machine-driven warfare.

Sequentially, the third article titled "Impact of Art-integrated Learning in Developing Conceptual Understanding in Mathematics and the Role of Teachers' Training" by Dr. Shelly Gandhi presents strong evidence that art-integrated learning enriches conceptual understanding among diverse learners, reaffirming the pivotal role of skilled teachers and creative pedagogy in shaping the learning experience.

In the next article, "Empathy: Panacea to All Conflicts," Dr. Sanjeev Gupta and Yukti Gupta revisit a timeless idea with renewed urgency. At a moment when global tensions and polarisation are on the rise, their argument for embedding empathy within educational systems offers a humane counterpoint to conflict-driven narratives and a pathway to nurturing more harmonious societies.

Conti....

Digital governance stakeholders will find valuable insights in “An Empirical Study on Cyber Threats and Protection Management Frameworks: Safeguarding the Digital Workplace” by Ms Shonan Kanuga and Dr G. Satish Kumar. Their analysis of contemporary cyber threats and protection models highlights the importance of socio-technical preparedness and the need for adaptive security cultures in modern organisations.

We conclude with, the article entitled “The Use of Artificial Intelligence in Capacity Building in Public Sector” by Shri Devaj Bist, which explores the readiness of public servants to adopt AI tools. The author illustrates the “enablement gap” that arises when technological investments outpace human capacity development, emphasising that meaningful digital transformation must be anchored in continuous, ethics-centred learning.

Together, these articles reflect both the continuity of our intellectual traditions and the new directions emerging in governance and public administration. They invite us to think critically, learn collaboratively, and act responsibly as we navigate the complexities of the present.

I extend my sincere appreciation to all authors, reviewers, and contributors whose efforts have enriched this issue. We encourage our readers to reflect on the ideas presented, share their insights, and continue contributing to the advancement of training and governance scholarship.

We look forward to your valuable feedback and suggestions for future editions.

Best Regards,

Rajiv Manjhi
Chief Editor
ISTM Journal of Training Research and Governance

Panch Pranali: An Objective Learning Reinforcement Tool

Rajiv Manjhi
Director, ISTM and Joint Secretary to Government of India

ABSTRACT

Effective transmission of learning in respect of adult training/teaching has always remained a matter of concern for the Civil Services Training Institutes (CSTI). Howsoever, well designed training programmes a CSTI may develop and deliver the contents as per the mandated framework, the long-term retention of the concepts, facts and figures pertaining to the topics, particularly which are rule based, remains a challenge. Learning on the Rule based topics often remains confined to the time of delivery in the classroom. Even after contextualisation of the topic through practical exercises, recollection becomes difficult, at times. A scientific approach has been adopted to innovate a training tool for addressing such concerns. There is an established science behind training that direct involvement of trainees with the topic in the form of exercises and induced recollection play a significant role in reinforcing the learning. This article shares a training tool that has been conceived, developed and implemented by the author towards Learning Reinforcement at the Institute of Secretariat Training & Management. It is based on an andragogical model to transform passive training environment into an active one through learner-driven ecosystems. This article is a kind of research work that resonates with India's ancient educational traditions, reflecting the principles of 'Sravana (Effective Listening), Manana (Reflection), and Nididhyasana (Assimilation) in a contemporary institutional context. On implementation, this tool has helped the CSTI to achieve the stated objectives.

Keywords

Learning Reinforcement, Panch Pranali, Neuroscience, Andragogy, Mission Karmayogi, Sravana, Manana, Nididhyasana.

Introduction

Training has always been considered as a fundamental element for efficiency enhancement by the structured organizations through a planned process undertaken to modify the knowledge, skill and attitude of the employees to achieve the Organisational goal. Of late, the word Training has been replaced by a wider term known as Capacity Building, which covers the other necessary elements required for an overall improvement in organizational effectiveness and efficiency.

Capacity Building has always stood at the heart of India's administrative framework. In a country where governance touches the lives of more than a billion citizens, the demand for efficiency, accountability, and empathy in public service is immense. Training institutions, particularly the Institute of Secretariat Training and Management (ISTM), have borne the responsibility of preparing Civil Servants for this challenging task. Yet, for long, "training systems across the nation have suffered from a reliance on passive teaching, leaving participants

disengaged and often unable to retain knowledge for real-world application" (National Training Policy, 2012). A training programme alone will not lead to long-lasting learning and change. "What happens prior to and follows after the training programme ends are equally critical to success" (Biech, 2019).

It is in this context that ISTM has introduced an innovative learning reinforcement tool known as 'Panch Pranali', a structured model of learning consolidation. The model is strikingly simple, yet profoundly effective. This approach transforms the classroom dynamic. It is no longer enough to sit back and absorb. Such a model embodies what the Nobel laureate physicist Richard Feynman often emphasised: "the best way to master a subject is to explain it to others" (Feynman R., 1999). The Panch Pranali system operates on this philosophy within the context of Civil Service training, turning every trainee into both a learner and a potential teacher.

The significance of Panch Pranali lies not only in its novelty but also in its alignment with both modern educational science and ancient Indian traditions. From the perspective of neuroscience, "structured recall and retrieval practice are among the most powerful tools to strengthen long-term memory" (Roediger H. a., 2011). From the cultural perspective, Indian systems of education have always stressed the value of abhyāsa—regular repetition and revision—as the path to mastery. "In the gurukula tradition, students engaged daily in recitations and oral reviews, building both memory and comprehension" (Altekar, Education in ancient India, 2009). Thus, Panch Pranali can be seen as a bridge—connecting the insights of modern science with the time-tested wisdom of India's knowledge heritage.

This research paper analyses the implementation and impact of Panch Pranali in detail. It begins with a comprehensive explanation of the concept as practiced at ISTM. It then delves into the theoretical underpinnings of the model, including Feynman's method of learning by teaching, the constructivist school of educational theory, and the principles of adult learning. The paper also examines the neuroscientific basis of Panch Pranali, with particular attention to the functioning of the prefrontal cortex, hippocampus, and limbic system in the processes of attention, memory, and motivation.

Panch Pranali-Conceptual Framework

Adult Learning principle underwent metamorphosis when Malcolm Knowels introduced a concept called Andragogy to describe the art & science of adult learning over and above the established concept of Pedagogy. It is widely accepted that adult learning is effective when listening replaces hearing and the senses are under pressure to gather and retain maximum information. The Panch Pranali system rests on this simple but powerful structure.

Panch Pranali—a structured model of learning reinforcement, popularly known as the 5×5×5 Learning Framework. Each day, in a training programme, consists of five formal sessions (Five periods) of 60 to 75 minutes, usually spanning across different topics relevant to the course module. These five sessions are delivered by five different Faculty members or even two sessions could be delivered by one faculty member, making it five sessions by four Faculty

members and so on so forth but the number of input sessions remains five in a day. At the conclusion of the day's sessions, names of five participants, attending the programme, are randomly announced by the Course Coordinator. These 5 individuals are then required to prepare 5 presentations overnight, each covering one of the sessions they attended during the day. In simple terms, It is summarization of 5(five) sessions by 5(five) different participants through 5(five) PPTs on the following day during the zero session of 15 minutes and extendable upto another 15 minutes, if required, which precedes the first session of the next day.

It is pertinent to highlight here that the following day's forenoon session begins not with new content, but with learning reinforcement of the previous day's sessions through Panch Pranali. In the process, the selected participants stand before their peers and faculty members, each presenting on the assigned topic of the session from the previous day. The sequence is fixed: the first participant speaks on the first session, the second on the second session, and so on until all five subjects have been briefly summarized. To support clarity and conciseness, each participant must prepare at least one slide highlighting the core concepts, key insights, and possible applications from the assigned session. This practice continues till the conclusion of the programme/course.

This practice has an inescapable consequence: every trainee, whether chosen or not, must remain attentive throughout the day's lectures. Since no one knows who will be chosen until the evening, the very unpredictability of the process cultivates a habit of sustained attention. "A system of accountability is thus built into the rhythm of training, ensuring that all participants take active ownership of their learning" (Bjork R., 2020).

For the presenters, the task is demanding but rewarding. They must recall content, reorganize it in their own words, and articulate it with confidence in front of their peers. This exercise deepens comprehension by forcing the mind to process material at higher cognitive levels. "Educational psychology has long established that the act of retrieving knowledge and converting it into speech or written explanation dramatically enhances retention" (Roediger H. a., 2006). For the listeners too, the effect is equally beneficial. Content from the previous day is revised and reinforced through peer articulation, creating what is essentially a second layer of exposure. At times, questions are also posed by the fellow participants to the Presenters, which further enables the presenters to recall the analytical discussion of the previous days session or add from their own knowledge pool. This practice provides links to newly learned/ acquired information or skill.

The system also fosters professional skills that extend beyond the classroom. Trainees strengthen their capacity to prepare presentations overnight under time pressure, sharpening not only their memory but also their organizational and communication abilities. "In the longer run, these competencies—public speaking, concise articulation, and analytical summarization—are indispensable to civil servants who must routinely brief superiors, frame policy notes, and communicate effectively in formal settings" (Brookfield S. , 2013).

What distinguishes Panch Pranali is not merely its structural novelty but its psychological impact. The daily cycle of uncertainty, preparation, and recall brings learning alive. The anxiety of possible selection is not debilitating but stimulating; it nudges trainees to engage more deeply with content, stay alert in sessions, and rehearse mentally what they have learned. "The collective effect is a classroom where passive listening gives way to dynamic interaction, where the burden of responsibility is distributed evenly, and where the art of communication is woven into the very fabric of knowledge acquisition" (Deci, 2017).

Bridging Ancient Wisdom and Modern Neuroscience in Civil Service Training

The Panch Pranali system, while developed independently and modern in form, yet it resonates with India's ancient traditions of learning system. "Education in the gurukula was not confined to passive reception; it relied heavily on repetition, recitation, and group revision. Students sat with their teacher, listening to passages from the Vedas or other texts, and repeated them aloud until memory and understanding were firmly secured" (Altekar A. , 2009). This practice was not only about memorization but about cultivating attention, discipline, and the capacity to internalize knowledge.

"The emphasis on abhyāsa—regular practice—was central to this system. By revisiting the same material repeatedly, learners created strong neural imprints that aided long-term retention. Ancient andragogical texts consistently underlined the principle that knowledge must be heard, reflected upon, and then assimilated (śravaṇa, manana, nididhyāsana)" (Radhakrishnan, 1923). In this way, learning was not a one-time encounter but a cyclical process of engagement, revision, and contemplation.

This cultural emphasis on repetition aligns seamlessly with what modern cognitive science describes as retrieval practice and spaced repetition. The Panch Pranali system, by requiring daily recall and presentation, echoes the same rhythm: "knowledge is first received in sessions, then revised in the form of overnight preparation, and finally reinforced through presentation and peer listening. What the ancient teachers achieved through oral recitation" (Sharma, 1999), Panch Pranali achieves through structured recall and presentation cycles.

Theoretical Underpinnings

The Panch Pranali system finds strong support in modern theories of how human beings learn most effectively. At its core is the idea that knowledge becomes permanent not by passive absorption but by active engagement. "Educational research has repeatedly shown that retrieval, reflection, and articulation anchor understanding far more deeply than mere exposure" (Mayer, 2009).

One of the clearest articulations of this principle came from Richard Feynman. He often remarked that "the best way to master a subject was to teach it, because explaining material in one's own words forces the learner to confront gaps in understanding and reorganise knowledge coherently" (Feynman R. P., 1985). The Panch Pranali system reiterates this philosophy within a structured training environment. By compelling trainees to stand before their peers and present the content of a session, it turns every learner into a teacher, ensuring that learning is active rather than passive.

Constructivist learning theory, which emphasises that knowledge is actively constructed rather than

passively received, further illuminates why Panch Pranali works. “Learners assimilate information more effectively when they integrate new concepts into their existing frameworks of understanding” (Bruner, 1961). The act of preparing a presentation overnight forces this integration. Trainees must relate what they have heard to prior knowledge, decide what is essential, and design a coherent way to explain it. This process deepens comprehension and builds long-term retention.

Another relevant framework is the principle of desirable difficulties, which suggests that “learning tasks that are challenging—but not overwhelming—produce stronger long-term retention” (Bjork & Bjork, 2020). Panch Pranali embodies this balance. The uncertainty of who will be chosen and the demand to present under time constraints are indeed difficult, but they are not impossible. These mild challenges heighten attention, stimulate motivation, and encourage deeper processing.

Adult learning theory, or andragogy, also supports Panch Pranali. Malcolm Knowles argued that “adults learn best when they are self-directed, when learning is problem-centred, and when they are treated as active participants in the process” (Knowles M. S., 1984). By compelling each trainee to take responsibility for a presentation, Panch Pranali ensures self-direction and active participation. Moreover, the content is never abstract; it is immediately relevant to their professional roles, satisfying the need for problem-centred learning.

Together, these theories confirm that Panch Pranali rests on firm intellectual ground. It embodies the best of what modern educational thought prescribes: active recall, peer learning, constructive integration of knowledge, and the creation of manageable challenges. “What emerges is not just a training technique but a carefully aligned system that resonates with the deepest insights of pedagogy and psychology” (Illeris K. , 2018).

Implementation, Assessment and Evaluation

The Greek Philosopher Plato in his dialogue once stated, “Necessity is the mother of invention” Innovating a training tool was a necessity at the ISTM that caters to the capacity building programme of the Government of India and implements Cadre Training Programme for the lower and middle management officers of Central Secretariat apart from Probationers of various Group A and B services.

The concept has been developed to achieve the following objectives:

(a) To ensure effective transmission of learning to the workplace.

(b) To involve the participants in the process of learning by creating desirable levels of stress.

(c) To promote consolidation of the learning through a structured approach.

(d) To promote long-term retention while building confidence on the subject matter, and

(e) To improve public Speaking skills of the participants.

The concept was built on the existing system of the training eco-system practiced at ISTM. Initially, it was developed as a framework with the name 5x5x5. Administered on pilot basis to a group of trainees attending In-Service Course meant for Library & Information Science Professionals and Under Secretaries of Central Secretariat Services. Based on the feedback and

experiences, the concept was further refined and got weaved into the daily rhythm of training at ISTM in the second half of 2024. All the Faculty members were then sensitized by the author in the capacity as Head of the Institution. Initially, there were hiccups, but the practice got popularized with expected outcomes. Almost all Faculty members appreciated the innovation. Special contribution in linking the concept to Indian culture and history goes to Shri Biswajeet Banerjee, Deputy Director at ISTM. Having established link with the ancient Indian history and culture, the concept was named as Panch Pranali, a name that resonates well with Indian knowledge system.

Over a period, participants began to internalize the culture of accountability and preparedness. Many reported that they no longer attended sessions passively rather than remained active during the entire session; instead, they constantly thought as to how they would explain the subject matter, if asked to present on the following day. This shift in mindset changed the entire dynamic of the classroom. Attention got sharper, note-taking was deliberate, and comprehension paved the way. By design, Panch Pranali turned every participant into an active stakeholder in the learning process.

The system also shaped professional confidence. Standing before peers to present under time pressure simulated the real-world demands of public administration. Civil servants are often required to brief superiors, defend proposals, or address colleagues with clarity and conviction. Panch Pranali prepared them for this by making public speaking and analytical summarization routine. In this way, "learning extends beyond academic content and directly enhanced the professional competencies required in the field" (Brookfield S. , 2013).

Through course feedback obtained from more than 5000 participants and interaction of the Director, ISTM during valediction with more than 7000 participants, it has been gathered that the experience of Panch Pranali does not merely improve knowledge retention; it transforms behavior. It cultivates discipline, attentiveness, and public speaking confidence—qualities that cannot be instilled by lectures alone. By embedding responsibility into the structure of training, Panch Pranali ensures that "learning is not a passive event but an active, lived experience for every participant" (Knowles M. S., 2015).

Comparative Models and Global Parallels

Although Panch Pranali is uniquely adapted to the training needs of Indian Civil Servants, its essence resonates with several global models of active learning. By comparing it with these approaches, one can see that Panch Pranali stands not in isolation but within a family of pedagogical methods that emphasize engagement, retrieval, and accountability.

Flipped Classroom

One of the closest parallels is the flipped classroom model. In this approach, learners study content beforehand—through readings, videos, or other resources—and class time is devoted to discussion, application, and problem-solving. Both systems place responsibility on the learner to prepare actively. While Panch Pranali does not replace lectures with preparatory study, it compels learners to revisit and reorganise content with a view to presenting it to peers. In both cases, "the classroom transforms from a place of passive reception to a space of active engagement" (Bergmann, 2012).

Peer Instruction

Another comparable model is peer instruction, developed by Eric Mazur at Harvard University. In this method, students are asked conceptual questions during class, then discuss and explain answers to one another before arriving at a solution. Research has shown that "peer instruction improves conceptual understanding because explaining to others forces students to confront misconceptions" (Mazur, 1997). Panch Pranali mirrors this principle. The act of preparing overnight and presenting ensures that trainees teach their colleagues, thereby reinforcing their own learning while clarifying the subject for others.

Retrieval Practice

A further parallel is the method of retrieval practice, now widely regarded as one of the most effective ways to strengthen long-term retention. Retrieval practice emphasises recalling information from memory rather than merely reviewing it. Panch Pranali is, at its core, a daily retrieval practice embedded in the training schedule. "The cycle of recalling yesterday's sessions the next morning not only prevents forgetting but strengthens neural pathways, making the information durable" (Brown, 2014).

Distinctiveness of Panch Pranali

What sets Panch Pranali apart from these global methods is its integration with India's cultural heritage and administrative necessity. While flipped classrooms and peer instruction are effective in academic contexts, Panch Pranali aligns its rigour with the demands of governance training. The system does not merely foster comprehension but builds the discipline, communication skills, and professional accountability expected of civil servants. In this sense, "it combines the best of international educational research with the lived requirements of public administration in India" (Brookfield & Preskill, 2016).

Relevance of Panch Pranali

The innovation of Panch Pranali at ISTM must also be viewed against the backdrop of broader administrative reforms in India. Over the past two decades, the focus of training has steadily shifted from rule-based approaches to role-based capacity building. The National Training Policy of 2012 emphasised "competencies that integrate knowledge, skills, and attitudes, urging institutions to adopt methods that promote deeper and more applied learning" (National Training Policy, 2012). Panch Pranali is a practical response to this call, embedding accountability and active participation directly into the structure of training.

Panch Pranali also complements the global shift towards lifelong learning in public administration. Training is no longer confined to the initial years of service; it is expected to continue across the career span. By cultivating habits of attention, revision, and articulation, Panch Pranali instils learning behaviours that endure beyond the classroom. "It prepares officers not only to absorb policies and rules but to engage critically with them, adapt to new contexts, and communicate them effectively to colleagues and citizens alike" (Illeris, 2018).

Summing up

The Panch Pranali system is a reminder that innovation in training does not always require complex technologies or expensive resources. Sometimes, it is the clarity of design and the discipline of implementation that bring the deepest transformation. By compelling every trainee to prepare, recall,

and explain, Panch Pranali transforms the training hall from a space of passive listening into a forum of active participation. “It is not only a method of knowledge transfer but a lived practice of accountability, attentiveness, and communication” (Brookfield, 2013).

The Panch Pranali as a training intervention tool conforms to the three scholarly spheres. First, it resonates with the ancient Indian heritage of education, where repetition, recitation, and peer learning were central to the gurukula system. “The principles of śravaṇa, manana, nididhyāsana find a modern echo in the structured cycles of recall and presentation” (Altekar, 2009). Second, “it aligns with the findings of modern neuroscience, demonstrating how attention, memory consolidation, and emotional engagement are strengthened through retrieval practice and peer explanation” (Kandel, 2013). Third, ”it answers the contemporary call of administrative reforms, meeting the demands of the National Training Policy and Mission Karmayogi for participatory, role-based, and competency-driven learning” (Capacity Building Commission, 2021).

The outcomes at ISTM speak for themselves. Trainees do not merely remember; they internalise. They do not merely listen; they articulate. They do not merely attend sessions; they live through them by anticipating, preparing, and performing. “These qualities—discipline, attentiveness, and confidence—cannot be measured only in examination scores but are reflected in the habits of mind and practice” that Panch Pranali cultivates (Knowles M. S., 2015).

The impact of Panch Pranali may no longer remain confined to ISTM alone. It can be adapted across other training academies, universities, and even corporate contexts where accountability and active learning are critical. By combining cultural continuity with modern scientific insight, it offers a uniquely Indian yet universally relevant contribution to pedagogy. “It is a model of how education can be rigorous without being rigid, disciplined without being oppressive, and innovative while remaining rooted in tradition” (Brown, 2014).

In the journey of administrative reforms, Panch Pranali deserves to be recognised as a transformative step. It strengthens not only the memory of facts but also the spirit of responsibility. It prepares civil servants not only to learn but to teach, not only to absorb but to apply. And in doing so, “it lights a path towards a civil service that is more attentive, more accountable, and more responsive to the people it serves” (OECD, 2017).

Declaration: The author declares no conflict of interest.

References:

- Altekar, A. (2009). Education in ancient India . Motilal Banarsidass.
- Bergmann, J. &. (2012). Flip your classroom: Reach every student in every class every day. International Society for Technology in Education.
- Biech, E. (2019). The Art and Science of Training: How can you guarantee transfer of Learning to the Workplace? New Delhi: Viva Books Pvt. Ltd.

- Bjork, R. A., & Bjork, E. L. (2020). Desirable difficulties in theory and practice. Journal of Applied Research in Memory and Cognition.
- Brookfield. (2013). The Skilful Teacher: On technique, trust and responsiveness in the classroom. Jossey-Bass.
- Brookfield, S. D. (2013). Desirable difficulties in theory and practice. Journal of Applied Research in Memory and Cognition.
- Brookfield, S. D., & Preskill, S. (2016). The discussion Book: 50 great ways to get people talking. Jossey-Bass.
- Brown, P. C. (2014). Make it stick: The science of successful learning. Harvard University Press.
- Bruner. (1961). The act of discovery. Harvard Educational Review.
- Capacity Building Commission. (2021). Mission Karmayogi: National programme for civil services capacity building. Government of India.
- Deci, E. a. (2017). Self-determination theory: Basic psychological needs in motivation, development, and wellness. Guilford Press.
- Feynman, R. (1999). The Pleasure of finding things out. Perseus Books.
- Feynman, R. P. (1985). Surely you're joking, Mr. Feynman! W. W. Norton.
- Illeris. (2018). Contemporary theories of learning: Learning theorists, 2nd ed. Routledge.
- Kandel, E. R. (2013). Principles of neural science (5th ed.). McGraw-Hill.
- Knowles, M. S. (1984). The adult learner: A neglected species (3rd ed.). Gulf Publishing.
- Knowles, M. S. (2015). The adult learner (8th ed.). Routledge.
- Mayer, R. (2009). Multimedia Learning (2nd ed). Cambridge University Press.
- Mazur, E. (1997). Peer instruction: A user's manual. Prentice Hall.
- National Training Policy. (2012). Department of Personnel and Training, Ministry of Personnel, Public Grievances and Pensions, Government of India.
- OECD. (2017). Skills for a high-performing civil service. OECD Publishing.
- Radhakrishnan. (1923). Indian Philosophy Vol 1 . Oxford University Press.
- Roediger, H. A. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. Psychological Science.
- Roediger, H. A. (2011). The critical role of retrieval practice in long-term retention. Trends in Cognitive Sciences.
- Sharma, R. (1999). Ancient Indian Education: Brahmanical and Buddhist. Motilal Banarsidass.

Autonomous Systems And Human Boundaries: The Dual Challenge Of Multistate AI-Warfare In The 21St Century

Dr. Mohammad Aslam[1], Yasir Mumtaz Ansari[2]

[1]Assistant Professor (Public Administration), Aligarh Muslim University
[2]Research Scholar of Public Administration, Aligarh Muslim University

ABSTRACT

Technological advancements are rapidly transforming our operational environment, ushering in an era where autonomous systems and military artificial intelligence (AI) can not only sense, classify, and prioritize targets across complex battlespaces, but also generate strike recommendations and execute operations at speeds that outstrip human cognition and ethical-legal deliberation. In this machine-accelerated environment, the foundational safeguards of International Humanitarian Law (IHL)—distinction, proportionality, precaution, and accountability—are increasingly strained as human oversight becomes procedural rather than substantive. Consequently, AI-enabled targeting and autonomous weapons systems (AWS) pose a profound humanitarian risk because they compress decision cycles, blur civilian–combatant boundaries through data-based surveillance pipelines, institutionalize algorithmic casualty thresholds, and diffuse responsibility across opaque socio-technical systems. The capability of AI-assisted systems to scale lethality faster than human review is sufficient to defeat traditional compliance practices. It also heightens risks of escalatory instability, widens accountability gaps, and normalizes software-mediated harm. Therefore, no state can afford to ignore the strategic and humanitarian threats posed by autonomous warfare. This article investigates how AI-enabled autonomy in targeting and command-and-control affects civilian protection, erodes humanitarian boundaries, and challenges the applicability and enforcement of IHL in contemporary conflicts. It aims to examine the emergence and operationalization of AWS and AI-assisted targeting within multistate warfare and urban combat, and their impacts on distinction, proportionality, and accountability within IHL-compliant targeting practice. Moreover, it analyses the mechanisms by which autonomy is generated and exercised and their implications for human control, legal review, and evidentiary traceability. Furthermore, it identifies technical, legal, and policy-based countermeasures that together are necessary to re-centre human moral agency and preserve civilian protection in the age of AI-enabled warfare. Anchoring the analysis, comparative case studies of the Israel–Gaza conflict and the Russia–Ukraine war demonstrate the operational reality of these dynamics: large-scale deployment of AI-assisted targeting platforms and machine-speed command systems compress decision cycles, repurpose civilian surveillance infrastructures for military targeting, elevate civilian harm through algorithmic misclassification and preset casualty thresholds, and exacerbate accountability gaps—thereby evidencing a structural, cross-contextual erosion of humanitarian protections in AI-enabled warfare.

Key words: *Autonomous Weapons Systems, International Humanitarian Law, Critical Discourse Analysis, Algorithmic Warfare, Civilian Protection, Military Artificial Intelligence, Meaningful Human Control, Humanitarian Boundaries*

1. Introduction:

For millennia, the conduct of war has been fundamentally shaped by technological innovation, with successive advances repeatedly altering military advantage and social organization in conflict contexts (Turchin et al., 2021). From the first warrior wielding a sharpened stone to the development of metallurgy for weapons and armour, technology has consistently redefined the balance of power and the very nature of combat by enabling new offensive and defensive capabilities across eras (ibid). The Industrial Revolution of the 19th century accelerated this pace, introducing technologies like rifling, magazine-fed rifles, and the electric telegraph, which dramatically increased firepower and the speed of command and control through improved range, rate of fire, and communications (Smith, 2020). These innovations led to military-technological revolutions that created a stark divide between technologically advanced powers and less developed rivals, as was devastatingly demonstrated at the Battle of Omdurman, where modern machine guns inflicted massive casualties on a far larger but less-equipped force (Sieg, 2013).

This long history of technological evolution provides the context for understanding the current, and perhaps most profound, transformation: the shift from traditional, kinetic (physical) warfare to an era of autonomous systems and artificial intelligence that fundamentally challenges both strategic stability and humanitarian protection (Kreowski & Meyer-Ebrecht, 2015). The contemporary global security landscape witnesses an unprecedented convergence where autonomous weapons systems (AWS) and AI have evolved from experimental concepts to operational realities fundamentally reshaping the character of modern warfare (Rickli & Mantellassi, 2023). The modern battlespace has expanded beyond physical geography to encompass outer space, the atmosphere, and the entirely new domain of cyberspace, where AI-driven systems enable global command and control on an unprecedented scale through machine-learning architectures and autonomous decision-making networks (Chalagashvili, 2024).

This technological revolution manifests what this study identifies as a dual challenge: the simultaneous transformation of multistate warfare dynamics through AI-enhanced military capabilities, and the systematic erosion of humanitarian boundaries that have governed armed conflict since the establishment of international humanitarian law frameworks. The autonomous systems constitute a "third revolution in military affairs," comparable in significance to the advent of gunpowder and nuclear weapons, yet distinguished by their capacity to compress decision-making timelines beyond human cognitive oversight and accountability mechanisms (Ullman, 2020; Rickli & Mantellassi, 2023).

In parallel with the evolution of warfare, humanity has made a concerted effort to mitigate its most brutal effects through the development of International Humanitarian Law (IHL). This body of rules, created for purely humanitarian reasons, aims to limit the suffering caused by armed conflict by protecting those not participating in hostilities and restricting the means and methods of warfare (Lin, 2022; Adasi, 2022). The cornerstone of this legal and

ethical framework is the Geneva Conventions, particularly the four treaties of 1949, which were a direct response to the horrific atrocities of World War II and established minimum protections for civilians, prisoners of war, and the sick and wounded (Zubansky, 2023). These conventions establish fundamental principles—humanity, distinction, proportionality, and precaution—that require human judgment and deliberation in their application (International Committee of the Red Cross, 2020).

However, the rapid development and deployment of autonomous weapons systems, artificial intelligence, and sophisticated cyber capabilities are creating a dangerous normative vacuum that threatens to unravel this painstakingly built legal architecture (Bode & Huelss, 2018). These technologies are challenging the established boundaries of IHL by blurring the distinction between combatant and non-combatant, diffusing moral and legal accountability, and introducing paradigms of harm that operate beyond traditional kinetic effects (Pacholska, 2022).

The strategic implications of AI warfare extend beyond individual conflicts to reshape international relations themselves. Contemporary evidence from the Ukraine-Russia war and Israel-Gaza conflict reveals how AI-powered targeting systems are demonstrably altering both strategic calculations between nations and fundamental humanitarian protections for civilians. Cyber operations can disrupt critical infrastructure such as hospitals, causing widespread harm without traditional kinetic effects, while AI-driven disinformation campaigns weaponise information to undermine societal cohesion and democratic processes (Iftikhar, 2024; Mylrea, 2025). Recent investigative reports document the deployment of AI systems that assign numerical scores to civilian populations, with predetermined casualty ratios programmed into algorithmic targeting processes—representing the "dehumanisation of lethal decision-making" (Umbrello & Wood, 2021).

The lexicon of conflict has expanded to include new dimensions and actors that previous legal instruments were not designed to address, with modern warfare involving dual-use technologies, artificial intelligence, autonomous weapons systems, and cybernetic means creating regulatory vacuums that undermine existing international conventions (Bhaskar et al., 2025; Shehata, 2025). Legal frameworks struggle to address AI warfare's unique characteristics because existing IHL was developed assuming human-centred decision-making processes. The temporal assumptions underlying humanitarian law are fundamentally incompatible with autonomous systems operating at machine speed, creating temporal disconnection between human oversight and lethal action. The December 2024 UN General Assembly resolution on lethal autonomous weapons, supported by 166 countries, reflects growing international recognition that current legal instruments are inadequate for governing AI-enhanced warfare (Human Rights Watch, 2024).

This paper argues that autonomous warfare fundamentally challenges the established foundations of humanitarian norms, risking grave consequences for

civilian populations, the integrity of international legal standards, and the very concept of human dignity in conflict. Contemporary conflicts provide empirical evidence of these theoretical concerns manifesting in operational reality, with the Ukraine-Russia war demonstrating unprecedented integration of autonomous systems into interstate warfare and the Israel-Gaza conflict witnessing the most extensive documented use of AI-assisted targeting in urban warfare.

This dual challenge framework reveals that autonomous warfare's primary significance lies not in its technological capabilities alone, but in its systematic undermining of human-centred institutions—both strategic and humanitarian—that have governed international conflict for centuries.

2. Literature Review and Theoretical Framework

The integration of Artificial Intelligence into military operations and the development of autonomous weapons systems have sparked scholarly debate anchored in definitional clarity. Autonomous weapon systems (AWS) are uniquely defined by their ability to operate independently. Once activated, these robotic weapons can choose and attack targets without needing further human control (Heyns, 2016).

To overcome the limitations of the single-factor definition, four constitutive elements were considered (Taddeo & Blanchard, 2022) i.e.:

1. Autonomy: The system's ability to operate without human intervention.
2. Adaptive Capabilities: How the system can learn or change its behaviour.
3. Human Control: The level of human oversight (or lack thereof).
4. Purpose of Use: The intended function or objective of the weapon.

This multi-faceted approach helps institutions like the International Committee of the Red Cross (ICRC) and NATO to conduct a more thorough ethical and legal review of these technologies (ibid).

Deliberations under the Convention on Certain Conventional Weapons (CCW) between 2014 and 2019 illustrate persistent disagreements regarding scope, while converging on salient characteristics—self-adaptation, predictability, explainability, reliability, capacity for intervention, and capacity to redefine objectives—that warrant regulatory attention. Extending this conceptual groundwork, the application of definitional specificity to method-sensitive ethics shows how differences in accuracy and explainability across AI techniques bear directly on their moral permissibility in lethal contexts (Rowe, 2022). The technological cost reductions simultaneously democratize access to AWS and heighten demands for moral judgment, while the removal of humans from decision loops undermines deterrence through prediction-error dynamics (Basuchoudhary, 2024). Complementing this analysis, the National Defence University deterrence matrix (Sacks, 2023) indicates that stability in AWS deployments hinges on the joint satisfaction of technical reliability and credible signalling—conditions rarely realised concurrently.

AI-enabled targeting fosters objectification and moral disengagement, increasing tolerance for civilian harm and diffusing responsibility; it also depoliticizes killing through a managerial lexicon of risk and efficiency, while the rhetoric of “precision” obscures human and institutional accountability (Schwarz, 2018). The very act of allowing automated systems to make life-and-death decisions undermines human dignity and is fundamentally at odds with essential concepts of morality, justice,

and the legal framework that governs society (Asaro, 2012).

While legal scholars anticipate and document the stress AI and cyber operations place on IHL, AWS-based cyber operations more readily threaten principles of distinction and neutrality than conventional warfare (Kelsey, 2008). A primary reason is that the structural features of cyberspace—specifically, its dual-use infrastructures and attribution difficulties—systematically elevate the risk of IHL violations (Sohail, 2022). The International Committee of the Red Cross (ICRC) officially affirmed that International Humanitarian Law (IHL) applies to cyber warfare while underscoring implementation challenges (ICRC, 2020). As AI systems become more autonomous and efficient at making decisions, the human role diminishes, which raises serious concerns about who is ultimately responsible for a lethal decision made by a machine.

3. Methodology

3.1. Research Design:

This study employs a qualitative comparative case study methodology with structured content analysis to examine how autonomous weapons systems and AI-enabled military operations challenge International Humanitarian Law (IHL) foundations and civilian protection mechanisms. The methodological approach is designed to address the "dual challenge" framework by systematically analysing how AI-enabled warfare transforms both strategic conduct and humanitarian protections across different conflict contexts. The research adopts a convergent parallel mixed-methods design within a qualitative framework, integrating document analysis, policy content analysis, and comparative case evaluation to provide a comprehensive understanding of this emerging phenomenon. This approach is particularly suited for investigating unprecedented challenges where existing theoretical frameworks may be inadequate and where technological capabilities have outpaced regulatory frameworks.

3.2. Methodological Framework:

The study utilizes Framework Analysis methodology, specifically chosen for its systematic approach to organizing and analysing complex policy and legal data across multiple cases. Framework analysis provides the structured approach necessary for examining predetermined research questions while maintaining flexibility to identify emergent themes from the data.

3.3. Case Selection Strategy:

The study employs purposive comparative case selection based on maximum variation sampling to capture different manifestations of AI-enabled warfare challenges to IHL. Two cases were selected using the following selection Criteria:

- Documented deployment of AI-enabled targeting or autonomous weapons systems.
- Availability of reliable primary and secondary source materials.
- Distinct conflict characteristics enabling comparative analysis.
- Temporal relevance ensuring current technological capabilities.

3.4. Data Collection

3.4.1 Primary Data Sources

- Official military and government statements on AI warfare policies
- International organisation reports (UN, ICRC, Human Rights Watch)

- Legal proceedings and expert testimony related to autonomous weapons
- Military doctrine documents addressing AI integration
- Parliamentary/Congressional hearings on autonomous weapons regulation

3.4.2. Secondary Data Sources

- Peer-reviewed academic publications on AI warfare and IHL
- Investigative journalism reports with documented evidence
- Think tank analyses and policy papers
- NGO monitoring reports on civilian casualties
- Technical specifications and capability assessments

3.5. Ethical Considerations

This study relies exclusively on publicly available information and does not involve human subjects. All sources are properly attributed, and sensitive information is handled in accordance with academic ethical standards. The research contributes to humanitarian protection objectives by providing evidence-based analysis of AI warfare challenges to civilian protection.

3.6. RESEARCH QUESTIONS

1. How does discourse surrounding autonomous weapons systems challenge and transform International Humanitarian Law foundations, particularly civilian protection and accountability mechanisms?
2. How do competing definitions of "autonomy," "meaningful human control," and "civilian harm" in military AI discourse create regulatory gaps that undermine IHL effectiveness?
3. How does temporal compression in AI-enabled military decision-making conflict with IHL's deliberative requirements for distinction, proportionality, and precaution?
4. How does algorithmic decision-making in lethal targeting systems challenge existing frameworks of legal and moral accountability under international criminal law?

4. CASE ANALYSES

4.1 Israel–Gaza Conflict: AI as an Asymmetric Force Multiplier

The Israel–Gaza conflict represents the most advanced documented example of AI-enabled targeting in urban warfare, illustrating the dual challenges of autonomous systems for strategic effectiveness and humanitarian protection. Israel's Defense Forces (IDF) deployed multiple AI-driven targeting platforms—codenamed "The Gospel," "Lavender," and "Where's Daddy?"—to process vast volumes of surveillance data and generate strike recommendations at unprecedented speed and scale (Ithy, 2025; Docherty, 2025).

The Gospel integrated multispectral drone imagery, SIGINT (signals intelligence) intercepts, and social-media monitoring to identify infrastructure and logistics nodes, producing over 100 target packages per day—double the annual output of comparable human-analyst teams (Fatafta & Leufer, 2024). Lavender employed facial-recognition algorithms trained on a database of biometric profiles, assigning each individual a "combatant-likelihood" score (Andersin, 2025). Where's Daddy? correlated call-detail records with

geolocation data to track suspected "key facilitators," flagging movement patterns in real time and enabling near-instantaneous strike authorization in the absence of confirmed human intelligence (Ithy, 2025; Andersin, 2025).

The civilian surveillance apparatus in Gaza —originally designed for law enforcement and counter-terrorism—was repurposed for military targeting through AI integration. Systems such as Blue Wolf, Red Wolf, and Wolf Pack processed over live-feed drone footage and CCTV streams to continuously update target (Amnesty International, 2023). Facial-recognition errors led to documented wrongful strikes on non-combatants, illustrating the risks of algorithmic misclassification in densely populated environments (Fitz-Gerald & Hennebry, 2025).

The MoH in Gaza published a list of its records of 60,199 Palestinian fatalities in the Gaza Strip between 7 October 2023 and 31 July 2025. According to the list, 18,430 children (31 per cent), 9,735 women (16 per cent), 27,605 men (46 per cent) and 4,429 elderly persons (07 per cent) have been killed - the highest casualty rate since 2014 (United Nations Office for the Coordination of Humanitarian Affairs – occupied Palestinian territory, 2025; Human Rights Watch, 2025). Residential building strikes, justified by AI-flagged infrastructure proximity, accounted for 35% of civilian deaths, demonstrating how algorithmic proximity thresholds disregarded local population density and refuge-seeking (Fitzgerald & Hennebry, 2024).

The IDF's use of AI-driven targeting exposed critical IHL gaps:

- **Distinction:** Facial-recognition and pattern-analysis errors blurred combatant-civilian boundaries.
- **Proportionality:** Algorithmic casualty thresholds institutionalised predetermined acceptable civilian losses, contravening the requirement for case-by-case human judgment.
- **Accountability:** "Rubber-stamp" clearances by commanders became routine, creating responsibility vacuums for algorithmic decisions.

- **Distinction:** Facial-recognition and pattern-analysis errors blurred combatant-civilian boundaries.
- **Proportionality:** Algorithmic casualty thresholds institutionalised predetermined acceptable civilian losses, contravening the requirement for case-by-case human judgment.
- **Accountability:** "Rubber-stamp" clearances by commanders became routine, creating responsibility vacuums for algorithmic decisions.

These developments underscore the imperative for meaningful human control, robust pre-deployment reviews, and international oversight mechanisms to ensure compliance with humanitarian norms in AI-enabled operations.

4.2 Ukraine–Russia Conflict: Multistate AI Arms Race and Civilian Protection Erosion

The Russia–Ukraine war exemplifies the large-scale integration of artificial intelligence (AI) and autonomous systems in a high-intensity interstate conflict, creating profound strategic and humanitarian challenges. Ukraine's rapid "robots-first" transformation has industrialised drone warfare (Santora et al., 2025; Bondar, 2025), while Russia has matched these innovations, resulting in an algorithmic arms race that compresses decision cycles and strains international humanitarian law (IHL).

Ukraine emerged as the world's leading tactical drone producer in 2024, manufacturing over 2.2 million units—including 200,000 FPV (First-Person View) loitering munitions (suicide drone) per month—through a multi-vendor industrial pipeline that scaled capacity ten-fold within a year (Litnarovych, 2025; Reuters, 2025). This "robots-first" doctrine offsets shortages of manpower and artillery by deploying

cheap, attritable unmanned aerial vehicles (UAVs) at scale (Bendett & Kirichenko, 2025; Daxhelet, 2023)

Central to Ukraine's AI-enabled command acceleration is the Delta situational awareness system (Zoria, 2025), adopted by the Ministry of Defence in 2023. Delta fuses data from satellites, drones, ground sensors, and civilian reports into a unified operational picture, compressing operational and tactical decision cycles from hours to minutes and is faster than some more modern militaries (Jakes, 2022; Dale, 2021). Its AI modules—such as the "Avengers AI" target-nomination tool —automatically process over 2 million hours of ISR footage, tagging and prioritising targets for strike packages (Hunder, 2024).

On the battlefield, Ukraine deploys advanced autonomous strike systems. The GOGOL-M "mother drone" platform, operational since May 2025, autonomously navigates 300 km to detect, track, and engage targets using onboard AI, vision-inertial guidance, and preplanned attack profiles (Hambling, 2025). FPV loitering munitions achieve three-to-fourfold higher engagement rates than manual drones by combining computer vision target recognition with real-time human oversight (Freedberg, 2025).

Russia's counterpart efforts include mass production of Shahed-136 kamikaze drones named as Geran-2 —upgraded with AI target-recognition software—and development of the Donbass Dome air-defence system, which employs machine-learning algorithms for rapid threat evaluation and automated engagement recommendations (Brennan, 2025; Stepovoy, 2025). Both sides fuse electronic warfare (EW) and cyber-electromagnetic operations with kinetic strikes to blind adversary AI stacks and create "hyper-velocity" engagements that exceed human oversight windows (Stepanenko, 2025).

The humanitarian impact has been severe. UN monitoring reports a 37 per cent increase in civilian casualties during early 2025 compared to 2024, with over 230 civilians killed in June 2025 alone—the highest monthly toll in three years (UN News, 2025). Short-range loitering munitions accounted for a majority of these deaths by striking energy infrastructure, hospitals, and urban residences, often without adequate distinction or proportionality assessments (Sergeev, 2024; UN News, 2025). Automated target-nomination tools and compressed decision cycles have reduced meaningful human review of strike legality, institutionalising algorithmic casualty thresholds (Kirichenko, 2025).

This conflict highlights three fundamental IHL challenges.

- First, distinction failures arise from AI misclassification of dual-use objects and civilian-like signatures.
- Second, proportionality obligations are undermined when automated triage assigns acceptable civilian-loss ratios without case-by-case human judgment.
- Third, accountability gaps emerge as autonomous engagements obscure chains of command, making attribution of unlawful strikes increasingly difficult.

The Ukraine-Russia war demonstrates how AI-enabled autonomy increases operational tempo and effectiveness while simultaneously eroding humanitarian protections and legal accountability. Addressing these dual challenges requires

enforceable "meaningful human control" measures, auditable AI decision logs, and updated IHL instruments that explicitly regulate algorithmic targeting and autonomous engagements.

5. FINDINGS/RESULTS.

The comparative analysis of the Israel–Gaza and Ukraine–Russia conflicts reveals seven interlocking findings that confirm the "dual challenge" of autonomous warfare: AI-enabled systems simultaneously transform strategic conduct and erode humanitarian protections. Across asymmetric (Israel–Gaza) and interstate (Ukraine–Russia) contexts, the same structural patterns emerge—compressed decision cycles, algorithmic targeting, militarisation of civilian data, escalating arms racing, and widening accountability gaps—signalling a qualitative shift in how wars are fought and regulated:

1. **Temporal compression exceeds meaningful human oversight:** AI-accelerated command-and-control compresses Observe–Orient–Decide–Act cycles from hours to minutes (and, tactically, seconds), turning human review into a procedural formality. In Gaza, automated target-generation pipelines reportedly enabled strike approvals within minutes; in Ukraine, digital C2 (e.g., Delta) integrates multi-source Intelligence, Surveillance and Reconnaissance (ISR) and AI triage to nominate, deconflict, and cue fires rapidly. This speed conflicts with the case-by-case deliberation required by international humanitarian law (IHL) for distinction, proportionality, and precaution. The result is systematic "temporal disconnection": lethal outcomes occur faster than realistic human ethical-legal appraisal, shifting moral agency from humans to machine-optimized processes.
2. **Algorithmic dehumanisation of targeting:** Both cases show humans reduced to probability scores and patterns. Target-scoring models (e.g., "combatant-likelihood") and automated triage embed preset civilian-casualty tolerances into engagement logic, normalising "acceptable loss" ratios and displacing individualised judgment. In Ukraine, operational pressures and AI-enabled target nomination can encourage treating ambiguous signatures as threats; in Gaza, reported preset casualty thresholds for target classes illustrate how optimisation logic can institutionalise proportionality violations. This transforms lethal decisions into risk-score operations, eroding dignity-based protections.
3. **Erosion of the civilian–combatant boundary via data pipelines:** Civilian surveillance systems—facial recognition networks, telecom metadata, urban CCTV—are repurposed into military targeting architectures, collapsing peacetime-wartime distinctions. In Gaza, Blue Wolf/Red Wolf/Wolf Pack comprise a surveillance-to-targeting pipeline; in Ukraine, dual-use infrastructure (telecoms, energy, logistics platforms) becomes militarily integrated through AI-enabled Delta Platform and ISR fusion, inviting lawful attack while exposing civilians at scale. The broader "civilianization of digital operations" draws unwitting populations into conflicts through their data exhaust, undermining IHL's central principle of distinction.
4. **Mass autonomy and the algorithmic arms race:** Ukraine's "robots-first" transformation—industrial-scale production of FPV and loitering drones, rapid iteration cycles, and AI-assisted command—met a Russian counter-

mobilization (including AI-enabled drones, electronic warfare, and automated air defences). The marginal cost of precision attack falls as software scales, incentivizing volume over restraint on both sides. Software-defined autonomy also spreads quickly across units and theatres via updates and commercial components, accelerating diffusion to non-state actors and complicating coalition interoperability.

5. **Elevated civilian risk and indirect harm in digitally contested battlespace:** Persistent UAV/USV attack, AI-aided target nomination, and stacked cyber-electromagnetic operations drive civilian casualties and critical infrastructure disruption (energy, hospitals, communications). Short-range loitering munitions with real-time visual feeds can still misclassify or be employed unlawfully; at scale, compressed timelines and automation bias degrade proportionality/precaution in practice. Cyber effects synchronised with kinetic strikes magnify harm without traditional "blast" signatures, challenging monitoring, attribution, and remedy.
6. **Legal and accountability gaps in software-mediated lethality:** Three structural gaps recur: (a) Attribution—who owns an algorithmic error when humans are nominally "on the loop" but not substantively in control? (b) Temporal—machine-speed decisions defeat practical legal review windows; and (c) Predictability—learning systems exhibit non-linear, context-sensitive behaviour that frustrates foreseeability requirements. Existing IHL instruments were built for human-paced, human-centred targeting, not algorithmic pipelines with embedded thresholds. The reviews, designed for hardware weapons, struggle to assess evolving software stacks and data dependencies.
7. **Convergence across conflict types signals structural, not contextual, risks:** Despite different strategic settings, both cases manifest the same humanitarian erosion mechanisms: speed outpacing oversight, optimization replacing judgment, civilian data weaponized, and accountability diffused. This indicates the problem lies in the technological substrate—autonomy, data fusion, and AI optimization—rather than specific doctrine or context. Accordingly, piecemeal fixes will underperform unless they address the shared foundations of machine-mediated warfare.

Taken together, these findings show autonomous warfare is not merely incremental modernization; it is a qualitative shift that systematically weakens the institutional boundaries—strategic and humanitarian—that have constrained war for decades. Only integrated, binding regulation that re-centres human moral agency within machine-speed operations can arrest this trajectory.

6. DISCUSSION

The "Dual Challenge Framework" as a novel theoretical construct for understanding how autonomous warfare fundamentally transforms both strategic interstate relations and humanitarian protection mechanisms simultaneously builded on Ullman's (2020) conceptualization of AI as a "third revolution in military affairs" and Taddeo and Blanchard's (2022) multidimensional definition of autonomous weapons

systems, this framework posits that AI-enabled warfare creates unprecedented structural tensions between operational effectiveness and normative compliance that cannot be resolved through incremental legal adaptation. The Dual Challenge Framework consists of two interconnected dimensions:

1. **Strategic Transformation Dimension:** AI-enabled autonomous systems fundamentally alter the strategic calculus of interstate warfare by compressing decision cycles, scaling lethality, and democratizing precision attack capabilities, creating new forms of strategic instability and arms race dynamics (Chalagashvili, 2024).
2. **Humanitarian Erosion Dimension:** These same technological capabilities systematically undermine the foundational principles of International Humanitarian Law (IHL)—distinction, proportionality, precaution, and accountability—by operating at temporal and cognitive scales incompatible with human-centred legal frameworks (Bode & Huelss, 2018; Pacholska, 2022).

The framework's central theoretical proposition is that these dimensions are causally linked and mutually reinforcing: the strategic advantages of AI warfare (speed, scale, precision) directly generate the humanitarian challenges (compressed oversight, algorithmic targeting, accountability gaps), creating a structural rather than incidental relationship between technological capability and normative violation.

In examining autonomous weapons systems (AWS), it is essential to recognise that these technologies span a spectrum of autonomy levels, ranging from human-in-the-loop systems—where an active operator retains final decision authority over each engagement—to human-on-the-loop systems, in which a supervisory monitor oversees operations and may intervene, and ultimately to human-out-of-the-loop systems, where machines autonomously execute targeting decisions without real-time human input. Crucially, AWS also differ in adaptive capability, from static programming—pre-set rules incapable of learning—to supervised learning systems that improve through human-labelled training data, and further to reinforcement learning systems that self-optimize based on operational feedback. The mechanisms by which humans retain control over AWS can be classified into direct control, supervisory control, and management by exception. Direct control requires real-time human authorization for each engagement. Supervisory control, grants human supervisors veto authority but defaults to automated fire unless overridden. Management by exception allows systems to operate unhindered unless they breach safety or engagement parameters, at which point a “threshold manager” intervenes. Operational purpose further contextualizes AWS as defensive systems; protect friendly forces and infrastructure, offensive systems actively engage adversary targets, and dual-use systems flexibly perform both roles.

Underlying meaningful human control (MHC) are five interrelated requirements. Temporal adequacy ensures humans have sufficient time to assess complex engagement decisions. Cognitive accessibility refers to transparent AI explanations that allow operators to interpret system reasoning. Intervention capacity denotes the technical ability to

halt or override AWS in real time. Predictable behaviour mandates that systems operate within known performance envelopes, enforced through constraint algorithms limiting collateral damage estimates. Finally, accountability traceability requires cryptographically secured logs of every engagement decision; these logs proved vital in post-incident reviews to verify compliance with international humanitarian law.

Humanitarian boundaries safeguard the moral and legal framework within which AWS operate. Temporal boundaries preserve deliberation time—countering the risk that machine-speed cycles compress decision windows—by enforcing human review pauses during war engagements. Cognitive boundaries uphold contextual moral reasoning, ensuring that probability-based targeting scores used by states are always accompanied by human judgments about civilian risk. Institutional boundaries maintain clear chains of command—preventing diffusion of responsibility across AI networks—through strict designation of mission commanders in both theatres. Normative boundaries protect human dignity by requiring that all life-and-death decisions ultimately rest with humans, a principle reinforced in international committees reviewing the use of autonomous surveillance assets.

These concerns crystallise into four testable propositions. The temporal disconnection hypothesis posits that AI's rapid decision cycles undermine lawful deliberation; strike approval times fell below standard IHL thresholds, reducing human oversight. The algorithmic dehumanisation observes that reliance on target-scoring systems led to proportionality questions when preset casualty thresholds were exceeded. Data pipeline militarization highlights how repurposing civilian surveillance networks erodes the distinction principle. Lastly, structural accountability gaps emerge when machine-mediated engagements obscure attribution, as evidenced by contested responsibility for autonomous drone strikes in both conflicts.

7. STRATEGIES FOR REGULATING MILITARY AI AND AUTONOMOUS WARFARE SYSTEMS

The analysis reveals that autonomous warfare simultaneously destabilises strategic relations and erodes humanitarian protections, necessitating integrated regulatory responses addressing both dimensions. Based on the Gaza and Ukraine case studies, the priority areas emerge:

7.1 Binding International Legal Framework

Current IHL proves structurally inadequate for AI-enabled warfare, as demonstrated by systematic civilian protection failures in both conflicts. A new legally binding treaty must establish clear prohibitions and regulations for autonomous systems (Boulanin et al., 2021; Docherty, 2025). The framework should impose an absolute prohibition on fully autonomous systems targeting persons, particularly those employing unpredictable machine learning algorithms whose decision processes cannot be reliably explained or controlled (Taddeo & Blanchard, 2022). For regulated semi-autonomous systems, the treaty must mandate: human authorisation for all lethal engagements; enforceable temporal buffers for legal review proportionate to civilian risk; geographic restrictions in populated areas; and technical requirements ensuring human veto authority (Cavalcante Siebert et al., 2022). Article 36 of Additional Protocol I reviews

must assess training data, algorithmic processes, and operational performance across diverse environments—addressing the Ukraine conflict's rapid iteration cycles that render traditional hardware reviews obsolete (Perrin, 2025).

7.2 Operationalizing Meaningful Human Control

The concept of meaningful human control emerges as the central governance mechanism, but evidence from both conflicts shows nominal human presence does not guarantee substantive control when temporal compression dominates (Bo, 2020; Trabucco, 2023). Design-level implementation requires value-sensitive approaches embedding human primacy from system conception rather than operational add-ons (Eklund, 2020; Santoni de Sio & van den Hoven, 2018). Technical requirements must include: real-time confidence indicators showing AI certainty levels; explainable interfaces providing intelligible target rationales; configurable engagement thresholds allowing operators to adjust automation based on complexity; and fail-safe behaviours defaulting to human oversight when parameters are exceeded (Santoni de Sio & van den Hoven, 2018; Docherty, 2025).

7.3 Comprehensive Accountability Architecture

Both conflicts reveal critical "accountability gaps" where algorithmic decision-making obscures human responsibility for unlawful acts, potentially undermining war crimes prosecution frameworks (McFarland & McCormack, 2015; Sergeev, 2024). Strict liability frameworks should hold states responsible for civilian harm from algorithmic failures, creating incentives for careful development while ensuring victim remedies (Bo, 2020; Trabucco, 2023). Distributed responsibility models must assign specific obligations across development-to-deployment chains: commanders retain ultimate engagement responsibility; developers bear liability for foreseeable failures; operators must demonstrate competence in system limitations (Bo, 2020; Docherty, 2025). Auditable decision processes require cryptographically secured logs documenting sensor inputs, algorithmic steps, confidence levels, and human interventions—enabling post-incident investigation of IHL violations (Perrin, 2025).

7.4 Immediate Implementation Measures

While comprehensive treaties require multilateral negotiation, urgent "no-regrets" measures can be implemented immediately: moratorium on fully autonomous anti-personnel systems; enhanced Article 36 of Additional Protocol I for AI weapons, including algorithmic auditing; voluntary transparency on military AI capabilities through existing confidence-building measures; and mandatory black-box logging for all AI-assisted lethal engagements (Docherty, 2025; United Nations, 2023).

These recommendations simultaneously constrain strategic instability (through transparency and arms control measures) and preserve humanitarian protection (via human control requirements and accountability mechanisms). Only integrated approaches recognising these interconnected dimensions can effectively govern AI warfare while preserving both international security and human dignity principles underlying the laws of war.

Declaration: The author declares no conflict of interest.

References

- Adasi, N. I. (2022). An Appraisal of The Legal Framework for The Protection of Civilians in Cyber-Warfare Under International Humanitarian Law. International Journal of Research and Scientific Innovation. https://rsisinternational.org/journals/ijrsi/digital-library/volume-9-issue-7/14-26.pdf
- Amnesty International. (2023). AUTOMATED APARTHEID: HOW FACIAL RECOGNITION FRAGMENTS, SEGREGATESAND CONTROLS PALESTINIANS IN THE OPT. amnesty.org. https://www.amnesty.nl/content/uploads/2023/05/automated_apartheid.pdf?x67232
- Andersin, E. (2025). The Use of the "Lavender" in Gaza and the Law of Targeting: ai-Decision Support Systems and Facial Recognition Technology. Journal of International Humanitarian Legal Studies, 1–35. https://doi.org/10.1163/18781527-bja10119
- Anneken, M., Burkart, N., Jeschke, F., Kuwertz-Wolf, A., Mueller, A., Schumann, A., & Teutsch, M. (2025). Ethical Considerations for the Military Use of Artificial Intelligence in Visual Reconnaissance. ArXiv.org. https://arxiv.org/abs/2502.03376
- Asaro, P. (2012). On Banning Autonomous Weapon systems: Human rights, automation, and the Dehumanization of Lethal decision-making. International Review of the Red Cross, 94(886), 687–709. https://doi.org/10.1017/s1816383112000768
- Basuchoudhary, A. (2024). AI and Warfare: A Rational Choice Approach. Eastern Economic Journal, 51. https://doi.org/10.1057/s41302-024-00280-7
- Bendett, S., & Kirichenko, D. (2025, January 10). Battlefield Drones and the Accelerating Autonomous Arms Race in Ukraine. Modern War Institute -; Modern War Institute. https://mwi.westpoint.edu/battlefield-drones-and-the-accelerating-autonomous-arms-race-in-ukraine/
- Bhaskar, N., Magoge, J. S., & Hashimy, S. Q. (2025). Technology Transfer in the Era of Military Conflict: Legal Challenges for International Trade and International Humanitarian Law. Journal of Digital Technologies and Law, 3(2), 222–258. https://doi.org/10.21202/jdtl.2025.10
- Blanchard, A., & Bruun, L. (2025). Autonomous Weapon Systems and AI-enabled Decision Support Systems in Military Targeting: A Comparison and Recommended Policy Responses. Stockholm International Peace Research Institute. https://doi.org/10.55163/yqby3151
- Bo, M. (2020, December 18). Meaningful Human Control over Autonomous Weapon Systems: An (International) Criminal Law Account. Opinio Juris. https://opiniojuris.org/2020/12/18/meaningful-human-control-over-autonomous-weapon-systems-an-international-criminal-law-account/
- Bode, I., & Huelss, H. (2018). Kent Academic Repository Full text document (pdf) Citation for published version Link to record in KAR. Review of International Studies, 44(3), 393–413. https://doi.org/10.1017/S0260210517000614
- Bondar, K. (2025, March 6). Ukraine's Future Vision and Current Capabilities for Waging AI-Enabled Autonomous Warfare. Csis.org. https://www.csis.org/analysis/ukraines-future-vision-and-current-capabilities-waging-ai-enabled-autonomous-warfare
- Boulanin, V., Bruun, L., & Goussac, A. (2021). AUTONOMOUS WEAPON SYSTEMS AND INTERNATIONAL HUMANITARIAN LAW. Stockholm International Peace Research Institute. https://www.sipri.org/sites/default/files/2021-06/2106_aws_and_ihl_0.pdf
- Brennan, D. (2025, August). Russia launches 6,400 drones, missiles into Ukraine in record-breaking month. ABC News. https://abcnews.go.com/International/russia-launches-6400-drones-missiles-ukraine-record-breaking/story?id=124201916
- Cavalcante Siebert, L., Lupetti, M. L., Aizenberg, E., Beckers, N., Zgonnikov, A., Veluwenkamp, H., Abbink, D., Giaccardi, E., Houben, G.-J., Jonker, C. M., van den Hoven, J., Forster, D., & Lagendijk, R. L. (2022). Meaningful human control: actionable properties for AI system development. AI and Ethics, 3. https://doi.org/10.1007/s43681-022-00167-3
- Chalagashvili, I. (2024). AI Era in Modern Warfare. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.4813807
- Dale, D. (2021). Defence innovation: a case study on the Ukrainian Delta system. https://www.dominicdale.me/2025/01/16/defence-innovation-a-case-study-on-the-ukrainian-delta-system/
- Daxhelet, É. (2023). Artificial Intelligence and the Future of Warfare . https://finabel.org/wp-content/uploads/2024/07/FFT-AI-and-the-future-of-warfare-ED.pdf
- Docherty, B. (2025, April 28). A Hazard to Human Rights. Human Rights Watch. https://www.hrw.org/report/2025/04/28/hazard-human-rights/autonomous-weapons-systems-and-digital-decision-making

- Eklund, A. M. (2020). Meaningful Human Control of Autonomous Weapon Systems Definitions and Key Elements in the Light of International Humanitarian Law and International Human Rights Law. https://www.fcas-forum.eu/publications/Meaningful-Human-Control-of-Autonomous-Weapon-Systems-Eklund.pdf
- Fatafta, M., & Leufer, D. (2024, May 9). AI in Israel's war on Gaza. Access Now. https://www.accessnow.org/publication/artificial-genocidal-intelligence-israel-gaza/
- Fitz-Gerald, A., & Hennebry, J. (2025). Protecting civilians in a data-driven and digitalized battlespace: toward a baseline humanitarian technology infrastructure. Frontiers in Human Dynamics, 6. https://doi.org/10.3389/fhumd.2024.1465594
- Freedberg, S. J. (2025, March 6). Trained on classified battlefield data, AI multiplies effectiveness of Ukraine's drones: Report. Breaking Defense. https://breakingdefense.com/2025/03/trained-on-classified-battlefield-data-ai-multiplies-effectiveness-of-ukraines-drones-report/
- Hambling, D. (2025, May 26). Ukraine Drone Carriers Launch First Long-Range Autonomous Strikes. Forbes. https://www.forbes.com/sites/davidhambling/2025/05/26/ukraine-drone-carriers-launch-first-long-range-autonomous-strikes/
- Heyns, C. (2016). Autonomous weapons systems: living a dignified life and dying a dignified death. In N. Bhuta, S. Beck, R. Geiβ, H.-Y. Liu, & C. Kreβ (Eds.), Autonomous Weapons Systems: Law, Ethics, Policy (pp. 3–20). chapter, Cambridge: Cambridge University Press.
- Human Rights Watch. (2024, December 5). Killer Robots: UN Vote Should Spur Treaty Negotiations. Human Rights Watch. https://www.hrw.org/news/2024/12/05/killer-robots-un-vote-should-spur-treaty-negotiations
- Hunder, M. (2024, December 20). Ukraine collects vast war data trove to train AI models. Reuters. https://www.reuters.com/technology/ukraine-collects-vast-war-data-trove-train-ai-models-2024-12-20/
- Iftikhar, S. (2024). Cyberterrorism as a Global threat: a Review on Repercussions and Countermeasures. PeerJ Computer Science, 10(e1772). https://doi.org/10.7717/peerj-cs.1772
- International Committee of the Red Cross. (2020). International humanitarian law and cyber operations during armed conflicts. International Review of the Red Cross, 102(913), 481–492. https://doi.org/10.1017/s1816383120000478
- Ithy. (2025). The Algorithmic Battlefield: How Israel Deploys Artificial Intelligence in Modern Targeting. Ithy.com. https://ithy.com/article/israel-ai-military-targeting-v8hbmfdu
- Jai Galliott, & Scholz, J. (2020). The Case for Ethical AI in the Military. In The Oxford Handbook of Ethics of AI. (pp. 683–702). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190067397.013.43
- Jakes, L. (2022, November 15). For Western Weapons, the Ukraine War Is a Beta Test. The New York Times. https://www.nytimes.com/2022/11/15/world/europe/ukraine-weapons.html
- Joseph-Asoh, C., Worluh-Okolie, N., & Ebibode, J. (2024). The rise of cyberwarfare: The applicability of international humanitarian law for the protection of civilians and civilian objects. https://www.lawjournals.org/assets/archives/2024/vol10issue2/10065.pdf
- Kelsey, J. T. G. (2008). Hacking into International Humanitarian Law: The Principles of Distinction and Neutrality in the Age of Cyber Warfare. Michigan Law Review, 106(7), 1427–1451. https://www.jstor.org/stable/40041623
- Kirichenko, D. (2025, May 23). How AI Is Eroding the Norms of War. AI Frontiers. https://ai-frontiers.org/articles/how-ai-is-eroding-the-norms-of-war
- Kreowski, H.-J., & Meyer-Ebrecht, D. (2015). "Revolution in Military Affairs" - Not Without Information and Communication Technology. T1.4004–T1.4004. https://doi.org/10.3390/isis-summit-vienna-2015-t1.4004
- Lin, C. (2022). Why Does Buddhism Support International Humanitarian Law? – A Humanistic Perspective. Contemporary Buddhism, 23(1-2), 2–17. https://doi.org/10.1080/14639947.2023.2269332
- Litnarovych, V. (2025, April 11). Ukraine Becomes World's Leading FPV Drone Producer With Over 2.2 Million Units Built. UNITED24 Media. https://united24media.com/latest-news/ukraine-becomes-worlds-leading-fpv-drone-producer-with-over-22-million-units-built-7527
- Longpre, S., Storm, M., & Shah, R. (2022). Lethal autonomous weapons systems & artificial intelligence: Trends, challenges, and policies. MIT Science Policy Review, 3, 47–56. https://doi.org/10.38105/spr.360apm5typ
- McFarland, T., & McCormack, T. (2015). Mind the Gap: Can Developers of Autonomous Weapons Systems be Liable for War Crimes? U.S. Naval War College Digital Commons. https://digital-commons.usnwc.edu/ils/vol90/iss1/2/

- Mylrea, M. (2025). The generative AI weapon of mass destruction: Evolving disinformation threats, vulnerabilities, and mitigation frameworks (pp. 315–347). Academic Press. https://doi.org/10.1016/B978-0-443-29246-0.00007-9
- Pacholska, M. (2022). Military Artificial Intelligence and the Principle of Distinction: A State Responsibility Perspective. Israel Law Review, 1–21. https://doi.org/10.1017/s0021223722000188
- Perrin, B. (2025, January 24). Lethal Autonomous Weapons Systems & International Law: Growing Momentum Towards a New International Treaty | ASIL. Asil.org. https://www.asil.org/insights/volume/29/issue/1
- Reuters. (2025, March 10). Ukraine to sharply raise purchases of home produced FPV drones in 2025. Reuters. https://www.reuters.com/business/aerospace-defense/ukraine-sharply-raise-purchases-home-produced-fpv-drones-2025-2025-03-10/
- Rickli, J.-M., & Mantellassi, F. (2023). Artificial Intelligence in Warfare. Routledge EBooks, 12–36. https://doi.org/10.4324/9781003218326-2
- Rowe, N. C. (2022). The comparative ethics of artificial-intelligence methods for military applications. Frontiers in Big Data, 5. https://doi.org/10.3389/fdata.2022.991759
- Sacks, S. (2023). A Framework for Lethal Autonomous Weapons Systems Deterrence. Joint Force Quarterly, 110, 16–25. https://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-110/jfq-110_16-25_Sacks.pdf?ver=mfeQ6y3DgoicEeCHgYP94Q%3d%3d
- Santoni de Sio, F., & van den Hoven, J. (2018). Meaningful Human Control over Autonomous Systems: A Philosophical Account. Frontiers in Robotics and AI, 5(15). https://doi.org/10.3389/frobt.2018.00015
- Santora, M., Jakes, L., Kramer, A. E., Hernandez, M., & Sholudko, L. (2025, March 3). Drones Now Rule the Battlefield in the Ukraine-Russia War. The New York Times. https://www.nytimes.com/interactive/2025/03/03/world/europe/ukraine-russia-war-drones-deaths.html
- Schwarz, E. (2018). Death machines. Manchester University Press.
- Sergeev, M. (2024, November 8). Lethal Autonomous Weapon Systems (LAWS): Accountability, Collateral Damage, and the Inadequacies of International Law - Temple iLIT. Temple ILIT. https://law.temple.edu/ilit/lethal-autonomous-weapon-systems-laws-accountability-collateral-damage-and-the-inadequacies-of-international-law/
- Shehabi, O. Y., & Lubin, A. (2025). The New Frontlines: Digital Rights Protection in Contemporary Armed Conflicts. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.5243571
- Shehata, M. A. Z. (2025). The Impact of the Use of Artificial Intelligence in Military Operations in Light of the Rules of International Humanitarian Law. Journal of Law and Emerging Technologies, 4(1), 11–58. https://doi.org/10.54873/jolets.v4i1.196
- Sieg, H. M. (2013). How the Transformation of Military Power Leads to Increasing Asymmetries in Warfare? From the Battle of Omdurman to the Iraq Insurgency. Armed Forces & Society, 40(2), 332–356. https://doi.org/10.1177/0095327x12466228
- Smith, M. R. (2020). Empire of Guns: The Violent Making of the Industrial Revolution. The Journal of Interdisciplinary History, 51(2), 314–315. https://doi.org/10.1162/jinh_r_01566
- Sohail, H. (2022). Fault Lines In The Application Of International Humanitarian Law To Cyberwarfare. Journal of Digital Forensics, Security and Law. https://doi.org/10.15394/jdfsl.2022.1761
- S, S., & Chandrakanthi, L. (2025). Military AI and international humanitarian law: Navigating ethical and legal frontiers. JSS Journal for Legal Studies and Research, (Special Issue), 80–109.
- Stepanenko, K. (2025). The Battlefield AI Revolution Is Not Here Yet: The Status of Current Russian and Ukrainian AI Drone Efforts. In Institute for the Study of War. https://understandingwar.org/backgrounder/battlefield-ai-revolution-not-here-yet-status-current-russian-and-ukrainian-ai-drone
- Stepovoy, B. (2025, May 22). Russia's Miniaturized Shahed and Combat Management System – Left Opposition aims to inspire workers to build Rank and File Assemblies for the peaceful seizure of power. Leftopposition.com. https://leftopposition.com/2025/05/russias-miniaturized-shahed-and-combat-management-system/
- Taddeo, M., & Blanchard, A. (2022). A Comparative Analysis of the Definitions of Autonomous Weapons Systems. Science and Engineering Ethics, 28(5). https://doi.org/10.1007/s11948-022-00392-3
- Trabucco, L. (2023, September 21). What is Meaningful Human Control, Anyway? Cracking the Code on Autonomous Weapons and Human Judgment. Modern War Institute. https://mwi.westpoint.edu/what-is-meaningful-human-control-anyway-cracking-the-code-on-autonomous-weapons-and-human-judgment/

- Turchin, P., Hoyer, D., Korotayev, A., Kradin, N., Nefedov, S., Feinman, G., Levine, J., Reddish, J., Cioni, E., Thorpe, C., Bennett, J. S., Francois, P., & Whitehouse, H. (2021). Rise of the war machines: Charting the evolution of military technologies from the Neolithic to the Industrial Revolution. PLOS ONE, 16(10), e0258161. https://doi.org/10.1371/journal.pone.0258161
- Ullman, H. (2020, January 15). The Third Revolution in Military Affairs. U.S. Naval Institute. https://www.usni.org/magazines/proceedings/2020/january/third-revolution-military-affairs
- Umbrello, S., & Wood, N. G. (2021). Autonomous Weapons Systems and the Contextual Nature of Hors de Combat Status. Information, 12(5), 216. https://doi.org/10.3390/info12050216
- UN News. (2025, June 30). Report reveals significant rise in civilian casualties and rights violations in Ukraine. UN News. https://news.un.org/en/story/2025/06/1165116
- United Nations . (2023). Lethal Autonomous Weapon Systems (LAWS). United Nations. https://disarmament.unoda.org/the-convention-on-certain-conventional-weapons/background-on-laws-in-the-ccw/
- United Nations Office for the Coordination of Humanitarian Affairs – occupied Palestinian territory. (2025, August 6). Humanitarian situation update #311: Gaza Strip. https://www.ochaopt.org/content/humanitarian-situation-update-311-gaza-strip
- Waxman, M., & Anderson, K. (2013). Law and Ethics for Autonomous Weapon Systems: Why a Ban Won't Work and How the Laws of War Can. In Hoover Institution. https://www.hoover.org/research/law-and-ethics-autonomous-weapon-systems-why-ban-wont-work-and-how-laws-war-can
- Zoria, Y. (2025, August 7). Ukraine's AI war room just got real — DELTA now scales across the entire military - Euromaidan Press. Euromaidan Press. https://euromaidanpress.com/2025/08/07/ukraines-delta-battlefield-management-system/
- Zubansky, M. (2023). Legal restrictions in the choice of methods and means of warfare. Uzhhorod National University Herald Series Law, 2(78), 180–185. https://doi.org/10.24144/2307-3322.2023.78.2.28

Impact of Art-integrated Learning in Developing Conceptual Understanding in Mathematics and the Role of Teachers' Training

Dr. Shelly Gandhi
Resource person, CBSE

ABSTRACT

Not all learners are alike! They retain and conclude information in distinct manners, have distinct strengths and shortcomings, and have diverse cultural, economic and social backgrounds which may lead to divergent ways of thinking, learning and behaving. Only a well-trained teacher can cater to the individual needs of diverse learners. Teachers' training helps in the more focused and uniform transmission of knowledge to every classroom in a more structured way. In view of this, CBSE and ISTM under the Government of India have initiated the ToT (Training of Trainers) program for ensuring quality training. Art-integrated learning has redefined the multidisciplinary approach of teaching and learning that gives freedom to learners to innovate, and this leads to effective and joyful learning in the mathematics classroom. It can be defined as understanding the learning content with the use of various art forms to maximise the learning outcomes for non-art domains. Art activities as a curricular link and art-imbued learning as a method to maximise collaborative practice for every learning activity that gives learners hands-on learning experience with the vision to plan and experience joy with and through art-imbued learning. Conceptual understanding or insight can be interpreted as the learner's capacity to reflect at the level of applying, analysing, evaluating and creating in a school subject. This makes it pertinent to understand the impact of Art-imbued learning towards developing understanding of concepts in mathematics, also to correlate the efficacy of Art-imbued learning in enhancing understanding of concepts among girls and boys and also among those who achieve high and those who achieve low at the middle level for grade 8. To carry out this research, the quasi-experimental design is used in which the dependent variable is understanding of the concept, and the independent variable is art-imbued learning. For the categorical variable, level of achievement and sex are used. Two sections of grade 8 were selected at random as a sample, keeping one as the experimental group and the other as the control group for carrying out the experiment. Findings of this study implied that the students develop a better conceptual understanding of mathematics when taught using AIL than through traditional teaching methods. Both boys and girls are getting benefitted by art-imbued approach in developing conceptual understanding in mathematics. Art Integrated or imbued approach is equally beneficial in enhancing the impact of conceptual understanding or insight among both high achievers and low achievers. This means that it caters to the needs of a large spectrum of learners.

Keywords: Teachers' Training, Art Integrated/Imbued Learning (AIL), Conceptual Understanding, Mathematics, Middle School Level, Classroom Process

Introduction:

Teachers' training (Ciraso A., 2012) is an important part of the better quality of education in a country. The skills that are learnt by a teacher in the training has positive impact on the minds of learners in

in the classroom and help in developing more conceptual understanding amongst learners, even in subjects like mathematics. For impactful teaching in the classroom, regular teacher training, Francisco José Melara-Gutiérreza, Ignacio González-Lópezb, (2021), is an inseparable part of our education system. Training is very important, Sonia Casillas Martín, Marcos Cabezas González, & Francisco José García Peñalvo, (2019) to reinforce pedagogical knowledge of various domains. This helps teachers to know, understand and apply its didactic and methodological use in the classroom during the teaching learning process. In view of achieving quality teaching in the classroom, two prestigious institutions, CBSE and ISTM has launched a training program for bringing change to the classrooms. Under the visionary leadership of hon'ble Prime Minister of India Shri Narender Modi ji, Sh. Rahul Singh (IAS), Chairman CBSE, Shri Rajiv Manjhi, Director, ISTM & Joint Secretary to the Government of India, Sh. Manoj Kumar Srivastava, Director(Training Unit), CBSE and their team of experts have launched the ToT program to make NEP2020 a great success for the country. Here is the study by a participant who was trained by ISTM in their ToT program during the year 2024. In this study, the researcher has researched the effectiveness of using art integrated approach in teaching mathematics at the middle school level for developing conceptual understanding.

Art-integrated learning has redefined the multidisciplinary approach of teaching and learning that gives freedom to learners to innovate, and this leads to effective and joyful learning in the classroom. This involves the active participation of every learner in the classroom. Art (C.E., 2011) in every possible form – activates the brain. They spark creativity and allow learners to analyse precisely and interpret different situations around them holistically. AIL helps learners to construct and display an understanding by means of an art form. This helps learner to enhance their expression skills, to think logically and understand the importance of collaboration. It's a hands-on approach to learning that helps learners to innovate and create. Art integration acts as an effective means (Burnaford, G., Brown, S., Doherty, J., & McLaughlin, J., 2007) to pass on skills using the art domain to non-art domains and hence making art for all in spite of confining itself to the art domain. It can be defined as understanding the learning content with the use of art forms to maximise the learning outcomes for non-art domains. Art activities as a curricular link and art-imbued learning as a means towards maximising collaborative practice for every learning activity that gives learners hands-on learning experience with the vision to plan and experience joy with and through art-imbued learning.

Conceptual understanding or insight can be interpreted as the learner's capacity to reflect at the level related to applying, analysing, evaluating and creating in a school subject. Declarative knowledge learning can help a learner to the extent of remembering, defining and recognising some features, but this will not help the learner to reach the higher stages of cognitive development of Conceptual understanding. Darmofal, D. L., Soderholm, D. H., & Brodeur, D. R. (2002) involves the application of knowledge to a variety of situations. Conceptual questions are the questions (Clement, J. F., 1981) that are based on higher-order thinking skills and help them get the idea of basic principles related to the subject. Declarative

knowledge learning or rote learning involves memorisation, which doesn't ensure the application of learning in previously unencountered situations. Conceptual understanding is strengthened (Spier-Dance, L., Mayer-Smith, J., Dance, N., & Khan, S., 2005) through meaningful learning imparted by following meaningful learning strategies with and through the use of meaningful content and material, also, making the content and material available and accessible to the learner. The idea of conceptual understanding (Milligan, A. and Wood, B. (2010)) is changeable, contextual and contested. The learner must be taught the same way, and the teacher must include in her lesson plan the fluidity of conceptual understanding. Also, the conceptual understanding (Mills S., 2016) may be attained by using meaningful constructive activities. The use of constructive activities by the educators may help learners to better connect and organise knowledge to bridge the gap between theory and practice.

Conceptual understanding or insight in the context of mathematics ensures understanding of mathematical concepts in a systematic and scientific way for better understanding through its visualisation. This is about helping learners to use math effectively through critical and creative thinking. Mathematics is everywhere and an inseparable part of our society at large. Knowledge of mathematics will help a learner to categorise and classify places, processes and objects as per their characteristics. With conceptual understanding, the learner will be in a position to create what they think or imagine through the knowledge gained through art integrated approach. Learning becomes easier and enjoyable at the same time with art integrated approach in everyday classes to understand the challenges of day-to-day situations. With the integration of various forms of arts, the learning becomes more lasting, meaningful, corelated and more visual. This may help learners to visualise the cause-and-effect relationship. The students will be able to internalise and visualise the concept, which helps the learner to think critically and results in reflection of knowledge through their own interpretation of the concept, which they got through AIL.

Rationale of the study:

"Art is not the possession of the few who are recognised writers, painters, musicians; it is the authentic expression of any individuality". —John Dewey, Moral Principles in Education.

Integration of art forms with non-art subjects may be regarded as an impactful instructional method to cater to the problem-solving approach for 21st-century learners. Teaching with and through the arts helps learners to visualise and enables them to create, and through their creation, he communicates his thoughts, which results from their deep understanding of themselves, society and the world we live in. The NEP 2020 and NCF SE 2023 recommended the art-integrated approach right from the foundational stage to preparatory, then at the middle and secondary level to attain the desired learning outcomes. It has also acknowledged the importance of Bharat's incredible crafts heritage, which has economic as well as aesthetic values. To pass on these incredible art forms like music, dance, theatre, visual arts, etc. to the next generations, the due importance (NEP,2020, GoI) has been given in NEP 2020 and NCFSE 2023 to bring it to (NCF

SE, 2023; NCERT; CBSE, GoI), the classrooms through art integrated approach. The importance of these art forms should be recognised as being relevant to an inseparable part of school education. It is very important to bring into the domain of school curricular by squarely imbued art-integrated approach through all forms of art. The CBSE, in association with NCERT and other stakeholders, including school principals, teachers, lecturers, and artists of various domains, etc., had discussions and realised that art integration in education at the school level will be much more impactful and more lasting in the minds of learners. Through AIL, the child learns by doing; he is learning through his experience. This will have a positive impact on his life regarding the development of life skills like spirit of inquiry, reflection, developing his own thinking, right interpretation, freedom from conditioned mindset, which will increase the level of confidence, appreciate aesthetic values and think creatively. Research have (Hardiman, M., Rinne, L., & Yarmolinskaya, J., 2014) proved that AIL can improve the learners' academic background by increasing conceptual understanding (Mohalik, R., & Basu, M., 2020)and also strengthens the memory of the learning event. This is also evident that (Hardiman, M. (2016) Education and the Arts) educating through the arts results in the spirit of inquiry and joy. AIL adds new dimensions to the thinking of the learner and therefore enables them to look through a multidisciplinary aspect. The studies Brezovnik A. (2015) have shown that art integrated approach keeps them self-motivated and enables them to think unconventionally and helps them to create through their creativity. Also, learners enjoy being involved in mathematics in the art activity (Jeronimo, J. (2019)) despite differences in their abilities and likes to attend the class. AIL makes the class more joyful and learning more lasting. Role of music as AIL played a key role. BUTZLAFF, R. (2000) in developing interest and lasting understanding. The difficult concept (Kugler E. andKárpáti A., 2023) may be made easy through experientially-based learning instructions by art integrated approach. This helped in developing spatial skills and motivated them to create what they think. Even the low-performing group (Samperio, N, 2018) performed better with the use of AIL.

After reviewing the research papers, the author has concluded that art integrated approach has resulted positively in nurturing the learner to understand the concept, to think out of the box, to create out of his own imagination, to foster the problem-solving ability of the learner, and also, it results in an increase in the achievement of the learner as well. The art-integrated approach stands out very strongly for experiential learning. From the traditional folk songs and dances, music, classical dances, sculptures, carvings on the caves, ancient architecture, the art has played a fundamental role, and its contributions to human evolution through cognitive development cannot be ignored. Also, Art-integrated Learning is a competitive contender for experiential learning. The research work done in this area is not much in India. Hence, conducting research studies in mathematics is quite relevant in the present scenario. The author has raised the following questions for further investigation.

Whether the art-imbued or integrated learning is effective in developing

conceptual understanding in Mathematics?'

Objective:

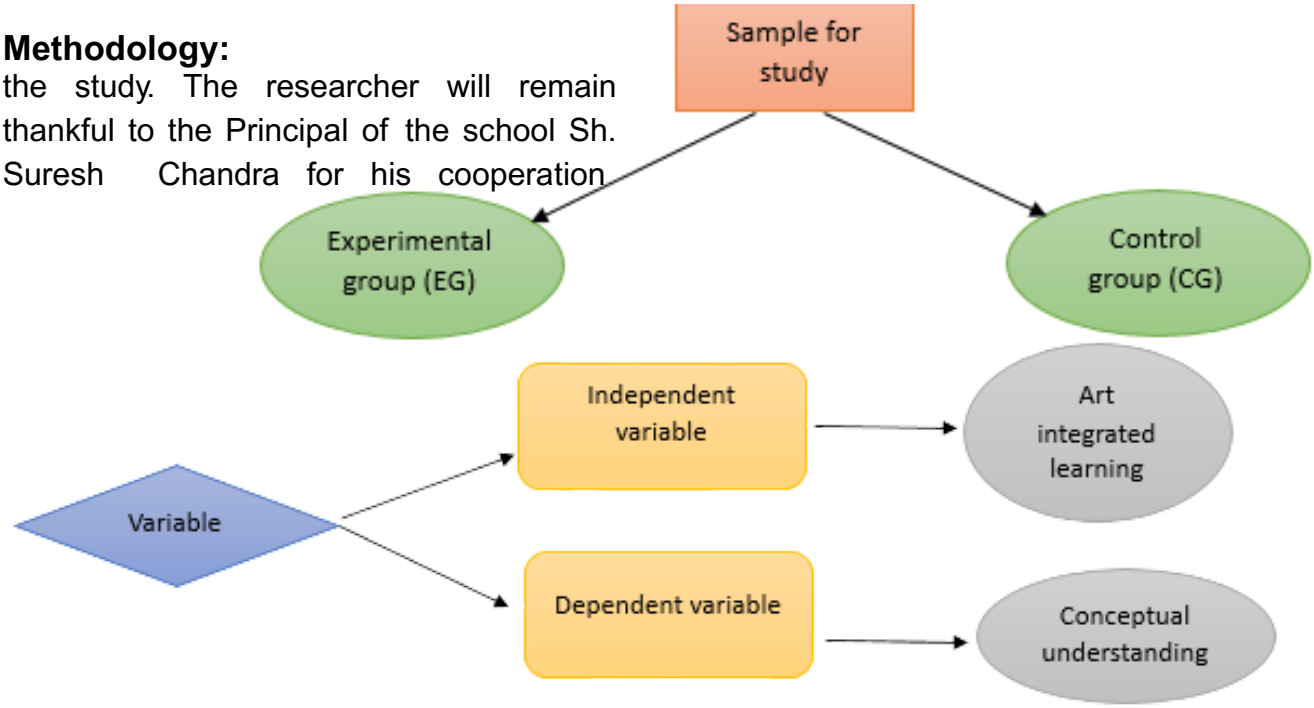
- To find out the efficacy of Art imbued learning in promoting conceptual insight in mathematics at middle level.
- To compare the efficacy of Art imbued/integrated learning in promoting conceptual insight in mathematics among girls and boys.
- To compare the efficacy of Art integrated learning in promoting conceptual insight in mathematics among those who achieve high and to those who achieve low.

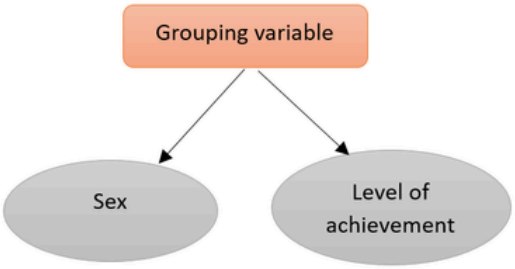
Hypothesis:

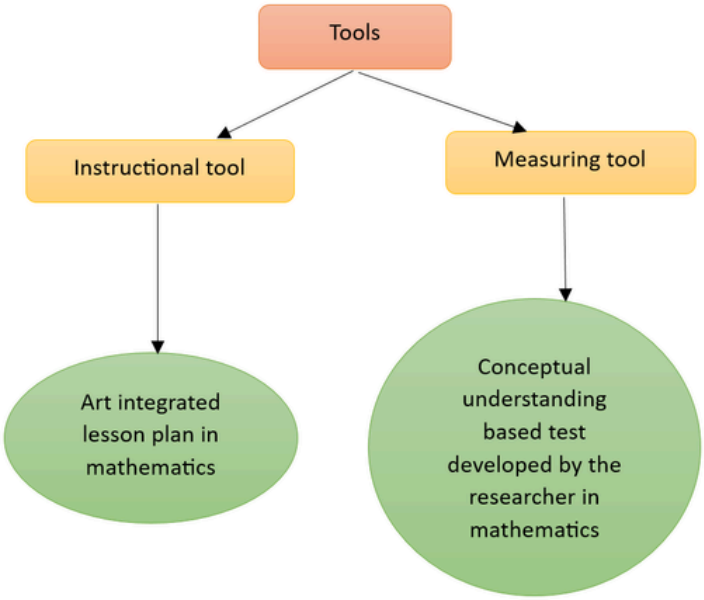
- There will be remarkable effect of Art imbued learning in promoting conceptual insight in mathematics at middle level.
- Art integrated learning not gender sensitive. Means there will not be remarkable difference between conceptual understanding among boys and girls.
- There will be no remarkable difference in the efficacy of Art integrated learning in promoting conceptual insight among those who achieve high and to those who achieve low.

Methodology:

the study. The researcher will remain thankful to the Principal of the school Sh. Suresh Chandra for his cooperation and the study. The researcher will remain thankful to the Principal of the school Sh. Suresh Chandra for his cooperation and support in the interest of the students. The study is demarcated to mathematics teaching at middle level only. For carrying out this research, the researcher has used Quasi-experimental design with Experimental group (EG) and controlled group (CG). In this study, the variable which is dependent is conceptual understanding or insight and independent variable is AIL. In this research, AIL refers to teaching of mathematics by means of visual and performing arts and conceptual understanding refers to learner's understanding at the level application, analysis, evaluation and creation in mathematics. This study includes both boys and girls. In this study, grouping variable represented are sex and level of achievement. For this study, two sections of grade 8 from Atal Adarsh Bal Vidyalaya and Atal Adarsh Balika Bengali Vidyalaya were selected as sample for the study by the researcher. Two kinds of tools are used in present study. Instructional tools: lesson plan based on AIL in mathematics for class 8. Measuring tools: self-created test on conceptual understanding in mathematics.







After getting approval from the school Principal, the researcher visited the schools and interacted with students of selected sections of grade 8. One section is marked as Experimental Group (EG) (B-18 and G-20=total 38) and other one as controlled group (CG) (B-21 and G-20=total 41) randomly. A pre - trial was conducted by the investigator to know the conceptual understanding of students of both the groups. After that the mathematics topic was taught using art integrated approach (AIL) to the experimental group (EG) and the same topic was taught in controlled group (CG) by using traditional methods. Once the topic was taught using art integrated approach to EG and traditional approach to CG, the researcher has conducted Post-Test for both the groups, and the scores are recorded for further analysis. Data collected was interpreted by using descriptive statistics and inferential statistics using SPSS Software.

Data Analysis and Interpretation:

Methods used by the investigator is descriptive and inferential statistics for data analysis and thereafter the interpretations are made. The data analysis is done as per the objectives of the study.

- A-The efficacy of Art imbued learning in promoting conceptual insight in mathematics at middle level.
- B-Compare the efficacy of Art imbued/integrated learning in promoting conceptual insight in mathematics among girls and boys.
- C-Compare the efficacy of Art integrated learning in promoting conceptual insight in mathematics among those who achieve high and to those who achieve low.

Interpretation:

Variables	Shapiro-Wilk		
	Statistic	df	Sig.
Group	0.636	79.0	0.000
Marks	0.801	79.0	0.000
Gender	0.636	38.0	0.000
Achievers	0.628	38.0	0.000

Table: 1 Normality Test

In the table 1, none of the variables follow a normal distribution (p-value<0.05). So, for the further analysis consider using non -parametric tests.

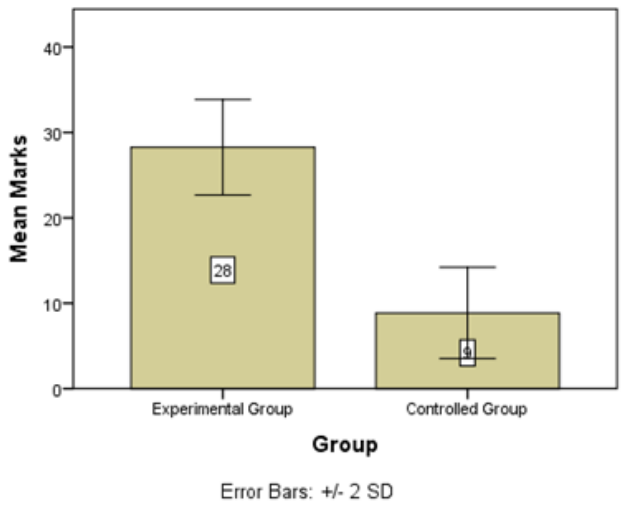
H -1: There will be remarkable effect of Art imbued learning in promoting conceptual insight in mathematics at middle level.

Group	Marks			Mann-Whitney U Statistic (p-value)
	Mean	Median	Standard Deviation	
Experimental Group	28.26	29.00	2.80	0.000 (0.000)
Controlled Group	8.85	9.00	2.67	

Table: 2

The null hypothesis states that there is no remarkable effect of Art-Integrated Learning (AIL) on conceptual understanding in Mathematics between the two groups. The Mann-Whitney U test compares the ranks of marks for the Experimental and Controlled Groups. Since the p-value is 0.000 (< 0.05), we reject the null hypothesis.

- This implies there is a significant difference in the marks between the Experimental Group (Mean = 28.26) and the Controlled Group (Mean = 8.85).
- The Experimental Group scored remarkably higher, suggesting Art-Integrated Learning has a positive impact on conceptual insight or understanding in Mathematics.



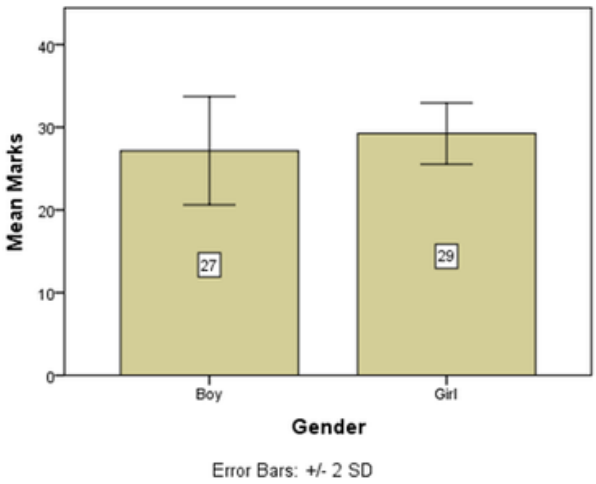
H-2: Art integrated learning not gender sensitive. Means there will not be remarkable difference between conceptual understanding among boys and girls.

Gender	Marks			Mann-Whitney U Statistic (p-value)
	Mean	Median	Standard Deviation	
Boys	27.17	28.00	3.28	79.500 (0.002)
Girls	29.25	30.00	1.86	

Table: 3

The null hypothesis assumes that "Art-Integrated Learning (AIL) marks are not gender-sensitive, means there is no remarkable difference in conceptual understanding in Mathematics between boys and girls in the Experimental Group." Since the p-value is 0.002 (< 0.05), we reject the null hypothesis.

- The significant p-value indicates a statistically significant difference in AIL marks between boys and girls in the Experimental Group.
- Girls scored higher (Mean = 29.25) compared to boys (Mean = 27.17), suggesting a gender-based variation in conceptual understanding developed through Art-Integrated Learning. However, its pertinent to observe here that the magnitude of the difference in their mean marks is very less. That shows that both are getting benefitted by art integrated approach in developing conceptual understanding in mathematics.



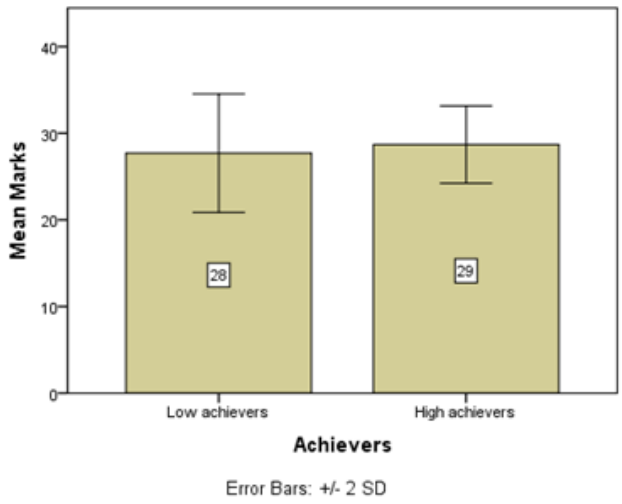
H-3: There will be no remarkable difference in the efficacy of Art integrated learning in promoting conceptual insight among those who achieve high and to those who achieve low.

Achievers	Marks			Mann-Whitney U Statistic
	Mean	Median	Standard Deviation	
Low achievers	27.69	29.00	3.42	141.000 (0.271)
High achievers	28.68	30.00	2.23	

Table: 4

The null hypothesis assumes that There is no remarkable difference in the efficacy/effectiveness of Art Integrated Lesson (AIL) marks in promoting conceptual insight among those who achieve high and those who achieve low in the experimental group. Since p=0.271 (greater than 0.05), we fail to reject the null hypothesis.

- ·This means there is insufficient evidence to conclude that high achievers and low achievers differ significantly in their conceptual understanding developed through AIL.
- The results support the null hypothesis, suggesting that Art Integrated Lessons are equally effective in enhancing conceptual insight among both high achievers and low achievers.



Significant Findings:

1. Art integrated learning plays remarkable role in developing the conceptual understanding in mathematics. The students get a better conceptual understanding in mathematics when taught with the help of AIL than through traditional teaching methods.
2. Girls scored higher (Mean = 29.25) compared to boys (Mean = 27.17), suggesting a gender-based variation in conceptual understanding developed through Art-Integrated Learning. However, its pertinent to observe that the magnitude of the difference in their mean marks is very less. That shows that both are getting benefitted by art integrated approach in developing conceptual understanding in mathematics.
3. Art Integrated approach is equally effective for enhancing conceptual understanding among both high achievers and low achievers. This means that it caters to needs of large spectrum of learners.

Results and Discussion:

The first objective of this research is to study the effectiveness of art-integrated learning (AIL) in promoting conceptual insight in mathematics at the middle level. The result explains that there is a remarkable difference in the conceptual understanding of mathematics among learners in the controlled group and the experimental group. This result is supported by Neumann, J. (2023), stating that integration of art is a powerful instrument for developing higher-order thinking. The relevance of visual as a means through art integration for learning has been irreplaceable, even with the evolution of technologies. It is relevant to mention here that technology has its own role to play. Ulger, K. (2020) also concluded that art integrated approach helps learners to think alternatively. Eisner, E. (1998), Folkes-Bryant, B. (2008), Tucker, S.D. (2017), Hoyt, L. (1992) and DeMoss, K. & Morris, T. (2002) reflect that arts integration gives learner opportunity to absorb learning in their unique, different methods

that result in deepening their learning and enhancing their understanding. Art-integrated approach motivates learners from the inside, as a result, they feel encouraged for learning and gain knowledge.

In our second objective of this study, which is to compare the effectiveness of art-integrated learning in promoting conceptual insight in mathematics among boys and girls. The result shows that Girls scored higher (Mean = 29.25) compared to boys (Mean = 27.17), suggesting a statistically significant gender-based variation in conceptual understanding developed through Art-Integrated Learning. However, it's pertinent to observe that the magnitude of the difference in their mean marks is very small. That shows that both are getting benefitted by art integrated approach in developing conceptual understanding in mathematics. This is supported by Ross, Cindra L. (2008) that art-integrated learning bridges multiple subject areas and develops critical thinking through conceptual understanding. This also deepens their ability to express their understanding in various innovative ways, resulting in fostering innovation in them. It helps in highlighting their inner strength. Eveline M. Schoevers & Paul P. M. Leseman & Evelyn H. Kroesbergen (2019) supports positive impact of mathematics, arts, and creativity in education (MACE) in understanding mathematics and getting conceptual clarity. This also enhances their creativity.

The third objective in this study is to compare the efficacy/effectiveness of Art-integrated learning in promoting conceptual insight among high achievers and low achievers. The result reflects that the Art-integrated approach is equally effective in enhancing conceptual insight among both high achievers and low achievers in the experimental group. This means that it caters to the needs of all types of learners. This result is supported by Catterall, J., Chapleau, R., & Iwanaga, J. (1999), reflecting that when art becomes central to the learning environment, then the institutions become the centre of innovation and discoveries. Through art integrated learning approach, even that learner can be reached which otherwise couldn't. AIL caters for different learning styles. AIL offers unlimited challenges to the high achievers. AIL provides unparalleled opportunities for learning and enhancing their conceptual understanding. AIL has contributed to positive change in the environment of the institution as it fosters collaboration and care. Robinson, A.H. (2013) reflects that the Art-integrated approach has the potential to positively contribute towards enhancing the knowledge of the low achievers.

Educational implications:

1. A well-trained teacher is well versed with the latest advancements and hence an important means to transfer latest knowledge to the classroom. Teachers play a crucial role in bringing change to the classroom. So, regular training of teachers from authentic institutions is a must and can't be ignored.
2. The use of art integrated approach for mathematics is useful to teacher as well as the learner. The use of AIL in mathematics allows learner to connect the dots i.e. to visualise cross curricula connections. AIL makes learning fun and joyful. This will develop intrinsic motivation amongst the learners and motivate them to attend the classes regularly as a result reduce the drop-out rate. Hence, this study contributes towards bringing and retaining more learners to the classroom.
3. The study gives a broad and clear vision to teachers to use AIL in

vision to teachers to use AIL in mathematics that how a small change in pedagogy can bring a better, enhanced, and lasting conceptual understanding in mathematics in learners. AIL has the potential to engage learner's mind, body and hearts, provided that AIL is taught well.

4. The findings of this study can be made part of teachers' training programme (pre and post) with the vision to equip them with the use of art integrated approach during their teaching in the classroom. The results would also help the administrators, curriculum planners, textbook authors to design their content with art integrated approach in mathematics with an aim to develop child centric curriculum and pedagogical approaches.
5. As we are moving towards more inclusive society, this study contributes to cater to the individual needs of variety of learners in the classroom. AIL keeps them engage productively along with their inner learning.

Limitations:

- Many teachers are reluctant to integrate any form of art into their classroom teaching as they feel that it consumes time and requires more efforts that is needed to meet the required standard in core subjects.
- Even the trained teachers transfer the learning differently, and the extent of transfer varies, which may result in non-uniform transfer of learning.

Conclusion:

As we are moving towards more inclusive society, it is evident that art integrated learning approach to teaching and learning process is effective in engaging students in developing multiple skills through conceptual understanding in mathematics. Only a well-trained teacher can cater to the individual needs of diverse learners. Teachers' training helps in a more focused and uniform transfer of knowledge to every classroom in a more structured way. AIL connects learners to themselves and with others, making it collaborative. Boredom and complacency are two major obstacles to innovation and learning. Art offers unlimited challenge to those who outgrow their established learning environments. AIL in mathematics fosters self-directed learning as well by developing the capacity to experience. Art integrated approach in mathematics keeps the learner self-motivated and enables them to think unconventionally, and helps them create unexplored possibilities through their creativity. This helps learners to enhance their expression skills, to think logically and understand the importance of collaboration. It's a hands-on approach to learning mathematics that helps learners to innovate and create. Art integration acts as an effective means to pass on skills using the art domain to non-art domains, and hence making art for all, despite confining itself to the art domain. Art integrated approach in teaching mathematics makes the learning joyful and fun, and breaks the myth that mathematics is a difficult subject.

Declaration: The author declares no conflict of interest.

References:

- A. Helene Robinson (2013) Arts Integration and the Success of Disadvantaged Students: A Research Evaluation. Arts Education Policy Review, 114(4), 191–204. doi:10.1080/10632913.2013.826050, University of South Florida Sarasota-Manatee, Sarasota, Florida, USA.
- Anja Brezovnik; (2015)The Benefits of Fine Art Integration into Mathematics in Primary School;FOCUS; c e p s Journal | Vol.5 | No 3 | Year 2015

- Burnaford, G., Brown, S., Doherty, J., & McLaughlin, J. (2007). Arts Integration Frameworks, Research & Practice: A Literature Review. Washington DC: Arts Education Partnership.
- Catterall, J. , Chapleau, R. , & Iwanaga, J. (1999) , Involvement in the arts and human development. In E. Fiske (Ed.), Champions of change: The impact of the arts on learning. 1-18 Washington, DC: The Arts education partnership and president's committee on the Arts and the Humanities. Retrieved from http://www.aep-arts.org/publication
- CBSE: https://cbseportal.com/ebook/art-integration
- Ciraso A., 2012 ; An Evaluation of the Effectiveness of Teacher Training: Some Results from a Study on the Transfer Factors of Teacher Training in Barcelona Area, December 2012, Procedia - Social and Behavioral Sciences 46(37):1776-1780
- Claudia E. Cornett, 2011, Center Stage: Arts-Based Read-Alouds, https://doi.org/10.1598/RT.60.3.3
- Clement, J. F. (1981) Analogy generation in scientific problem solving, in: Proceedings of the Third Annual Conference of the Cognitive Science Society, Berkeley, CA (Hillsdale, NJ, Erlbaum).
- Darmofal, D. L., Soderholm, D. H., & Brodeur, D. R. (2002). Using concept maps and concept questions to enhance conceptual understanding. T3A-1–T3A-6. 32nd Annual Frontiers in Education. doi:10.1109/fie.2002.1157954
- DeMoss, K. & Morris, T. (2002) How arts integration supports student learning; students shed light on the connections. Chicago, IL; Chicago arts partnership in education (CAPE)
- Department of Sistematic and Social Pedagogy, Faculty of Science Education, Autonomous University of Barcelona , Bellaterra 08193, Spain ; doi: 10.1016/j.sbspro.2012.05.377
- Driver, R., Asoko, H., Leach, J., Scott, P., & Mortimer, E. (1994). Constructing Scientific Knowledge in the Classroom. Educational Researcher, 23(7), 512. doi:10.3102/0013189x023007005
- Eisner, E. 1998. Does experience in the arts boost academic achievement? Arts Education Policy Review 100: 32–38.
- Erika Kugler and Andrea Kárpáti; (2023) Teaching Mathematics through art Developing spatial skills and digital literacy of children with learning challenges through visual arts education; Arts-Based Interventions and Social Change in Europe (pp.30-38) DOI: 10.4324/9781003376927-6
- Eveline M. Schoevers & Paul P. M. Leseman & Evelyn H. Kroesbergen;(2019) International Journal of Science and Mathematics 18 (5) Education,https://doi.org/10.1007/s10763-019-10018-z; Enriching Mathematics Education with Visual Arts: Effects on Elementary School Students` Ability in Geometry and Visual Arts
- Folkes-Bryant, B. 2008. Investigating the effect on student attitudes, motivation and self-esteem in performing arts elementary schools incorporating arts integration. Ed.D. diss., St. John's University (New York).
- Francisco José Melara-Gutiérreza , Ignacio González-Lópezb (2021) , Institute of Education, Health and Social Sciences; University of Chichester, United Kingdom , https://doi.org/10.14201/eks.25290 , Teacher Training for Effective Teaching, Education in the Knowledge Society Vol 22
- Hardiman, M. (2016) Education and the Arts: Educating Every Child in the Spirit of Inquiry and Joy. Creative Education, 7, 1913-1928. doi: 10.4236/ce.2016.714194.
- Hardiman, M., Rinne, L., & Yarmolinskaya, J. (2014). The Effects of Arts Integration on Long-Term Retention of Academic Content. Mind, Brain, and Education, 8(3), 144–148. doi:10.1111/mbe.12053
- Hoyt,L.(1992) many ways of knowing, using drama, oral interactions and the visual arts to enhance reading proficiency. The Reading Teacher, 45(8), 580-584
- Jeronimo, Jessica, (2019), "Integrating Art Into a Math Curriculum". Capstone Projects and Master's Theses. 491.
- Milligan, A. and Wood, B. (2010). Conceptual understandings as transition points: making sense of a complex social world. Journal of Curriculum Studies, 42(4), 487–501. doi:10.1080/00220270903494287
- Mohalik, R. and Basu, M. (2020) Effectiveness of Arts Integrated Learning (AIL) in Developing Conceptual Understanding in Geography at Elementary Level. http://dx.doi.org/10.2139/ssrn.3674340
- Nahum Samperio(2018)Universidad Autónoma de Baja California, Tijuana, Mexico; Learning Strategies Used by High and Low Achievers in the First Level of English; Issues in Teachers' Professional Development, 21(1), 75-89. https://doi.org/10.15446/profile.v21n1.68246
- NCERT: https://ncert.nic.in/deaa/pdf/ArtIntegratedLearning-Handbook-Classes%20VI-VIII.pdf
- NCF SE, 2023: https://ncert.nic.in/pdf/NCFSE-2023-August_2023.pdf
- NEP,2020: https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- Neumann, Jill, (2023), "THE EFFECTS OF VISUAL ART INTEGRATION ON K-12 CRITICAL LITERACY". Culminating Projects in Teacher Development. 55.

- RON BUTZLAFF; (2000) , Can Music Be Used to Teach Reading?; Journal of Aesthetic Education, Vol. 34, Nos. 3-4, Fall/Winter 2000 @2000 Board of Trustees of the University of Illinois
- Ross, Cindra L., (2008), "Art Integration in the Classroom". Regis University Student Publications (comprehensive collection). 100. https://epublications.regis.edu/theses/100
- Sonia Casillas Martín a, Marcos Cabezas González a and Francisco José García Peñalvo, (2019) Digital competence of early childhood education teachers: attitude, knowledge and use of ICT, EUROPEAN JOURNAL OF TEACHER EDUCATION, https://doi.org/10.1080/02619768.2019.1681393
- Spier-Dance, L., Mayer-Smith, J., Dance, N., & Khan, S. (2005). The role of student-generated analogies in promoting conceptual understanding for undergraduate chemistry students. Research in Science & Technological Education, 23(2), 163–178. doi:10.1080/02635140500266401
- Susan Mills;(2016) Conceptual Understanding: A Concept Analysis; The qualitative report, DOI:10.46743/2160-3715/2016.2308
- Tucker, S.D.(2017) the effects of art integration on literacy comprehension achievement (doctoral dissertation)
- Ulger, K. (2020). The Effects of Visual Arts Education upon Literacy . International Journal of Research in Fine Arts Education, 3(2), 1-13.

Empathy: Panacea to All Conflicts ?

Sanjeev Gupta[1], Yukti Gupta[2]

[1]Deputy Secretary, union public service commission
[2]Research scholar, IIM Rohtak

ABSTRACT

The world is facing a time when domestic and international conflicts are on the rise. The threat of a world war does not appear improbable. Many countries are openly intimidating their rivals with usage of nuclear arsenal. Patriotism appears to have been replaced by jingoism. Personal egos and bullying have replaced globalisation. The paper looks at the solution to national wars by promoting empathy and the spirit of one world, one family.

If we go by the conventional definition of World War, we are not going through such a phase. But a look around the world will reveal that many major and minor armed conflicts/wars between nations are going on. Russia and Ukraine are at war since 2022, Israel is at war with Hamas of Palestine since October, 2023, India and Pakistan recently had an armed conflict which thankfully lasted a few days, so did Israel and Iran, Thailand and Cambodia had a similar situation recently, Armenia and Azerbaijan are in a war like situation, China is having skirmishes with Philippines, Japan and Taiwan and so on.

These wars don't come cheap for humanity. Besides the obvious economic cost, the loss of life, fatal injuries and loss of livelihood are much bigger losses. Just taking the example of the Russia-Ukraine war, though it's not possible to evaluate the actual loss of life due to claims and counter-claims, it is estimated that nearly 350,000 people have been directly killed in the war since 2022 (Statista Research Department, Aug 8, 2025). While in Gaza, not only have over 60000 civilians died, almost 92 percent houses have been destroyed or damaged, and half of Gaza's hospitals and healthcare facilities are closed (Statista Research Department, Aug 7, 2025).

1. Reasons for Global Conflicts/Wars

That brings us to the most pertinent question, why do nations go on war? In part the question can be explained by understanding the term nationalism. Walker Connor described nation in 1978, as an entity whose true essence cannot be physically measured. It is more a felling rather than any tangible commodity. It lies in the psychological bond that unites its people and, at a deep subconscious level, sets them apart from others in some substantial way. What matters most is not the objective reality, but rather what people collectively believe to be true. As the definition implies, nationalism is a state of mind. If this nationalism is about pride for one's country its patriotism, which is expected to every citizen of a country, but if the concept of nationhood focusses on isolationism and identity-building based solely on separation and hatred for others, its hyper-nationalism.

That brings us to the most pertinent question, why do nations go on war? In part the question can be explained by understanding the term nationalism. Walker Connor described nation in 1978, as an entity whose true essence cannot be physically measured. It is more a felling rather than any tangible commodity. It lies in the psychological bond that unites its people and, at a deep subconscious level, sets

them apart from others in some substantial way. What matters most is not the objective reality, but rather what people collectively believe to be true. As the definition implies, nationalism is a state of mind. If this nationalism is about pride for one's country its patriotism, which is expected of every citizen of a country, but if the concept of nationhood focuses on isolationism and identity-building based solely on separation and hatred for others, it's hyper-nationalism.

Nationalism, when expressed in a restricted sense or in an antagonistic form, often creates disharmony and divisions. It gives precedence to the interests of a single group above all others, even if this comes at the cost of various other groups. When stretched to its extreme, nationalism becomes illiberal and intolerant. It refuses to recognise those outside of the preferred group as equals, although they are residents of the same nation. This rigid "us versus them" outlook, frequently grounded in notions of racial or national superiority, has the potential to fuel harmful and violent outcomes within as well as outside of the nations. (Reading from Sovereignty, Understanding the Constructive and Destructive Natures of Nationalism, February 16, 2023).

Famous contemporary historian Richard Lebow has done a fantastic study on the reasons for wars among nations. He used data related to 94 major wars that have occurred since 1648. He concluded that out of the three major motives – appetite (wealth), spirit (honour) and fear (security) – it is the human 'spirit' which incites most wars. A whopping 58% of wars were over standing or prestige. Revenge accounted for 10%. Material aggrandisement, or imperialism, accounted for just 7%. This is a revelation as till now the major causes of wars were thought to be security or material interest. This also brings out the fact how hyper nationalism and ego have become the biggest reasons for the modern war instead of nation's security or gains for it.

Nobel laureate economist Paul Krugman, in an article in The New York Times in 2014 tried to make economic sense of wars between the nations and concluded that modern nations cannot enrich themselves by waging war. It just goes to show that the leaders or the governments get the cost-benefit calculation wrong. However, he offered that if it's not economics, the reason appears to be political gain from the wars to the incumbent leaders/governments, though they are against the national interests. It makes sense in context of recent wars where many of them appear to be desire to distract the public attention from an economic/political/domestic debacle.

The situation is indeed frightening, friction between the nations is palpable and world appears to be on the brink of a conflict involving multiple nations on either side. Any of the conflicts already in progress or any new trigger can lead to a World War with each country choosing sides as per its convenience which is seldom based on any principles. As may be seen the reasons for war are becoming flimsier and too dependent on personalities who head the countries. Tariffs/protectionism on the economic front is fuelling the countries towards hyper nationalism which are anti-thesis to globalisation. The situation is so fickle that even personal attributes like egos and biases of any eccentric leader could be the reason for the next World War.

2. Can we avoid conflicts/wars?

This leads us to the next question: what could be done to diffuse the situation? On a lighter note, we should all pray for an alien

invasion. The best and fastest method to bring together enemies is always to find them a stronger common enemy. An alien invasion will certainly make all countries forget about their petty differences, as the threat will then be common to the whole of humankind.

Jokes apart, aliens are not needed as the common enemy to reunite the world; there are so many other threats staring at us, which threaten the whole of mankind. Michael D. Bess, in his book, Planet in Peril, talks about the four biggest challenges that haunt the existence of the human race, namely, Fossil fuel and climate change, Nuclear arsenal, Pandemics (natural and bioengineered) and Artificial Intelligence. Pamlin et al., in their research paper, have also come up with 12 existential risks to humanity, and they too include the above 4 risks as mentioned by Michael D. Bess in his book. World Economic Forum, in one of its articles in 2019, has included obesity with climate change as a potential risk to human risk.

It is clear that so much needs to be done to save humanity itself, and we are in a race against time to achieve it. We can all see that there is so much to be done to save humanity itself that we are actually running against the clock to save it. Issues like climate change, protection from pandemics, obesity, etc., need urgent attention from our leaders and policymakers. The looming threat of Artificial Intelligence and ways to regulate it to stop it from making whole human mankind redundant should be the issue which should give sleepless nights to the heads of the nations, instead what we are seeing is one-upmanship on display in all bilateral and international meetings. Keeping the domestic constituency satisfied and happy is the only narrow target of all world leaders, without realising what will be left of their own nations when the whole world ceases to survive.

Alana HF, a US-based researcher, suggests Cosmopolitanism as one of the approaches to counter hyper nationalism. The word Cosmopolitan comes from the Greek word kosmopolitēs, which means "citizen of the world." The idea is that all humans, regardless of their physical location or other ties, are part of one global community. It also connotes that each one of us is responsible for the well-being of others. This concept questions the preference to help only those who happen, through the accident of birth, to be part of our local neighbourhood, city, or country. The idea is very good and seems practical due to the modern means of communication and transportation, but we have seen that migrants (even when they are legal) are being mistreated, thereby making it necessary for everyone to first understand the true meaning of empathy.

3. Way ahead – Empathy?

Empathy can most simply be described as the capacity to emotionally grasp what others are feeling, to view a situation from their perspective, and to imagine ourselves in their place. In essence, it means placing ourselves in another person's position and experiencing their emotions as if they were our own. It is often referred to as 'putting yourself in someone else's shoes. Herein lies the problem, as no one can enter someone else's shoes till they take off their own shoes.

The Bhagavad Gita verse 6.32 describes empathy as a virtue wherein one sees

similarity between self and all living entities.

आत्मौपम्येन सर्वत्र समं पश्यति योऽर्जुन |
सुखं वा यदि वा दु:खं स योगी परमो मत: || 32||

"Dear Arjuna, the Yogi who looks upon all beings as his own self, treats all beings equally, and considers happiness and misery as the same, is truly a great being himself."

While sympathy is the feeling of sorrow or pity for someone else, empathy is the ability to understand and share the feelings of others, especially when one has been in a similar situation. That is the reason empathy is a divine quality worthy of mention by Lord Krishna. Thereby, meaning letting aside our own ego, biases, status, etc., we know that it is the biggest challenge.

Yet empathy is the only fix to wars. Empathy can help bring about cooperation amongst the countries, and it helps build trust. We have seen how countries rush in to aid the countries battered by natural calamities like earthquakes, tsunamis, draughts etc. All feelings of enmity and hostility are forgotten. Recently, India, despite conflicts at different levels with Turkey, provided it with men as well as material aid when Turkey was ravaged by massive floods. Such humanitarian actions can help foster relations based on trust and mutual respect.

Empathy can also help in de-escalating ongoing conflicts, as it can reduce conflicts by breaking stereotypes and encouraging dialogue. It can bring the warring parties to the table for negotiation. It's a universal truth that no war can be ended till parties sit together for negotiations. The parties may come to the negotiating table because there is a stalemate, or one party is feeling too weak to continue. Looking at the lasting nature of modern wars (the Ukraine-Russia war has been going on for nearly 3 years), it may be difficult to have quick negotiations, but then empathy for mankind as a whole may push the nations towards negotiations.

Unfortunately, more and more world leaders are coming through an agenda of hyper nationalism, which reduces their cognitive empathy. As per the human behaviour researchers Decety and Jackson (2004), cognitive empathy is crucial for understanding other people's mental states and intentions. There used to be times when any death or destruction in any part of the world used to bring tears to the eyes of the whole of humanity, irrespective of countries and regions. A terrorist attack in a school in Pakistan, leading to the deaths of scores of young children used to bring out candle marches in India, in solidarity for departed souls, despite the 2 countries being at loggerheads for decades. This affective empathy, as defined by Singer et al. (2004), to be linked to feeling the pain of others, seems like a historic concept, as now we rejoice at the sufferings of "enemy countries", forgetting they are humans too.

Collective effort is needed, which will require Herculean multinational effort (may be through a body like the UN, which may once again become relevant) to uphold human values, which include dignity, equality, and respect for all individuals, regardless of their background, culture, or nationality. These values are fundamental to promoting peace, stability, and sustainable development globally. Discrimination and Marginalization on the basis of caste, creed, religion, race, colour, ethnicity, gender, etc. are the curses that make the lives of millions and millions

of individuals a misery of unimaginable sufferings. Forget nations, these scourges plague people within their own country, too. National interests have to be complemented by human rights, whether of citizens or otherwise.

One solution also emerges from the Indian philosophy of "Vasudhaiva Kutumbakam". It is a Sanskrit phrase from the Maha Upanishad, meaning "the world is one family." We as mankind are all in the same boat. We are destined to swim or sink together as a race. Nature did not create any divisions; it's the humans who invented notions like nation, religion, race, etc. If we follow the Indian philosophy, it cajoles us all to come together as a family and look for solutions rather than divisive factors and resolve all our conflicts peacefully by sitting across the table and negotiating (vaad-vivad).

4. Conclusion

In the modern world where jingoism, apathy and antagonism rule, talking about empathy appears to be empty rhetoric. It is an absolute truth that trying to train grown-up leaders about empathy will have no result. It's almost impossible to even change behaviours of teenagers. The only hope is the education system. An education system aimed at complementing or even replacing patriotism and war histories of nations with empathy. Teaching the next generation about mutual respect, dignity for all, caring, sharing and giving, the art of listening, standing for others, etc. This kind of education system needs to be introduced universally at all levels, in all schools, across the world.

Empathy is the only way forward for humanity, but the only prayer is that by the time we take a decision, implement such an approach and a whole empathetic generation is born to mend this world, we may not have lost half the population of the world in some mindless wars. The moment for action has already passed, and we are actually running behind the clock. All's not lost, let's work together to leave a world better than the way we inherited it.

Declaration: The author declares no conflict of interest.

References:

- Bess, M. D. (2022). Planet in peril: Humanity's four greatest challenges and how we can overcome them. Cambridge University Press.
- Bhagavad Gita. (n.d.). (Chapter 6, verses 32). The Bhagavad Gita (Eknath Easwaran, Trans.). Nilgiri Press
- Connor, W. (1978). A nation is a nation, is a state, is an ethnic group is a…. Ethnic and Racial Studies, 1(3), 377–400.
- Decety, J., & Jackson, P. L. (2004). The functional architecture of human empathy. Behavioral and Cognitive Neuroscience Reviews, 3(2), 71–100.
- HF, A. (2025). What's the antidote to hypernationalism? Giving What We Can. Retrieved from https://www.givingwhatwecan.org/en/blog/what-s-the-antidote-to-hypernationalism
- Krugman, P. (2014, August 17). The New York Times.
- Lebow, R. N. (2010). Why nations fight: Past and future motives for war. Cambridge University Press. https://doi.org/10.1017/CBO9780511761485
- Maha Upanishad. (n.d.). (Chapter 6, verses 71–73). (Note: Ancient text; no date; include translation if applicable.)
- Pamlin, D., & Armstrong, S. (2015). 12 risks that threaten human civilisation: The case for a new risk category. Global Challenges Foundation.

- Singer, T., Seymour, B., O'Doherty, J., Kaube, H., Dolan, R. J., & Frith, C. D. (2004). Empathy for pain involves the affective but not sensory components of pain. Science, 303(5661), 1157–1162. https://doi.org/10.1126/science.1093535
- Sovereignty: Understanding the constructive and destructive natures of nationalism. (2023, February 16)
- Statista Research Department. (2025, August 7).
- Statista Research Department. (2025, August 8).

An Empirical Study on Cyber Threats and Protection Management Frameworks: Safeguarding the Digital Workplace

Shonan K Mahajan
[1]Founder Wizcyber and Research Scholar

ABSTRACT

The rapid digitization of the workplace has exponentially increased organizational dependency on information systems, concurrently expanding the attack surface for cyber threats. This paper presents an empirical analysis of the contemporary cyber threat landscape and evaluates the efficacy of established protection management frameworks in safeguarding the digital workplace. Through a systematic literature review and synthesis of existing empirical data, this study identifies the most prevalent cyber threats, including social engineering, ransomware, and insider threats, and maps them against human, technical, and organizational vulnerabilities. The research critically assesses prominent frameworks such as the NIST Cybersecurity Framework, COBIT 5, and ISO/IEC 27001, analyzing their components—Identify, Protect, Detect, Respond, Recover—and their integration into a cohesive risk management strategy. Furthermore, the paper integrates criminological theories, including Routine Activity Theory and General Deterrence Theory, to provide a nuanced understanding of cybercrime victimization and perpetration. The findings indicate that a siloed approach to cybersecurity is insufficient. A holistic, socio-technical model is proposed, emphasizing the continuous integration of technological controls, robust governance processes, and comprehensive security awareness training to create a resilient security culture. The study concludes that the future of digital workplace security lies in adaptive, intelligence-driven frameworks capable of evolving with the threat landscape, supported by cross-organizational commitment and an understanding of the human factors in cybersecurity.

Keyword: Air-gap, Malwares, Data Diode, Out-of-band Acknowledgment, Cyber Security, UBA [User Behavior Analytics],Network Behavior Analytics [NBA], AI [Artificial Intelligence], Neural Networks.

1.0. Introduction

The digital transformation of the modern workplace is an irreversible global trend, accelerated by technological advancements and, more recently, the global shift to remote and hybrid work models (Buil-Gil et al., 2021). While this transformation offers unparalleled efficiency, collaboration, and scalability, it also introduces a complex and dynamic array of cyber threats. Organizations of all sizes and across all sectors are now operating in a digital environment where the boundaries of the traditional network perimeter have dissolved, creating a vastly expanded and more vulnerable attack surface (Obaidat et al., 2020).

Cybercrime has evolved from a niche concern to a significant threat to national

security, economic stability, and organizational continuity. The financial impact is staggering, with global costs projected to reach trillions of dollars annually (Statista, 2024). Beyond direct financial loss, the consequences of cyber incidents include operational disruption, severe reputational damage, loss of intellectual property, and regulatory penalties (Paoli et al., 2018). The digital workplace, characterized by cloud services, Internet of Things (IoT) devices, and a mobile workforce, presents unique challenges that legacy security models are ill-equipped to handle (Phillips et al., 2023).

In response to this escalating threat, a multitude of cybersecurity standards, guidelines, and management frameworks have been developed. Prominent among these are the NIST Cybersecurity Framework (NIST, n.d.), COBIT 5 (Harmer & Williams, 2014), and the ISO/IEC 27001 family. These frameworks aim to provide structured, repeatable processes for managing cybersecurity risk. However, the mere adoption of a framework does not guarantee security. Many organizations struggle with implementation, often treating cybersecurity as a purely technical issue rather than an integrated business function (Soomro et al., 2016; Malatji et al., 2020). The critical human element—often cited as the weakest link—is frequently overlooked in favor of technological solutions (Dupont & Holt, 2021; Pollini et al., 2022).

This paper conducts an empirical study to bridge the gap between the theoretical prescriptions of cybersecurity frameworks and the practical realities of the modern digital workplace. It seeks to answer the following research questions:

1. What are the most salient cyber threats targeting the digital workplace, and what are their underlying attack vectors?
2. How effective are established cybersecurity management frameworks (e.g., NIST, COBIT) in mitigating these threats?
3. How can insights from criminological theory enhance the understanding and prevention of cybercrime within organizations?
4. What constitutes an integrated, socio-technical model for effective cybersecurity protection management?

By synthesizing findings from a wide body of literature and presenting empirical data analyses, this study aims to provide a comprehensive overview for academics, policymakers, and practitioners seeking to fortify the digital workplace against an ever-evolving threat landscape.

2. Literature Review

2.1 The Evolving Cyber Threat Landscape

The spectrum of cyber threats is diverse and continuously adapting. Social engineering attacks, particularly phishing, remain highly effective due to their exploitation of human psychology rather than technical vulnerabilities (Dupont & Holt, 2023). The COVID-19 pandemic created a fertile ground for such scams, exploiting anxiety and the rapid shift to remote work (Tang et al., 2021; van de Weijer et al., 2024). Ransomware has emerged as a dominant threat, crippling organizations by encrypting critical data and demanding payment for its release, with attacks becoming more targeted and sophisticated (Phillips et al., 2023). Insider threats, whether malicious or accidental, pose a significant risk, as trusted

individuals have privileged access to systems (Williams et al., 2019). The proliferation of IoT devices introduces millions of poorly secured endpoints into corporate networks, creating new opportunities for botnets and data breaches (Obaidat et al., 2020). For Small and Medium Enterprises (SMEs), which often lack dedicated security resources, these threats are particularly acute (Rawindaran et al., 2022).

2.2 Cybersecurity Management Frameworks

To combat these threats, organizations turn to structured frameworks. The NIST Cybersecurity Framework (CSF) is one of the most widely adopted. It provides a policy framework of computer security guidance for how private sector organizations can assess and improve their ability to prevent, detect, and respond to cyber attacks, organized around five core functions: Identify, Protect, Detect, Respond, and Recover (NIST, n.d.). Its strength lies in its flexibility and risk-based approach.

COBIT 5 (Control Objectives for Information and Related Technologies) is a comprehensive framework for the governance and management of enterprise IT. It helps organizations create optimal value from IT by maintaining a balance between realizing benefits and optimizing risk levels and resource use (Harmer & Williams, 2014). It is particularly strong in aligning IT goals with business objectives and ensuring regulatory compliance.

The ISO/IEC 27001 standard specifies the requirements for establishing, implementing, maintaining, and continually improving an information security management system (ISMS). It provides a systematic approach to managing sensitive company information so that it remains secure (Kurii & Opirskyy, 2022).

Research indicates that while these frameworks are robust individually, their effectiveness is maximized when integrated. For instance, NIST CSF can operationalize the high-level governance goals of COBIT 5, while ISO/IEC 27001 can provide the certification standard for the resulting controls (Ma et al., 2009; Wallace et al., 2021).

2.3 The Human Factor and Criminological Theories

A purely technological defense is doomed to fail without addressing the human element. The field of cybersecurity has increasingly recognized the value of integrating criminological theories to understand and prevent cybercrime (Leukfeldt & Holt, 2019; Dupont & Whelan, 2021).

Routine Activity Theory (RAT) posits that crime occurs when a motivated offender, a suitable target, and the absence of a capable guardian converge in time and space (Cohen & Felson, 1979). In cyberspace, this translates to cybercriminals (motivated offenders) targeting organizations or individuals (suitable targets) that lack effective security controls, monitoring, or user awareness (capable guardians) (Reyns & Henson, 2016; Back & LaPrade, 2020). General Deterrence Theory (GDT) suggests that crime can be prevented if the perceived costs (e.g., severity and certainty of punishment) outweigh the benefits (Alanezi & Brooks, 2014). In cybersecurity, this relates to the implementation of logging, monitoring, and prosecution efforts. Social

Learning Theory (Bandura & Walters, 1977) explains how cybercriminal techniques and motivations can be learned and reinforced through online interactions and communities (Onwuadiamu, 2025).

Integrating these theories into security management moves the focus beyond technical controls to include behavioral and environmental factors, leading to more holistic strategies such as Security Awareness Training (to create capable guardians) and robust audit trails (to increase the certainty of detection for deterrence) (Ho et al., 2022; Graham & Triplett, 2017).

3. Research Methodology

This study employs a systematic literature review (SLR) methodology to synthesize existing empirical and theoretical research. The process was conducted in three stages:

- Planning: The research questions were defined, and a protocol was established to identify relevant literature.
- Execution: A comprehensive search was conducted across major academic databases (e.g., Scopus, Web of Science, Google Scholar) using keywords such as "cyber threats," "digital workplace," "NIST framework," "COBIT," "cybercrime theory," and "security management." The search was limited to peer-reviewed journal articles, conference proceedings, and authoritative reports published primarily between 2000 and 2025.
- Synthesis: The identified literature was analyzed and coded according to key themes: threat types, framework components, human factors, and theoretical foundations. Data from empirical studies were extracted to support quantitative and qualitative analyses where possible.

The analysis is primarily qualitative, identifying trends, gaps, and relationships within the literature. For quantitative support, data from cited sources (e.g., Statista, 2024; van de Weijer et al., 2024) were synthesized and visualized using Python code to generate figures that illustrate key trends.

4. Findings and Results

4.1 Analysis of Prevalent Cyber Threats

The literature consistently identifies a core set of threats that dominate the digital workplace. While Phishing/Social Engineering is the most prevalent threat due to its low cost and high success rate, Ransomware and Advanced Persistent Threats (APTs) have the highest impact scores, reflecting their potential for catastrophic operational and financial damage. The significant impact of Insider Threats underscores the criticality of the human factor.

4.2 Efficacy of Protection Frameworks: A Functional Mapping

To evaluate the frameworks, we mapped their core components against the key threats identified in Figure 1. The following table summarizes how the NIST CSF functions address these threats.

Table 1: Mapping of NIST CSF Functions to Mitigate Prevalent Cyber Threats

NIST CSF Function	Key Activities	Primary Threats Mitigated	Empirical Support
Identify	Asset management, Business environment, Governance, Risk assessment, Risk management strategy	All threats (foundational)	In et al. (2004) stress risk analysis; Wallace et al. (2021) confirm its necessity for adoption.
Protect	Access Control, Awareness Training, Data Security, Maintenance, Protective Technology	Phishing, Insider Threat, IoT-Based Attacks	Rawindaran et al. (2022) show training reduces SME breaches; Moody et al. (2018) on policy compliance.

Detect	Anomalies and Events, Continuous Monitoring, Detection Processes	APTs, Ransomware, Insider Threat	McLeod & Dolezel (2018) link monitoring to reduced breach impact.
Respond	Response Planning, Communications, Analysis, Mitigation, Improvements	Ransomware, DDoS	Yeboah-Ofori & Opoku-Boateng (2023) highlight response planning for resilience.
Recover	Recovery Planning, Improvements, Communications	Ransomware, DDoS	Paoli et al. (2018) note recovery planning mitigates financial impact.

The analysis reveals that no single function is sufficient. A layered defense, integrating all five functions, is required. For example, while Protect measures like training can reduce phishing success, Detect functions are needed to identify bypassed controls, and Respond/Recover functions are essential for when an attack is successful.

The integration of governance-focused frameworks like COBIT 5 strengthens the Identify function. COBIT's processes for ensuring stakeholder alignment and defining a governance framework provide the strategic oversight needed to resource and prioritize the NIST CSF activities effectively (Harmer & Williams, 2014; Al-ma'aitah, 2022).

4.3 The Role of Criminological Theories in Shaping Defences

The integration of criminological theories provides a powerful lens for designing more effective security measures. The following figure models how Routine Activity Theory (RAT) explains a common cybercrime event and suggests corresponding security controls.

Routine Activity Theory (RAT)		
(a) potential offender	**(b) suitable target**	**(c) absence of guardians**
Applicable factors in the study:		
human presence	elaborated in terms of VIVA (below)	labels
Predictions:		
likelihood of item disappearance increases with increasing number of people close to the object	likelihood of item disappearance increases with its *suitability* determined by VIVA	likelihood of item disappearance is influenced by label tone

Value, Inertia, Visibility, Access (VIVA) (Within equipment type)			
(b.1) Value	**(b.2) Inertia**	**(b.3) Visibility**	**(b.4) Access**
Applicable factors in this study:			
novelty	constant within equipment type	tree cover	closest path closest road
Predictions regarding the likelihood of theft:			
value of an item decreases over time (Dinnin 2009)	N/A	visibility increases with smaller tree cover	access increases with shorter distance to paths and roads

Figure 1 : Routine Activity Theory (RAT)

Figure 1 visually demonstrates the power of RAT. To prevent crime, one must disrupt the convergence of the three elements. The corresponding controls directly address this:

- Target Hardening makes the asset less suitable (e.g., training employees to spot phishing).
- Increasing Guardianship introduces capable guardians (e.g., automated monitoring systems).
- Deterring Offenders increases the perceived effort and risk (e.g., publicizing successful prosecutions).

Studies by Ho et al. (2022) and Graham & Triplett (2017) provide empirical support for the effectiveness of these theory-informed interventions, showing that improved digital literacy (guardianship) reduces victimization.

4.4 The Socio-Technical Security Management Model

Based on the synthesis of findings, a holistic model is proposed. This model integrates the technical controls from frameworks like NIST with the human and organizational insights from criminology and management science.

Table 2: The Integrated Socio-Technical Cybersecurity Management Model

Layer	Component	Description	Supporting References
Governance & Strategy	Executive Commitment	Cybersecurity treated as a business risk, not just an IT issue. Resources allocated accordingly.	Soomro et al. (2016); Harmer & Williams (2014)
	Risk Management	Continuous process of identification, assessment, and mitigation based on business impact.	In et al. (2004); NIST (n.d.)
	Compliance & Audit	Adherence to legal/regulatory requirements and internal policies through regular audits.	Kurii & Opirskyy (2022); Moody et al. (2018)
Technology & Processes	Preventive Controls	Firewalls, antivirus, access control, patch management, secure configuration.	Obaidat et al. (2020); Phillips et al. (2023)
	Detective Controls	SIEM, IDS/IPS, vulnerability scanning, behavioral analytics.	McLeod & Dolezel (2018)
	Responsive Controls	Incident response plan, disaster recovery, backup systems.	Yeboah-Ofori & Opoku-Boateng (2023)
Human & Culture	Security Awareness	Continuous, engaging training tailored to different roles and current threats.	Rawindaran et al. (2022); Pollini et al. (2022)
	Cultivating Guardians	Empowering all employees to recognize and report threats (creating capable guardians).	Graham & Triplett (2017); Dupont & Holt (2023)
	Positive Security Culture	Leadership modeling secure behavior, rewarding compliance, and fostering shared responsibility.	Malatji et al. (2020); Chourasia & Bahuguna (2024)

This model posits that effective cybersecurity is an emergent property of the continuous interaction between these three layers. A failure in one layer (e.g., lack of executive commitment) can undermine the others (e.g., insufficient budget for tools, or a culture that dismisses security training).

5. Discussion

The findings of this study underscore the multifaceted nature of cybersecurity in the digital workplace. The escalating cost and sophistication of cyber threats, as visualized in Figure 1, demand a response that is equally sophisticated and multi-dimensional.

The first key insight is that framework adoption must be holistic and integrated. Simply purchasing security tools that align

with the NIST "Protect" function is inadequate. Organizations must build a mature program that encompasses all five functions, from identifying critical assets to having a robust recovery plan. This requires the strategic direction provided by governance frameworks like COBIT 5, ensuring that cybersecurity investments are aligned with business objectives and risk appetite (Wallace et al., 2021).

The second, and perhaps most critical, insight is the paramount importance of the human factor. The high prevalence of social engineering and insider threats is a direct testament to this. Technological controls can be bypassed if employees are not trained, motivated, and empowered to act as the first line of defense. The application of criminological theories, particularly RAT, provides a scientifically-grounded rationale for investing in security awareness and culture. By viewing employees not as "weak links" but as potential "capable guardians," organizations can fundamentally shift their defensive posture (Leukfeldt & Holt, 2019).

Therefore, the proposed Socio-Technical Model (Table 2) is not merely a theoretical construct but a practical necessity. It provides a blueprint for moving beyond siloed security efforts. For instance, a technology deployment (e.g., a new MFA system) should be driven by governance (policy mandating its use) and supported by the human layer (training and cultural buy-in to reduce resistance). Future research should focus on empirically validating this model through case studies and quantitative analysis in different organizational contexts.

Finally, the landscape is not static. The rise of Artificial Intelligence (AI) presents a dual-use challenge: while AI can power advanced threat detection (Chaure & Punjabi, 2024), it can also be weaponized by attackers to create more convincing deepfakes and automate attacks. Future frameworks and models must be adaptive to incorporate these technological shifts.

5.1. Practical and Implementable Cybersecurity Recommendations for the Digital Workplace

To enhance the applicability of this research for practitioners and non-technical stakeholders, this section translates the study's findings into **practical, implementable recommendations** that can be readily adopted in organisational settings.

For Individual Employees (End Users):

- Use strong, unique passwords for work-related accounts and enable multi-factor authentication wherever available.
- Exercise caution when handling emails, messages, or links, particularly those requesting urgent actions or sensitive information.
- Regularly update devices and avoid installing unauthorized software or browser extensions.
- Immediately report suspicious emails, login alerts, or unusual system behavior to the IT or security team.

For Organisational Management and Leadership:

- Treat cybersecurity as a core business risk by incorporating it into enterprise risk management and strategic planning.
- Establish clear cybersecurity policies and ensure they are communicated in simple, non-technical language.
- Allocate sufficient resources for employee training, security tools, and incident response preparedness.

- Promote a positive security culture by encouraging reporting without fear of blame and by leading by example.

For Organisational Management and Leadership:

- Implement continuous system monitoring, centralised logging, and regular vulnerability assessments.
- Conduct periodic phishing simulations and tabletop incident response exercises to assess organisational readiness.
- Maintain regular, tested data backups to ensure rapid recovery from ransomware or system failures.
- Align technical controls with recognised frameworks such as NIST CSF while tailoring implementation to organisational context and risk tolerance.

Table 3: Practical Mapping of Common Cyber Threats to Implementable Security Actions in the Digital Workplace

Cyber Threat	How the Threat Occurs (Simple Explanation)	Practical Preventive Actions
Phishing / Social Engineering	Fake emails or messages trick users into revealing credentials or clicking malicious links	Employee awareness training, email filtering tools, verification of sender identity, multi-factor authentication (MFA)
Ransomware	Malicious software encrypts organizational data and demands payment for recovery	Regular offline backups, timely patch management, endpoint protection, incident response planning
Insider Threats (Malicious or Accidental)	Employees misuse access intentionally or make errors that expose systems	Role-based access control, user activity monitoring, clear security policies, continuous training
Credential Theft	Passwords are stolen through leaks, malware, or reused credentials	Strong password policies, MFA, password managers, monitoring of unusual login behavior
IoT-Based Attacks	Poorly secured devices provide attackers access to networks	Network segmentation, device inventory management, firmware updates, restricted access controls
Data Breaches	Unauthorized access leads to exposure of sensitive information	Encryption of data, access control enforcement, regular audits, compliance monitoring
Distributed Denial of Service (DDoS)	Systems are overwhelmed by excessive traffic causing service outages	Traffic monitoring, rate limiting, cloud-based DDoS protection services

6. Conclusion

This empirical study has delineated the critical challenges in safeguarding the digital workplace. It confirms that the threat landscape is dominated by highly prevalent and high-impact threats like ransomware and social engineering, which exploit both technical and human vulnerabilities. The research affirms the value of established frameworks like NIST CSF and COBIT 5, but argues that their true power is unlocked only through integrated implementation that spans governance, technology, and people.

The major contribution of this paper is the explicit integration of criminological theory with IT management practice. By demonstrating how theories like Routine Activity Theory can inform the design of security controls and training programs, the study provides a more profound, human-centric foundation for cybersecurity efforts. The proposed Socio-Technical Model synthesises these elements into an actionable guide for organisations.

In conclusion, securing the digital workplace is a continuous journey, not a destination. It requires a strategic, layered, and adaptive approach that is deeply embedded in the organisation's culture. Leaders must champion this effort,

recognising that a resilient digital workplace is not just a technical requirement but a core business imperative in the 21st century.

Declaration: The author declares no conflict of interest.

References

- Abomhara, M., Yayilgan, S. Y., Nweke, L. O., & Székely, Z. (2021). A comparison of primary stakeholders' views on the deployment of biometric technologies in border management: Case study of SMart mobILity at the European land borders. Technology in Society, 64, 101484.
- Agnew, R. (1992). Foundation for a general strain theory of crime and delinquency. Criminology, 30(1), 47–88.
- Alanezi, F., & Brooks, L. (2014). Combatting Online Fraud in Saudi Arabia Using General Deterrence Theory (GDT). Americas Conference on Information Systems.
- Al-ma'aitah, M. A. (2022). Investigating the drivers of cybersecurity enhancement in public organizations: The case of Jordan. The Electronic Journal of Information Systems in Developing Countries, 88(4), e12223.
- Back, S., & LaPrade, J. (2020). Cyber-situational crime prevention and the breadth of cybercrimes among higher education institutions. International Journal of Cybersecurity Intelligence and Cybercrime, 3(1), 25–47.
- Bandura, A., & Walters, R. H. (1977). Social learning theory (Vol. 1). Prentice Hall.
- Beccaria, C. (2016). On crimes and punishments. Transaction Publishers.
- Brantingham, P., & Brantingham, P. (2013). Crime pattern theory. In Environmental criminology and crime analysis (pp. 100–116). Willan.
- Buil-Gil, D., Miró-Llinares, F., Moneva, A., Kemp, S., & Díaz-Castaño, N. (2021). Cybercrime and shifts in opportunities during COVID-19: A preliminary analysis in the UK. European Societies, 23(sup1), S47–S59.
- Chaure, S., & Punjabi, S. (2024). The Effect of Artificial Intelligence on Data Security Systems. In Proceedings of the Cognitive Computing and Cyber Physical Systems (pp. 408–419). Springer Nature.
- Chourasia, A., & Bahuguna, P. (2024). Organizational performance as dependent variable in strategic human resource management literature–a journey so far. Benchmarking: An International Journal, ahead-of-print.
- Clarke, R. V. G., & Felson, M. (1993). Routine activity and rational choice (Vol. 5). Transaction Publishers.
- Dion, M. (2011). Corruption, fraud and cybercrime as dehumanizing phenomena. International Journal of Social Economics, 38(6), 466–476.
- Drew, J. M. (2020). A study of cybercrime victimisation and prevention: Exploring the use of online crime prevention behaviours and strategies. Journal of Criminological Research, Policy and Practice, 6(1), 17–33.
- Dupont, B., & Holt, T. J. (2021). The Human Factor of Cybercrime. Social Science Computer Review, 40(4), 860–864.
- Dupont, B., & Holt, T. J. (2023). Advancing research on the Human Factor in Cybercrime. Computers in Human Behavior, 138, 107410.
- Dupont, B., & Whelan, C. (2021). Enhancing relationships between criminology and cybersecurity. Journal of Criminology, 54(1), 76–92.
- Eck, J. E. (1995). Examining routine activity theory: A review of two books. Taylor & Francis.
- Goldsmith, A., & Brewer, R. (2015). Digital drift and the criminal interaction order. Theoretical Criminology, 19(1), 112–130.
- Graham, R., & Triplett, R. (2017). Capable guardians in the digital environment: The role of digital literacy in reducing phishing victimization. Deviant Behavior, 38(12), 1371–1382.
- Grasmick, H. G., Tittle, C. R., Bursik, R. J., & Arneklev, B. J. (1993). Testing the core empirical implications of Gottfredson and Hirschi's general theory of crime. Journal of Research in Crime and Delinquency, 30(1), 5–29.
- Harmer, G., & Williams, M. (2014). Governance of Enterprise IT based on COBIT®5: A management guide (1st ed.). IT Governance Ltd.
- Haugen, S. (2005). E-government, cyber-crime and cyber-terrorism: A population at risk. Electronic Government, an International Journal, 2(4), 403–412.
- Hawdon, J. (2021). Cybercrime: Victimization, Perpetration, and Techniques. American Journal of Criminal Justice, 46(6), 837–842.
- Hechter, M., & Kanazawa, S. (1997). Sociological rational choice theory. Annual Review of Sociology, 23(1), 191–214.

- Ho, H., Gilmour, J., Mazerolle, L., & Ko, R. (2023). Utilizing cyberplace managers to prevent and control cybercrimes: A vignette experimental study. Security Journal, 21(1), 1–24.
- Ho, H., Ko, R., & Mazerolle, L. (2022). Situational crime prevention (SCP) techniques to prevent and control cybercrimes: A focused systematic review. Computers & Security, 115, 102611.
- In, H. P., Kim, Y.-G., Lee, T., Moon, C.-J., Jung, Y., & Kim, I. (2004). A security risk analysis model for information systems. In Proceedings of the Systems Modeling and Simulation: Theory and Applications: Third Asian Simulation Conference, AsianSim 2004 (pp. 505–513).
- Jaishankar, K. (2008). Space transition theory of cyber crimes. Crimes of the Internet, 5, 283–301.
- Johnson, M. (2013). Cyber crime, security and digital intelligence. Taylor & Francis Group.
- Kurii, Y., & Opirskyy, I. (2022). Analysis and comparison of the NIST SP 800-53 and ISO/IEC 27001: 2013. NIST Special Publication, 800, 10.
- Leukfeldt, R., & Holt, T. J. (Eds.). (2019). The human factor of cybercrime. Routledge.
- Lohrke, F. T., & Frownfelter-Lohrke, C. (2023). Cybersecurity research from a management perspective: A systematic literature review and future research agenda. Journal of General Management.
- Ma, Q., Schmidt, M. B., Herberger, G. R., & Pearson, J. M. (2009). An integrated framework for information security management. Review of Business, 30(1), 58.
- Malatji, M., Marnewick, A., & von Solms, S. (2020). Validation of a socio-technical management process for optimising cybersecurity practices. Computers & Security, 95, 101846.
- Martin, C. S. (2024). Integrating criminological theories in cybersecurity risk assessment: A study of the TRACI framework's application to critical infrastructure [Doctoral dissertation, Liberty University]. ProQuest Dissertations & Theses.
- McLeod, A., & Dolezel, D. (2018). Cyber-analytics: Modeling factors associated with healthcare data breaches. Decision Support Systems, 108, 57–68.
- Mee, P., & Chandrasekhar, C. (2021). Cybersecurity is too big a job for governments or business to handle alone. European Union Agency for Law Enforcement Training (CEPOL).
- Moody, G. D., Siponen, M., & Pahnila, S. (2018). Toward a unified model of information security policy compliance. MIS Quarterly, 42(1), 285–312.
- NIST. (n.d.). NIST Cybersecurity Framework. Retrieved January 10, 2025, from https://www.nist.gov/cyberframework/framework
- Obaidat, M. A., Obeidat, S., Holst, J., Al Hayajneh, A., & Brown, J. (2020). A comprehensive and systematic survey on the internet of things: Security and privacy challenges, security frameworks, enabling technologies, threats, vulnerabilities and countermeasures. Computers, 9(2), 44.
- Okeke, R. I., & Eiza, M. H. (2023). The application of role-based framework in preventing internal identity theft related crimes: A qualitative case study of UK retail companies. Information Systems Frontiers, 25(2), 451–472.
- Onwuadiamu, G. (2025). Cybercrime in criminology: A systematic review of criminological theories, methods, and concepts. Journal of Economic Criminology, 8, 100136.
- Painter, K. A., & Farrington, D. P. (2001). Evaluating situational crime prevention using a young people's survey: Part II making sense of the elite police voice. British Journal of Criminology, 41(2), 266–284.
- Paoli, L., Visschers, J., & Verstraete, C. (2018). The impact of cybercrime on businesses: A novel conceptual framework and its application to Belgium. Crime, Law and Social Change, 70(4), 397–420.
- Phillips, A., Ojalade, I., Taiwo, E., Obunadike, C., & Oloyede, K. (2023). Cyber-security tactics in mitigating cyber-crimes: A review and proposal. International Journal of Cryptography and Information Security (IJCIS), 13(1), 1–20.
- Phillips, B. (2013). Information technology management practice: Impacts upon effectiveness. Journal of Organizational and End User Computing (JOEUC), 25(4), 50–74.
- Pollini, A., Callari, T. C., Tedeschi, A., Ruscio, D., Save, L., Chiarugi, F., & Guerri, D. (2022). Leveraging human factors in cybersecurity: An integrated methodological approach. Cognition, Technology & Work, 24(2), 371–390.
- Radanliev, P. (2024). Digital security by design. Security Journal, 37(4), 1640–1679.
- Rawindaran, N., Jayal, A., & Prakash, E. (2022). Exploration of the impact of cybersecurity awareness on small and medium enterprises (SMEs) in Wales using intelligent software to combat cybercrime. Computers, 11(12), 174.
- Reyns, B. W., & Henson, B. (2016). The thief with a thousand faces and the victim with none: Identifying determinants for online identity theft victimization with routine activity theory. International Journal of Offender Therapy and Comparative Criminology, 60(10), 1119–1139.

- Saleem, S., Khan, N. F., & Zafar, S. (2021). Prevalence of cyberbullying victimization among Pakistani youth. Technology in Society, 65, 101577.
- Soomro, Z. A., Shah, M. H., & Ahmed, J. (2016). Information security management needs more holistic approach: A literature review. International Journal of Information Management, 36(2), 215–225.
- Statista. (2024). Estimated cost of cybercrime worldwide 2018–2029. Retrieved January 12, 2025, from https://www.statista.com/forecasts/1280009/cost-cybercrime-worldwide
- Straub, D. W., & Welke, R. J. (1998). Coping with systems risk: Security planning models for management decision making. MIS Quarterly, 22(4), 441–469.
- Tang, Z., Miller, A. S., Zhou, Z., & Warkentin, M. (2021). Does government social media promote users' information security behavior towards COVID-19 scams? Cultivation effects and protective motivations. Government Information Quarterly, 38(4), 101572.
- van de Weijer, S., Leukfeldt, R., & Moneva, A. (2024). Cybercrime during the COVID-19 pandemic: Prevalence, nature and impact of cybercrime for citizens and SME owners in the Netherlands. Computers & Security, 139, 103693.
- Volti, R., & William, F. O. (2004). Social change with respect to culture and original nature. JSTOR.
- Wallace, S., Green, K., Johnson, C., Cooper, J., & Gilstrap, C. (2021). An extended TOE framework for cybersecurity adoption decisions. Communications of the Association for Information Systems, 47(1), 51.

The Use of Artificial Intelligence in Capacity Building in Public Sector

Devaj Bist
Research Scholar, Amity University

ABSTRACT

As governments globally accelerate their transition toward Digital Era Governance (DEG), the integration of Artificial Intelligence (AI) has emerged as a critical lever for administrative efficiency. However, a significant dichotomy exists between the procurement of advanced AI tools and the readiness of the public workforce to utilize them effectively—a phenomenon termed the "Enablement Gap." This study investigates the current state of AI capacity building within the public sector, moving beyond infrastructure analysis to focus on human capital readiness. Grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT), this research employs a quantitative, descriptive-correlational design to assess the "Performance Expectancy" and "Facilitating Conditions" among public servants. Data was collected via a structured survey instrument targeting a stratified sample of experienced government officials (N=26). Findings indicate a "Paradox of Readiness": while 76.9% of respondents believe AI would improve productivity, nearly 50% report receiving no formal training. Consequently, 58.3% cite "lack of time" rather than fear as their primary barrier to adoption. This disconnect has fostered an environment of "Shadow AI," where unauthorized tools are used without oversight. This paper proposes a "Human-in-the-Loop" competency framework, arguing that sustainable capacity building requires a shift from sporadic technical workshops to continuous, ethics-centred algorithmic literacy.

Keyword: Public Administration, Artificial Intelligence, Capacity Building, Digital Governance, UTAUT, AI Literacy, Shadow AI

1. Introduction

1.1. Background of the Study:

The modernization of public administration is no longer a matter of choice but a strategic imperative. As governments globally face the "iron triangle" of constraints—shrinking budgets, reducing personnel, and escalating citizen expectations—the traditional bureaucratic models are proving insufficient. In this context, the Fourth Industrial Revolution has introduced Artificial Intelligence (AI) as a potential disruptor capable of fundamentally reshaping how public services are delivered. From predictive analytics in urban planning to Large Language Models (LLMs) assisting in policy drafting, AI offers the promise of "cognitive automation." However, the successful integration of these technologies relies less on the sophistication of the algorithms and more on the readiness of the human workforce. This places Capacity Building at the centre of the discourse. Unlike previous waves of digitization which focused on hardware procurement, the AI era demands a pedagogical shift—moving from static IT training to dynamic, continuous upskilling of civil servants.

1.2. Statement of the Problem:

Despite the clear potential of AI, a significant "enablement gap" persists within the public sector. Recent reports indicate a paradox: while governments are aggressively procuring AI tools, the vast majority of public servants remain untrained in their ethical and operational use. This disconnect creates two critical risks. First, the "Underutilization Risk," where expensive tools lie dormant because staff lack the confidence to use them. Second, and more dangerously, the "Misuse Risk" (or Shadow AI), where enthusiastic but untrained officials use unverified public AI tools for sensitive government work, inadvertently exposing state data or bypassing privacy protocols. The central problem this research addresses is not the lack of technology, but the lack of a structured, human-centric framework to empower public servants to work alongside it.

1.3. Research Objectives:

The primary objective of this study is to diagnose the current state of AI readiness among public service employees and propose a framework for sustainable capacity building. Specifically, this paper aims to:

- **Quantify the "Enablement Gap"** by measuring the difference between employees' willingness to use AI and the institutional support they receive.
- **Identify structural barriers** (technical, cultural, and ethical) that hinder the adoption of AI in daily administrative workflows.
- **Propose a "Human-in-the-Loop" Capacity Building Framework** that moves beyond basic digital literacy to include ethical stewardship and algorithmic decision-making skills.

2. Literature Review and Theoretical Framework

2.1. The Evolution of Capacity Building:

The concept of "capacity building" in public service has undergone a radical transformation. Traditionally, under the **Weberian model** of bureaucracy, capacity building was synonymous with strict procedural adherence and record-keeping. However, the advent of **New Public Management (NPM)** shifted the focus toward efficiency and performance metrics. We are now entering the era of **Digital Era Governance (DEG)**, where technology is the central nervous system of administration. In this context, capacity building is no longer about "computer literacy" (e.g., knowing how to use a spreadsheet) but "data fluency." The literature suggests that the modern public servant faces a "cognitive load" crisis; thus, the integration of AI is not merely an option for modernization but a necessity for survival in a data-saturated environment (Dunleavy et al., 2006).

2.2. AI in Governance: A Taxonomy of Applications:

Contemporary research categorizes AI interventions into three distinct tiers: Service Interface AI: Chatbots and Virtual Assistants (e.g., dealing with citizen queries). Process Automation AI: Robotic Process Automation (RPA) handling repetitive back-office tasks. Decision-Support AI: Predictive analytics used for resource allocation. This presents the most significant "enablement gap," as officials must interpret algorithmic outputs they may not fully understand. Capacity building institutes in public sector, which generally lacks trained manforce in the AI field, face the challenge of creating conditions to fill this “enablement gap”.

2.3. The "Human-in-the-Loop" (HITL) Paradigm:

A critical theme in recent literature is the rejection of full automation in favour of the Human-in-the-Loop (HITL) approach. Research by De Sousa et al. (2023) suggests that the public sector requires a "hybrid intelligence" model. Therefore, capacity building must pivot toward "Algorithmic Stewardship," where public servants are trained to identify bias and intervene when AI logic conflicts with public values.

2.4. Theoretical Framework: The UTAUT Mode:

To empirically analyse readiness, this study adopts the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). We analyse four constructs:

- **Performance Expectancy (PE):** Does the user believe AI helps?
- **Effort Expectancy (EE):** Is it easy to use?
- **Social Influence (SI):** Does leadership encourage it?
- **Facilitating Conditions (FC):** Does the infrastructure/training exist?

3. Research Methodology

3.1. Research Design:

This study adopts a quantitative, descriptive-correlational research design. The primary objective is to empirically measure the "enablement gap." A quantitative approach allows for the statistical measurement of variables across a diverse demographic. The study is cross-sectional, capturing a snapshot of AI readiness in Late 2025.

3.1. Data Collection Instrument:

The primary instrument for data collection was a structured, self-administered questionnaire titled "AI Readiness & Capacity Building Assessment." The instrument consisted of 14 items divided into three strategic sections: Individual Readiness & Adoption: Assessing familiarity with Generative AI tools, current productivity perceptions, and the prevalence of unauthorized "Shadow AI" usage. Institutional Capacity: Measuring the existence of formal training programs, help-desk support, and perceived organizational barriers. Strategic & Ethical Capacity: Evaluating the respondents' understanding of data privacy risks, preferred training methods, and specific governance use-cases. Core variables were
measured using a Likert Scale, specifically ranging from "Strongly Disagree" to "Strongly Agree" for attitudinal questions. Demographic data was limited to tenure (years of service) to preserve respondent anonymity while allowing for experience-based correlation.

3.3. Sampling Strategy:

The target population comprised public sector employees and civil servants. A purposive sampling technique was employed to ensure respondents were currently active in administrative roles. The final sample size was N=26, representing a focused exploratory cohort ranging from operational staff to senior officials.

4. Empirical Analysis and Key Findings

4.1. Demographic Profile: A Seasoned Workforce:

The study surveyed a sample of public service employees to assess their readiness for AI integration. A critical finding is the maturity of the cohort. As illustrated in Figure 1, many respondents possess significant tenure, with 50% having 6–15 years of service and 38.5% having over 15 years.

Years of Service in Public Administration

26 responses

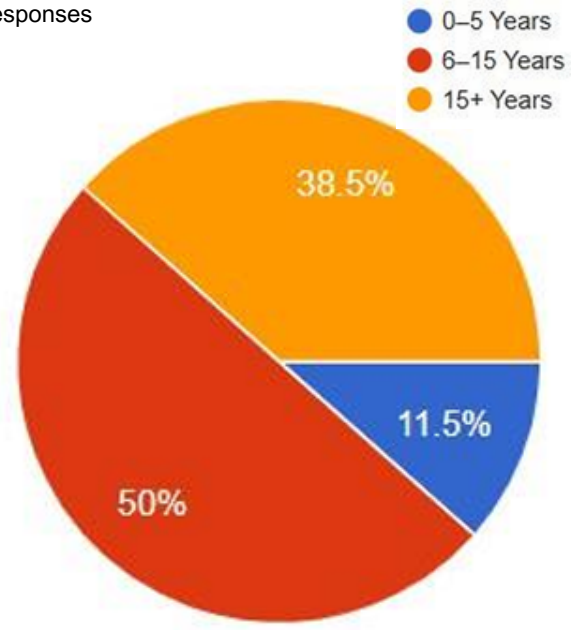


Figure 1: Years of Service in Public Administration

This demographic distribution refutes the assumption that demand for digital tools is driven solely by "digital native" youths. Instead, mid-to-senior level bureaucrats are the primary drivers of AI interest.

4.2. Assessment of Individual Readiness (Performance Expectancy) :

The data reveals a remarkably high "Performance Expectancy." When asked if integrating AI would improve productivity, 76.9% of respondents agreed or strongly agreed (30.8% Strongly Agreed, 46.2% Agreed).

"I believe that integrating AI into my daily workflow would significantly improve my productivity."

26 responses

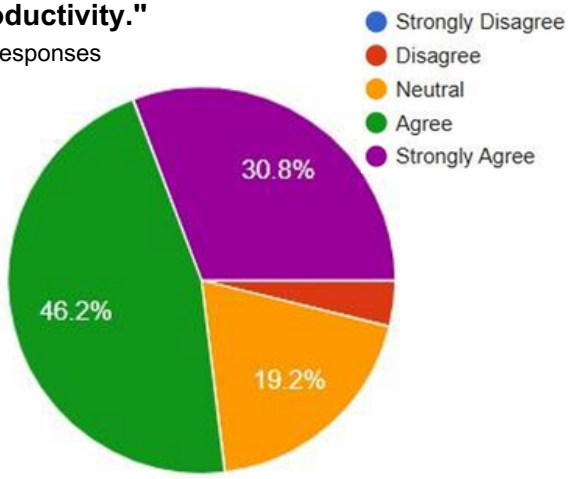


Figure 2: Productivity Belief

This high willingness is supported by existing levels of self-taught familiarity. Despite the lack of official training, **68% of respondents rated themselves as having "Intermediate" or "Advanced"** familiarity with tools like ChatGPT or Gemini. This indicates an **autodidactic workforce** upskilling independently.

4.3. The Institutional Gap: Training and Support:

In contrast to high individual readiness, the "Facilitating Conditions" are lacking. As shown in **Figure 3**, nearly half of the respondents **(46.2%)** reported that their department has provided **no formal training** on AI in the last 12 months.

"Has your department provided any formal training or workshops on Artificial Intelligence in the last 12 months?"

26 responses

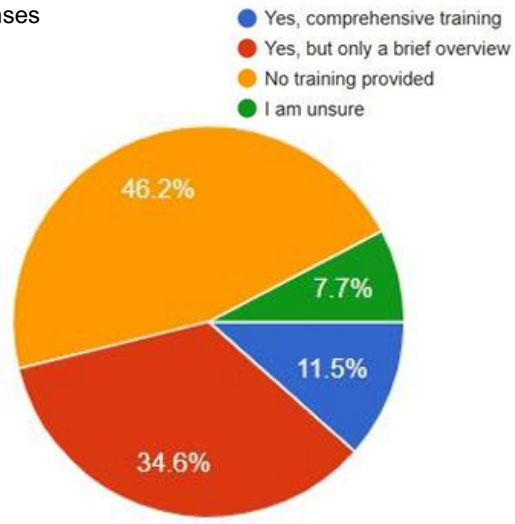


Figure 3: Training Provided

Furthermore, regarding IT support, 46.2% of respondents stated they "have to figure it out ourselves," effectively operating without a digital safety net.

4.4. The "Shadow AI" Phenomenon:

Perhaps the most concerning finding is the prevalence of unauthorized AI usage. When asked if they had used public AI tools for work without authorization: 26.9% openly admitted to doing so. 26.9% selected "Prefer not to say," which suggests undisclosed behaviour.

Years of Service in Public Administration

26 responses

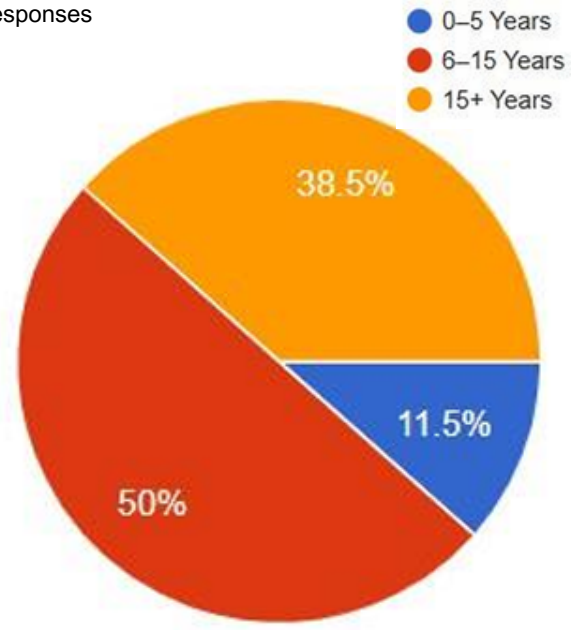


Figure 1: Years of Service in Public Administration

This demographic distribution refutes the assumption that demand for digital tools is driven solely by "digital native" youths. Instead, mid-to-senior level bureaucrats are the primary drivers of AI interest.

4.2. Assessment of Individual Readiness (Performance Expectancy) :

The data reveals a remarkably high "Performance Expectancy." When asked if integrating AI would improve productivity, 76.9% of respondents agreed or strongly agreed (30.8% Strongly Agreed, 46.2% Agreed).

"I believe that integrating AI into my daily workflow would significantly improve my productivity."

26 responses

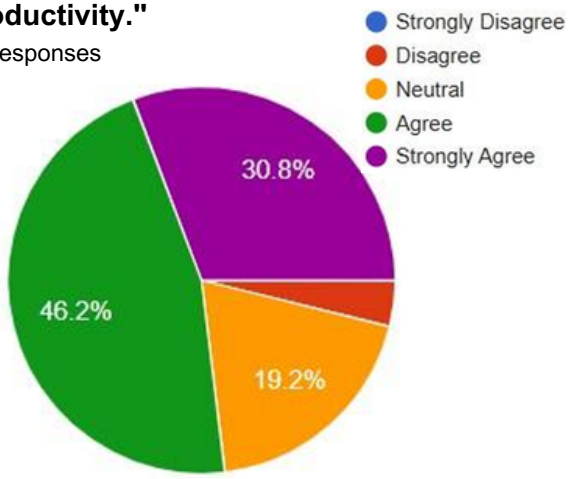


Figure 2: Productivity Belief

This high willingness is supported by existing levels of self-taught familiarity. Despite the lack of official training, **68% of respondents rated themselves as having "Intermediate" or "Advanced"** familiarity with tools like ChatGPT or Gemini. This indicates an **autodidactic workforce** upskilling independently.

4.3. The Institutional Gap: Training and Support:

In contrast to high individual readiness, the "Facilitating Conditions" are lacking. As shown in **Figure 3**, nearly half of the respondents **(46.2%)** reported that their department has provided **no formal training** on AI in the last 12 months.

"Has your department provided any formal training or workshops on Artificial Intelligence in the last 12 months?"

26 responses

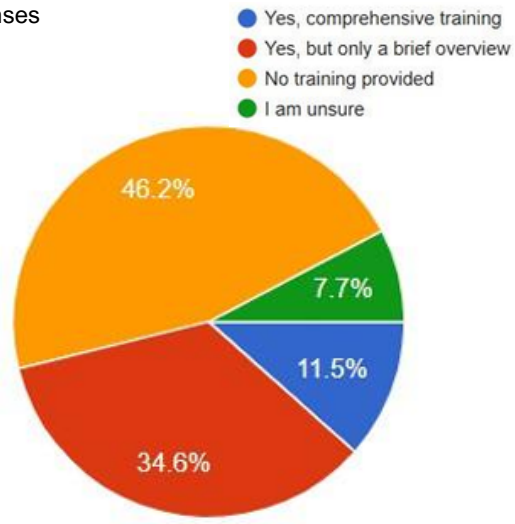


Figure 3: Training Provided

Furthermore, regarding IT support, 46.2% of respondents stated they "have to figure it out ourselves," effectively operating without a digital safety net.

4.4. The "Shadow AI" Phenomenon:

Perhaps the most concerning finding is the prevalence of unauthorized AI usage. When asked if they had used public AI tools for work without authorization: 26.9% openly admitted to doing so. 26.9% selected "Prefer not to say," which suggests undisclosed behaviour.

Have you ever used a publicly available AI tool to assist with a work-related task (e.g. drafting an email, summarising a report) without official authorisation?

26 responses

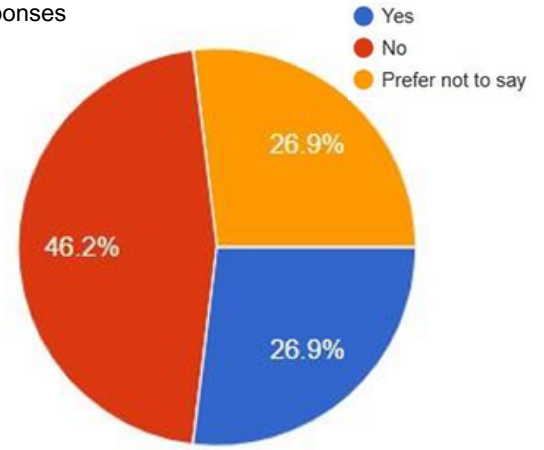


Figure 4: Unauthorized Use

This suggests that potentially over **50% of the workforce** may be processing government data through unvetted public servers driven by productivity demands.

4.5. Task Viability and Automation Potential :

Respondents identified **Summarizing Long Policy Documents (57.7%) and Data Entry (53.8%)** as the most burdensome tasks they would trust AI to handle.

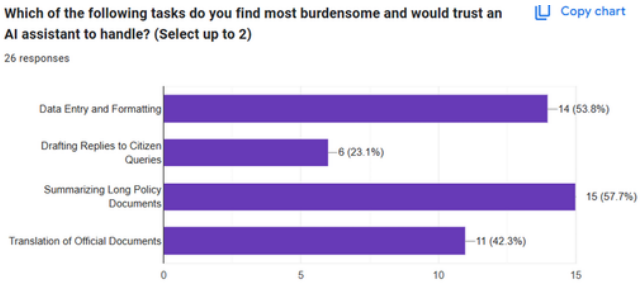


Figure 5: Burdensome Task

4.6. Impediments to Capacity Building: The "Time Poverty" Trap:

A prevailing stereotype suggests bureaucratic resistance stems from fear. However, the data refutes this. Only **20.8%** cited "Fear of technology" as their barrier. Instead, the overwhelming majority (**58.3%**) identified **"Lack of time / High workload"** as the primary obstacle.

"What is the primary barier preventing you from upskilling in AI?"

26 responses

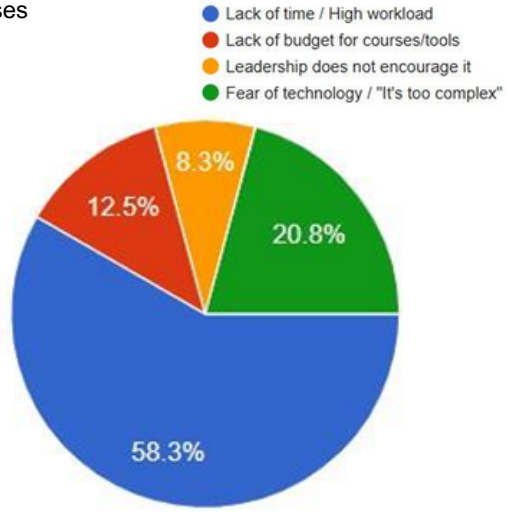


Figure 6: Training Provided

This **"Time Poverty"** suggests that capacity building cannot be added on top of existing workloads; it must be integrated into them.

4.7. Ethical Preparedness and Policy Awareness:

While willingness to use AI is high, the regulatory framework appears fractured. A combined **46.2%** of respondents indicated they operate in a grey zone regarding data privacy guidelines (either "vague" or "non-existent").

"Are you aware of Government's guidelines regarding "Data Privacy" while using third-party AI tools?"

26 responses

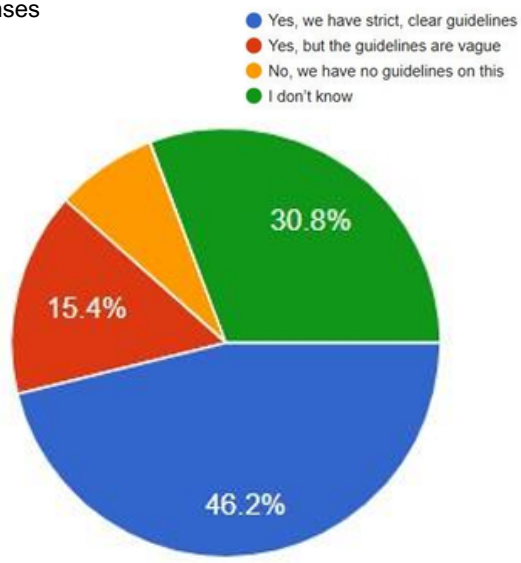


Figure 7: Data Privacy Guidelines

4.8. Preferred Pedagogical Models:

The results indicate a fragmented preference structure for training: **34.6%** prefer traditional Offline Workshops. **26.9%** prefer Integrated "AI Tutors". **23.1%** requested Mentorship.

How should AI training be delivered to be most effective for you?

26 responses

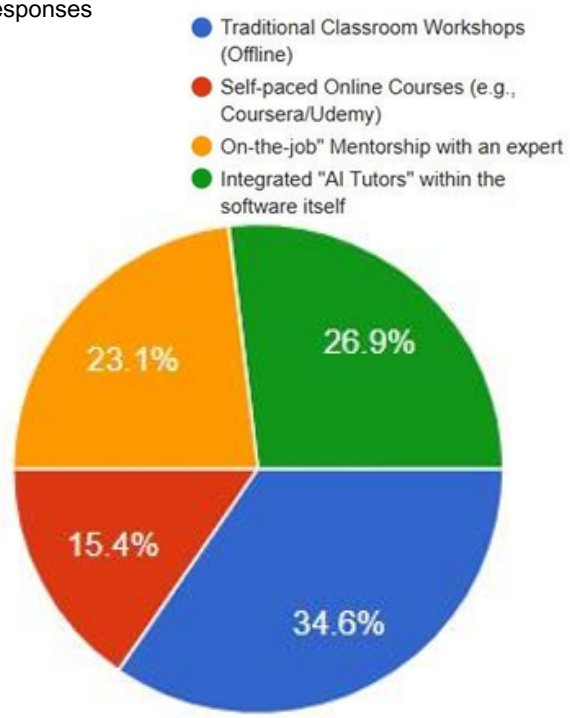


Figure 8: Training Preferences

4.9. Perceived Utility in Governance:

Finally, respondents demonstrated a sophisticated understanding of AI's dual utility in public administration. There was near-unanimous agreement that AI would be beneficial for high-level **Public Project and Policy formulation**. Crucially, for daily operations, respondents specifically validated the use of AI in **"Office Management including Noting and Drafting"**. This is a significant finding, as "Noting and Drafting" skill represents the core administrative workload of the civil service. The high acceptance rate here suggests that officials do not view AI as a threat to their core duties, but as a necessary aid to handle the increasing volume of administrative correspondence.

"The use of AI in capacity building wih respect to Office Management including Noting and Drafting will be beneficial"

26 responses

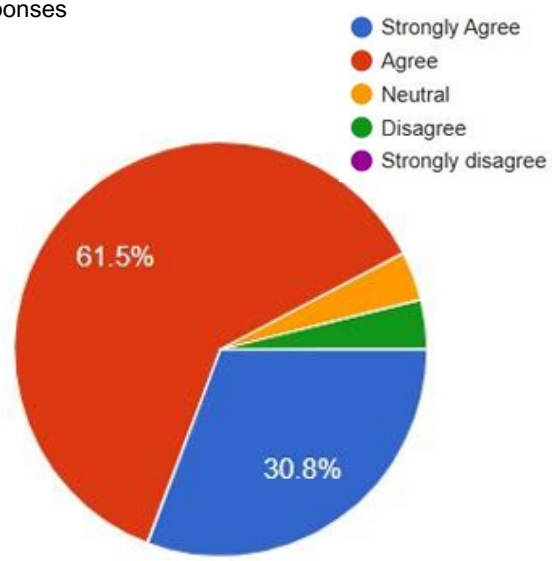


Figure 9: Use of AI in Noting and Drafting

"The use of AI in Capacity Building with respect to Public Project and Policy will be beneficial"

26 responses

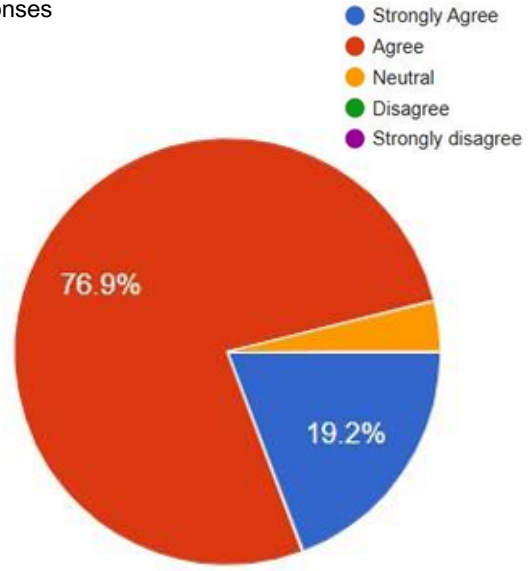


Figure 10: Use of AI in Policy Making

5. Discussion

5.1. The "Enablement Gap" and The Paradox of Readiness:

The central finding of this study is the confirmation of a significant "Enablement Gap." The workforce exhibits high Performance Expectancy (77% believe AI helps) but low Facilitating Conditions (46% have no training). In the UTAUT framework,

this imbalance typicallyleads to "workarounds." This is evidenced by the high rates of "Shadow AI" usage. Public servants are bypassing institutional inertia to access the tools they need, effectively "bootlegging" efficiency at the cost of security.

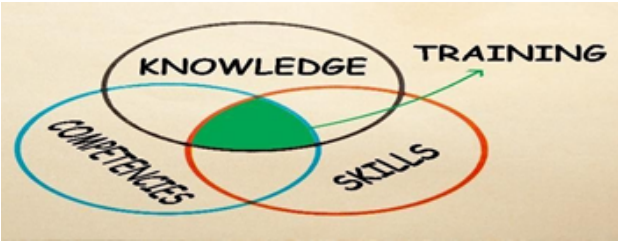
5.2. De-bunking the "Technophobic Bureaucrat" Myth:

This research contributes significantly to the literature by isolating "Time" (58.3%) rather than "Fear" as the main adversary of modernization. This implies that previous capacity-building initiatives failed due to design rather than content. Training programs that requireofficials to take time away from their duties are most likely to fail. Future interventions must focus on "Micro-learning" and workflow- integrated training.

6. Proposed Framework

The "Human-in-the-Loop" Competency Model

Based on the empirical evidence,this paper proposesa three-tiered Strategic Framework for AI Capacity Building.



Tier 1: Operational Literacy (For All Staff)

- **Objective:** Mitigate "Shadow AI" risks.
- **Method:** Implementation of "Sandboxed" AI environments where staff can use Large Language Models (LLMs) safely.
- **Curriculum:** Modules on "Data Privacy" and "Verification of AI Outputs."

Tier 2: Tactical Integration (For Mid-Level Management)

- **Objective:** Address the "Time Poverty" barrier.
- **Method:** Introduction of RPA (Robotic Process Automation) to handle the Data Entry tasks identified as burdensome.
- **Curriculum:** Workshops on workflow automation and using AI for drafting/summarising.

Tier 3: Strategic Stewardship (For Leadership)

- **Objective:** Create clear guidelines (addressing the 46% policy gap).
- **Method:** Leadership seminars focused on governing tools rather than using them.
- **Curriculum:** Algorithmic accountability and bias detection.

Here, government online platforms – generic as well as specific, can also act as providers for requisite content with respect to the Strategic Framework for AI Capacity Building.

7. Conclusion

The integration of Artificial Intelligence into public service is inevitable, but its success is not guaranteed. This study highlights that the current barrier to adoption is not a lack of will, but a lack of institutional support and time. The public workforceis ready, experienced, and eager to modernize, yet they are operating in a pedagogical vacuum.

By shifting the focus from mere "software procurement" to "human capacity building"— specifically through the proposed Human-in-the-Loop Framework— governments can bridge the enablement gap. Besides inclusion of phased training in annual capacity building plan of the

employee and mentorship is required to be put in place, planned use of government online learning portals/platforms can also be useful in this regard. The future of efficient governance lies not in replacing the public servant, but in empowering them to become the sophisticated architect of a digital society.

Declaration: The author declares no conflict of interest.

References:

- Venkatesh,V., Morris, M. G., Davis,G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 425-478.
- OECD. (2024). The OECD Digital Government Index: Benchmarking the Maturity of Digital Strategies. OECD Publishing, Paris.
- World Bank. (2023). GovTech: The New Frontierin Digital Government Transformation. Washington, DC: World Bank.
- Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New Public Management Is Dead—Long Live Digital-Era Governance. Journal of Public Administration Researchand Theory.
- Mergel,I., Ganapati, S., & Whitford, A. B. (2019). Agile: A New Way of Governing. Public Administration Review.
- Bostrom, N., & Yudkowsky, E. (2014). The Ethics of Artificial Intelligence. Cambridge University Press.

CONTRIBUTORS

Rajiv Manjhi

Shri Rajiv Manjhi, Director, ISTM and Joint Secretary to the Government of India, joined the Government service through the Civil Services Examination 1993 and has put in more than 30 years of service with Government organisations in various capacities. While working as Joint Secretary to Government of India with the Ministry of Health and Family Welfare, he was instrumental in the elimination of Kala-azar, a neglected tropical disease from India, apart from other major notable contributions.

Shri Rajiv Manjhi holds two master's degrees in management, i.e. MBA (HR) and MBA (Finance), with distinctions and is decorated with M.Phil in Public Administration. He is a certified trainer by UNDP and the Government of India on the Leadership Development Programme. He has been visiting the faculty at many institutions of national repute, namely NIFM, IIPA, IILM, DSSC and ICISA. While working as Director, ISTM, he has streamlined the training ecosystem at ISTM and taken various innovative training excellence initiatives to strengthen the capacity building for public servants. This includes a learning reinforcement tool, namely "Panch Pranali", and a competency skill identification as well as development tool, namely "Role Visualisation". He is also involved in several research works being undertaken by the Institute in the capacity either as Chair or Mentor. ISTM is the top e-content contributor on the iGOT Karmayogi Bharat Portal. During his tenure, ISTM has launched more than 250 courses on the iGOT Karmayogi Bharat platform in as many as six languages, and this is further poised to expand to 19 Indian languages. Further, ISTM courses on iGOT have been bestowed with the Top Performing Course, Highly Rated Course and Most Consumed Course.

Under his leadership, ISTM has been accredited with "सर्वोत्कृष्ट" (5 Star) rating by the Capacity Building Commission, Government of India.

Mohammad Aslam

Mohammad Aslam has a doctorate in Public Administration and has over 17 years of work experience in academia, consulting, programme management and technical backstopping as a consultant as well as researcher in areas of core government functions, including public service delivery, governmental training and administrative reforms. Aslam has also worked on research projects pertaining to Reforms in Public Sector Undertakings, Environment, water supply and sanitation, and the regulatory framework for using groundwater in India. He has been involved in the evaluation of Centrally Sponsored Schemes. His key strength is an intimate knowledge of how government works. He has successfully worked with senior civil servants and has adequate knowledge of the state of the art in the Governance and Public Management domain. Besides, He had also engaged in training as a guest faculty in the Institute of

Secretariat Training and Management (ISTM), DoPT, Govt. of India, to deliver lectures on Public Administration, Public Policy, and Sensitisation of Government officials on Social, Economic and Educational conditions of the Muslim Community in India to the CSS officers. He has worked as an Assistant Professor in Public Administration in the College of Business Administration, University of Hail, Kingdom of Saudi Arabia.

Yasir Mumtaz Ansari

Mr Yasir Mumtaz Ansari is a Research Scholar in Public Administration at the Department of Political Science, Aligarh Muslim University, Aligarh. His academic pursuits focus on the principles and practices of public governance, reflecting a commitment to scholarly rigour and the enduring values of administrative studies.

Dr. Shelly Gandhi

Dr. Shelly Gandhi is an accomplished academician with a deep passion for mathematics and music. Known for her innovative outlook, she continually seeks to enrich the teaching–learning process through creative and learner-centred pedagogical approaches. She holds a PhD in Mathematics and has authored six books on mathematics, including the distinctive work Rhythm of Mathematics, which presents mathematical ideas through a unique poetic and artistic expression, making complex concepts more engaging and accessible to learners.

A respected academician, teacher trainer, and researcher, Dr. Gandhi is empanelled with Central Board of Secondary Education as a Resource Person. She is also a National Awardee from All India Council for Technical Education (Ministry of Education, Government of India) for her notable contribution to toy-based pedagogy and innovative educational practices. In addition, she serves as an Innovation Ambassador, actively advocating creativity and innovation in teaching.

Her research contributions have been published in several reputed national and international journals. With over a decade of experience in inclusive educational environments, Dr. Gandhi remains committed to transforming the learning of mathematics into an engaging, experiential, and intellectually stimulating journey. Through her work, she aspires to inspire learners to explore the boundless possibilities of mathematical thought and imagination.

Let's imagine and sing together...
'Infinity, Infinity, Infinity....
It's everywhere we see,
In every moment, in every memory,
A limitless expanse of possibility, A never-ending, eternal legacy.'

CONTRIBUTORS

Dr. Sanjeev Gupta

Dr Sanjeev Gupta is Deputy Secretary at UPSC and an Ex-faculty member of ISTM. He is decorated with a PhD degree in Economics. He has been working in the Government of India for more than 26 years. He has worked in various policy, legislation, and Administration divisions. He takes training sessions on behavioural issues, soft skills, POSH, RTI, government rules and regulations, etc.

Yukti Gupta

Yukti Gupta is an MBA student (2024-26) at IIM Rohtak with a background in completing BBA from the same institution. She has interned at different organisations, including PwC HR at the Income Tax Office and contributed to social research on various topics. She is a winner of the Microsoft Office Specialist World Championship (MS Word 2013). Yukti has also been a finalist in several prestigious competitions. Her specialisations include marketing, MIS, and public policy analysis.

Shonan Kanuga

Shonan Kanuga is a leading figure in Cyber Protection Awareness, founder of WizCyber, and advocate for global cyber safety. With a background in management, law, and cybersecurity, she champions education and practical solutions for cyber threats. An empanelled faculty member at ISTM and a practising cyber lawyer, she brings over 20 years of experience in training and mentoring, fostering a culture of cyber resilience.

Devaj Bist

Sh Devaj Bist, as an honours scholar of Amity University, is pursuing a B.Sc.(IT), specialisation in Artificial Intelligence and Data Science. He has a keen interest in the field of computers and technology. In the past, he has researched on “Blockchain Technology in Healthcare”. In a short tenure of association with DRDO as an Intern, he presented a report on Satellite Communication.

Recently Enlisted Faculty/Officers

Shri Balaji. N, Deputy Director, ISTM

Shri Balaji. N joined ISTM as Deputy Director (Office Management) on 23rd June 2025. He holds a MBA degree in General Management and has more than 15 years of experience in various government departments. He began his career in private sector and later joined Government Service in 2010 as Postal Assistant in Department of Post. In 2011, he joined Central Secretariat Service as Assistant Section Officer and posted in Prime Minister's Office. In 2019 he was promoted and posted as Section Officer in Department of Drinking Water and Sanitation and later in 2024 became Under Secretary in the same department.

Shri Sudhir Pratap Singh Parihar , Deputy Director, ISTM

Shri Sudhir Pratap Singh Parihar, joined ISTM as Deputy Director (Accounts) on 25th August 2025. He holds a Bachelor degree from GMV, Jiwaji University, Gwalior. With over 25+ years of service in the Government of India, his experience in the field of Government Accounts and related Rules and Manuals i.e. Central Government Account (Receipts & Payments) Rules, Civil Accounts Manual, Primary Unit of Appropriations (Object Heads). He also specialise in delivering training sessions on Budget an overview, Classification of Accounts, Leave Rules, Pension Rules including NPS, UPS.

Shri Rahul Agarwal, Deputy Director, ISTM

Shri Rahul Agarwal joined ISTM as Deputy Director (Management Services) on 25th Jul 2025. He holds a B. Tech in Electronics and Communication and a MBA in Finance and Marketing. He joined government services after qualifying the Civil Services Examination 2013.. He began his career in Ministry of Defence as Assistant Director in Directorate General of Armed Forces Medical Services. He has travelled extensively in various Countries and has undergone many Training Programmes held abroad. His domain for imparting training at ISTM includes Pension Rules, FR/SR, RTI, Leave Rules, Ethics in Administration, International Cooperation & Trade etc.

Shri Anit Shishir Kerketta , Deputy Director, ISTM

Shri Anit Shishir Kerketta joined ISTM as Deputy Director (OM) on 12th November 2025. He is an engineering graduate in Computer Engineering from Netaji Subhas Institute of Technology, University of Delhi. He holds a Master's degree in Executive MBA (Finance) from the Faculty of Management Studies, New Delhi.

He has qualified the UGC-NET for Assistant Professor in Management. He worked as a Probationary Officer in Allahabad Bank from 2011 to 2014, handling operations, financial systems, and customer-centric service delivery. Subsequently, he joined the Department of Legal Affairs as an Assistant Section Officer on 6th March 2014 in the Ministry of Law & Justice, where he extensively worked in vigilance matters and establishment matters, including court cases, relating to the Income Tax Appellate Tribunal and the Indian Legal Service. His areas of specialization include reservation, handling of court cases, and behavioural training.

Shri Tarun, Assistant Director, ISTM

Shri Tarun joined ISTM as Assistant Director (Accounts) on 28th November 2025. He holds a B.tech. degree om Electrical & Electronics and has working experience of 10 years in Government Sector. He has served as Training assistant in Defence Headquarters Training Institute (DHTI) which is a nodal agency for civilians working in variour department in Ministry of Defence (MoD). For his stint efforts in development, management of Rashtraparv portal, he has been awarded with Letter of Appreciation from Defence Secretary. His area of specialization includes Purchase Procedure, e-Procurement through Gem, National Pension systems, Unified Pension system, LTC Rules, Leave Rules, Office Procedure and Writing Drafting etc

Smt. Sarika Soin, Assistant Director, ISTM

Ms. Sarika Soin joined ISTM as Assistant Director (EST) on 22nd December, 2025. She holds a Bachelors Degree in Business Economics (Hons.) from College of Vocational Studies, Delhi University. She did her LLB (Hons.) from Faculty of Law, Delhi University. She has a working experience of 23 years in Government Service.

She is an officer of Central Secretariat Stenographers Service (CSSS) and is a Private Secretary of 2018 Select List. She has worked in various divisions of the then Planning Commission like Agriculture Division, Education Division and Water Resources Division. During her 10 years service in Department of Telecommunications, she worked in Security – Policy, Planning and Intelligence Wing, working and coordinating with major law enforcement agencies. Her area of specialisation includes Secretarial skills for Personal Staff Members, Communicaiton Skills, TA Rules, LTC Rules, Leave Rules and Behavioural trainings.

FACULTY MEMBERS

S. NO.	NAME OF FACULTY MEMBER(S)	DESIGNATION	CORE AREAS OF EXPERTIES
1	RAJIV MANJHI	DIRECTOR, ISTM AND JOINT SECRETARY TO GOVERNMENT OF INDIA	PUBLIC FINANCE, BUDGET-FORMULATION, IMPLEMENTATION & EXPENDITURE MANAGEMENT, GFR FOR MIDDIE/SENIOR MANAGEMENT LEVEL OFFICERS, PERFORMANCE MANAGEMENT & EVALUATION FOR IMPROVING EFFECTIVENESS, STRATEGIC PLANNING & LEADERSHIP DEVELOPMENT PROGRAMME
2	DEEPAK KUMAR BIST	JOINT DIRECTOR	RTI ACT, VIGILANCE, PENSION RULES, PAY FIXATION, EFC/SFC NOTE, TRAINING OF TRAINER, CABINET NOTES, ADMINISTRATIVE RULES
3	NAMITA MALIK	JOINT DIRECTOR	BEHAVIOURAL SKILLS, COMMUNICATION, LEADERSHIP, STRESS MANAGEMENT, RESERVATION, ESTABLISHMENT RULES, POSH, GENDER SENSETIZATION
4	GUNJAN GANDHI	JOINT DIRECTOR	MENTORING SKILLS, DTS, BEHAVIOURAL SKILLS, ADMINISTRATIVE RULES, ESTABLISHMENT RULES, DISCIPLINE AND VIGILANCE, INFORMATION TECHNOLOGY, FINANCIAL MANAGEMENT
5	BISWAJIT BANERJEE	DEPUTY DIRECTOR	VIGILANCE INCLUDING FINANCIAL EFFECTS OF PENALTIES, COMMUNICATION SKILLS. GOVT. LITIGATION, CONSTITUTION OF INDIA, PERSONALITY DEVELOPMENT, MOTIVATION, PARLIAMENTARY PROCEDURE, NOTING & DRAFTING, RESERVATION IN SERVICE, ENGLISH COMMUNICATION, LINGUISTICS
6	BHAGABAN PADHY	DEPUTY DIRECTOR	NOTING & DRAFTING, SOFT SKILLS, COMMUNICATION SKILLS, STRESS MANAGEMENT, LEADERSHIP, MOTIVATION, PENSION, CONDUCT RULES, CCA RULES, LEAVE RULES, LTC RULE, RECORD MANAGEMENT, SBM
7	PUNEET KUMAR SHARMA	DEPUTY DIRECTOR	RTI ACT, NOTING & DRAFTING, RESERVATION, DTS/DOT, VIGILANCE, CONDUCT RULES, COMMUNICATION SKILLS, OFFICE PROCEDURE, LEAVE RULES, RECORD MANAGEMENT, CGHS
8	VIPIN KUMAR BHARGAVA	DEPUTY DIRECTOR	FINANCIAL ADMINISTRATION & GENERAL FINANCIAL RULES, DELEGATION OF FINANCIAL POWER RULES, PROCUREMENT PROCEDURE, PUBLIC FINANCE, BUDGET, INCOME TAX, GEM, AUDIT PROCEDURE, PAY FIXATION, PENSION RULES, OFFICE PROCEDURE, NOTING AND DRAFTING, FUNDAMENTAL RULES/ SUPPLEMENTARY RULES (FR/SR), ESTABLISHMENT RULES, LEAVE RULES, LTC RULES, CONDUCT RULES, CGHS & CS(MA) RULES, PREVENTIVE VIGILANCE, LITIGATION MANAGEMENT, HANDLING CAT/COURT CASES, RIGHT TO INFORMATION ACT, PARLIAMENTARY PROCEDURE
9	JITENDER BHATTI	DEPUTY DIRECTOR	GOVERNMENT OF INDIA MACHINERY, OFFICE PROCEDURE, FILE MANAGEMENT, NOTING & DRAFTING, PARLIAMENTARY PROCEDURES, CCS (LEAVE) RULES, FR-SR GENERAL CONDITIONS OF SERVICE, CS (MA) & CGHS RULES, PAY FIXATION, MACP, LTC RULES, TA RULES, PENSION RULES, RTI, SERVICE BOOK, APAR, COMMUNICATION SKILLS, TEAM BUILDING AND LEADERSHIP, CCS CONDUCT RULES, SECRETARIAL SKILLS FOR PERSONAL STAFF MEMBERS, TRAINING OF TRAINERS (TOT)
10	VIJAY KUMAR KESHARI	DEPUTY DIRECTOR	PUBLIC PROCUREMENT, BUDGET, GFR/DFPR, CPWD WORKS MANUAL, PENSION, PAY FIXATION, LEAVE RULES, TA RULES, LTC, CASH & ACCOUNT
11	PRIYANKA DHULL	DEPUTY DIRECTOR	MS OFFICE, PRESENTATION SKILLS, COMMUNICATION SKILLS, TIME MANAGEMENT, ORGANISING OFFICE WORK, LEADERSHIP, TEAM BUILDING, MOTIVATION, STRESS MANAGEMENT, OFFICE ETTIQUETTE, DATA LED DECISION MAKING IN POLICY MATTERS, INTRODUCTION OF KARAMYOGI DIGITAL LEARNING LAB, MISSION KARAMYOGI, DATA ANALYSIS & EVIDENCE BASED POLICY MAKING, OVERVIEW OF AI, AI USAGE IN DIFFERENT SECTORS
12	BALAJI N	DEPUTY DIRECTOR	OFFICE PROCEDURE, NOTING DRAFTING, PENSION RULES, RTI, PARLIAMENT PROCEDURE, GFR, DFPR, RECRUITMENT RULES, MS OFFICE SUITE ETC
13	SUDHIR PRATAP SINGH PARIHAR	DEPUTY DIRECTOR	CCS (LEAVE) RULES, CHILDREN EDUCATION ALLOWANCE, LTC RULES, NOTING & DRAFTING, PAY FIXATION, PENSION RULES, PUBLIC FINANCES
14	RAHUL AGGARWAL	DEPUTY DIRECTOR	SERVICE RULES, PAY FIXATION, TA RULES, LTC RULES, PENSION RULES, BUDGET, GFR, DFPR, LEADERSHIP SKILS, EMERGING TECHNOLOGY AND COMPUTER APPLICATIONS
15	ANIT SHISHIR KERKETTA	DEPUTY DIRECTOR	COMMUNICATION SKILLS, HANDLING CAT/COURT CASES, LEADERSHIP, NOTING & DRAFTING, PARLIAMENTARY PROCEDURE, HANDLING OF GOVERNMENT LITIGATION
16	KAVITA SHARMA	ASSISTANT DIRECTOR	RTI, GENDER, SEXUAL HARASSMENT (POSH), LTC, SWACHH BHARAT MISSION, CONDUCT RULES, LEAVE RULES, NOTING & DRAFTING, LEADERSHIP, TEAM BUILDING, PERSONALITY DEVELOPMENT, PRESENTATION SKILLS, MANAGING SELF, STRESS MANAGEMENT, SOCIAL MEDIA MANNERS, MANAGING OFFICE IN THE ABSENCE OF BOSS, RECORD MANAGEMENT, OFFICE PROCEDURE, OFFICE MANAGEMENT

Faculty Members

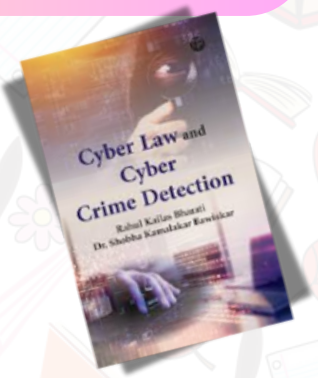
S. NO.	NAME OF FACULTY MEMBER(S)	DESIGNATION	CORE AREAS OF EXPERTIES
17	RIZWANA BANO	ASSISTANT DIRECTOR	TA RULES, NPS, EHRMS, STRESS MANAGEMENT, LANGUAGE SKILLS, PROBLEM SOLVING, CREATIVE THINKING, EMOTIONAL INTELLIGENCE, MS OFFICE SUITE, MS WORD, MS EXCEL, MS POWERPOINT, NOTING & DRAFTING, E-OFFICE, RECORD MANAGEMENT, SWACHH BHARAT ABHIYAN, OFFICIAL LANGUAGE POLICY, MISSION KARMAYOGI, FILE MANAGEMENT, RTI, ORGAN DONATION, COMPOSITE CULTURE OF INDIA, CGHS & CS(MA) RULES, POSH & GENDER SENSITIZATION, HOW TO HANDLE CAT/COURT CASES, RESERVATION IN SERVICES, PREVENTIVE VIGILANCE
18	ROOSHAN KUMAR MISHRA	ASSISTANT DIRECTOR	RTI ACT, NOTING & DRAFTING, LTC, LEAVE RULES, PENSION RULES, CONDUCT RULES, PAY FIXATION, CGHS RULES, PARLIAMENTARY PROCEDURE
19	KISHORE	ASSISTANT DIRECTOR	ALL SUBJECTS RELATED TO CSSS/CTP, COMMUNICATION SKILLS, DEPARTMENTAL SECURITY INSTRUCTIONS, RECORDS MANAGEMENT, STRESS MANAGEMENT, PRESENTATION SKILLS
20	HANUMAN PRASAD	ASSISTANT DIRECTOR	CYBER SECURITY, ARTIFICIAL INTELLIGENCE, E-GOVERNANCE ESTABLISHMENT RULES, RESERVATION IN SERVICE, HANDLING CAT/COURT CASES
21	TARUN	ASSISTANT DIRECTOR	PURCHASE PROCEDURE, E-PROCUREMENT THROUGH GEM, NPS, UPS, LEAVE RULES, LTC, OFFICE PROCEDURE, NOTING & DRAFTING
22	SARIKA SOIN	ASSISTANT DIRECTOR	SECRETARIAL SKILLS FOR PERSONAL STAFF, COMMUNICAITON SKILLS, TA RULES, LTC RULES, LEAVE RULES AND BEHAVIOURAL TOPICS

Must read books, recommended by ISTM Library

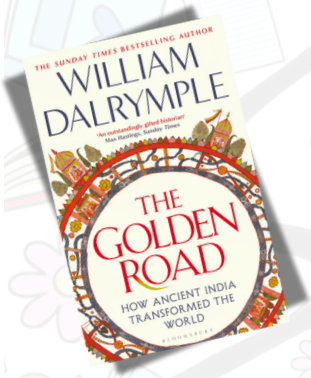
Title: Artificial intelligence: Law And Policy Implications
Author(s): Pokhariyal, Purvi; Kashyap, Amit K. and Prasad, Arun B.;
Publisher: Eastern Book Company;
Format: Print; Binding: Hardbound; Pages: 144;
Year of Publication: 2023

Explains legal challenges posed by AI and the policies needed for its ethical governance.

Title: Cyber Law and Cyber Crime Detection
Author(s): Bharati, Rahul Kailas and Bawiskar, Shobha Kamalakar;
Publisher: Namya Press;
Format: Print; Binding: Hardbound; Pages: 296;
Year of Publication: 2023



Covers key concepts of cyber law and methods for detecting and preventing cyber crimes.

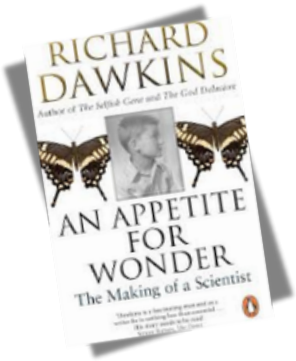


Title: The Golden Road: How Ancient India Transformed the World
Author(s): Dalrymple, Wlliam;
Publisher: Bloomsbury Publishing;
Format: Print; Binding: Paperback; Pages: 482;
Year of Publication: 2024

Shows how ancient India shaped global culture, trade, science, and ideas across the world.

Title: On Earth We're Briefly Gorgeous
Author(s): Vuong, Ocean;
Publisher: Penguin Random House;
Format: Print; Binding: Paperback; Pages: 242;
Year of Publication: 2020

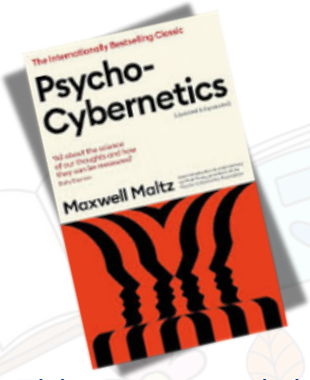
A poetic novel exploring identity, trauma, and family through a son's letter to his mother.



Title: An Appetite For Wonder: The Making of a Scientist
Author(s): Dawkins, Richard;
Publisher: Black Swan;
Format: Print; Binding: Paperback; Pages: 309;
Year of Publication: 2014

Richard Dawkins recounts his early life and the experiences that shaped him into a scientist.

Must read books, recommended by ISTM Library

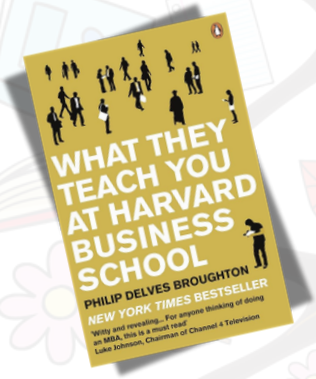


Title: Psycho-Cybernetics
Author(s): Maxwell, Maltz;
Publisher: Profile Books ;
Format: Print; Binding: Paperback; Pages: 310;
Year of Publication: 2023

Teaches how improving self-image can transform confidence, habits, and life outcomes.

Title: Waste and the City: The Crisis of Sanitation and the Right to Citylife
Author(s): Mcfarlane, Colin;
Publisher: Verso Books;
Format: Print; Binding: Paperback; Pages: 312;
Year of Publication: 2023

Examines urban sanitation failures and argues for clean, dignified city life as a fundamental right.

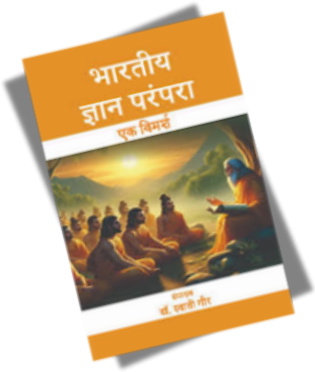


Title: What They Teach You at Harvard Business School My Two Years Inside the Cauldron of Capitalism
Author(s): Broughton, Philip Delves.;
Publisher: Penguin Books;
Format: Print; Binding: Paperback; Pages: 290;
Year of Publication: 2009

A sharp insider view of the lessons, culture, and realities of an MBA journey at Harvard Business School.

Title: Decode Life -Ecological Entanglements: Affect, Embodiment and Ethics of Care
Author(s): Ambika Aiyadurai; Arka Chattopadhyay and Nishaant Choksi;
Publisher: Orient Blackswan Pvt Ltd;
Format: Print; Binding: Paperback; Pages: 274;
Year of Publication: 2023

Explores how humans, animals, and environments are interconnected through emotions, embodiment, and ethical care.



Title: भारतीय ज्ञान परंपरा: एक विमर्श
Author(s): गौर, स्वाती;
Publisher: Meena Book Publications;
Format: Print; Binding: Paperback; Pages: 223;
Year of Publication: 2024

भारतीय ज्ञान परंपरा की मूल अवधारणाओं और उसके दार्शनिक-सांस्कृतिक योगदान का संक्षिप्त विवेचन।