Developing AI Leadership Competencies while Supporting Organization Capacity Building

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***Abstract*—In this research-to-practice full paper, we present the third iteration of our educational framework that advances AI-informed leadership — a much-needed competency in this era of rapid AI transformation. Our study aimed to evaluate our proposed content and pedagogy and whether it can be made widely accessible to non-technical leaders. We focused on modifying our existing curriculum and research protocol based on the feedback and learnings from our previous workshops.**

Our current workshop is part of an AI-Education program developed by MIT aiming to provide AI education to the U.S Air Force, which is one of the largest organizations in the US. Previous two iterations of the workshop aimed to offer an introduction to AI to U.S Air Force leaders, while the current iteration's goals are twofold: offering the updated content to U.S Air Force leaders, and supporting their capacity building by preparing a cohort of workshop trainers, who will lead the future iterations of the program in-house.

We conducted the workshop with over 50 participants, including 10 facilitators who were trained to run future workshops internally. Our comprehensive educational materials, including facilitator guides, student-facing documents, and digital resources, support this scalable model. The results demonstrate significant improvements in AI knowledge and leadership competencies, including AI mindset, culture, and ethos. Our findings affirm the effectiveness of experiential learning methodologies and underscore the potential for scalable, sustainable AI education within large organizations through the facilitators' feedback.

***Index Terms*—Continuing education, Computing skills [syn: Computing knowledge], Organization Capacity Building, Leadership, Ethics**

I. Introduction

The role of artificial intelligence (AI) continues to expand across all sectors, revolutionizing the way organizations operate and strategize. As AI technologies rapidly advance, the need for effective leadership in navigating these changes is increasingly critical, especially for non-technical leaders who must bridge the gap between AI innovations and organizational operations [1]. The transformation of AI is not only technical but also impacts organizational culture, decision-making processes, and strategic initiatives, let alone the societal and ethical impacts [2]. With this fast pace AI advancements, non-technical leaders face the distinct challenge of steering their organizations through this dynamic landscape, emphasizing the necessity for understanding AI capabilities and its implications [3].

Recognizing this need, the Learning Machines program focuses on addressing the educational gap in AI leadership competencies. The workshop described in this paper is part of a larger AI-Education research program developed by MIT aiming to provide AI education to the U.S Air Force, which is one of the largest organizations in the US. The program is designed to equip leaders with the necessary skills and knowledge to both understand and guide AI adoption responsibly within their organizations. Our previous cohorts have highlighted the importance of hands-on, practical learning experiences in enhancing AI literacy among leaders [2], [3]. Building on these insights, this third iteration of our AI leadership workshop has been specifically tailored to further refine and scale up the educational framework to support organizational capacity building for sustaining ongoing AI education internally. For example, beside creating training material for facilitators, we refined our curriculum by augmenting it with more sessions on Generative AI and ethical discussions reflecting recent AI advancements.

The curriculum of the 3-day workshop is designed aiming to simplify complex AI concepts through experiential learning principles and AI accessibility for all technical levels. It involves hands-on activities, case studies, and problem-solving scenarios, addressing various aspects of machine perception, machine behavior, generating with AI, and ethical and policy implications of AI. Recognizing the importance of being ready for widespread dissemination, we took an additional step to ensure our curriculum material was robustly structured and well-prepared including videos, activity sheets as well as instructor-facing documentations for scalability. Furthermore, we refined our research instruments – survey questions, knowledge checks, leadership questionnaires, pedagogical exposure, and demographic surveys – to address the need for a comprehensive evaluation mechanism that could serve larger groups with diverse profiles.

The central research question for this round revolved around scalability and accessibility of AI competencies for non-technical leaders and organizations. To test this, we conducted the workshop with over 60 participants, ten of whom were trained to facilitate alongside the instructors, as part of "train the trainer" model [4]. This widened participation is a critical indicator of whether our revised approach can support the U.S.

Air Force develop in-house future trainings and achieve future scaling.

Past studies have demonstrated the effectiveness of our approach in augmenting AI leadership competencies, emphasizing the efficacy of the proposed experiential hands-on learning approach [1]–[3]. We expect our current research to not only further validate these findings, but also provide robust evidence of scalability. This research thus has direct implications for educational practitioners, providing them with a scalable framework that they can use to train non-technical leaders to navigate the world of AI effectively.

II. Curriculum Design with Scalability

A. Workshop Structure

Our 3-day Learning Machines workshop is designed for leaders with no technical background. The curriculum focuses on distinct but interrelated aspects of AI, with a consistent emphasis on ethical considerations and policy implications. Below is the overall design of each day, and Table I illustrates the sessions' details.

Day 1: Machine Perception: The focus for the first day is on foundational understanding of AI, particularly machine perception and conversational AI. Through interactive sessions, participants engage in learning how AI systems perceive and interpret data compared to human cognition. For example, as hands-on activities, participants engage in comparing and developing different approaches for automatic drone navigation to track a trained object. As another example, in the conversational AI activity, participants develop a customized dialog agent that utilizes Large Language Models (LLMs) with Retrieval-Augmented Generation (RAG) for its interaction with people. Furthermore, case studies and activities on bias in AI system are developed, in the context of face identification modelling, to illustrate ethical and societal implications.

Day 2: Machine Behavior: On the second day, the focus shifts from perception to action, exploring how machines can make decisions and perform tasks. This is done through exploring machine behavior using reinforcement learning as a core concept. This demonstrates how AI systems learn from environments to make decisions, where participants apply these concepts in simulated settings. Such activities include Q-learning and deep reinforcement learning within virtual agents in game simulations.

Day 3: Generative Machines: The final day covers the creative aspect of AI, focusing on generative systems that can create new content, enabling participants to understand and engage with such AI systems. The day is designed to explore the creative capacities of AI and its transformative potential in various tasks. These include generating media (e.g. text, image, voice), as well as generating codes to develop an interactive game.

Every day of the workshop includes an integrated component that focuses on **ethics and policy implications** relevant to the day's material. This structure ensures that ethical considerations are not an afterthought, but a core part of learning about AI. Through case studies, group discussions, and scenario analyses, participants explore the broader societal, ethical, and policy implications of AI technologies[1].

B. Theoretical and pedagogical framework

~~As it can be noticed, the~~ The proposed workshop follows a pedagogical approach ~~of the workshop is~~ rooted in the theoretical frameworks of adult learning and experiential learning principles, and includes hands-on activities, active engagement and practical application of learned concepts through group discussions and projects [5], [6]. This approach is particularly effective in adult education, as it encourages learners to connect theoretical knowledge with their real-world experiences and existing knowledge bases [7], [8]. The curriculum leverages several teaching methodologies: (1) **Interactive Lectures**, to establish foundational knowledge and introduce complex ideas in an accessible manner, (2) **Hands-On Activities**, allowing participants to experiment with custom-built AI tools and technologies in controlled environments to reinforce their understanding while decreasing the technical knowledge demands, and (3) **Case Studies and Problem-Solving Scenarios**, for ethical discussion sessions, to encourage integrating AI concepts to real-life organizational challenges.

These practices ensure that participants not only grasp theoretical concepts, but are also be prepared to ask the right questions and strategically and ethically evaluate AI implementation within their organizations.

The Learning Machines workshop requires high-touch, in-person, interactions facilitated by experts. This means it is not suitable for training at scale for large organizations, unless involving enough qualified facilitators. Goal of this program was to also support capacity building within the organization. For that reason in this iteration we also employed the "Train the trainer" theoretical approach. This relies on AI experts that guide trainers (current selected learners) into developing or increasing their core topical knowledge, gaining self-efficacy, and improving their management skills in a topic of interest, with the goal of these learners becoming facilitators of the same training activities in the future (and possibly train other trainers) [4]. This model has proven to be an effective approach for scaling educational programs in social [9] and health sciences [10], and the military [11]. For this reason, we implemented the "train the trainer" model so future workshops can be led by in-house facilitators from the U.S. Air Force. This could secures program sustainability and scaling, without the participation of MIT.

C. Scalability

To address scalability and effective delivery of the workshop, we utilized the feedback from the past cohorts, to develop a comprehensive multimedia training materials and documentation. This resource development included:

[1]See our workshop website for further details about the workshop agenda and material: learningmachinestraining.com

TABLE I
ROUND 3 CURRICULUM OVERVIEW AND SCALABILITY OF OUR LEARNING MACHINES WORKSHOP

Day & Theme		Session Title	Activities	Key Skills/Topics
1	Machine Perception	Seeing Machines	Interactive lecture, hands-on drone activity	Computer vision, feature engineering
		Supervised Learning	Interactive exercises, hands-on drone activity	model development
		Conversational AI	Fine-tuning LLM, RAG framework	NLP, LLM, information retrieval
		Bias and Ethical Implications	Face Identification modelling, Case studies discussions	Bias in ML, ethical principles
2	Machine Behavior	Reinforcement Learning	Q-learning introduction in game agents	Virtual Robot behavior
		Deep Reinforcement Learning	Simulated virtual vehicle training	Deep RL,
		Ethics & Policy	Group discussion, real-world examples	Responsible AI use, ethical principles
		AI Leadership	Group discussion and reflection, real-world examples	Technical and Adaptive challenges and leadership
3	Generative Machines	Generative Media	Creating graphs based on documents	Creative applications of AI, visual elements
		Generative Codes	Game development and assets creation	Creative process, Creative product, Collaborating with AI
		Responsible Design	Conversational card based game	AI explainability, inclusivity, and transparency.
		Organizational Change & Culture	Reflective discussion, organizational impact	Adapting to new technology, cultural considerations

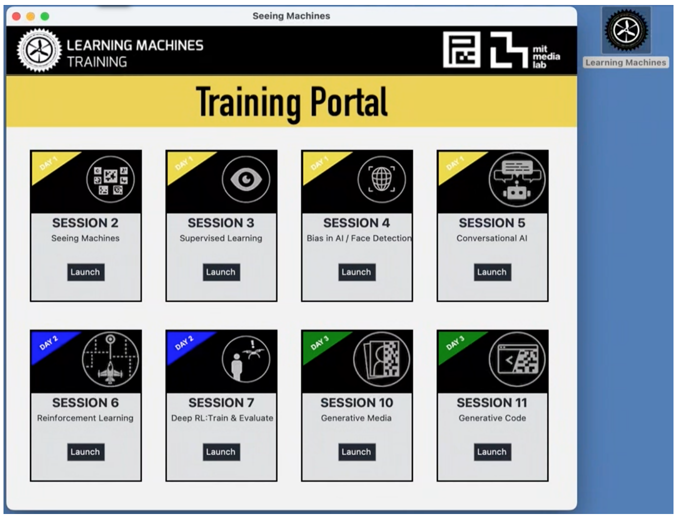

Fig. 1. Screenshot of the Customized Digital Tools Designed for the Hands-on Activities

Detailed Facilitator Guides: Resources include documents providing step-by-step instructions for delivering each session, and resources and background information on the topics.

Recorded videos: Training videos were recorded in two parts; one for the lectures and the other for the activities setup and walk-through. The lecture videos are shared with both the learners and the facilitators, while the activity videos are shared with the facilitators only.

Student-facing Material: Material such as slides, activity sheets, and case-studies were made available for both the facilitators as part of "train the trainer", and for the student participants to have access to these materials before and after they join the workshop.

Digital Resources: Customized and interactive digital tools were created to complement the hands-on activities (see Figure 1), allowing facilitators and participants to revisit concepts post-workshop. These tools are accompanied by detailed instructions for installation and troubleshooting.

Train the trainer: As previously mentioned, we aim to support program scalability by encouraging the U.S. Air Force to continue offering the workshop but delivered by in-house facilitators, who will be trained by the facilitators that participated in the train the trainer activities.

These materials are designed not only to support the current facilitators, but also to empower future trainers from within the organization to lead workshops independently. The robust structure of the curriculum, combined with comprehensive support materials and digital tools, ensures that the workshop can be scaled effectively, maintaining high quality and adaptability to the needs of different leader groups across various sectors.

III. METHODOLOGY

A. Educational Setting and Participant Demographics

For the purpose of scalability of the workshop, a large conference room was prepared for group interaction, where each group table was equipped with a computer system that had our custom designed AI tools pre-installed (see Figure 1). The workshop was held in-person, to maximize the effectiveness of hands-on activities and face-to-face discussions.

In this study, we aimed to examine the effectiveness and scalability of our workshop specifically tailored for non-technical leaders. Out of the initial 50 participants, we conducted a thorough analysis on a subset of 19 individuals who met the criteria for inclusion: (1) providing informed consent, (2) matching coded names to actual names, (2) securing additional mandatory commander approval for research participation, and (4) completing both pre- and post-workshop surveys.

The cohort was predominantly male (68.4%), with participants largely affiliated with the Military (52.6%). The majority of the participants are in varied leadership roles (52.7%): in organizational/operational (26.3%), strategic (15.7%), and direct/tactical (5.2%) roles. Ethnically, the group was primarily White or Caucasian (84.2%), with smaller representations from Eastern Asian, Central Asian, Native Hawaiian or Other Pacific Islander, and Indigenous backgrounds. The majority of these participants held advanced degrees, with 68.4% having a Master's Degree. Professionally, they were mainly from Engineering (47.4%) and Administration and Management (26.3%), with the remainder working in various other fields. This diverse demographic profile contributes to the validity and relevance of our findings regarding AI leadership competencies and scalability.

From these participants, we recruited ten facilitators from the same organization as part of "train the trainer", where they have advance background in technical, mathematical, statistical or AI knowledge. Prior to the workshop, we run several virtual training sessions with these facilitators, and provided training materials of recorded lectures, access to the hands-on activity codes with installation instructions, and conducted synchronous sessions to run and troubleshoot the hands-on activities, followed by sending the recording of these sessions to them.

B. Research Instruments

Knowledge Checks: To evaluate the effectiveness of the workshop content and its delivery, a series of surveys and knowledge checks were administered Pre- and post- the workshop. There were 3-4 knowledge questions relevant to each workshop session, accumulating to 34 questions in total.

AI Leadership Questionnaires: To assess how participants' perceptions towards AI integration within their leadership practices evolved throughout the workshop, we designed questionnaires exploring areas such as:

- **AI Mindset,** which refers to an action-oriented process for leaders to rethink and consider how AI can help to solve problems responsibly within authentic human contexts.
- **AI Culture**, AI culture which refers to the participant's ability to address the challenges and opportunities that arise in a world newly shaped by AI, particularly with respect to innovation and collaboration in rapidly-changing and cross-disciplinary environments.
- **AI Ethos**, which refers to the participant's commitment to the responsible use of AI by considering the ethical, moral, and policy implications of AI technology. Commitment includes devoting resources to the organization to make sure people are aware of the ethical implications of the technology.

Pedagogical Exposure Assessments: Pedagogical exposure assessments were used to gauge participants' engagement with the educational methodologies employed during the workshop. Participants provided feedback on the hands-on activities, case studies, and the interactive lecture format. This helped to identify the most effective teaching methods and areas needing improvement for future iterations.

Learner Experience: To capture a holistic view of the participants' experience, a comprehensive learner experience survey was administered. This survey covered various aspects, including content, structure, and time commitment, as well as pedagogy, experts, and the community of peers. This approach ensures that we capture the subjective experiences of the participants, allowing for evaluation of our educational intervention.

Facilitator Feedback: To thoroughly assess the readiness and preparedness of the facilitators (future trainers), we added a set of specific questions targeting the facilitators' unique experiences and perceptions. These questions delved into various critical areas, including the facilitators' self-assessed preparedness and confidence levels to lead the Learning Machines Workshop independently. This facilitator-specific feedback is vital for understanding the practical aspects of training future trainers and ensuring the robustness of our "train the trainer" approach for scalability.

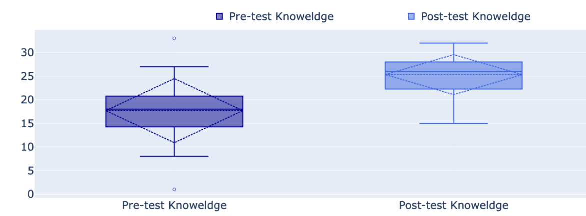

Fig. 2. AI Knowledge Check; results shows significant improvements from the workshop sessions.

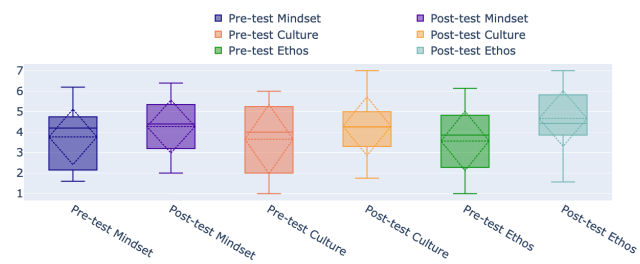

Fig. 3. AI Leadership Competence Development; showing significant improvement in all three areas: AI Mindset, Culture and Ethos.

IV. Results

A. Improvement in AI Knowledge

One of the primary measures of success for the workshop was the improvement in participants' AI knowledge. Based on the pre- and post-test scores, we observed that out of 19 participants, 17 demonstrated an improvement. This accounts for 89.47% of the cohort, indicating a significant enhancement in AI understanding due to the workshop.

To validate the significance of these improvements, we conducted a paired t-test, which resulted in a statistic of -4.0469 with a p-value of 0.000263, and degrees of freedom (df) of 36. These results indicate that the improvement in AI knowledge is statistically significant at the 0.01 level. As seen in Figure 2, the post-test scores show a higher median and reduced variance compared to the pre-test scores, emphasizing the overall improvement among participants.

B. AI Leadership Competence Development

To assess the impact of the workshop on participants' AI leadership capabilities, we examined three key areas: AI Mindset, AI Culture, and AI Ethos. We utilized pre- and post-workshop questionnaires to measure changes in these areas. The data analysis was performed using Wilcoxon signed-rank tests, given the non-parametric nature of our data. The results are detailed as follows, with the box plot (Figure 3) illustrating the comparative distributions of pre-test and post-test scores for each category.

AI Mindset refers to the leaders' perception and readiness to integrate AI solutions responsibly within their organizational contexts. The Wilcoxon test for AI Mindset indicated a statistically significant change (statistic=23.5, p=0.0117). The box plot shows an upward shift in the median scores from pre-test to post-test, reflecting enhanced readiness and openness in adopting AI initiatives.

AI Culture encompasses the organizational readiness and collaborative environment required for effective AI integration. The test results for AI Culture also demonstrated significant improvement (statistic=21.0, p=0.0147). The box plot shows an increase in the spread and central tendency of post-test scores, indicating a broader understanding and appreciation of the organizational culture needed to support AI implementation.

AI Ethos captures the commitment to ethical AI use and the proactive consideration of moral implications within decision-making processes. The Wilcoxon test for AI Ethos yielded highly significant results (statistic=7.0, $p<0.0001$). The corresponding box plot displays a noticeable rise in the median and a reduction in score variance, underscoring an improved and more cohesive approach to AI ethics among the participants.

The observed improvements across all three AI leadership competencies - AI Mindset, AI Culture, and AI Ethos - align with our expectations of the workshop. These results are indicative of a successful intervention that not only enhanced the participants' technical understanding of AI but also significantly influenced their leadership perspectives in the context of AI adoption, organizational culture, and ethics.

The increased AI Mindset scores highlight the efficacy of the hands-on activities and case studies, which likely facilitated a deeper and more practical understanding of how AI can be leveraged within their organizations. The growth in AI Culture scores suggests that our focus on collaborative learning and scenario-based problem-solving effectively communicated the importance of a supportive and innovative organizational atmosphere for AI.

Most notably, the substantial improvement in AI Ethos scores emphasize the success of our integrated ethical discussions and policy implications sessions. This result shows the importance of embedding ethical considerations into AI education for leaders, ensuring they are prepared to address and mitigate AI-related risks and challenges within their organizations.

C. Pedagogical Exposure

To understand the participants' engagement with educational technologies outside the provided AI program resources, we asked about their use of supplementary tools and platforms. The responses from the 19 participants indicated varied engagement with extra resources: videos were utilized by 7 participants, and online learning platforms such as EdX and Coursera were used by 6 participants. Additionally, coding platforms utilized by 4 participants, and educational video games or apps were used by 3 participants. Other resources, including virtual reality apps, discussion forums, online learning communities, educational toys and robots, and augmented reality apps, had limited but notable use. The majority of these additional tools align closely with the hands-on, experiential pedagogical approach we utilize in our curriculum design. These results reflect the anticipated pedagogical immersion and the efficacy of the workshop's methodology in promoting a culture of continuous, diverse learning.

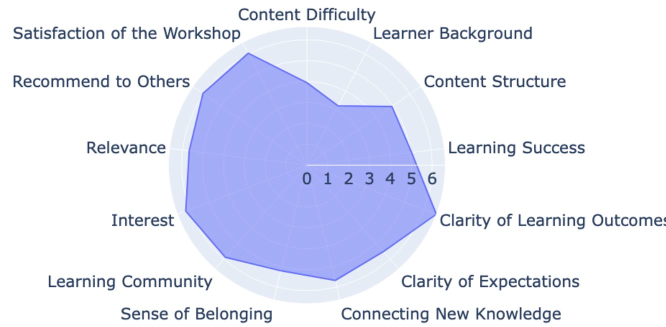

Fig. 4. Learner Experience Rating, showing several categories with high ratings, regardless of the learner's background and advance level of the workshop content.

Our workshop's pedagogical strategy and use of education technology were evaluated based on participant feedback. A majority of participants (11 of 19) identified the educational technology as a mix of passive and active, while 7 described it as mostly active, highlighting their engagement in the activities. Furthermore, a significant majority (17 out of 19) reported that the educational technology supported their academic experience. Positive feedback was largely focused on the hands-on sessions, which were appreciated for their interactive and practical nature. However, there were some criticisms regarding occasional software bugs and technical issues, with two participants indicating these aspects did not support their academic experience.

D. Learner Experience

The learner experience was evaluated through 7-likert scale questions that assessed various aspects of the workshop, including content difficulty, learner background, content structure, learning success, and overall satisfaction among others. These dimensions provide a view of participants' experiences. Figure 4 illustrates the summarized results from the participants.

Regardless of the low rating for learners' background and the content difficulty, participants rated the content structure and learning success highly, with an average score around 5.7 and 5.6 respectively. The high rating for learning success confirm the suitability of the designed curriculum to the non-technical learners. Moreover, the clarity of learning outcomes and expectations both received high ratings, with averages of 5.9 and 5.8, respectively. This suggests that our use of explicit session objectives and a well-organized curriculum enabled participants to understand what was expected of them and what they would achieve. The clear articulation of these outcomes likely contributed to participants' positive perceptions and overall satisfaction. These high scores validate our approach of providing detailed, well-structured educational material for non-technical participants. The utilization of facilitator guides, comprehensive student-facing material, and digital resources likely contributed to these positive evaluations.

Relevance and interest of the workshop to the learners were rated very highly, both averaging around 5.7. These scores reflect our successful integration of real-world case studies and hands-on activities designed to illustrate practical applications of AI in leadership contexts. This experiential learning approach not only maintained participant interest but also ensured the practical relevance of the content. The sense of belonging and learning community scored slightly lower, with averages around 4.9 and 5.0. While these scores are still positive, they indicate an area for potential improvement. Even though we designed the workshop to be group-based activities (a group of 5 learners and 1 facilitator) with group facilitated discussions, future implementation might consider these interactive and team-based activities and discussions has appropriate group size (e.g. 3-4 participants per group) to enhance these aspects.

Participants expressed a high likelihood of recommending the workshop, with an average score of 5.8, and the overall satisfaction rated at 5.9. These results indicate strong approval of the workshop, suggesting that participants found it both valuable and enjoyable. These metrics are critical indicators of the program's success and its potential for scalability and wider adoption.

We asked the participants before the workshop about their goals of attending the workshop, then after the workshop we asked if they accomplished their goals. The feedback from participants both before and after the workshop demonstrates a high level of goal accomplishment among the attendees. Participants initially expressed specific aspirations such as gaining a foundational understanding of AI principles, enhancing their knowledge of machine learning techniques, and understanding AI applications within defense contexts. They also aimed to learn how to integrate AI into their work environments and desired to understand AI from various perspectives, including ethical considerations, commercial visions, and technical implementations. Post-workshop feedback reveals that most participants felt they achieved their objectives, particularly noting improvements in their understanding of general AI concepts, machine learning, and the ethical implications of AI. Many appreciated the interactive, hands-on learning opportunities, which allowed them to apply their knowledge practically. However, a few participants indicated a desire for a deeper technical dive, expressing that while the course met many of their learning needs, they would have benefited from more in-depth technical content. Overall, the workshop was successful in meeting the diverse learning goals of participants, affirming the efficacy of its curriculum design.

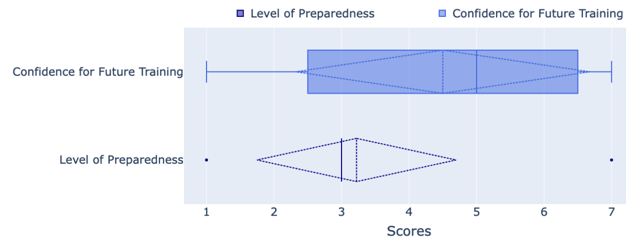

Fig. 5. Facilitator-Specific Preparedness and Confidence; showing that even though the facilitators didn't have enough time to prepare before the workshop, they were confident that they can train others given the provided material and attending the workshop.

Finally, the overall feedback from participants reflected an overwhelmingly positive sentiment of the course content, workshops, and lectures. Participants appreciated the instructors' engaging and inclusive teaching approach, which ensured active participation and respected varying levels of prior knowledge. The use of follow-up materials and support for further research were also noted as significant strengths. Key positive highlights include the hands-on activities such as drone flying and game development, which were repeatedly noted for their engaging and practical applicability. In-table discussions facilitated understanding between technical and non-technical students, creating a collaborative learning environment. There were also diverse perspectives on the value of leadership and ethical content, with some participants appreciating these discussions while others preferred a more technically focused approach. Additionally, non-U.S. participants had difficulties fully engaging with U.S.-centric case studies, though they generally felt welcomed. Overall, while some aspects could be improved, such as accommodating varying coding skills, the workshop successfully fostered a supportive, inclusive, and dynamic learning environment that motivated further exploration in the AI field.

E. Facilitator-Specific Feedback

The feedback from the 7 facilitators (future trainers) among the 19 participants, who met the inclusion criteria for this analysis, in the Learning Machines workshop provides key insights into the training, readiness, and perceived impact of the workshop. This feedback serves as a critical component in evaluating the scalability of the workshop for organizational capacity building.

The box plot in Figure 5 shows the facilitators' confidence to lead future training sessions and their level of preparedness before the workshop. The level of preparedness before the workshop shows a lower median score around 3.5, indicating the need for further preparation. Since our training sessions were conducted virtually during their workday, most facilitators were not able to attend, and relied on watching the video recording of these sessions. Furthermore, some facilitators expressed the inability to install the activity codes for several reasons, including not having sufficient administrator privileges in their machines. Nonetheless, the confidence for future training is shown with a higher median score of 5, indicating a generally positive confidence to lead the workshop independently. This result suggests the provided material and facilitating the activities during the workshop helped them to be optimistic about leading the workshop and its activities.

Prior to the workshop, facilitators indicated that they expected to reinforce their understanding of AI, and aimed to learn how to teach and explain AI concepts better to others. They also expressed a desire to understand different perspectives and potentially adapt the course for classified versions within their specific contexts. These expectations indicate facilitators' motivation to gain deep AI insights and pedagogical skills crucial for scaling the workshop internally.

Facilitators also suggested practical needs for their training sessions such as in-person sessions for troubleshooting, programming skills in Python, and more facilitated discussions. This feedback is insightful for scalability, as it underscores the necessity of foundational AI knowledge and hands-on programming skills. The call for in-person interactions for technical troubleshooting and software debugging indicates that real-time engagement could be crucial for effective facilitation. Addressing these needs in future training could strengthen trainer preparedness, ensuring they can independently conduct sessions, thereby supporting scalability.

Facilitators emphasized the workshop impact on their organizations, mentioning the capacity to share their learnings with their staff, emphasizing the potential ripple effect of the program. The ability to share AI knowledge broadly and enhance organizational awareness and capabilities in AI aligns with the goal of wide accessibility and internal capacity building, reinforcing the scalability aspect of our workshop.

Moreover, facilitators identified several challenges for scaling the program, including financial resources, usability of the user interface, provision of necessary infrastructure, and personnel resources. Some suggested minimal external involvement would be required if local resources were provided. These identified challenges are critical to address for effective scalability. The emphasis on financial resources indicates a potential barrier to scalability that must be mitigated through strategic planning and possibly securing funding or sponsorships.

V. Discussion

The results from this third cohort of the Learning Machines workshop demonstrate significant enhancements in AI knowledge and leadership competencies among non-technical leaders. These improvements align with prior findings in the literature that highlights the need for AI literacy for organizational leaders [1], [2]. Previous iterations of our workshop primarily focused on introducing AI concepts with experiential learning utilizing hands-on activities and case-studies. In contrast, this iteration emphasized scalability and equipping trainers to sustain AI education within their organizations. Compared to earlier cohorts, the current study extends the scope by not only validating the educational framework, but also demonstrating its potential for broad implementation.

Our findings indicate that experiential learning methodologies effectively enhance AI knowledge and leadership competencies. The hands-on activities, case studies, and interactive sessions were critical in facilitating a deeper understanding of AI principles and their ethical and policy implications, leading to significant improvements observed in not only the AI knowledge, but also in AI Mindset, AI Culture, and AI Ethos. This aligns with the experiential learning theory, which implies that active involvement in learning processes leads to better retention and application of knowledge [**?**].

The success of this workshop iteration provides valuable insights for future AI education and curricula design. Firstly, it validates the importance of integrating ethical considerations and practical applications into the curriculum. The significant increase in participants' AI Ethos scores highlights the importance of embedding ethical discussions within AI training programs. This approach ensures that leaders are not only technically equipped, but also prepared to navigate the moral and societal implications of AI technologies.

Secondly, the observed improvement in AI Culture scores suggests that fostering a collaborative and innovative learning environment is critical for effective AI education. Future programs should prioritize creating a supportive atmosphere that encourages cross-disciplinary collaboration and continuous learning. The high ratings for learner experience and relevance further highlights the need for content that is directly applicable to learners' professional contexts.

The process of developing in-house training capabilities revealed several key insights. Facilitators' feedback indicated that while they felt confident in leading future sessions, additional preparation and resources were necessary to run the workshop in their organizations. Challenges such as financial resources, infrastructure, and technical support were identified as potential barriers to scalability. Addressing these needs will be crucial for ensuring facilitators' preparedness and the scalable success of the program. Moreover, the positive impact of the ”train the trainer” approach suggests that empowering internal leaders to take ownership of AI education can foster a sustainable learning culture. This approach could enable organizations to embed AI competencies into their strategic planning actively. The scalability of the training framework was a central focus of this iteration, and the results demonstrate promising potential. The comprehensive material developed—ranging from instructional videos to detailed activity guides—played a significant role in ensuring the consistency and quality of the training. This structured approach would allow facilitators to deliver the curriculum effectively, even with varying levels of initial preparedness.

Future iterations should focus on refining facilitator training, addressing scalability challenges, and continually aligning content with the evolving AI technologies. This approach will ensure that non-technical leaders are well-equipped to navigate the complexities and opportunities presented by AI, fostering a culture of responsible and innovative AI adoption within their organizations.

VI. Conclusion

In this study, we analyze the results from the third iteration of the Learning Machines workshop, focusing on enhancing AI knowledge and leadership competencies among non-technical leaders and scaling up the program through a "train the trainer" approach. Our findings affirm the effectiveness of experiential learning methodologies in deepening AI understanding and fostering crucial leadership competencies. The statistically significant improvements in AI knowledge, mindset, culture, and ethos highlight the power of hands-on activities, case studies, and ethical discussions. These insights are particularly valuable for non-technical leaders who must navigate the complexities of AI integration and strategic decision-making within their organizations to better be equipped to leverage AI technologies responsibly and effectively.

Secondly, the successful implementation of the training model shows the potential for sustainable and scalable AI education within large organizations. Facilitators' feedback revealed that the comprehensive materials and structured curriculum effectively supported their training readiness. The positive views and high recommendation rates of the workshop further validate the program's relevance and applicability to diverse professional contexts.

The potential impact of a scalable AI education framework on organizational capacity building cannot be overstated. By empowering internal trainers and embedding AI literacy into the strategic planning of the organization can ensure that their workforce is prepared to meet future challenges and opportunities introduced by rapid technological advancements. This approach not only enhances immediate knowledge and skills but also promotes a proactive and adaptive mindset, crucial for sustaining long-term competitiveness and ethical AI adoption.

Future research in AI leadership training should focus on several key areas. First, refining the facilitator training process is essential to ensure high preparedness and confidence levels among trainers. This could involve more extensive pre-workshop sessions, hands-on practice, and troubleshooting support. Additionally, future iterations should address the scalability challenges identified, such as financial resources and infrastructure needs, to facilitate broader adoption. Regularly updating the curriculum to reflect the latest AI advancements and ethical considerations will ensure continued relevance and efficacy.

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