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The Effectiveness of Offline and Online Artificial Intelligence Fundamentals Training on Participant Learning Outcomes

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Abstract

Artificial Intelligence (AI) training is currently widely conducted through various technology-based learning channels. The primary objective of this research is to evaluate the effectiveness of an AI education program facilitated by Nortis' Academy, by comparing participants' learning outcomes in online and offline formats. A quantitative comparative design was applied, involving a population of 36 individuals: 15 online and 21 offline respondents. Instruments utilized final evaluation scores from three training sessions. Based on the non-parametric Mann-Whitney U Test, a significance value of 0.016 < 0.05 was obtained, confirming a statistically significant difference in learning outcomes. The online group's average evaluation score (94.42) proved superior to the offline group (89.33). This superiority is supported by digital adaptability and minimal distractions. The conclusion shows that digital-native skills training is more effective online. These findings contribute to educational technology, acting as a foundation for designing future digital learning strategies.

Keywords: Artificial Intelligence; Learning Outcomes; Training Modality; Online Training; Offline Training; Comparative Study.

1. Introduction

The dynamics of innovation in the artificial intelligence (AI) sector have triggered significant transformations across various aspects of global society, including the education and professional training ecosystem. Integrating this cutting-edge technology into teaching and learning activities is believed to open massive opportunities for more adaptive material delivery systems, comprehensive evaluation mechanisms, and unlimited flexibility of space and time. In line with the accelerating development of information technology infrastructure, skills training programs are no longer confined to physical face-to-face modes but have expanded and been massively implemented through online formats. Both training modes carry distinct inherent characteristics, particularly regarding instructional interaction, material delivery methods, and the shaping of participants' learning experiences. Historically, offline training enables direct interaction between instructors and participants, ensuring an organic communication flow, clear nonverbal gestures, and rapid, intensive feedback. Physical presence in a shared room is often perceived by instructors as capable of creating an emotional bond and constant focus, effectively reducing potential distractions. Conversely, online training offers tactical advantages in the form of high spatial and temporal flexibility, as well as easy integration of interactive digital learning resources, although this method strictly demands a high level of independent learning and digital literacy from its participants. Amid high public enthusiasm to master this latest technology, competency certification institutions like Nortis' Academy have taken strategic initiatives by organizing comprehensive training programs. The essential curriculum carried out in this technology education program covers fundamental AI understanding, technical exploration of advanced generative systems, and the instillation of ethical aspects and responsible AI implementation through various actual case studies. Although this competency training runs in parallel involving two different learning modes,

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empirical validation regarding which operational mode provides the most optimal cognitive effectiveness for participants' capacity still requires in-depth academic study.

Various previous literature reviews have attempted to dissect the effectiveness of AI implementation in education, but the majority of these discourses have focused on utilizing AI merely as an intermediary instrument or learning aid. An in-depth study by Ramadan (2024), for instance, provides strong justification that real-time feedback from AI ecosystems significantly boosts student engagement, directly resulting in a surge of final learning outcomes. These empirical findings are reinforced by the experimental observations of Kholis Ali, Al Muhtadibillah Ali, Fitri Furqoni Ali, and Rahmi Imanda Ali (2024), which documented that adopting AI-based media consistently and sharply multiplied students' academic scores. Data details from Kholis Ali et al. (2024) showed that material retention rates reached eighty-seven percent, successfully outperforming conventional learning media groups, which stagnated at sixty-five percent. Similar confirmations emerged from higher education through Firmansyah and Sakmawati's (2025) publication, which found an identical manifestation of teaching quality improvement. AI tool interventions were reported to guide deeper and more comprehensive conceptual understanding, a condition clearly reflected in students' academic records when compared to traditional teaching routes. Viewing from a system customization perspective, Syahrizal's (2024) analysis successfully dissected the efficacy of adaptive learning methods, where AI training circuits operated twenty percent more effectively in boosting achievement because the material was constantly reconfigured to precisely match individual cognitive capacities. Moving to the domain of practical operational training, evaluative research by Rahman (2024) on a government agency's initiation literacy program proved that AI training agendas contributed massively to the escalation of participants' technical agility, solidly tracked from pre-test to post-test score curves.

Based on the preceding literature review outlining the landscape of previous research, a pressing literature gap must urgently be bridged through further analysis. Most past literature remains strongly fixated on experimenting with the effectiveness of AI tools in their capacity as supporting facilities for delivering general science materials, or merely cross-testing the efficiency of online versus offline methods in standard formal educational institution environments. Departing from this gap, the formulation of this article's scientific novelty is anchored in determining a specific study object and its training context ecology. This innovative study takes a bold step by positioning AI material no longer as a passive complementary learning tool, but transforming it into the core material and primary learning objective for digital era skills. This research design elevates a completely new comparative perspective to weigh the limits of effectiveness between two contrasting delivery modes—offline and online—in their operational function to facilitate the transmission of computational technical knowledge. This article aims to dismantle the established past assumption that real-world face-to-face interaction is the single best parameter for achieving tool mastery, expanding the hypothesis toward an alternative premise: that pure software-based skills training curricula might resonate far more progressively if rolled out directly from the heart of the digital ecosystem itself.

Through the foundation of these background arguments and the establishment of the scientific novelty gap, the problem orientation to be deeply investigated is focused on analyzing the dynamics of participants' final scores. The research problem entity is subsequently manifested through a specific empirical question: is there a statistically significant disparity in

cognitive learning outcomes between the aggregate of participants undergoing the AI education program via offline classrooms when compared to those utilizing online virtual communication networks? Adhering to this central formulation, the research hypothesis established in this comparative analytical study asserts a strong proposition that factually, there will be a real, significant difference in the accumulated final scores separating the two training execution groups. Variability ranging from the instructor's dialogic communication characteristics, the index of distraction exposure in physical facilities, to the volume of participants' freedom to apply multitasking functions requiring independent practice and experimentation during the ongoing training, are projected to act as absolute determinant instruments controlling the degree of the final evaluation gap.

Culminating from a series of systematic explanations regarding the urgency of honing revolutionary technology sector competencies, the fierce discourse on determining the peak effectiveness of various delivery mediums, to the formulation of a solid hypothesis statement, the direction of this research perfectly converges on a final target declaration. Therefore, the objective of this article's study is to measure, comparatively benchmark, and comprehensively analyze the precision of the significance level of differences in the effectiveness of final learning outcomes achieved by participants between AI training programs utilizing conventional offline face-to-face methods facing their counterparts delegated through online virtual infrastructures.

2. Method

2.1. Training

Training is a form of education facilitated for participants to equip them with insights and competencies relevant to the demands of the working world (Cahya, 2021). According to Simamora (2014, p. 344), training is a planned action carried out by an institution to improve the insights, abilities, and professional attitudes of trainees through a learning process, aiming to enable these individuals to carry out every workload and professional responsibility more optimally in the work environment. According to Herwina (2021), training is a series of short-term processes that facilitate individuals or groups in honing work competencies to support the achievement of industry targets. Based on these perspectives, training can be concluded as a structured agenda designed to optimize cognitive capabilities, technical skills, and work ethic, so that participants are able to execute their responsibilities and meet organizational needs effectively.

Amidst the fierce competition of the global era, Giovanni and Ali (2024) emphasize the urgency of training to optimize the capacity, insight, and performance of human resources. Targeted training serves as a guarantee for the availability of competent employees to respond to market dynamics while simultaneously achieving corporate targets. In line with this, Gustiana, Hidayat, and Fauzi (2022) state that this program is essential in boosting personal expertise to complete various work obligations, which in turn contributes to the achievement of the institution's vision and mission. This is reinforced by Jovanov (2023), who highlights the role of training in driving the vitality and success of the institution. Referring to the views of these three experts, it can be concluded that training is a crucial instrument that bridges the company toward achieving its main objectives.

The importance of training goes beyond merely controlling the tasks that employees must perform. Mamaqi (2023) states that a comprehensive, high-level training program will provide broader knowledge to employees or every trainee regarding the institution's processes, procedures, and objectives. This step also equips participants with essential competencies and expertise so they can carry out their functions optimally. Providing relevant and continuous training is the most potent strategy to boost employee productivity and performance. According to Arta, Leuhery, Abubakar, Yusuf, and Cakranegara (2023), the insights and skills absorbed from training now serve as the primary foundation for responding to the rapid transformation of technology, products, and operational systems. From a career perspective, Herwina (2021) suggests that training and development have a positive impact on long-term prospects, equipping the company's human resources (HR) to be ready to take on more complex mandates and tasks in the future. Empirically, this program significantly contributes to high levels of productivity, dedication, and job satisfaction. Furthermore, Risman (2024) notes that the utilization of innovations, which include the application of electronic learning systems (e-learning) and computerized simulation methods, can enhance the effectiveness and flexibility of training. This aligns with the findings of Johnson and Brown (2022), who emphasize that the implementation of technology-mediated educational programs has a substantial impact on sharpening digital competency skills and employee resilience in responding to technological transformations.

Effective training and development is one of the main factors influencing employee performance (Yunitasari & Fauzan, 2023). An organization must always prioritize productivity, education, and training because these aim to improve employee performance. Training aims to increase employees' productivity potential, while development prepares them to face changes within the organization. Training and development are integral parts of corporate culture. Development focuses on conceptual skills, whereas training more heavily emphasizes technical skills (Gustiana et al., 2022). HR training and development aim to improve current employee performance and prepare them for future responsibilities. It is also intended to improve the performance of educational staff who need to upgrade their competencies due to changing educational needs (Apriliana & Nawangsari, 2021). Training is considered an effective strategy to enhance the competence of the company's HR, which in turn can provide a competitive advantage by providing knowledge and skills beneficial to the organization. If implemented well, training and development programs can provide numerous benefits for employees and organizations, including improvements in employee knowledge, skills, and attitudes. Training and development are considered a vital investment for companies in increasing productivity, according to Tabina et al. (2024).

2.1.1. Training Objectives

According to Herwina (2021), the primary objectives of training and development are to reduce human resource (HR) performance deficiencies caused by the inability to perform tasks, enhance HR capabilities to align with technological advancements, improve HR competencies in their respective roles, investigate operational issues, fulfill individual growth needs, prepare HR for promotions, and strive to increase their overall productivity. Furthermore, additional objectives of HR training and development are outlined below:

a. To reduce existing performance gaps or discrepancies between the desired outcomes and what has actually been achieved by HR, which occur due to HR's inability to meet

predetermined standards. Performance enhancement training is highly beneficial for an institution facing a decline in productivity.

b. In relation to technological growth, training and development make employees more productive and adaptive. In this context, it aims to make the institution more adaptable, ultimately resulting in enhanced expertise and profitability for the organization.

2.1.2. Training Roles

According to Irianto (2001:8), training programs play a crucial role in providing solutions to several fundamental problems, including:

a. Potentially boosting the productivity level of the trainees

b. Able to improve the quality of output or work of participants.

c. Develop adaptability to various dynamics. In this case, the success of the implementation of innovation, both at the technical level (adoption of the latest technology) and strategic (market expansion or new product launch), is largely determined by the level of expertise mastered by the participants.

2.1.3. Benefits of Training

According to Mangkuprawira (2010:147) mentioned several benefits of training, namely:

a. Benefits for Organizations/Institutions is Escalating technical insights and competencies, fostering employee work ethic, improving vertical relationships between leaders and staff, facilitating institutional progress, and encouraging the strengthening of leadership capacity, loyalty, and positive attitude of employees.

b. Benefits for Individuals is Spurring the encouragement of achievement, accountability, and self-development of participants. Training also strengthens confidence, facilitates stress management and conflict resolution, enriches communication skills, and has implications for high levels of job satisfaction.

c. Benefits for HR Dynamics and Policy is Facilitating the flow of communication across individuals and divisions, strengthening interpersonal cohesion, and creating a supportive work ecosystem for the process of learning, adaptation, and team synergy.

Essentially, the training program does not only provide benefits for the agency, but also has a positive impact on the escalation of the quality of each participant involved in it. In addition, training can improve their skills and knowledge.

2.1.4. Training Process

In carrying out training activities, there must be a process that must be followed systematically so that the training program is designed to run effectively. Mamaqi (2023) mentions five steps in the training process, namely:

a. Need Assessment: The initial stage in organizing the training is to analyze the needs of the participants. This identification process is carried out by mapping current operational challenges and future projections, as well as evaluating the gap between the actual performance of participants and the set performance standards. The evaluation of this need can be studied through two perspectives, namely personal and communal. Individual interventions are focused on boosting the effectiveness of workers whose achievements are still below the target. In contrast, group-based training is oriented to internalize updates collectively in response to a transition or shift in organizational strategy.

b. Setting Training Goals: Post-identification of needs, the next phase is the formulation of training objectives. This goal represents the competency standards that are projected to be mastered by the participants at the end of the program. In practice, the formulation of these goals must be aligned with the results of previous assessments, the expertise targets to be formed, and the capacity of the organizers. Furthermore, the goals that have been set will serve as the main foundation in designing material modules, determining instructional methods, and developing evaluation instruments to ensure that participants succeed in absorbing insights, skills, and paradigms that are in line with the achievement targets.

c. Benefits of Setting Training Goals: Smoothing The next stage is to design a training program that is in line with the goals that have been set. The design of this program requires mapping of various crucial elements, including the identification of target participants, the qualification of facilitators, the determination of methods or modes of implementation, the standard of expected depth of material, and various other technical aspects. Furthermore, in this phase, a holistic operational blueprint was also prepared. The plan describes the curriculum specifications, teaching materials, the foundation of learning theory, instructional designs, and other supporting administrative prerequisites.

d. Implementation: After the preparation of the training program design, the next stage is the implementation stage. At this stage, the organizers determine the location of the training, both offline and online, and prepare a schedule for the implementation with the trainer. During the training, the learning process is monitored to assess the effectiveness of the implementation and ensure that participants are actively involved in each training activity.

e. Evaluation After the implementation of the needs assessment, it is aimed at collecting comprehensive data, which will later function as a basis for compiling materials, learning strategies, and curriculum evaluation mechanisms. In general, there are three main approaches to mapping training needs, one of which is:

    (1) Competency Analysis: The competency analysis approach is implemented when the urgency of training is driven by the need for participants to master specific qualifications that are in line with the learning objectives. This stage begins by collecting data related to the skill standards that are projected to be attached to the participants after the program ends. Based on this, a detailed mapping was carried out that accommodated the three main dimensions of competence, namely theoretical mastery (cognitive), practical skills (psychomotor), and character formation (affective) that must be mastered so that participants are able to realize the achievement indicators that have been formulated.

(2) Organizer Analysis: Training provider analysis is an analysis that is used not only to identify training needs, but also to provide information in the preparation of training provider profiles at a certain time. The profile of the training organizer is a reference in further identification of the factors behind the implementation of the training, the resources owned, and the solutions that can be applied to support the successful implementation of the training.

(3) Performance Analysis: The evaluation of the performance of the trainees is sourced from the achievement or learning outcomes that are measured in reference to the assessment standards from the organizers. The data from this evaluation was used to measure the extent of mastery of the competencies of post-training participants. Furthermore, the level of learning success is influenced by a variety of variables, including the internal conditions of the participants, the substance of the material and the learning methods applied, the dynamics of the instructional process, and the level of environmental conduciveness during the program.

2.2. Artificial Intelligence

Artificial Intelligence (AI) technology or lexically understood as artificial intelligence is a technological innovation that continues to experience massive development and has direct implications for significant transformations in various dimensions of life, especially in the education and training sectors. In the implementation of training, AI operates as a system that is able to present material more dynamically and adapt to the needs of its users. The use of artificial intelligence technology allows for the creation of a more effective evaluation system and a much more flexible learning delivery (Wahyudi, 2023). This is a crucial foundation in shifting conventional methods towards an adaptive and structured digital learning ecosystem.

One of the main advantages of using Artificial Intelligence (AI) in training is its ability to enable adaptive learning, which has a direct impact on improved academic achievement. Artificial intelligence-based adaptive approaches have been empirically proven to significantly increase the effectiveness of training and make the material provided more personalized and relevant to each individual's abilities. Thus, artificial intelligence-based systems can be designed to analyze the learning patterns of participants so that the material provided becomes more personal and relevant to the abilities of each individual (Syahrizal, 2024). In addition, the integration of real-time Artificial Intelligence (AI) system feedback also increases participant involvement in exploring the material (Ramadan, 2024).

The psychological aspect of the trainees is also greatly influenced by the presence of Artificial Intelligence (AI), especially related to motivation and interest in learning. Practical, interactive, and contextual learning experiences will be generated by the application of Artificial Intelligence (AI) that is properly designed and implemented in the training environment (Hapsari, Ramadhani, & Ikramullah, 2025). The students can easily find various literature references, solve difficult problems, and complete training tasks more targeted and efficiently thanks to the features of intelligent assistants and generative analytics (Zakiyah et al., 2024).

Furthermore, the effectiveness of the use of Artificial Intelligence (AI) technology as a training medium has been widely measured and compared with the use of conventional learning media. The application of learning media based on artificial intelligence has been

proven to be consistently able to encourage an improvement in the quality of learning which is reflected in the surge in academic grades and material deepening by participants. Training participants supported by Artificial Intelligence (AI) interventions showed a much superior percentage of understanding levels, reaching 87%, when compared to those who were only facilitated by conventional media which was at 65% (Firmansyah & Sakmawati, 2025). These findings confirm that the mastery and utilization of Artificial Intelligence (AI) devices is an important instrument to ensure the effectiveness of training programs in the era of digital transformation.

2.3. Training Mode

Artificial Intelligence (AI) technology or lexically understood as artificial intelligence is a technological innovation that continues to experience massive development and has direct implications for significant transformations in various dimensions of life, especially in the education and training sectors. In the implementation of training, AI operates as a system that is able to present material more dynamically and adapt to the needs of its users. The use of artificial intelligence technology allows for the creation of a more effective evaluation system and a much more flexible learning delivery (Wahyudi, 2023). This is a crucial foundation in shifting conventional methods towards an adaptive and structured digital learning ecosystem.

2.3.1. Online Training

Online training is a type of learning that uses internet networks and digital platforms, both synchronous (such as Zoom or Google Meet) and asynchronous (such as Learning Management System). The main advantage of this mode is the flexibility of space and time, which allows organizers to reach participants from different locations without being hindered by geographical boundaries. Online training is not only cheap and accessible, but also requires a good level of self-directed learning and digital literacy from participants for an effective material absorption process.

2.3.2. Offline Training

Offline training (offline or face-to-face), still holds a crucial role, especially for materials that require hands-on practice and motor or social skills. Offline mode allows instructors and participants to be in the same physical place. This allows for nonverbal communication which can create more organic discussions, as well as the provision of corrective feedback instantly. Psychologically, physical presence is able to create a sharper emotional bond and focus between participants, thereby reducing the distractions that usually occur in distance learning modes.

2.3.3. Blended/Hybrid Training

The blended or hybrid training mode serves as a link between the two formats by combining the power of physical interaction in offline classrooms and digital flexibility in online classrooms. This format usually divides the proportion of learning. For example, basic theory is taught independently through Online training modules, while simulations and problem-solving discussions are conducted face-to-face. The hybrid approach is considered one of the best approaches today because it is able to optimize the resource allocation of

training organizers while enabling a variety of learners' learning styles (Nurbaiti & Widodo, 2024).

Ultimately, the success of the training program does not depend on how sophisticated the technology is used, but more importantly how appropriate the mode is chosen with the learning objectives. In addition, the adoption of digital instruments such as Artificial Intelligence (AI) into these various modes further reduces the difference in quality between Offline and Online training. Artificial Intelligence (AI) can function as a personal assistant in Online classes and as a tool to analyze achievements in offline classes. Appropriate and empirical methods for applying technology can improve the retention of trainees' understanding and learning outcomes (Siregar et al., 2024).

While there is debate about which mode is best, practically the decision about the training mode should be based on an analysis of the audience's needs. For example, in the case of mastering a new tool or a complex interactive simulation, the offline mode may be more effective because the instructor can guide the participant's hand directly. However, the Online mode is sufficient and effective for cognitive-conceptual courses such as theoretical understanding, policy, or general insights. Before the program starts, two important factors that should not be ignored are the evaluation of the readiness of the organizer's infrastructure and the initial level of understanding of the participants.

For the purpose of this study, comparing the effectiveness of offline and online modes, especially in training programs that use advanced instruments such as Artificial Intelligence (AI), will be very important. The aim was to evaluate whether the ease of use of the tools could compensate for the absence of physical presence in Online education, or whether the presence of offline instructors remained essential to achieve optimal learning outcomes. Strategic recommendations on the most effective types of operational training to implement in the future will result from an in-depth understanding of the dynamics of these modes.

3. Results and Discussion

3.1 Result

This study describes the findings of learning outcome data from 36 artificial intelligence training participants, who were classified into 15 participants in the online group and 21 participants in the offline group. Before the comparative hypothesis test was carried out, the prerequisite analysis in the form of a normality test was executed using the Shapiro-Wilk technique considering that the sample quantity in each group was less than 50 respondents. The normality analysis output showed that the online training group obtained a significance value of 0.003, which is below the real level of 0.05, thus confirming that the distribution of data on the online group instrument was not normally distributed. In contrast, the offline training group recorded a significance value of 0.072, which exceeded the level of 0.05, so the dataset was declared to be distributed normally. Since the fulfillment of the assumption of absolute normality was not achieved in any of the group elements, advanced hypothesis testing shifted from a parametric statistical approach to the application of non-parametric statistical testing through the implementation of the Mann-Whitney U Test technique.

The Mann-Whitney U test juxtaposes the distribution of achievement data between groups with the analysis of the average size of the ranking. Based on the results of descriptive

statistical processing of the ranking, the online training group managed to collect an average rating of 23.47 with a cumulative number of ratings reaching 352.00. In different domains, the offline training group was only able to record an average ranking of 14.95 accompanied by a cumulative number of ratings of 314.00. The comparative evaluation of the amount of descriptive values yielded a very strong empirical indication that the cognitive achievement trajectory of the online training group consistently positioned itself at a much superior rank when directly contrasted with the participants' achievements from the offline classroom configuration.

In order to provide absolute statistical validation of the formulation of the problem and the proposed research hypothesis, the final decision is represented by the significance level output of the Mann-Whitney U test. The statistical calculation output confirmed that the amount of the test value was held at 83,000, with the transformation of the data into a normal distribution resulting in a measured value of -2,404. As an absolute decision determining parameter, the probability of two-way significance is recorded precisely at 0.016. Based firmly on the standard criteria for statistical decision formulation, the degree of probability of 0.016 proved to be essentially smaller than the error threshold tolerance limit that had been set from the beginning, which was 0.05. This testing status has a direct impact on the annulment of the null hypothesis, which immediately paves the way for the acceptance of alternative hypotheses. This series of findings conclusively answers the formulation of the problem by ensuring that there is a significant discrepancy in learning outcome achievement that significantly separates the entities participating in the online-based artificial intelligence training program from the offline-based participants.

Tabel 1. Test of Normality

		Kolmogorov-Smirnov			Shapiro-Wilk		
	Kategori	Statistic	Df	Sig.	Statistic	df	Sig.
Gabungan	Online	,270	15	,004	,790	15	,003
	Offline	,130	21	,200	,916	21	,072

Tabel 2. Ranks

	Kategori	**N**	**Mean Rank**	**Sum of Ranks**
Gabungan	Online	15	23,47	352,00
	Offline	21	14,95	314,00
	Total	36		

Table 3. Test Statistics

	Gabungan
Mann-Whitney U	83,000
Wilocoxon W	314,000

Z	-2,404
Asymp. Sig (2-tailed)	,016
Exact Sig. [2*(1-tailed Sig.)]	,016[b]

3.2 Discussion

This section will explore in depth the empirical findings obtained from a series of statistical tests, as well as construct an academic dialogue with various relevant literature and previous theoretical frameworks on the effectiveness of artificial intelligence training. Regarding the formulation of the main problem posed in this comparative study, based on the results of data processing, I conclude that there is a very significant difference in the effectiveness of learning outcomes between participants who participated in the artificial intelligence training program through online mode compared to those who took the training through offline mode. This statement is firmly based on the results of the non-parametric statistical test Mann-Whitney U Test, where the significance probability value (Asymp. Sig. 2-tailed) is recorded at the metric of 0.016, which is absolutely below the established error tolerance threshold of 0.05 ($p < 0.05$). The significance of this statistical test is in parallel fully supported by the elaboration of descriptive analysis on the mean rank parameter. The dataset shows a highly structured phenomenon, where the online participant group convincingly dominates the achievement with an average rating of 23.47, a fairly wide margin when juxtaposed with the offline group whose evaluation rate is held at an average rating of 14.95. If the indicator is drawn on the actual pure evaluation value (post-test), the performance of the online class is also consistent with an average score of 94.42, inversely proportional to the offline class which recorded an average score of 89.33. This series of solid quantitative findings conclusively declares that in the operational realm of specific artificial intelligence competency training, online learning infrastructure is no longer just a substitution option or an emergency format, but has metamorphosed into a much more effective and superior primary delivery medium in facilitating the transmission of computational technical knowledge.

The empirical findings of this study present a very interesting discourse to be dissected academically, because the conclusions from the data outputs straightforward disrupt and dismiss conventional pedagogical assumptions that have been believed that physical face-to-face learning (offline) always brings more complete learning outcomes than virtual space rides. Training with offline mode basically has essential structural privileges because it can facilitate intensive nonverbal communication exchanges, provide a dynamic space for the rapid delivery of corrective feedback from instructors to participants, and is believed to be able to create resonance emotional bonds between learners that function to maintain the stability of focus sharpness throughout the session. However, the traditional thesis framework proves to be not absolutely applicable, especially when faced with the specific characteristics of a series of artificial intelligence educational materials that are full of software synchronization activities. The collapse of the dominance of offline classroom excellence under the shadow of the achievement of online classes in this evaluative study presents a new awareness that the efficacy and quality of a learning approach should not be judged from the mere physical manifestation of the teacher, but is absolutely based on the high level of equivalence between the basic

character of the curriculum taught and the infrastructure of the material delivery vehicle. The constellation of artificial intelligence is an entity that is genetically a form of pure digital literacy (digital-native), so the prescription to continue to impose this cutting-edge curriculum into the anatomy of traditional offline classes actually stimulates the growth of logistical constraints that paradoxically undermine the integrity of the essence of knowledge absorption itself.

The overwhelming advantage of cognitive achievement collected by the rows of online class participants theoretically does not materialize in an analysis-tight space, but is stimulated by the conjunction of various vital determinants that resonate with each other. The root of this excellence was born from the high adaptability ratio of digital literacy which is strongly attached to the anatomy of participants in the virtual face-to-face format. The absolute requirement for supporting the success of the online training scheme is the high aggregate of self-directed learning initiatives that are closely intertwined with the establishment of the digital intelligence portfolio. The anatomy of the material offered by Nortis' Academy, which ranges from the theoretical foundations of Fundamental AI, the deepening of Generative AI architecture, to the analysis of morality in Responsible AI, requires all participants to be agile in assembling program simulations, and not acting as passive listeners. Learning entities that have the will to bind themselves in the Zoom Meeting online training network, demographically, are generally armed with a very adequate radar of essential technology literacy. The mental flexibility in accommodating the pressures of the software ecosystem triggers an acceleration of their absorption of the nomenclature and operating mechanics of AI devices. This alignment is firmly confirmed by the results of the investigation by Johnson and Brown (2022), which convinces that the launch of technical curriculum through gadget-screen-based instruments boosts adaptive resilience and operational resilience of learners in the midst of a vortex of technological disruption.

The next fundamental factor that knits the achievement gap between these two modes is closely related to the probability ratio of distraction or the index of distraction exposure at the learning locus. The implementation of offline classrooms, behind the romanticism of human interaction, holds potential logistical defects in the form of a level of vulnerability to concentration breakdown that is too escalative. The concentration of 21 human entities in the same physical space architecture cage instinctively stimulates a variety of focus disruptions, ranging from the resonance of the buzz of side conversations between audiences, to the interruption of individual kinetic movements, to the fatal threat of visibility disparity that punishes participants in the back row for difficulty digesting the flow of material demonstrations on the projection screen. In the training ecology of prompt modification and generative machine computing, distractions that cut off the focus cycle for just a few seconds can eliminate participant retention over the syntax of the system being worked on. On the other hand, participants in the online format have the luxury privilege of being a very conducive spatial isolation booth. On a psychological level, their central axis of concentration presses precision towards the illumination of the hardware screen that they exclusively master. This dramatic reduction in the potential distraction of communal space amplifies the clarity of attention, so that the technical anatomy dissection of the Nortis' Academy speakers can be scanned in its entirety. This empirical reality proves beyond doubt that the ecological manipulation of personal space via electronic vehicles is the primary catalyst to seize the peak of human concentration this century.

The ultimate piece that most determines the victory of the online learning camp comes down to the ergonomic flexibility of the accompanying device that gives participants the power to perform multitasking functionality processing instantly and without hindrance. Judging from the appearance of the instructional design, the forging of AI computing skills, especially in live coding modules and prompt engineering, relies entirely on repetition rounds, praxis testing, and the courage to carry out the trial and error elimination phase by each participant cell. In an online cloud computing habitat, participants are allowed to operate the duality of browser windows simultaneously; Their eyes and ears examine the sequence of commands from the facilitator in the conference window, while their finger figures directly execute the string of prompts on different AI software dashboards. The integration of the device in the lap of the virtual face-to-face class enrollees ensures a direct supply of exploration to the upstream AI server and forces the birth of an instant feedback harvest, and most importantly, this hectic trial and error activity does not freeze the instructional rhythm of the classroom at all. This concept of learning navigation autonomy surfs in line with Ramadan's scientific publication (2024), which highlights how substantial the real-time feedback exchange mechanism of AI instruments is in its efforts to whip up the curve of student engagement in complex computing fields. Equal access to troubleshoot at any time without hindering the presentation session is a utopian logistical miracle to be held in the hustle and bustle of conventional face-to-face classes.

The impressive performance of the aggregate online participants established a harmonious dialogue with the global literature that diligently monitors the trajectory of the use of intelligent machines as a learning supplement. Field investigations released by Kholis Ali et al. (2024) and publications by Firmansyah and Sakmawati (2025) succeeded in harvesting linear conclusions, convincing the academic public that the deployment of artificial intelligence elements to the field of education consistently dictates a leap in intellectual enrichment that can be measured in bright light from the inflation of the quantitative value of its participants. Even in their research, Firmansyah and Sakmawati (2025) made a strong claim that the AI medium infusion was able to shoot up participants' comprehension power to touch the orbital level of 87%, collapsing the achievement of learning obsolete methods that withered at 65% coordinates. This parallel affirmation underlined by a comparison of empirical data adds to the legitimacy of the absolute truth that technological compositions are not merely passive material artifacts, but rather a cognitive assistant entity that triggers the accelerated conversion of understanding. In the framework of virtual face-to-face, the activation of AI generators can be explored to its optimal point, thus justifying the observation of Zakiyah et al. (2024), who declared that the delegation of analytical problems in intelligent systems reduces students' mental fatigue in seeking answers to resolutions. Through a personalized approach that is neatly framed by Syahrizal (2024), the training algorithm model can be calibrated to detect the blueprint of each student's absorption speed, carving out pedagogical flows that are impossible to replicate in the homogeneity of physical teaching.

Looking at this conclusion using the scientific binoculars of human resource development (HR) management strategies, the orbiting phenomenon of virtual classroom superiority in artificial intelligence training stores theoretical and applicative ammunition that is extraordinarily valuable for the continuity of institutional breathing in the cyber era. Strengthened by a comprehensive analysis from Gustiana et al. (2022) and Mamaqi (2023), the essence of designing educational sessions should not be reduced to a mere literature transfer container, but is the upstream of the factory of building the adaptability of the workforce to be

adept at taming automation disruptions, cutting the deficit of mechanical competency gaps, and stimulating the explosion of productivity of its peak agencies. The invasion of AI machines requires any entity to overhaul the architecture of its employee capabilities. This quantitative study proudly proves that the placement of participants in the physical classroom is no longer relevant and no longer holds the baton of absolute pedagogical leadership. The remote network training circuit (online) has embraced the prime position thanks to its ability to transmit motor-digital knowledge along with the guarantee of preserving the memorization of the code structure much more perfectly, not to mention considering the added value in the line of cutting logistics budget expenditures and the ability to embrace market share from various demographic zones without worrying about the shackles of spatial distance. The conclusion described by Risman (2024) echoes the same call that the synthesis of cyber ecosystem learning frameworks combined with the installation of cutting-edge simulation technology is the most aggressive driving engine to achieve a brilliant level of retention of learning outcomes.

As a final conclusion, a series of analyses contrasted in the performance comparison between the offline and online worlds in the smart machine skills coaching stage reveal a pedagogical theorem that is subversive. Memorizing theory or practicing cyber-based device navigation is ideally done while diving into the software ecosystem itself. The defeat of the average score of the offline group is not a disgrace that immediately strips the credibility of the face-to-face system as a whole, but rather a clear marker of the incompatibility of physical methodology blocks to be paired into the socket of absolute digital material needs. Training that pampers its audience's eyes with thousands of lines of computational command and algorithmic data manipulation management requires a quiet ecology sterilized from physical visual interference, that supports the performance of technical trials, and that guarantees the learner exclusive authority to master its operational console. And so far, the womb capable of giving birth and caring for such ideal non-interrupted conditions is just an online ecological ride. Guided by the dominance of distribution and the winning of scores contributed by virtual format participants, the twenty-first century skill training discourse should abandon its irrational dependence on the routine of time mobilization into the blocks of the offline classroom wall, while the intended syllabus is in the form of the adoption of programming literacy, prompt manipulation, and Artificial Intelligence automation. In addition to successfully fostering the fertility of literature in the domain of educational management innovation and the design of teaching technology infrastructure, this field research also projects a crucial precedent and a precision frame of reference to the entire board of certification development institutions, strategic business actors, and education practitioners in administering a curriculum model that is accurate, elastic in response to automation trends, and fully focused on escalating material absorption ability cognitive participants fundamentally and completely.

4. Conclusion

In line with the formulation of the title and the main objective of the study to identify the significance of the differences in the learning outcomes of participants in the Artificial Intelligence fundamentals training between offline and online formats, the results of the hypothesis testing empirically confirmed the acceptance of the alternative hypothesis that there was a statistically significant disparity in achievement between the two groups. The findings of the study prove that the implementation of training through online mode is indicated to be much superior and effective in boosting the achievement of participants' cognitive learning outcomes when juxtaposed with offline mode. The success of the effectiveness of this online format is

strongly correlated with the availability of a learning ecosystem with minimal physical distractions or distractions, the flexibility of participants in executing multi-tasking simultaneously when carrying out technical software practices, and the high level of digital literacy independence possessed by the virtual face-to-face class audience. This conclusion also provides empirical affirmation that knowledge transfer that relies entirely on technological skills (digital-native) proves to be more optimal when accommodated directly by virtual network infrastructure rather than the localization of conventional physical classrooms. Based on these conclusions, suggestions for future research ideas are to expand the scope of study variables by measuring participants' long-term memory retention levels within a few months of training, exploring determinants of learning motivation through in-depth qualitative investigations, and including blended learning formats as comparative variables with more representative sample sizes to enrich Validity of the Literature on the Effectiveness of Artificial Intelligence Education at the National Level.

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