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Exploring the Concept of Learner Agency in Artificial Intelligence–Based Educational Environments: A Qualitative Study from the Perspective of Philosophy of Education

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A B S T R A C T

Purpose: This study aimed to explore the meaning, dimensions, enabling conditions, constraints, and educational implications of learner agency in artificial intelligence–based educational environments from the perspective of philosophy of education.

Methods and Materials: This qualitative study employed an interpretive phenomenological design. Participants were 22 faculty members, educational technology specialists, artificial intelligence researchers, and postgraduate students selected through purposive criterion-based and maximum-variation sampling from universities, research institutions, and educational organizations in Tehran during the 2025–2026 academic year. Data were collected through in-depth semi-structured interviews, reflective field notes, and analytical memos. Interviews continued until interpretive saturation was reached. Data were analyzed through interpretive thematic analysis using repeated reading, extraction of meaning units, initial and focused coding, constant comparison, development of subthemes and overarching themes, and philosophical interpretation of the findings. Credibility, dependability, confirmability, and transferability were strengthened through member checking, peer debriefing, reflexive documentation, and maintenance of an audit trail.

Findings: Analysis yielded three overarching themes and 12 subthemes. The first theme, expansion of learner agency through augmented educational possibilities, included personalized pathways, immediate feedback, cognitive and creative augmentation, and increased participation. The second theme, erosion and reconfiguration of agency under algorithmic mediation, included cognitive delegation, invisible direction of choice, displacement of authorship, and diffusion of responsibility. The third theme, conditions for responsible and authentically human agency, included critical artificial intelligence literacy, reflective and metacognitive control, pedagogical mediation, and ethical responsibility.

Conclusion: Learner agency in artificial intelligence–based education can be understood as reflective human authorship within a technologically mediated field of possibilities, requiring intentionality, critical judgment, meaningful participation, and accountability.

Keywords: *Learner agency; artificial intelligence in education; philosophy of education; qualitative research; educational technology; autonomy; ethical responsibility*

1. Introduction

Artificial intelligence has rapidly become one of the most consequential forces reshaping contemporary educational environments. Its influence extends beyond the introduction of new digital tools and increasingly affects how knowledge is accessed, represented, evaluated, produced, and communicated. Generative artificial intelligence, adaptive learning systems, intelligent tutoring platforms, automated feedback applications, learning analytics, and algorithmic recommendation systems now participate in activities that were historically associated primarily with teachers, textbooks, and learners themselves. These systems can provide immediate explanations, generate instructional materials, personalize learning pathways, evaluate written work, recommend resources, and support decision-making across formal and informal educational settings. As a result, artificial intelligence is not merely an external aid added to an otherwise unchanged educational process; it is becoming an active mediating structure within which educational intentions, interactions, and outcomes are formed. This transformation has been described as an epistemological rupture in the historical development of educational technology because artificial intelligence does not simply deliver predetermined content but can dynamically participate in knowledge construction, dialogue, and co-creation (Hasan et al., 2026). Accordingly, understanding education in the artificial intelligence era requires attention not only to efficiency, achievement, or technological adoption but also to the changing status of the human learner as a knowing, choosing, and responsible agent.

The concept of learner agency provides a particularly important framework for examining these changes. Learner agency generally refers to the capacity of learners to act intentionally, make meaningful choices, influence the direction of their learning, regulate their participation, evaluate available possibilities, and accept responsibility for educational decisions and outcomes. Agency is therefore more than observable activity or engagement. A learner may interact continuously with a technological system while exercising little substantive control over the purposes, assumptions, and consequences of that interaction. From the perspective of philosophy of education, agency is connected to fundamental concepts such as autonomy, freedom, intentionality, rational judgment, self-determination, authorship, responsibility, identity, and human flourishing. It concerns whether the learner remains the originator of educational action or becomes primarily a respondent to externally structured options. In artificial intelligence–based environments, this question becomes particularly complex because algorithmic systems can simultaneously expand learners' practical possibilities and influence the very processes through which preferences, questions, and judgments are formed. The relationship between human-mediated and algorithmically mediated pedagogy therefore involves both convergence and divergence, as educational authority becomes distributed across teachers, learners, institutional structures, and technological systems (Turvey & Pachler, 2025).

One of the strongest arguments in favor of artificial intelligence in education concerns its capacity to personalize learning. Conventional educational environments often operate through standardized curricula, common pacing, and relatively uniform modes of instruction. Artificial intelligence can potentially respond to individual differences in prior knowledge, learning speed, language proficiency, interests, and educational needs. Personalized systems may offer alternative explanations, adjust task difficulty, recommend resources, identify weaknesses, and allow learners to proceed through flexible pathways. Reviews of technology-supported language learning suggest that personalized learning can increase relevance, responsiveness, and opportunities for differentiated engagement (Jambangan & Serrano, 2025). Similar developments have been reported in science education, where artificial intelligence is increasingly connected to classroom integration, adaptive support, simulation, and data-informed instruction (Kesgin, 2025). Such possibilities appear compatible with learner agency because they can reduce dependence on fixed instructional sequences and enable learners to select or construct pathways that correspond more closely to their own purposes and abilities.

Artificial intelligence may also strengthen agency by expanding access to educational participation. Learners who experience linguistic barriers, social anxiety, geographical isolation, disabilities, or limited access to specialized teachers may benefit from systems that provide continuous, individualized, and nonjudgmental support. Artificial intelligence has been examined as a pedagogical tool for language development among marginalized learners, demonstrating its potential to support practice, confidence, and differentiated participation (Abu-Gweder, 2026). Research on artificial intelligence–supported communicative language teaching has likewise emphasized its capacity to improve speaking opportunities among

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disadvantaged learners who might otherwise lack consistent access to interactive instruction (James et al., 2026). In low-resource classrooms, artificial intelligence–enhanced project-based learning may help educators adapt materials, generate instructional support, and bridge gaps in access to specialized resources (Jaya et al., 2026). Artificial intelligence can also support the creation of culturally responsive visual materials, thereby increasing the contextual relevance and representational inclusiveness of teaching content (Nabang, 2026). These developments suggest that technological mediation can widen the field of action available to learners and teachers, particularly in environments where conventional educational resources are unevenly distributed.

The relationship between artificial intelligence and inclusion, however, cannot be reduced to the provision of access. Inclusive agency requires that learners not only enter educational environments but also participate meaningfully within them. Artificial intelligence has been presented as a means of advancing equality, diversity, and ethical leadership in engineering education, particularly when systems are designed to recognize heterogeneous needs and reduce structural barriers (Hilal & Ibrahim, 2026). Multicultural curriculum design may similarly benefit from artificial intelligence through the rapid generation, adaptation, and comparison of culturally diverse educational materials (Qin & Zhou, 2026). Context-aware and curriculum-aligned conversational agents can also make artificial intelligence more responsive to local educational realities rather than imposing generic or culturally detached models of instruction (Nyaaba et al., 2026). Nevertheless, inclusion depends on who designs the system, which languages and cultural assumptions are represented, what data inform recommendations, and whether learners can question or modify the options presented to them. A system may offer individualized support while simultaneously limiting epistemic diversity if its underlying representations privilege dominant perspectives. Learner agency must therefore be considered in relation to both access and the power to critically interpret, negotiate, and challenge technologically mediated knowledge.

Another important contribution of artificial intelligence concerns feedback and self-regulated learning. Immediate feedback can allow learners to identify misunderstandings, test alternative responses, revise their work, and monitor progress without waiting for formal teacher evaluation. Studies of teachers' views regarding artificial intelligence in the assessment of academic writing indicate that automated support may increase the speed and availability of feedback while assisting learners in revision and language development (Sadigova et al., 2026). Artificial intelligence integration in language classrooms has likewise been associated with changes in teacher practices, student performance, and access to individualized instructional support (Saleem et al., 2025). In programming education, artificial intelligence technologies have been linked to computational and reflective thinking, suggesting that well-designed technological assistance can support learners in examining their reasoning and refining problem-solving processes (Omeh et al., 2025). Reviews of artificial intelligence tools in science, technology, engineering, and mathematics classrooms further highlight their potential role in scaffolding metacognition, planning, monitoring, and evaluation (Tsakeni et al., 2025). These capacities are closely related to agency because self-regulated learners do not merely receive information; they set goals, select strategies, observe the effects of their actions, and modify their behavior in response to evidence.

Yet the same feedback systems that support self-regulation can also produce dependency and narrow the learner's role. When artificial intelligence supplies answers before learners have formulated problems, provides complete revisions without requiring reflection, or continuously directs the next step, it may replace rather than scaffold metacognitive activity. The distinction between assistance and substitution is therefore central. Technological support strengthens agency when it increases the learner's ability to understand, decide, and act independently. It weakens agency when it transfers the origin of judgment from the learner to the system. Teachers' experiences with artificial intelligence in K–12 education demonstrate that perceived opportunities coexist with concerns regarding overreliance, accuracy, professional judgment, and the changing role of educators (Metin & Cetin, 2026). Educator preparation has consequently become essential, particularly because teachers must learn to design tasks that preserve student thinking while integrating generative artificial intelligence responsibly (Lewis, 2025). Without pedagogical mediation, the availability of automated support may encourage learners to interpret speed and fluency as equivalent to understanding.

The motivational effects of artificial intelligence similarly reveal the dual character of technological mediation. Artificial intelligence can increase curiosity, reduce anxiety, provide personalized encouragement, and make learning activities more interactive. Its use in English-

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language classrooms has been associated with enhanced learner motivation and engagement (Moybeka et al., 2023). The integration of artificial intelligence with social media and other digital platforms can also diversify teaching and learning experiences and increase opportunities for participation beyond the physical classroom (Felizarte et al., 2024). In artificial intelligence–supported classrooms, however, student motivation and well-being remain strongly connected to human relationships and the character strengths of teachers (Wang, 2026). This finding is philosophically significant because it challenges technologically deterministic accounts in which educational improvement is expected to result primarily from more advanced systems. Learners act within relational environments in which encouragement, recognition, trust, care, and moral example remain important. Artificial intelligence may reshape these relationships, but it does not eliminate the educational importance of human presence.

The increasing centrality of artificial intelligence also raises questions about active learning. Active learning has historically emphasized learner participation, inquiry, collaboration, problem-solving, and the construction of meaning rather than passive reception of information. Emerging forms of active learning must now account for situations in which learners collaborate not only with peers and teachers but also with generative and adaptive systems (Børte & Zeivots, 2026). Artificial intelligence may expand active learning by generating cases, simulations, questions, counterarguments, visual aids, and alternative explanations. It may allow learners to explore complex scenarios and receive immediate responses to evolving inquiries. However, visible activity does not necessarily indicate meaningful agency. A learner can produce many prompts, revise generated text, or interact repeatedly with a chatbot while remaining intellectually dependent on the system's framing. The philosophical question is therefore not simply whether learners are active, but whether their activity is intentional, reflective, and connected to personally understood educational purposes.

This distinction is particularly important in relation to creativity and authorship. Artificial intelligence can help learners overcome initial cognitive barriers, generate multiple possibilities, organize information, and explore alternative forms of expression. In translator education, for example, technological developments are transforming instructional approaches and requiring reconsideration of the relationship between human expertise, automated systems, and professional preparation (El-Karnichi, 2024). Artificial intelligence may support co-creation by allowing learners to refine drafts, compare linguistic choices, and examine diverse solutions. Nevertheless, it also complicates the meaning of intellectual ownership. When a learner submits a polished text generated largely by an artificial intelligence system, it may be difficult to determine whether the educational product expresses the learner's understanding, judgment, or voice. The issue is not limited to academic misconduct. It concerns the deeper relationship between the person and the product of learning. Agency requires that learners be able to explain, defend, revise, and accept responsibility for what they produce.

The epistemic authority of artificial intelligence constitutes another major concern. Artificial intelligence systems often present information in fluent, coherent, and confident language. Learners may therefore interpret generated responses as neutral, comprehensive, or authoritative even when the outputs contain inaccuracies, fabricated references, bias, or culturally limited assumptions. Opinion-based studies of artificial intelligence use in education indicate that perceptions of usefulness are accompanied by uncertainty regarding reliability, competence, and appropriate practice (Alam et al., 2024). The issue is intensified by the opacity of many systems. Learners generally do not know which data shaped an answer, why particular information was prioritized, or which alternatives were excluded. Algorithmic mediation can therefore influence choice while maintaining the subjective appearance of freedom. The learner may feel autonomous because several options are available, even though the field of options has been constructed by a system whose criteria remain invisible.

For this reason, trustworthy artificial intelligence education requires reciprocal rather than one-sided alignment. It is not sufficient to align artificial intelligence systems with educational objectives; learners and educators must also understand how to interact critically with those systems, while institutions must ensure that technological design remains responsive to human values and educational purposes (Shen, 2025). Human-centered educational technology similarly emphasizes that digital literacy should not be separated from interest, participation, meaning, and the broader development of the learner (Mahyiyuddin & Erlita, 2026). A human-centered approach is especially necessary in underresourced schools, where the introduction of artificial intelligence may reproduce inequality unless local needs, ethical safeguards, and community participation are incorporated into implementation (Kuskova et al., 2026).

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These perspectives imply that learner agency cannot be secured through individual competence alone. It also depends on transparent technologies, equitable access, responsive curricula, supportive teachers, and institutions that establish clear ethical expectations.

Ethical questions are inseparable from the analysis of agency because agency includes responsibility for action. Artificial intelligence in education raises concerns regarding privacy, surveillance, bias, intellectual property, data ownership, academic integrity, accountability, and the delegation of consequential decisions. A systematic review of artificial intelligence ethics in education has shown that ethical challenges extend across the design, implementation, and use of educational systems and require coordinated attention from learners, educators, institutions, developers, and policymakers (Yan & Chau, 2025). When learners use artificial intelligence to generate assignments, interpret data, or make recommendations, responsibility may appear distributed across the user, system, institution, and designer. Nevertheless, distributed causation does not eliminate moral accountability. The learner still decides whether to trust, verify, revise, disclose, or submit a generated output. Agency becomes weakened when learners claim ownership of successful results while attributing errors entirely to the machine.

The growing role of artificial intelligence also requires reconsideration of what abilities education should cultivate. Traditional educational systems have often privileged measurable cognitive performance, information retention, and standardized indicators of achievement. In the artificial intelligence era, however, the ability to retrieve or generate correct answers may no longer sufficiently represent human educational development. Greater emphasis may be needed on judgment, ethical discernment, creativity, resilience, collaboration, self-awareness, and the ability to formulate meaningful questions (Chou, 2026). These capacities distinguish substantive agency from mere operational efficiency. A learner who can rapidly produce an acceptable answer with artificial intelligence may display technological competence without demonstrating understanding, intellectual independence, or moral responsibility. Conversely, a learner who critically interrogates system outputs, recognizes uncertainty, defends a position, and revises conclusions may exercise stronger agency even if the process is slower.

Existing research has provided valuable evidence regarding artificial intelligence adoption, personalized learning, language education, assessment, metacognition, inclusion, motivation, teacher preparation, and ethical concerns. However, much of this literature examines effectiveness, perceptions, implementation, or observable educational outcomes. Fewer studies have investigated the underlying meaning of learner agency as experienced and interpreted by individuals who teach, design, study, and conduct research in artificial intelligence–based educational environments. This conceptual gap is important because the educational significance of artificial intelligence cannot be determined solely by whether it improves performance or increases access. It must also be assessed in relation to the kind of learner it helps to form. A system may improve productivity while weakening authorship, increase personalization while narrowing exposure to alternative perspectives, or strengthen participation while encouraging dependence on algorithmic guidance. These tensions require an interpretive approach capable of examining the lived and philosophical dimensions of human–technology interaction.

A qualitative inquiry grounded in philosophy of education is particularly appropriate for this purpose. Such an approach makes it possible to investigate how participants define meaningful choice, distinguish assistance from substitution, understand the distribution of authority, interpret responsibility, and identify the conditions under which artificial intelligence supports or undermines human development. It also allows the concept of agency to be examined as relational and contextual rather than as a fixed psychological trait. Learner agency emerges through interaction among individual capacities, teacher practices, institutional expectations, assessment systems, technological affordances, and social values. Its meaning may therefore differ across educational roles and contexts. Faculty members may emphasize intellectual authorship and ethical responsibility, educational technology specialists may focus on system design and scaffolding, artificial intelligence researchers may highlight transparency and algorithmic limitations, and students may foreground accessibility, autonomy, or dependency.

The need for such inquiry is especially significant in rapidly changing educational contexts where artificial intelligence adoption is progressing faster than conceptual, ethical, and pedagogical reflection. Institutions are increasingly encouraging or regulating artificial intelligence use, yet educators and learners may lack a shared understanding of what responsible agency entails. Educational policy may focus on acceptable and unacceptable uses without addressing deeper questions concerning intentionality, autonomy, and human judgment.

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Similarly, technical guidelines may explain how to operate artificial intelligence tools while neglecting how learners can preserve their capacity to question, resist, and assume responsibility. A philosophically informed account of learner agency can contribute to curriculum design, teacher preparation, assessment reform, institutional policy, and ethical artificial intelligence implementation by clarifying the human capacities that educational environments should protect and develop.

Accordingly, the aim of this study was to explore the meaning, dimensions, enabling conditions, constraints, and educational implications of learner agency in artificial intelligence–based educational environments from the perspective of philosophy of education.

2. Methods and Materials

This study employed a qualitative research design with an interpretive phenomenological orientation to explore the meaning, dimensions, conditions, and educational implications of learner agency in artificial intelligence–based learning environments. The qualitative approach was selected because learner agency is a multidimensional and context-dependent concept that cannot be adequately understood solely through predetermined variables or quantitative measures. From the perspective of philosophy of education, learner agency involves fundamental questions concerning autonomy, intentionality, rational choice, responsibility, self-determination, human–technology relations, and the learner's capacity to influence the direction and outcomes of the educational process. Accordingly, the interpretive phenomenological design enabled the researchers to examine how individuals experienced and understood their ability to make decisions, regulate learning, exercise judgment, and act purposefully while interacting with artificial intelligence technologies. The study was conducted in Tehran, Iran, during the 2025–2026 academic year. The research population consisted of university faculty members, specialists in philosophy of education, educational technology experts, artificial intelligence researchers with experience in educational applications, and postgraduate students who had directly used artificial intelligence–based tools in formal or informal learning settings. Participants were selected through purposive sampling using a criterion-based and maximum-variation strategy. The inclusion criteria comprised having at least three years of academic, research, teaching, or professional experience related to education, educational technology, artificial intelligence, or philosophy of education; having direct familiarity with artificial intelligence–supported learning systems such as generative artificial intelligence tools, intelligent tutoring systems, adaptive learning platforms, automated feedback systems, or learning analytics applications; willingness to describe personal experiences and professional interpretations in detail; and providing informed consent to participate in the study. Maximum variation was sought in terms of academic discipline, professional role, age, gender, educational level, and type of experience with artificial intelligence in education so that the phenomenon could be examined from multiple perspectives. The final sample consisted of 22 participants from universities, research institutions, and educational organizations located in Tehran. The sample included six faculty members in philosophy of education and educational sciences, five specialists in educational technology and digital learning, four researchers working in artificial intelligence and human–computer interaction, and seven postgraduate students with extensive experience using artificial intelligence tools for academic learning. Participant recruitment continued until theoretical and interpretive saturation was achieved. Saturation was considered to have occurred when successive interviews no longer produced substantially new meanings, conceptual categories, or philosophical interpretations concerning learner agency, and the emerging categories had sufficient depth, variation, and internal coherence. Preliminary saturation was observed after the nineteenth interview, and three additional interviews were conducted to ensure that no significant conceptual dimensions had been overlooked.

Data were collected primarily through in-depth semi-structured interviews designed to elicit participants' lived experiences, interpretations, judgments, and reflections concerning learner agency in artificial intelligence–based educational environments. A semi-structured interview guide was developed following a review of the conceptual literature on agency, autonomy, self-regulated learning, philosophy of education, artificial intelligence in education, human–machine interaction, and algorithmic decision-making. The interview guide was reviewed by three experts in qualitative research, philosophy of education, and educational technology to assess the clarity, relevance, conceptual comprehensiveness, and logical sequencing of the questions. Two pilot interviews were subsequently conducted with individuals who met the inclusion criteria but were not included in the final sample. Based on the pilot interviews, several questions were revised to reduce

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conceptual ambiguity, encourage experience-based responses, and facilitate deeper discussion of the philosophical aspects of agency. The interviews began with broad questions about participants' experiences of learning, teaching, or designing instruction with artificial intelligence technologies. More focused questions then examined how artificial intelligence affected learners' ability to define learning goals, select resources, make decisions, ask questions, evaluate information, regulate learning strategies, produce knowledge, revise ideas, and assume responsibility for educational outcomes. Participants were also asked to reflect on whether artificial intelligence expanded or restricted learner autonomy, how algorithmic recommendations influenced individual choice, whether reliance on artificial intelligence altered learners' intellectual independence, and how authority was distributed among the learner, teacher, educational institution, and technological system. Additional questions addressed the role of critical thinking, moral responsibility, creativity, intentional action, identity formation, and human judgment in technology-mediated learning. Probing questions such as "Can you describe a specific experience?", "What made you interpret the situation in this way?", "How did the artificial intelligence system influence your decision?", and "What does this experience imply for learner autonomy and responsibility?" were used to clarify responses and deepen the philosophical interpretation of participants' accounts.

Each interview was conducted individually, either face-to-face in a private setting in Tehran or through a secure online videoconferencing platform when an in-person meeting was not feasible. Interviews lasted between 55 and 90 minutes, with an average duration of approximately 70 minutes. With participants' permission, all interviews were digitally audio-recorded and transcribed verbatim immediately after completion. The researchers reviewed each transcript while listening to the original recording to ensure accuracy and preserve meaningful pauses, emphases, and contextual expressions. In addition to the interviews, reflective field notes and analytical memos were used as supplementary data collection tools. Field notes documented the interview context, nonverbal expressions, points of hesitation, emotional emphasis, contradictions, and preliminary interpretations that might not have been fully represented in the audio recordings. Analytical memos were written throughout the research process to record emerging concepts, philosophical questions, relationships among categories, and the researchers' reflections on possible assumptions or interpretive biases. These materials were integrated with the interview transcripts during analysis to strengthen contextual understanding and enhance interpretive depth. Data collection and analysis occurred concurrently, allowing emerging findings to inform subsequent interviews. For example, when early interviews indicated tension between perceived learner empowerment and dependence on algorithmic recommendations, later participants were asked more detailed questions about the boundaries between technological assistance, cognitive delegation, and loss of independent judgment. This iterative process enabled the interview guide to remain responsive to the developing conceptual structure while preserving consistency across participants.

Several strategies were used to ensure the trustworthiness of the data collection process. Credibility was enhanced through prolonged engagement with the data, purposive maximum-variation sampling, iterative questioning, and member checking. After the initial analysis, a concise summary of the principal interpretations was shared with eight participants, who were asked to evaluate whether the findings accurately reflected their experiences and perspectives. Their feedback was used to clarify several categories, particularly those related to distributed agency, algorithmic dependence, and learner responsibility. Peer debriefing was also undertaken with two qualitative researchers who were not involved in data collection. They reviewed selected transcripts, preliminary codes, and category definitions and discussed alternative interpretations with the research team. Dependability and confirmability were supported by maintaining an audit trail that included interview-guide revisions, sampling decisions, field notes, coding documents, analytical memos, category development records, and explanations of interpretive decisions. To promote reflexivity, the researchers recorded their prior assumptions concerning the educational benefits and risks of artificial intelligence and continuously examined how these assumptions might influence data interpretation. Transferability was addressed through detailed descriptions of the participants, research setting, artificial intelligence applications under discussion, and the conceptual characteristics of the identified categories.

The data were analyzed using an interpretive thematic analysis informed by phenomenological inquiry and philosophical analysis. The analytical process was conducted concurrently with data collection and involved continuous movement between individual statements, complete interview narratives, emerging themes, and broader philosophical concepts related to human agency.

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Analysis began with repeated reading of each transcript to develop a holistic understanding of the participant's experience and position. During this stage, the researchers attempted to bracket immediate judgments and attend closely to how participants described their actions, decisions, concerns, and relationships with artificial intelligence technologies. Significant statements and meaning units related to learner choice, intentionality, self-regulation, intellectual independence, responsibility, creativity, critical judgment, technological mediation, and educational authority were then identified. Each meaning unit was assigned an initial code that remained as close as possible to the participant's language while also capturing its underlying conceptual significance. Examples of initial codes included delegating difficult decisions to artificial intelligence, feeling more confident when receiving immediate feedback, questioning the neutrality of algorithmic recommendations, losing motivation to search independently, using artificial intelligence to expand possible solutions, retaining final responsibility for submitted work, and negotiating between personal judgment and system-generated advice.

Following initial coding, conceptually similar codes were compared and grouped into preliminary subcategories. The researchers used constant comparison to examine similarities, differences, contradictions, and variations across participants and professional groups. Particular attention was given to negative cases and accounts that challenged the dominant interpretation. For instance, while some participants described artificial intelligence as increasing autonomy by providing individualized resources and reducing dependence on teachers, others viewed the same functions as potentially diminishing agency by narrowing choices and encouraging uncritical acceptance of algorithmically generated responses. Such contrasting accounts were retained and analyzed as meaningful expressions of the conditional and paradoxical nature of learner agency rather than being treated as inconsistencies to be eliminated. Preliminary subcategories were subsequently integrated into broader themes representing the principal dimensions and conditions of learner agency in artificial intelligence–based educational environments. Theme development involved examining whether each theme possessed internal coherence, clear conceptual boundaries, sufficient empirical support, and relevance to the research question. The themes were repeatedly reviewed against the complete dataset to ensure that they represented both common patterns and significant variations in participants' experiences.

The philosophical dimension of the analysis involved interpreting the emergent themes in relation to concepts such as autonomy, freedom, intentionality, rationality, moral responsibility, authenticity, human flourishing, and the distribution of authority between human beings and technological systems. Rather than imposing a predetermined philosophical theory on the data, philosophical concepts were used as interpretive lenses to clarify the educational meaning of participants' experiences. The analysis therefore moved through a hermeneutic cycle in which individual experiences informed conceptual interpretation, while philosophical reflection deepened understanding of the participants' accounts. For example, participants' descriptions of choosing among artificial intelligence recommendations were analyzed not merely as instances of behavioral selection, but as questions concerning whether the learner possessed meaningful control, understood the basis of the available options, and accepted responsibility for the consequences of the decision. Similarly, the use of artificial intelligence to generate ideas was examined in relation to the distinction between assisted creativity and substitution of the learner's intellectual activity. This approach made it possible to differentiate between superficial participation and substantive agency and to identify the educational conditions under which artificial intelligence could either strengthen or weaken the learner's capacity for purposeful and responsible action.

The coding and category-development process was initially conducted independently by two researchers. They then compared their coding structures, discussed disagreements, and refined code definitions through consensus. Disagreements were resolved by returning to the original transcript, considering the broader narrative context, and evaluating which interpretation most adequately represented the participant's intended meaning. A third qualitative research expert reviewed the final thematic structure and assessed the correspondence among selected quotations, subcategories, and overarching themes. Qualitative data management software was used to organize transcripts, codes, memos, and thematic relationships; however, all interpretive decisions were made by the researchers rather than generated automatically by the software. The final analytical framework was established when the themes adequately captured the complexity of learner agency, no additional categories emerged from the data, and the relationships among themes could be explained

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in a coherent conceptual account. Throughout the analysis, participant confidentiality was protected by replacing names with identification codes and removing institutional or personal information that could reveal individual identities. Ethical principles of voluntary participation, informed consent, confidentiality, secure data storage, and the right to withdraw without penalty were observed throughout the study.

3. Findings and Results

The final sample consisted of 22 participants from universities, research centers, and educational organizations in Tehran. Participants included 12 men and 10 women, with ages ranging from 27 to 58 years and a mean age of 39.64 years. Six participants were faculty members specializing in philosophy of education and educational sciences, five were specialists in educational technology and digital learning, four were researchers in artificial intelligence and human–computer interaction, and seven were postgraduate students with extensive experience using artificial intelligence applications for academic learning. Regarding educational qualifications, 11 participants held doctoral degrees, four were doctoral candidates, three held master's degrees, and four were master's students. Their academic or professional experience ranged from 3 to 27 years, with a mean of 11.73 years. All participants had direct experience with at least one form of artificial intelligence–based educational technology. Eighteen participants had used generative artificial intelligence tools for teaching, learning, research, assessment, or content production; nine had experience with adaptive learning platforms; seven had used intelligent tutoring systems or automated feedback applications; and six had worked with learning analytics or algorithmic recommendation systems. Because several participants had experience with more than one type of technology, these categories were not mutually exclusive. The interviews generated approximately 1,470 minutes of audio-recorded data and 438 pages of verbatim transcripts. Following repeated reading, initial coding, comparison, consolidation, and interpretive refinement, 684 initial codes were extracted. After eliminating duplicate, overlapping, or contextually redundant codes, 247 focused codes remained. These codes were organized into 12 subthemes and three overarching themes. The three overarching themes were "expansion of learner agency through augmented educational possibilities," "erosion and reconfiguration of agency under algorithmic mediation," and "conditions for responsible and authentically human agency." The findings indicated that learner agency in artificial intelligence–based educational environments was neither inherently strengthened nor necessarily weakened. Rather, it emerged as a dynamic, relational, and conditional capacity shaped by the learner's competence, the design of the technological system, the pedagogical role of the teacher, the transparency of algorithmic processes, and the extent to which the learner retained reflective control over educational decisions.

Table 1

Overview of the Themes and Subthemes Related to Learner Agency in Artificial Intelligence–Based Educational Environments

Overarching theme	Subthemes	Participants referring to the theme	Number of focused codes	Interpretive meaning
Expansion of learner agency through augmented educational possibilities	Personalized pathways and expanded choice; immediate feedback and self-correction; cognitive and creative augmentation; increased participation and accessibility	21	86	Artificial intelligence increased learners' capacity to initiate, regulate, modify, and extend learning when it functioned as a flexible resource under the learner's reflective control.
Erosion and reconfiguration of agency under algorithmic mediation	Cognitive delegation and dependency; invisible direction of choice; displacement of authorship and authenticity; diffusion of responsibility	22	91	Artificial intelligence could reduce substantive agency when learners surrendered judgment, accepted algorithmic outputs uncritically, or became unable to distinguish assistance from substitution.
Conditions for responsible and authentically human agency	Critical artificial intelligence literacy; reflective and metacognitive control; pedagogical mediation and dialogical support; ethical responsibility and preservation of human judgment	22	70	Learner agency was sustained when educational environments required critical evaluation, transparent decision-making, accountability, and continued human participation in meaning-making.

As shown in Table 1, the findings revealed a three-part conceptual structure. The first theme represented the enabling dimension of artificial intelligence and described how technological tools could expand educational choice,

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accelerate access to feedback, support individualized learning, and strengthen learners' capacity to produce, revise, and communicate knowledge. This theme was reflected in the accounts of 21 participants and contained 86 focused codes. The second theme, identified in all 22 interviews and supported by 91 focused codes, represented the restrictive and transformative dimension of artificial intelligence. Participants repeatedly explained that the same systems that increased access and efficiency could also redirect learner behavior, normalize dependence, weaken authorship, and obscure responsibility. The third theme, also represented in all interviews, contained 70 focused codes and identified the conditions under which learner agency could remain educationally meaningful. Participants emphasized that access to artificial intelligence alone did not create agency. Meaningful agency required critical artificial intelligence literacy, metacognitive monitoring, teacher mediation, ethical accountability, and preservation of the learner's final authority in judgment and decision-making. The thematic structure therefore demonstrated that learner agency was not a stable personal characteristic residing exclusively within the individual learner. Instead, it was produced through interaction among the learner's capacities, the technological architecture of artificial intelligence systems, institutional expectations, pedagogical practices, and the ethical norms governing the educational environment.

Table 2

Expansion of Learner Agency Through Augmented Educational Possibilities

Subtheme	Principal focused codes	Participants	Description of the finding	Illustrative quotation
Personalized pathways and expanded choice	Selecting learning routes; adjusting level of difficulty; accessing multiple explanations; choosing formats and examples; learning at an individual pace; pursuing personal questions; overcoming curricular rigidity	19	Artificial intelligence expanded the range of learning options and enabled learners to adapt content, sequence, pace, and mode of engagement to their individual needs and interests.	"Before using these tools, I usually had to follow the explanation that the teacher or textbook provided. Now I can ask for another explanation, a simpler example, or even a completely different route. I feel that I have more control over how I understand the subject." (P17, postgraduate student)
Immediate feedback and self-correction	Receiving rapid feedback; identifying misunderstandings; revising responses; testing alternative solutions; monitoring progress; reducing fear of error; repeating practice without embarrassment	18	Continuous and low-risk feedback strengthened learners' capacity to monitor their understanding, recognize mistakes, and independently revise their learning strategies.	"The important thing is not only that it gives an answer. It allows me to compare my answer, see where my reasoning became weak, and try again. This makes me less dependent on waiting for the teacher." (P20, postgraduate student)
Cognitive and creative augmentation	Generating alternative ideas; organizing complex information; supporting brainstorming; connecting concepts; creating scenarios; extending inquiry; overcoming initial cognitive blockage	20	Artificial intelligence functioned as an intellectual scaffold that expanded the learner's field of possibilities, particularly during idea generation, conceptual organization, and exploration of complex problems.	"Sometimes the learner has an idea but cannot develop it. Artificial intelligence can place several possibilities in front of the learner. Agency appears when the learner evaluates those possibilities and creates a new direction rather than merely selecting one." (P4, faculty member)
Increased participation and accessibility	Supporting learners with language difficulties; enabling anonymous questioning; reducing social anxiety; facilitating continuous access; compensating for limited instructional resources; encouraging hesitant learners	16	Artificial intelligence reduced some temporal, linguistic, interpersonal, and institutional barriers to participation and allowed learners who were less active in conventional classrooms to engage more directly in learning.	"Some students never ask questions in class because they are afraid of being judged. With an artificial intelligence tool, they ask ten questions in one hour. Their silence in the classroom does not mean they lack curiosity; sometimes the environment has not given them a safe channel for action." (P9, educational technology specialist)

The first overarching theme, "expansion of learner agency through augmented educational possibilities," described situations in which artificial intelligence increased learners' practical capacity to influence the course of their learning. Participants did not define this expansion merely as faster access to information. They associated it with the learner's ability to formulate questions, select among alternatives, regulate the pace and level of instruction, revise

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personal understanding, and pursue lines of inquiry that might not be possible within a fixed curriculum. Nineteen participants stated that artificial intelligence facilitated personalized learning pathways. They explained that learners could request simplified or advanced explanations, ask for additional examples, change the format of presentation, revisit prior concepts, and explore topics beyond the sequence determined by the teacher or textbook. This flexibility was particularly important for learners whose prior knowledge, language proficiency, learning speed, or interests differed from the assumptions embedded in conventional instruction. Participants perceived such flexibility as an expansion of agency because learners were no longer limited to a single educational route. However, they emphasized that the mere availability of multiple options did not automatically constitute agency. The learner needed to understand why a particular route was being selected and remain capable of modifying or rejecting the proposed pathway.

Immediate feedback and self-correction were also identified as central mechanisms through which artificial intelligence could strengthen learner agency. Eighteen participants described delayed feedback in traditional educational settings as a barrier to independent action. When learners had to wait for an instructor to identify errors, they often lost the opportunity to revise their reasoning while the learning process was still active. Artificial intelligence–based feedback allowed learners to test responses, identify gaps, compare alternative solutions, and repeat practice without fear of embarrassment or public judgment. Several postgraduate students stated that this process made them feel less dependent on the teacher for every stage of academic work. Faculty members similarly observed that immediate feedback could shift the learner from passive reception toward iterative engagement. The learner was able to act, evaluate the consequences of the action, revise the approach, and act again. Participants nevertheless distinguished between feedback that stimulated reflection and feedback that simply supplied the correct answer. In their accounts, agency was strengthened when feedback required the learner to reconsider reasoning, but it was weakened when the system removed the need for independent cognitive effort.

Cognitive and creative augmentation was the most frequently discussed enabling subtheme and appeared in 20 interviews. Participants described artificial intelligence as a partner in brainstorming, conceptual mapping, hypothesis generation, scenario construction, and comparison of different viewpoints. Faculty members and artificial intelligence researchers explained that learners frequently possessed partial ideas that remained undeveloped because they could not identify possible connections or alternative directions. Artificial intelligence could make these latent possibilities more visible. Participants interpreted this function as supportive of agency when the learner used system-generated suggestions as provisional materials for further thought. In such cases, artificial intelligence extended the learner's cognitive field without determining the final product. By contrast, when the learner accepted generated content without selection, transformation, or critical evaluation, the process no longer represented cognitive augmentation and moved toward cognitive substitution. The participants therefore located agency not in the production of options by the technology, but in the learner's capacity to evaluate, combine, reject, or transform those options.

The final subtheme concerned increased participation and accessibility. Sixteen participants explained that artificial intelligence created new opportunities for learners who were reluctant, anxious, linguistically disadvantaged, geographically restricted, or unable to obtain continuous access to an instructor. Participants observed that some students who rarely spoke in face-to-face classrooms engaged extensively with conversational artificial intelligence systems because those systems reduced fear of negative evaluation. Others used artificial intelligence to translate terminology, clarify instructions, or receive explanations adjusted to their level of prior knowledge. Educational technology specialists emphasized that this expanded participation could reveal forms of curiosity and initiative that remained invisible in conventional classrooms. Nevertheless, participants warned that accessibility should not be confused with equality of agency. Differences in digital literacy, device quality, internet access, language support, and familiarity with effective prompting could create new inequalities. Thus, although artificial intelligence could expand opportunities for action, the actual realization of agency depended on whether learners possessed the resources and competencies required to use those opportunities meaningfully.

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Table 3

Erosion and Reconfiguration of Agency Under Algorithmic Mediation

Subtheme	Principal focused codes	Participants	Description of the finding	Illustrative quotation
Cognitive delegation and dependency	Outsourcing thinking; accepting first responses; reduction of persistence; avoidance of intellectual difficulty; dependence on prompts; weakening information-search skills; inability to work without artificial intelligence	21	Repeated reliance on artificial intelligence encouraged some learners to transfer cognitive tasks to the system and gradually reduced their willingness or ability to engage independently with difficult learning processes.	"At first, the student uses the tool to save time. After a while, the student cannot begin the task without it. The problem is no longer assistance; the starting point of thought has been transferred from the learner to the machine." (P7, educational technology specialist)
Invisible direction of choice	Algorithmic filtering; prioritization of certain answers; narrowing exposure; hidden assumptions; personalization bubbles; persuasive presentation; mistaking recommendation for neutral guidance	18	Artificial intelligence shaped the range and order of available options, often without making its criteria visible, thereby influencing decisions while preserving the learner's subjective feeling of freedom.	"The learner may think, 'I chose this answer,' but the system has already decided which possibilities will appear first and which possibilities will remain invisible. The sense of choice can exist even when the field of choice has been designed by the algorithm." (P2, faculty member)
Displacement of authorship and authenticity	Unclear ownership of ideas; imitation of generated language; loss of personal voice; fabricated competence; separation between product and understanding; weakened originality; uncertainty about intellectual contribution	20	Artificial intelligence complicated the relationship between the learner and the educational product by making it difficult to determine whether the final work expressed the learner's understanding, judgment, and intellectual identity.	"A polished text may be submitted, but when I ask the student to explain its main argument, the connection disappears. The product is present, but the learner is absent from the product." (P12, faculty member)
Diffusion of responsibility	Blaming the system; uncertainty about accountability; concealment of decision-makers; ethical disengagement; submission of unchecked information; shared but undefined responsibility; reduced ownership of consequences	17	Learners sometimes attributed errors, bias, or inappropriate outputs to the artificial intelligence system and distanced themselves from responsibility for evaluating and using the generated content.	"Students sometimes say, 'The system gave me this information,' as though that ends the matter. But the decision to use it, submit it, or act on it still belongs to the person. The technology can produce content, but it cannot carry moral responsibility." (P15, artificial intelligence researcher)

The second overarching theme, "erosion and reconfiguration of agency under algorithmic mediation," reflected the participants' concern that artificial intelligence could create the appearance of increased learner control while gradually weakening the foundations of meaningful action. Cognitive delegation and dependency appeared in 21 interviews and was described as one of the most immediate threats to learner agency. Participants distinguished legitimate delegation from excessive cognitive outsourcing. Legitimate delegation involved using artificial intelligence for repetitive, technical, or preliminary tasks while retaining control over the educational purpose, analytical process, and final judgment. Excessive outsourcing occurred when the learner transferred problem formulation, reasoning, interpretation, or decision-making to the system. Several participants observed that learners increasingly asked artificial intelligence to determine what to study, how to structure an argument, which position to adopt, and even what conclusion to reach. This reduced the learner's exposure to uncertainty, struggle, and productive failure. Faculty members emphasized that intellectual difficulty was not merely an obstacle to learning; it was often the condition through which perseverance, judgment, and independent thought were formed. When artificial intelligence removed all difficulty, it could also remove opportunities for the learner to exercise agency.

Participants further explained that dependency developed gradually. Initially, learners used artificial intelligence to improve efficiency or overcome a temporary difficulty. With repeated use, however, some learners became unable to initiate academic tasks without external generation of ideas, outlines, questions, or interpretations. Postgraduate participants acknowledged that they sometimes experienced anxiety when required to work without artificial intelligence after becoming accustomed to continuous support. Educational technology experts described this as a shift in the "origin of action." In an agentic learning process, the learner identified a purpose and selected technological assistance accordingly. In a dependent process, the technology initiated the direction of thought, and the learner merely responded to or edited what had already been produced. This finding suggested that the distinction

between support and substitution was not based solely on how much artificial intelligence was used. It depended on whether the learner remained the source of educational intention and whether the learner could continue the task independently when technological support was removed.

The subtheme of invisible direction of choice was identified in 18 interviews. Participants stated that artificial intelligence systems did not simply respond to learners' preferences; they actively organized the environment in which preferences were formed and expressed. Algorithmic systems selected, ranked, framed, and repeated certain materials while excluding or de-emphasizing others. Because these processes were often opaque, learners could experience a strong sense of autonomy without recognizing how their choices had been structured in advance. Faculty members in philosophy of education emphasized that meaningful choice required more than selecting from a list. It required awareness of how the list had been constructed, what alternatives had been excluded, and which assumptions had shaped the recommendations. Artificial intelligence researchers similarly noted that conversational systems could appear neutral and authoritative because they presented responses in fluent, confident, and personalized language. This persuasive form could discourage learners from asking whose knowledge, values, or priorities were represented in the answer. Participants therefore described a paradox in which the learner appeared to possess more options while becoming increasingly dependent on an invisible architecture of selection.

Displacement of authorship and authenticity appeared in 20 interviews. Participants frequently encountered educational products that were linguistically sophisticated but disconnected from the learner's actual understanding. Faculty members described situations in which students submitted well-structured assignments yet could not explain the argument, defend the selected evidence, or clarify the meaning of key concepts. This created uncertainty about whether the product represented learning or merely successful interaction with a generative system. Participants did not interpret authorship only as legal ownership of words. They defined it more broadly as the learner's meaningful presence in the process and product of learning. An authentic educational product was one in which the learner could explain the reasoning, acknowledge the sources of assistance, justify the decisions made, and accept responsibility for the final form. When artificial intelligence replaced the learner's voice, style, uncertainty, and conceptual struggle, the educational product became detached from the person who submitted it. Several participants referred to this condition as "performance without formation," meaning that the visible outcome suggested competence even though the corresponding intellectual capacity had not necessarily developed.

The diffusion of responsibility was identified in 17 interviews. Participants reported that learners occasionally used the presence of artificial intelligence to distance themselves from errors, bias, fabricated information, inappropriate wording, or unethical use of sources. Statements such as "the system generated it" were interpreted as attempts to transfer accountability from the human user to the technology. Artificial intelligence researchers and faculty members agreed that responsibility could be distributed among designers, institutions, teachers, and learners, but they rejected the idea that technological involvement eliminated personal responsibility. The learner still decided whether to use the tool, accept a response, verify information, submit the product, or act on a recommendation. Participants also observed that educational institutions had not always established clear expectations regarding disclosure, verification, authorship, and acceptable assistance. In the absence of explicit norms, learners could perceive responsibility as fragmented and undefined. The findings therefore indicated that artificial intelligence not only changed what learners could do but also complicated who was answerable for the consequences of educational actions.

Table 4

Conditions for Responsible and Authentically Human Agency

Subtheme	Principal focused codes	Participants	Description of the finding	Illustrative quotation
Critical artificial intelligence literacy	Understanding limitations; recognizing bias; verifying outputs; identifying hallucinated information; questioning data sources; examining algorithmic interests; understanding probabilistic generation	22	Learners required conceptual and practical knowledge about how artificial intelligence systems operated, what limitations they possessed, and why their outputs should not be treated as inherently accurate or neutral.	"A learner cannot be an agent in relation to a system that is treated as magical. Agency begins when the learner understands that the output is constructed, probabilistic, and potentially biased, and therefore must be questioned." (P14, artificial intelligence researcher)

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Reflective and metacognitive control	Defining purpose before use; monitoring dependence; explaining personal decisions; comparing independent and generated responses; pausing before acceptance; maintaining capacity to work without the tool	20	Agency depended on the learner's ability to regulate when, why, and how artificial intelligence was used and to evaluate whether technological assistance supported or replaced personal learning.	"Before opening the tool, the learner should know what the problem is and what kind of help is needed. Otherwise, the system defines both the question and the answer, and the learner only follows." (P5, faculty member)
Pedagogical mediation and dialogical support	Teacher as facilitator; questioning generated answers; requiring justification; designing process-based assessment; collaborative critique; discussing ethical dilemmas; balancing guidance and autonomy	21	Teachers remained essential in creating educational situations in which learners justified choices, confronted alternative viewpoints, and transformed artificial intelligence outputs through dialogue and reflection.	"The teacher should not compete with artificial intelligence as a source of information. The teacher should create the questions that force the learner to reveal how the answer was formed and why it should be accepted." (P8, educational technology specialist)
Ethical responsibility and preservation of human judgment	Retaining final judgment; disclosing artificial intelligence use; accepting consequences; protecting privacy; respecting intellectual ownership; considering social effects; refusing harmful recommendations	22	Responsible agency required learners to remain morally accountable for the use and consequences of artificial intelligence and to preserve human judgment in decisions affecting meaning, values, identity, and other people.	"The final decision must remain human, especially where values, fairness, or another person's rights are involved. Artificial intelligence may inform the decision, but it cannot replace the person who must answer for it." (P1, faculty member)

The third overarching theme, "conditions for responsible and authentically human agency," explained why the effects of artificial intelligence depended on educational and ethical conditions rather than on technological access alone. All 22 participants identified critical artificial intelligence literacy as a foundational requirement. They argued that conventional digital literacy, defined as the ability to operate devices or locate information, was insufficient for artificial intelligence–based learning environments. Learners needed to understand that artificial intelligence outputs were generated through probabilistic processes, that responses could contain errors or fabricated information, and that apparent confidence did not guarantee accuracy. They also needed to recognize that systems were trained on selected datasets, reflected particular linguistic and cultural patterns, and could reproduce existing biases. Participants emphasized that without such knowledge, learners were likely to approach artificial intelligence as an unquestionable authority. In this condition, the learner's interaction with the system might be active in a behavioral sense but passive in an epistemic sense. The learner asked questions and received answers but did not examine how knowledge claims were produced or whose perspectives were absent.

Critical artificial intelligence literacy also included the ability to verify information through independent sources, compare multiple responses, identify unsupported claims, and recognize the commercial or institutional interests underlying technological platforms. Artificial intelligence researchers explained that learners often anthropomorphized conversational systems and interpreted fluent responses as signs of understanding or intention. This misunderstanding could lead learners to trust outputs more deeply than they trusted conventional search results. Participants therefore proposed that education should make the functioning and limitations of artificial intelligence visible. Learners should be encouraged to ask what data might have shaped an answer, why a particular response appeared, which assumptions were embedded in the wording, and what information might have been excluded. According to the participants, such questioning transformed the learner from a recipient of algorithmic output into an evaluator of technological mediation.

Reflective and metacognitive control appeared in 20 interviews and referred to the learner's ability to regulate the purpose, timing, intensity, and form of artificial intelligence use. Participants repeatedly stated that agency began before the learner entered a prompt. The learner needed to define the educational problem, determine what kind of assistance was appropriate, and establish which parts of the task should remain independent. During interaction, the learner needed to monitor whether the system was clarifying thought or directing it. After interaction, the learner needed to evaluate what had been learned, what remained uncertain, and whether the final product could be independently explained. Several participants suggested that learners should occasionally complete comparable tasks without artificial intelligence to assess whether genuine competence had developed. The ability to function without the technology was viewed as an important indicator that artificial intelligence remained a tool rather than becoming the condition of all intellectual activity.

Participants also emphasized the importance of preserving productive cognitive effort. They did not advocate complete avoidance of artificial intelligence.

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Instead, they argued for deliberate distribution of work between the learner and the system. Artificial intelligence could be used to generate alternatives, identify weaknesses, provide examples, or support revision, while the learner retained responsibility for problem definition, interpretation, argumentation, and final judgment. Participants stated that this distribution should vary according to the educational objective. Greater technological assistance might be appropriate when the purpose was rapid exploration or language support, whereas less assistance might be appropriate when the objective was to assess independent reasoning or develop foundational competence. Reflective control therefore required learners to align the manner of artificial intelligence use with the intended form of learning.

Pedagogical mediation and dialogical support were identified by 21 participants. Contrary to the assumption that artificial intelligence would make teachers less important, participants argued that the teacher's role became more complex and philosophically significant. The teacher was no longer required merely to transmit information that learners could obtain from an artificial intelligence system. Instead, the teacher needed to design situations in which learners questioned outputs, justified choices, compared perspectives, and reflected on the consequences of using technological assistance. Participants described the teacher as a mediator among the learner, the artificial intelligence system, disciplinary knowledge, and educational values. This mediation involved helping learners distinguish credible from unreliable information, assistance from substitution, and efficiency from genuine understanding.

Participants particularly emphasized process-based assessment. Traditional assignments that evaluated only the final product were considered increasingly inadequate because artificial intelligence could produce polished outputs without demonstrating the learner's reasoning. Faculty members suggested that learners should be asked to document how artificial intelligence was used, identify which suggestions were accepted or rejected, explain how the final argument changed, and defend the decisions made. Oral questioning, reflective reports, version histories, classroom dialogue, and problem-solving observations were described as methods for making learner agency visible. Participants also recommended collaborative critique of artificial intelligence outputs. Rather than prohibiting the technology, teachers could ask students to identify errors, biases, missing perspectives, weak arguments, or ethical problems in generated responses. Such activities transformed artificial intelligence from an answer-producing device into an object of inquiry and created opportunities for collective reasoning.

Ethical responsibility and preservation of human judgment were emphasized in all 22 interviews. Participants regarded accountability as inseparable from agency. A learner could not be considered fully agentic while claiming ownership of successful outcomes and attributing failures entirely to the system. Responsible use required disclosure of artificial intelligence assistance, verification of information, respect for intellectual property, protection of personal and institutional data, and awareness of the possible effects of generated content on other people. Participants were particularly concerned about the use of sensitive information in commercial systems, the reproduction of discriminatory assumptions, and the possibility that learners might use artificial intelligence to justify harmful or unfair decisions. They stated that educational institutions should establish explicit policies regarding acceptable use, acknowledgment, privacy, verification, and responsibility.

Preservation of human judgment was viewed as especially important in educational decisions involving values, identity, fairness, emotional understanding, or consequences for other individuals. Participants accepted that artificial intelligence could provide information, identify patterns, or generate recommendations, but they rejected the delegation of final moral judgment to the system. They argued that artificial intelligence did not possess lived experience, moral accountability, or educational commitment in the human sense. Consequently, the learner and teacher had to retain authority over decisions concerning what was educationally desirable, ethically acceptable, and personally meaningful. Several participants explained that agency was not demonstrated by rejecting technological assistance, but by using it without surrendering human responsibility. In this interpretation, authentic agency involved the learner's capacity to integrate technological support into a personally understood, ethically defensible, and educationally purposeful course of action.

Across the three overarching themes, the central interpretive finding was that learner agency in artificial intelligence–based educational environments could be understood as "reflective human authorship within a technologically mediated field of possibilities." This central concept captured four interconnected characteristics. First, agency required intentionality, meaning that the learner entered the interaction with a purpose rather than allowing the system to define the educational problem entirely. Second, it required informed choice, meaning that the

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learner understood that algorithmic options were selected and structured rather than neutral or unlimited. Third, it required transformative participation, meaning that the learner interpreted, revised, challenged, or reconstructed artificial intelligence outputs instead of merely reproducing them. Fourth, it required accountability, meaning that the learner accepted responsibility for the knowledge claims, decisions, and consequences associated with the final educational product.

The findings further showed that learner agency existed along a continuum rather than as a simple present-or-absent condition. At one end of the continuum was learner-directed augmentation, in which the learner defined the objective, used artificial intelligence selectively, evaluated outputs critically, and retained final judgment. In the middle was negotiated or distributed agency, in which the learner and technological system jointly shaped the learning process, but the boundaries of control varied according to the task and context. At the opposite end was algorithmically directed dependence, in which the system defined questions, selected pathways, generated conclusions, and reduced the learner to an editor or transmitter of machine-produced content. Movement along this continuum was influenced by the learner's competence, the design and transparency of the system, the teacher's pedagogical approach, institutional assessment practices, and the ethical norms governing artificial intelligence use.

Participants' accounts also revealed that efficiency and agency were not equivalent. Artificial intelligence frequently reduced the time required to obtain information, organize content, or produce an educational artifact. However, greater efficiency did not necessarily indicate deeper control or more meaningful participation. In some cases, rapid completion concealed a reduction in reflection, persistence, authorship, and understanding. Conversely, participants explained that slower forms of engagement, including questioning, comparison, revision, and justification, could represent stronger agency because the learner remained intellectually present throughout the process. The findings therefore distinguished between operational agency, expressed through the ability to perform tasks efficiently, and substantive agency, expressed through intentional, reflective, critical, and responsible participation in learning.

Finally, the findings indicated that artificial intelligence altered the traditional distribution of educational authority. In conventional environments, authority was primarily negotiated between the teacher, curriculum, institution, and learner. Artificial intelligence introduced a new and often opaque actor that influenced what knowledge was presented, how questions were framed, which alternatives were prioritized, and how learners evaluated their own performance. Participants did not consider this redistribution inherently harmful, but they emphasized that it required explicit educational attention. When algorithmic authority remained invisible, learner agency could be weakened without the learner's awareness. When it was made visible, critically examined, and subordinated to human educational purposes, artificial intelligence could contribute to more flexible, participatory, and self-directed learning. Accordingly, the findings portrayed learner agency as a relational achievement that must be continuously constructed and protected within the interaction among human intention, pedagogical guidance, technological affordances, and ethical responsibility.

4. Discussion and Conclusion

The present study explored learner agency in artificial intelligence–based educational environments from the perspective of philosophy of education. The findings showed that learner agency was not a fixed individual attribute and could not be reduced to technological participation, frequent interaction, or access to multiple digital resources. Instead, it emerged as a dynamic and relational capacity shaped by the interaction among learners' intentions and competencies, teachers' pedagogical practices, institutional expectations, and the affordances and constraints embedded in artificial intelligence systems. Three overarching themes were identified: the expansion of learner agency through augmented educational possibilities, the erosion and reconfiguration of agency under algorithmic mediation, and the conditions required for responsible and authentically human agency. Taken together, these findings suggest that artificial intelligence can simultaneously enhance and undermine learner agency. Its educational value therefore depends not merely on whether it is available or technically effective, but on whether learners retain meaningful control over purposes, judgments, interpretations, and consequences.

The first major finding indicated that artificial intelligence could expand learner agency by increasing access to personalized pathways, immediate feedback, cognitive and creative support, and more inclusive forms of participation. Participants explained that learners were able to modify the pace, difficulty, format, and direction of

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learning in ways that were often unavailable in conventional educational settings. This finding is consistent with research showing that artificial intelligence and related technologies can support personalized learning by adapting resources, activities, and feedback to learners' individual characteristics and needs (Jambangan & Serrano, 2025). The increasing integration of artificial intelligence into science education has similarly been associated with adaptive instructional support, enriched learning resources, and expanded opportunities for classroom engagement (Kesgin, 2025). From a philosophical perspective, such personalization may strengthen agency when it enables learners to pursue meaningful educational purposes and make informed choices among alternative pathways. However, personalization alone does not guarantee autonomy. Agency is strengthened only when learners understand and critically evaluate the options available to them rather than merely following system recommendations.

The participants' emphasis on expanded participation and accessibility also aligns with previous research. Artificial intelligence has been shown to provide additional opportunities for language practice and educational engagement among marginalized and disadvantaged learners (Abu-Gweder, 2026; James et al., 2026). In low-resource educational contexts, artificial intelligence–enhanced project-based learning has been proposed as a means of widening access to instructional materials, supporting teachers, and increasing learners' participation in complex STEM activities (Jaya et al., 2026). The generation of culturally responsive visual aids may also facilitate more contextually meaningful participation by enabling educational content to reflect local languages, identities, and experiences (Nabang, 2026). Similarly, context-aware and curriculum-aligned conversational systems can potentially reduce the mismatch between globally developed technologies and local educational realities (Nyaaba et al., 2026). These studies support the present finding that artificial intelligence may strengthen agency by creating channels for action that are more flexible, accessible, and responsive than conventional instructional structures.

Nevertheless, the findings also showed that accessibility should not be equated with substantive agency. Participants observed that unequal access to devices, connectivity, linguistic resources, and artificial intelligence literacy could reproduce or intensify educational inequalities. This interpretation is consistent with human-centered approaches emphasizing that artificial intelligence implementation in underresourced schools must be accompanied by ethical safeguards, local participation, and attention to structural inequality (Kuskova et al., 2026). Artificial intelligence has also been discussed as a means of advancing equality and diversity in engineering education, but its inclusive potential depends on whether its design and use respond to heterogeneous learner needs and protect ethical principles (Hilal & Ibrahim, 2026). The feasibility of using artificial intelligence to support multicultural curricula likewise depends on the extent to which systems recognize cultural plurality rather than merely generating superficially diverse materials (Qin & Zhou, 2026). Therefore, artificial intelligence can widen the field of educational possibility, but this potential becomes meaningful only when learners possess the material, cultural, and epistemic resources necessary to act within that field.

The finding related to immediate feedback and self-correction further demonstrated how artificial intelligence could support self-regulated and reflective learning. Participants explained that rapid feedback enabled learners to identify errors, revise strategies, and repeat tasks without waiting for teacher intervention. This finding is supported by research on the use of artificial intelligence for assessing and providing feedback on academic writing, which has highlighted its capacity to accelerate revision and provide individualized support (Sadigova et al., 2026). Evidence from English-language classrooms also indicates that artificial intelligence can alter teaching practices, improve access to feedback, and contribute to student performance (Saleem et al., 2025). In programming education, artificial intelligence has been associated with improvements in computational and reflective thinking, indicating that technology can help learners examine their reasoning and revise their approaches (Omeh et al., 2025). Reviews of metacognitive scaffolding in STEM classrooms likewise suggest that artificial intelligence tools may support planning, monitoring, evaluation, and strategic adaptation (Tsakeni et al., 2025). These findings reinforce the interpretation that artificial intelligence can strengthen agency when it enables learners to observe the consequences of their actions and intentionally modify their learning processes.

At the same time, participants stressed that feedback could weaken agency when it replaced reflection rather than supported it. The second overarching theme showed that artificial intelligence could erode learner agency through cognitive delegation, algorithmic direction, displacement of authorship, and diffusion of responsibility. Cognitive delegation occurred when learners transferred problem

formulation, interpretation, and judgment to the system rather than using the system as a scaffold. Teachers' experiences with artificial intelligence in K–12 education similarly reveal concerns regarding learner overdependence, reduced persistence, and the weakening of independent thinking (Metin & Cetin, 2026). The preparation of educators for generative artificial intelligence has therefore been identified as essential, particularly because teachers must learn to design activities that preserve intellectual effort and prevent technological assistance from becoming cognitive substitution (Lewis, 2025). The present results extend this literature by showing that dependency is not simply a matter of frequent use. It involves a shift in the origin of educational action, from the learner's intention to the system's generated direction.

This distinction is philosophically important because agency requires more than responding to available prompts. It requires that learners define purposes, initiate inquiry, and understand the basis of their decisions. The historical development of educational technology toward artificial intelligence–mediated co-creation has been described as an epistemological rupture because artificial intelligence now participates in the generation and organization of knowledge rather than merely transmitting content (Hasan et al., 2026). Such participation can enrich learning, but it can also blur the boundary between learner-generated and machine-generated thought. The present findings suggest that when learners become unable to begin, continue, or explain a task without artificial intelligence, the technology no longer functions merely as an educational aid. Instead, it begins to shape the learner's cognitive agency at a foundational level.

The subtheme of invisible direction of choice further demonstrated that apparent freedom can coexist with algorithmic constraint. Participants noted that artificial intelligence systems organize, rank, and frame available information, often without revealing how these decisions are made. This finding aligns with analyses of the convergence and divergence between human-mediated and algorithmically mediated pedagogy, which show that educational authority is increasingly distributed across human and computational actors (Turvey & Pachler, 2025). Trustworthy learning environments therefore require bidirectional alignment in which technological systems are aligned with educational values while learners and teachers are equipped to understand, question, and respond critically to algorithmic influence (Shen, 2025). From this perspective, meaningful choice cannot be defined simply as selecting among options displayed by a system. It requires awareness of how the options were produced, which alternatives were omitted, and what assumptions structured the recommendation.

This interpretation also corresponds with broader ethical concerns in artificial intelligence education. A systematic review of artificial intelligence ethics in education has identified algorithmic bias, transparency, privacy, accountability, and unequal access as central challenges (Yan & Chau, 2025). The present findings show that these ethical concerns are directly connected to learner agency. A learner cannot exercise fully informed agency when the system's operations remain opaque or when recommendations are treated as neutral despite being shaped by particular datasets and design priorities. Similarly, studies of perceptions and practices surrounding artificial intelligence use in education reveal that positive attitudes toward usefulness often coexist with uncertainty regarding accuracy, reliability, and appropriate use (Alam et al., 2024). The participants' concern about invisible algorithmic authority therefore reflects a broader epistemic problem: learners may feel empowered by artificial intelligence while becoming less aware of the structures shaping their judgments.

The displacement of authorship and authenticity was another central finding. Participants described situations in which learners produced polished educational outputs but could not explain the underlying argument, justify the evidence, or demonstrate corresponding understanding. This finding is especially relevant in disciplines such as translation and language education, where artificial intelligence is transforming the relationship between automated production, professional competence, and human judgment (El-Karnichi, 2024). Artificial intelligence can support brainstorming, revision, and linguistic improvement, but it also complicates the relationship between the learner and the final product. The present study suggests that educational authorship should not be understood solely as ownership of words. It should be understood as the learner's meaningful intellectual presence in the process of inquiry, selection, transformation, and justification.

The motivational benefits reported in earlier research also need to be interpreted in relation to this distinction. Artificial intelligence can increase engagement, reduce anxiety, and enhance motivation in language learning contexts (Moybeka et al., 2023). Integration with social media and other digital platforms may further diversify learning experiences and increase participation (Felizarte et al., 2024). However,

increased engagement does not necessarily demonstrate authentic agency. Learners may interact extensively with artificial intelligence while contributing little independent judgment. The present findings therefore distinguish operational participation from substantive agency. Operational participation refers to visible activity, prompt generation, editing, and rapid task completion. Substantive agency involves intentionality, interpretation, critical evaluation, and responsibility. This distinction is consistent with emerging discussions of active learning, which emphasize that new technologically mediated forms of participation must still preserve meaningful inquiry, collaboration, and knowledge construction (Børte & Zeivots, 2026).

The findings regarding diffusion of responsibility further reinforced the ethical dimension of agency. Participants observed that learners sometimes attributed inaccurate or inappropriate outputs to the artificial intelligence system and distanced themselves from accountability. Yet responsibility remained with the learner who decided whether to accept, verify, revise, disclose, or submit the output. This result aligns with ethical literature emphasizing that responsibility in artificial intelligence–based education is distributed but not eliminated (Yan & Chau, 2025). Institutional policies, system designers, and teachers all share responsibility for creating safe and transparent environments, but learners remain morally accountable for how technological outputs are used. The capacity to accept responsibility is therefore not an additional ethical requirement placed upon agency; it is one of its defining characteristics.

The third overarching theme identified the conditions necessary for preserving responsible and authentically human agency. Participants emphasized critical artificial intelligence literacy, metacognitive control, pedagogical mediation, and ethical judgment. Critical artificial intelligence literacy involved understanding the probabilistic nature of generated outputs, recognizing bias, verifying claims, and questioning the apparent authority of fluent responses. This finding is consistent with human-centered approaches to educational technology, which argue that digital literacy must be connected to meaning, interest, participation, and human development rather than reduced to technical proficiency (Mahyiyuddin & Erlita, 2026). It also supports the argument that education in the artificial intelligence era must move beyond conventional measures of cognitive performance and cultivate judgment, creativity, ethical discernment, and the capacity to formulate meaningful questions (Chou, 2026).

Metacognitive control emerged as another essential condition. Participants argued that learners should define the purpose of artificial intelligence use before interacting with the system, monitor whether assistance was becoming substitution, and remain able to explain and perform key tasks independently. This interpretation is supported by studies showing that artificial intelligence can scaffold metacognition when learners actively plan, monitor, and evaluate their learning (Tsakeni et al., 2025). It also corresponds with findings that artificial intelligence can enhance reflective thinking in programming education when used to stimulate rather than replace analysis (Omeh et al., 2025). Thus, the key educational issue is not whether artificial intelligence is used, but how its use is regulated in relation to learning objectives.

Pedagogical mediation was similarly central. Participants rejected the assumption that artificial intelligence would make teachers less important. Instead, they argued that teachers must shift from being primary transmitters of information to designers of inquiry, dialogue, reflection, and ethical judgment. Teachers' character strengths and relational qualities continue to influence student motivation and well-being even in artificial intelligence–supported classrooms (Wang, 2026). The human teacher remains important because education involves recognition, trust, care, and moral formation as well as information processing. Teachers also play a crucial role in helping learners interpret artificial intelligence outputs, identify bias, justify decisions, and preserve intellectual ownership. Research on teacher experiences and educator preparation similarly emphasizes that effective artificial intelligence integration requires professional knowledge, pedagogical redesign, and explicit attention to responsible use (Lewis, 2025; Metin & Cetin, 2026).

Overall, the findings support a conceptualization of learner agency as reflective human authorship within a technologically mediated field of possibilities. Artificial intelligence can expand possibilities, but learners become agents only when they intentionally select, critically evaluate, transform, and assume responsibility for what the technology provides. This interpretation avoids both technological optimism and technological pessimism. Artificial intelligence is neither inherently emancipatory nor inherently restrictive. Its effect on agency depends on the design of learning environments and on whether educational practices preserve the learner's role as a meaning-making, judging, and responsible human being.

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The present study had several limitations. First, the participants were recruited from universities, research centers, and educational organizations in Tehran, and the findings may not fully represent learners and educators in other geographical, cultural, socioeconomic, or institutional contexts. Second, the sample included individuals with relatively substantial experience or familiarity with artificial intelligence, which may have resulted in more developed or critical perspectives than would be found among less experienced users. Third, the findings were based primarily on self-reported experiences and interpretations rather than direct observation of learners' behavior in artificial intelligence–based classrooms. Participants' accounts may therefore have been influenced by memory, professional position, or socially desirable responses. Finally, because artificial intelligence technologies are changing rapidly, some of the specific practices and concerns identified in this study may evolve as systems, institutional policies, and user competencies develop.

Future research should examine learner agency across different educational levels, disciplines, cultural contexts, and forms of artificial intelligence use. Comparative studies could investigate whether agency is experienced differently in schools, universities, vocational institutions, and informal learning environments. Longitudinal research would be particularly valuable for determining how sustained artificial intelligence use affects independence, motivation, authorship, and metacognitive competence over time. Future qualitative studies could incorporate classroom observation, learner diaries, prompt histories, and analysis of successive drafts to compare reported agency with observable learning processes. Quantitative research could also develop and validate instruments for assessing dimensions such as intentional control, critical evaluation, algorithmic dependence, authorship, and ethical responsibility. Intervention studies should test pedagogical models designed to strengthen learner agency while allowing productive use of artificial intelligence.

In practice, educational institutions should integrate artificial intelligence in ways that preserve human judgment, intellectual responsibility, and meaningful learner participation. Teachers should design activities that require learners to explain how artificial intelligence was used, justify which outputs were accepted or rejected, verify generated information, and demonstrate independent understanding. Assessment should focus more strongly on processes of reasoning, reflection, revision, and oral defense rather than only on polished final products. Learners should receive explicit instruction in artificial intelligence literacy, including bias recognition, privacy protection, source verification, authorship, and ethical accountability. Institutions should also establish clear policies regarding acceptable use and disclosure while ensuring that such policies support learning rather than merely prohibit technology. Most importantly, artificial intelligence should be positioned as a resource for extending human inquiry, not as a substitute for the learner's capacity to think, choose, create, and accept responsibility.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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