

When Knowledge Production No Longer Requires Knowing: Rethinking *Gewu Zhizhi* (Investigating Things and Extending Knowledge) in the Age of AI

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Abstract

This essay reconsiders *gewu zhizhi* (investigating things and extending knowledge) under a technological condition in which propositions, explanations, distinctions, questions, and even apparently reflective trajectories of inquiry can be produced before an equivalent process of human knowing has occurred. Rather than determining whether artificial intelligence itself knows, the paper examines what becomes of human epistemic formation when developed symbolic outputs can increasingly be obtained without reproducing the trajectories through which human knowing ordinarily emerges. It therefore distinguishes the possession or production of epistemic products from the genesis of knowing within historically and relationally formed subjects.

The analysis argues that knowing need not begin with an explicit question. Existential and affective salience, aesthetic interruption, contingent encounter, memory, and co-experience can reorganize attention before a determinate object of inquiry has been articulated. Curiosity can consequently become manifest through conditions whose relational and historical organization precedes the episode in which curiosity becomes recognizable. On this basis, the essay offers a contemporary philosophical reconstruction of *gewu zhizhi*. *Gewu* is approached through sustained encounter, attention, differentiation, testing, and revision, while *zhizhi* concerns the formation of a subject increasingly capable of seeing, questioning, judging, and continuing inquiry. Generative AI disrupts the familiar sequence from encounter and investigation toward articulated knowledge by allowing the proposition to precede the knowing. Yet the resulting proposition can itself become a new object of investigation and can either activate further inquiry or prematurely stabilize a question that had only begun to emerge. The additional capacity of AI to generate plausible questioning, hesitation, objection, revision, and discovery narratives further shows that the appearance of an epistemic process is insufficient to establish epistemic formation.

The continuing significance of *gewu zhizhi* therefore lies neither in restoring artificial scarcity to knowledge products nor in preserving difficulty for its own sake. Its contemporary significance can instead be located in the generative conditions through which a subject remains capable of becoming a knower: curiosity, world-directed encounter, existential and affective responsiveness, contingency, co-experience, judgment, revision, and the formation of new questions. The essay concludes with practical implications for non-substitutive education, AI-assisted inquiry, and public knowledge practices. Among these, it proposes that public knowledge systems may increasingly need to preserve sufficient generative provenance alongside stabilized epistemic products, while leaving the formal modeling and implementation of such infrastructures to a separate research programme.

Keywords: *gewu zhizhi*; epistemic formation; epistemic genesis; generative AI; curiosity; contingency; existential feeling; co-experience; relational epistemology; generative provenance

Discussion Paper Note

This paper is a conceptual and exploratory essay on the continuing significance of *gewu zhizhi*, rendered here as “investigating things and extending knowledge,” under conditions in which generative artificial intelligence can produce propositions, explanations, distinctions, questions, and other knowledge-like symbolic outputs with limited correspondence to an equivalent trajectory of human inquiry. Its principal object is human epistemic formation: the relational process through which something becomes salient, questionable, differentiable, examinable, and eventually available as knowing within a historically situated subject.

The paper begins from a growing separation among the production of an epistemic output, the possession of a proposition, the understanding of that proposition, and the formation of a subject capable of arriving at, evaluating, revising, and extending what is known. These phenomena have never been identical. Generative artificial intelligence nevertheless makes their separation especially visible because a developed symbolic result can now precede much of the human encounter, uncertainty, curiosity, comparison, and judgment through which a similar result might otherwise have become intelligible.

The title phrase “when knowledge production no longer requires knowing” therefore concerns a practical and epistemic separation rather than a completed theory of artificial cognition. The paper does not determine whether artificial intelligence possesses knowledge, understanding, consciousness, experience, or wisdom. It asks instead what becomes of human knowing when symbolic products that ordinarily function as signs or results of epistemic activity can be obtained before an equivalent process of human epistemic formation has occurred.

The treatment of *gewu zhizhi* is philosophical and reconstructive. Classical interpretations of the expression provide essential historical and conceptual resources, yet the present paper does not claim that a single classical interpretation directly anticipates artificial intelligence or the epistemic conditions examined here. Zhu Xi, Wang Yangming, and other traditions associated with the *Great Learning* should retain their own historical, ethical, metaphysical, and pedagogical contexts. The paper uses *gewu zhizhi* as a lens through which the relation among things, inquiry, knowing, and the formation of the knower can be reconsidered under contemporary conditions.

The English rendering “investigating things and extending knowledge” is used for practical continuity and should not be treated as an exhaustive translation of either *gewu* or *zhizhi*. The conceptual range of the expression is part of the historical literature reviewed in the paper. The later reconstruction of *gewu* through encounter, attention, differentiation, testing, and revision is explicitly presented as a contemporary philosophical use rather than as a claim that these terms reproduce a uniquely authoritative historical meaning.

A central distinction is maintained between an epistemic product and epistemic formation. An epistemic product can include a proposition, explanation, definition, argument, distinction, question, summary, or other stabilized symbolic object. Epistemic formation concerns changes in the subject’s capacity to notice, discriminate, question, judge, relate, revise, and continue inquiry. The two can interact closely, and either can contribute to the other. Their possible separation becomes increasingly important when a symbolic product can be supplied before the recipient has undergone a trajectory through which its significance would otherwise have emerged.

The paper therefore does not romanticize the reproduction of historical difficulty. A learner need not rediscover every theorem, repeat every failed experiment, reconstruct every philosophical dispute, or independently reproduce the complete history through which inherited knowledge first became available. Testimony, teaching, books, archives, instruments, institutions, collaboration, and computational systems are ordinary conditions of human knowledge. The relevant question concerns which elements of an epistemic trajectory remain important for the continuing formation of a knower once the final symbolic result has become inexpensive to obtain.

Curiosity is one such element, although the paper does not propose a new general theory of curiosity. It distinguishes the manifest episode of curiosity from the prior relational and historical conditions through which something can become capable of eliciting curiosity. A subject can possess memories, dis-

positions, unresolved tensions, linguistic resources, practices, concerns, and earlier relations that make a later encounter epistemically productive. The manifestation of curiosity can therefore be event-like without being independent of an already developed history.

The paper also gives attention to epistemic salience before explicit question formation. Human inquiry need not begin with a fully articulated question. Something can first appear strange, beautiful, disturbing, familiar, incongruous, significant, or otherwise capable of interrupting an ongoing trajectory of attention. Such an interruption does not itself constitute knowledge. It can, however, reorganize attention and create the conditions from which a question subsequently becomes possible.

The term “existential feeling” is used in this connection with appropriate phenomenological caution. The paper does not reduce inquiry to affect, and it does not claim that every epistemic event originates in a distinctive feeling. Its concern is narrower: the manner in which a subject already finds itself situated in a world can contribute to what becomes noticeable, important, or question-worthy. Feeling can therefore participate in epistemic salience without becoming a substitute for evidence, judgment, or justification.

Aesthetic interruption provides one illustrative case. A person engaged in an unrelated conversation may suddenly stop upon seeing evening light, a landscape, a face, a building, or another scene experienced as beautiful. The interruption can precede any explicit judgment about why the object is beautiful. It can also reactivate a relational history, such as the memory of having encountered a similar scene with someone loved. The present paper uses such cases to examine how perception, memory, feeling, and prior relation can participate in the emergence of a new object of inquiry. It does not attempt to develop a general theory of beauty or aesthetic value.

Contingency is treated as another condition of epistemic formation. Contingency does not mean absence of structure or determination. An accidental encounter, unexpected observation, interruption, practical failure, change of setting, or unplanned conversation can become epistemically consequential because it enters a subject whose prior organization makes a particular response possible. The paper therefore examines contingency through the interaction between an event and a historically constituted subject rather than through a simple opposition between randomness and necessity.

This account gives a particular role to serendipity. A contingent event can supply information, yet its epistemic importance can extend beyond information delivery. It can reorganize salience, activate a previously unmanifest question, connect otherwise separate experiences, or redirect an existing inquiry. The paper is especially concerned with this capacity of encounters to alter what can become a question for a subject.

Co-experience provides a further dimension of epistemic formation. Subjects can encounter a phenomenon together, respond to one another, and thereby alter the salience and interpretation of the event for each participant. Shared experience is therefore considered as a possible site of epistemic generation, rather than only a channel through which already completed information is transmitted. A past co-experience can also remain operative within later solitary perception when a present encounter reactivates a relation, association, question, or mode of attention formed through the earlier event.

These considerations support a relational account of the knowing subject. “Relational” in the present paper refers to the historically evolving organization through which bodies, environments, other subjects, practices, languages, memories, institutions, symbolic forms, and contingent encounters participate in epistemic formation. The term is used as an analytical framework. The argument does not require a complete relational ontology, and it does not claim that every epistemic phenomenon can be reduced to one uniform type of relation.

Within this framework, the contemporary significance of *gewu* is reconsidered through sustained contact with things and situations. Investigation can involve observation, attention, comparison, differentiation, testing, question formation, practical involvement, and revision. The significance of *zhizhi* is correspondingly extended beyond the acquisition of an additional proposition. It can include the formation of capacities through which a subject becomes able to encounter similar problems differently, form new questions, discriminate among alternatives, and revise earlier judgments.

Generative artificial intelligence introduces an important inversion into this relation. A familiar idealized sequence moves from encounter with a phenomenon through inquiry and differentiation toward

an articulated epistemic result. AI-mediated inquiry increasingly permits the articulated result to appear earlier. A proposition, explanation, distinction, or research question can therefore become available before the recipient has developed the corresponding trajectory of inquiry. The resulting symbolic object can subsequently become a new object of investigation. In this sense, a proposition supplied by AI can itself become something toward which a renewed practice of *gewu* is directed.

This inversion should not be interpreted as intrinsically epistemically harmful. AI can prematurely stabilize an indeterminate situation by supplying a distinction or answer before a subject has had an opportunity to develop the question. The same system can also introduce an unexpected comparison, counterexample, concept, or proposition that activates curiosity and opens a trajectory that would otherwise have remained unavailable. The paper therefore distinguishes provisionally between epistemic pre-emption and epistemic activation without treating either as an unavoidable consequence of AI use.

A further complication arises because generative systems can produce more than final answers. They can generate questions, objections, uncertainty, self-correction, apparent hesitation, sequences of revision, and narratives of discovery. A symbolically represented process of inquiry can consequently be generated in much the same way that a symbolically represented conclusion can be generated. The paper therefore avoids a simple opposition between product and process. An apparently generative process should not automatically be identified with an actual transformation in the epistemic capacities of the recipient.

This distinction leads to a narrower use of “generativity” within the essay. A representation can portray curiosity, revision, discovery, or reflection. A historical process can have an actual provenance through which the relevant representation was produced. A representation can also have downstream generative consequences by provoking real curiosity, judgment, disagreement, or further inquiry in another subject. These dimensions can coincide, but they should remain analytically distinguishable. A generated account of inquiry can still become the occasion for genuine later inquiry.

The normative argument of the paper therefore concerns the preservation of generative conditions rather than the preservation of epistemic friction itself. Difficulty, delay, uncertainty, and failed attempts can sometimes contribute to learning, and they can also consume attention without producing substantial epistemic development. The relevant question is whether a practice supports capacities for attention, curiosity, encounter, judgment, revision, world-directed investigation, co-experience, and the generation of further questions.

This orientation has implications for education. The paper provisionally uses the expression “non-substitutive education” for pedagogical arrangements in which teaching and computational assistance support the learner’s epistemic formation without consistently replacing processes that are important to that formation. Non-substitution does not require withholding available knowledge or forcing learners to reproduce historical difficulties. It requires attention to which aspects of inquiry can be delegated without undermining the learner’s capacity to notice, question, judge, and investigate.

The same orientation supports renewed attention to direct and world-directed encounter. Primary sources, observation, field experience, experiment, creation, conversation, and shared inquiry can matter because they expose the learner to phenomena whose significance has not been fully stabilized in advance. Their value should not be romanticized or universalized. They provide forms of relational and contingent exposure that can complement the efficient delivery of already articulated knowledge.

The paper also develops a preliminary practical implication for public knowledge practices. Scholarly and archival systems are highly effective at preserving stabilized outputs such as papers, datasets, code, citations, and successive document versions. When the genesis of knowing itself becomes more epistemically significant, there may also be value in preserving sufficient generative provenance: selected records of the events, relations, revisions, questions, encounters, debates, and changing states through which an epistemic result became possible.

“Sufficient” is essential to this proposal. The paper does not advocate total recording of intellectual life, continuous surveillance of researchers, or the preservation of every intermediate state. Complete reconstruction of an epistemic history is generally impossible, costly, invasive, and conceptually misleading. The practical proposal concerns the possibility of preserving epistemically salient portions of

a generative trajectory where doing so serves research, education, interpretation, accountability, or later inquiry.

The formal representation of such provenance lies outside the scope of the present essay. Questions concerning entities, properties, relations, states, processes, events, event-driven recording, domain-specific vocabularies, formal languages, provenance grammars, storage systems, privacy, security, legal rights, governance, political economy, and educational implementation constitute a separate interdisciplinary research programme. The present paper provides philosophical motivation for that programme rather than an engineering architecture.

Questions concerning trust, the recognizability of subjects, artificial companionship, experiential symmetry, and the relational reality of artificial agents are likewise reserved for subsequent work. These problems become important once symbolic appearances and even representations of epistemic genesis can be generated. Their full treatment would shift the principal object from the formation of human knowing to the recognition and ontological status of the subject who appears to know. The current essay retains *gewu zhizhi* and human epistemic formation as its central objects.

The relation between this paper and the preceding studies of curiosity and pre-propositional epistemic genesis should also remain clear. The earlier inquiries examined how something becomes question-worthy and how knowing can develop before stabilization into an explicit proposition. The present essay places those concerns within the practical transformation introduced by generative AI and asks what forms of epistemic formation should remain valuable when articulated results can increasingly be supplied in advance. The continuity is intentional, while the present paper has a distinct historical and normative problem.

The paper should therefore be read as a philosophical reconsideration with practical implications rather than as a complete theory of knowledge, a historical reconstruction of Confucian epistemology, an empirical study of AI learning, or a technical specification for future knowledge infrastructure. Its principal question remains comparatively modest: when obtaining a knowledge-like symbolic result no longer requires an equivalent human trajectory of knowing, what should *gewu zhizhi* preserve? The proposed answer locates its continuing significance in the relational conditions through which symbols can return to things, encounters can become questions, received propositions can become objects of investigation, and subjects can continue to be formed through knowing.

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1 Introduction

Human knowledge has long depended upon forms of epistemic inheritance. A student does not rediscover geometry before using a theorem, a physician does not reproduce the complete history of biomedical research before consulting a clinical result, and a philosopher can begin from distinctions developed over centuries without independently reconstructing every trajectory through which those distinctions became available. Testimony, teaching, writing, archives, institutions, instruments, and division of epistemic labour allow articulated results to travel further than the particular processes through which they first emerged. The possibility of receiving knowledge from others is therefore ordinary rather than exceptional within human epistemic life.

Generative artificial intelligence nevertheless alters the scale, speed, and form of this inheritance. A user can now request an explanation, conceptual distinction, counterargument, research question, comparison, summary, or structured line of reasoning and receive a developed symbolic product within seconds. The resulting text can resemble an output that, under other conditions, might have followed prolonged reading, observation, discussion, comparison, and revision. Recent work has consequently emphasized the widening distance between linguistic or propositional appearance and the epistemic states ordinarily inferred from such appearances. Baum characterizes this change through the decreasing cost of the “appearance of knowing,” while distinguishing proposition-producing systems from the epistemic states that their outputs may conventionally suggest [2]. Earlier debates concerning large language models have likewise drawn attention to the difference between linguistic form and meaning, and to the conceptual risks involved in attributing human epistemic predicates directly from fluent language behaviour [3, 28].

The present essay begins from this altered condition while directing the problem toward human knowing. The phrase “when knowledge production no longer requires knowing” in the title is intentionally provocative and requires qualification. “Knowledge production” here refers to the production of symbolic objects that can function within epistemic practices as explanations, claims, distinctions, arguments, questions, and other knowledge-like products. The phrase does not presuppose that every generated output constitutes knowledge in a strict epistemological sense. Nor does it settle whether an artificial system knows, understands, believes, experiences, or possesses epistemic agency. The narrower problem concerns what happens to human epistemic formation when a developed epistemic product can be made available before the recipient has undergone an equivalent trajectory of knowing.

This separation is significant because obtaining a proposition and becoming a knower are not obviously the same event. A subject can repeat a conclusion without understanding the considerations that make it significant. A distinction can be linguistically available before the subject has learned to recognize the situations in which the distinction matters. An explanation can be intelligible sentence by sentence while leaving the recipient unable to judge its scope, identify its assumptions, generate an objection, or recognize a nearby case in which it fails. Conversely, a subject can already have begun to know something before possessing a stable proposition through which that development can be communicated. Previous philosophical accounts of inquiry, tacit knowing, and concept formation provide different resources for understanding such intervals between experience, articulation, and stabilized epistemic result [6, 23, 8].

Generative AI makes the relation between these phenomena newly visible because the articulated result can increasingly arrive first. A learner can encounter a sophisticated distinction before having experienced the confusion from which the distinction might otherwise have emerged. A researcher can receive a list of plausible questions before any particular feature of the material has become puzzling. A philosophical objection can be supplied before the reader has become dissatisfied with the position to which the objection responds. Even a sequence resembling inquiry can be generated: an initial hypothesis, an apparent difficulty, a counterexample, a qualification, and a revised conclusion can all be presented as an ordered symbolic trajectory. The availability of such representations does not determine what later happens to the recipient. It does, however, make it increasingly difficult to infer a corresponding process of human epistemic formation from the existence of the symbolic result alone.

This condition provides the contemporary point of entry for reconsidering *gewu zhizhi*, conventionally rendered here as “investigating things and extending knowledge.” The expression has a long and contested interpretive history, and its meanings cannot be reduced to a modern theory of inquiry. Classical discussions associated with the *Great Learning*, Zhu Xi, Wang Yangming, and subsequent traditions connect investigation and knowing with broader questions of cultivation, conduct, moral development, and the ordering of human life. The historical literature therefore requires treatment on its own terms. The present essay uses *gewu zhizhi* more modestly as a philosophical lens through which to reconsider the relation among things, encounter, investigation, articulation, and the formation of a knower under conditions of generative AI.

The central difficulty can be expressed through an inversion. An idealized account of inquiry might move from an encounter with something in the world, through attention, uncertainty, questioning, investigation, and differentiation, toward an articulated epistemic result. Generative AI permits a substantially different ordering. The articulated proposition, distinction, or explanation can become available before much of the recipient’s inquiry has occurred. The proposition can therefore precede the knowing. Yet this inversion does not imply the disappearance of investigation. Once received, the proposition can itself become something encountered, tested, compared, questioned, revised, or brought back into relation with the world. What arrives as an answer can become a new object of *gewu*.

The possibility of this reversal prevents a simple opposition between AI-assisted knowledge and genuine human inquiry. A generated answer can close an emerging question prematurely. A subject who has only begun to notice that something is strange can be given a ready-made distinction that organizes the situation before alternative interpretations have become available. In this case, symbolic articulation can pre-empt part of the process through which curiosity and judgment might otherwise have developed. The same technology can also produce an unexpected analogy, expose a counterexample, connect previously separate domains, or formulate a distinction that causes the recipient to notice something that had remained invisible. In such cases, the generated symbol becomes a contingent event within a new trajectory of inquiry. AI can therefore participate in both epistemic pre-emption and epistemic activation.

The distinction between these possibilities directs attention away from the mere presence or absence of computational assistance. The more fundamental question concerns the conditions under which a symbolic product becomes generative for a subject. An answer can terminate inquiry, remain inert, or become the beginning of another inquiry. A distinction can substitute for judgment, or it can make finer judgment possible. A generated research question can be accepted as a task supplied from outside, or it can reorganize the recipient’s attention until the underlying phenomenon becomes genuinely question-worthy. The epistemic significance of an AI-mediated interaction therefore cannot be read from the generated artifact alone.

This problem requires a closer account of how knowing begins. Explicit questioning is important, yet an inquiry need not begin with a fully articulated question. A phenomenon can first become strange, disturbing, beautiful, incongruous, familiar in a newly significant way, or otherwise capable of interrupting an ongoing orientation. A subject can pause before being able to say what has become important. Dewey’s account of inquiry famously places an indeterminate situation prior to the formulation of a determinate problem [6]. Related questions arise in phenomenological and experiential approaches that attend to the manner in which a world is already encountered through embodied and historically organized forms of significance [22, 8]. The present essay draws upon these resources to examine the interval in which something becomes epistemically salient before a stable question has been completed.

Curiosity can emerge within this interval. The manifest event of curiosity need not mark the beginning of all the conditions that make curiosity possible. A subject enters an encounter with a history of language, memories, prior questions, unresolved tensions, conceptual resources, practices, attachments, and previous relations. A scene that is unremarkable to one subject can interrupt another because it enters a different historical organization. Accordingly, the claim developed here is limited. It does not posit an invisible substance of curiosity continuously present before curiosity becomes manifest. It proposes that the relational and historical conditions through which curiosity becomes possible can precede the recognizable episode in which a subject begins to ask.

Aesthetic interruption provides a simple illustration. A person may be engaged in an unrelated conversation and suddenly stop upon seeing evening light fall across a wall, a landscape, a building, or another person. The interruption can occur before an explicit aesthetic judgment has been formulated. Its significance can deepen when the present scene reactivates a previous relation. The light may recall a similar scene once encountered with someone loved, and the earlier co-experience can thereby become dynamically operative within a later solitary perception. What eventually becomes a question about beauty may therefore begin in an encounter through which perception, memory, feeling, and relational history reorganize attention. The example is not offered as a general theory of aesthetic value. Its relevance lies in showing that an object can become worthy of inquiry through a history that is absent from the proposition eventually used to describe it.

Contingency is central to this process. A subject cannot deliberately schedule every event from which a future question will emerge. A conversation can expose an assumption that had remained unnoticed. A failed attempt can reveal a distinction unavailable during uninterrupted success. An accidental encounter with a place, person, text, image, sound, or practical problem can redirect an existing inquiry or initiate an unforeseen one. Such contingency does not imply that the resulting epistemic event lacks conditions. The same encounter can remain irrelevant for one subject and become formative for another. Its effect depends upon the organization into which it enters.

This relation between prior organization and contingent event also makes co-experience epistemically significant. Human knowing frequently develops through situations in which several subjects encounter something together, attend to different dimensions of it, respond to one another, and thereby change what becomes salient for each participant. The resulting process cannot always be represented adequately as one subject transmitting a completed item of information to another. A shared encounter can participate in the generation of the question itself. The history of that encounter can remain operative after the participants separate, shaping later memory, interpretation, and attention.

These cases suggest a conception of epistemic formation that extends beyond the accumulation of symbolic contents. A knower is formed through changing capacities to notice, discriminate, question, compare, judge, test, revise, and continue inquiry. Symbolic articulation remains indispensable within this process. A proposition can stabilize a distinction, make disagreement possible, expose an assumption, support criticism, and allow knowledge to circulate beyond the event in which it emerged. The argument therefore gives no priority to an allegedly pure pre-symbolic experience over language or conceptualization. The relevant problem concerns the relation between symbolic products and the broader processes through which those products acquire epistemic significance for a subject.

This perspective changes the question posed to *gewu zhizhi*. If the principal value of investigation were merely the production of a proposition that can now be supplied more efficiently by another agent, then generative AI would appear to remove much of the need for the investigative trajectory. Human inquiry would remain useful primarily where the machine lacked an answer. A conception of *gewu zhizhi* centred on epistemic formation produces a different result. Investigation continues to matter where encounter with things, attention, curiosity, comparison, practical testing, judgment, revision, and relations with other subjects contribute to capacities that cannot be identified with possession of the final proposition alone.

The practical implication is therefore not a general demand for slower learning. Epistemic difficulty has no intrinsic virtue. Repeating avoidable errors, withholding useful information, or reconstructing every inherited result can waste finite attention and restrict access to knowledge. Generative AI can remove unproductive burdens and open trajectories of inquiry that would otherwise remain inaccessible. The relevant normative question is more selective: which forms of encounter, uncertainty, judgment, co-experience, and revision remain important because they participate in the formation of a subject capable of continuing to know?

The same question complicates an apparently straightforward recommendation to preserve “the process.” Generative AI can produce representations of process as readily as representations of results. It can generate a question, an objection, a moment of hesitation, a sequence of failed attempts, a self-correction, and a narrative of eventual discovery. A represented trajectory can be pedagogically useful,

and it can genuinely provoke later inquiry in a human recipient. Its process-like form nevertheless does not establish that the corresponding epistemic transformation has occurred. The distinction therefore lies less between product and process than between a symbolic representation of epistemic activity and the actual formation of capacities through which a subject's later relation to the world is changed.

This distinction provides the basis for the constructive proposals developed later in the essay. Education can be evaluated according to whether assistance supports or substitutes for epistemically important forms of formation. AI-mediated inquiry can be organized so that generated propositions return to primary materials, observation, comparison, judgment, and further question formation. Shared and world-directed forms of learning can retain importance because they expose subjects to events whose significance has not been completely stabilized in advance. Public knowledge practices can also begin to consider whether final artifacts alone preserve enough information about the conditions through which an epistemic result became possible.

The last implication motivates a preliminary proposal concerning *generative provenance*. Scholarly infrastructures preserve papers, datasets, code, citations, publication histories, and increasingly detailed versions of digital artifacts. Such records remain essential. If the conditions through which knowing emerges acquire greater epistemic importance, there may also be value in selectively preserving significant questions, revisions, encounters, debates, relations, changing states, and contingent events associated with an epistemic result. The relevant aim is sufficient generative provenance rather than total capture. A complete record of intellectual life would be impractical, invasive, and epistemically misleading. The formal modeling, event vocabulary, infrastructure, legal framework, security mechanisms, governance, and political economy of such preservation form a separate research programme. The present essay advances only the philosophical motivation for treating generative provenance as a potential public epistemic resource.

The argument remains centred on the formation of human knowing. Questions concerning whether symbolic appearances permit reliable recognition of another subject, how trust changes when epistemic performances can be generated, what forms of shared history are possible between humans and artificial agents, and whether artificial agents can acquire a distinctive relational reality raise further philosophical problems. Those problems follow naturally from the present analysis, yet their treatment requires a different object of inquiry. They are therefore reserved for subsequent work.

The paper proceeds in several stages. Section 2 reviews the philosophical and interdisciplinary resources relevant to *gewu zhizhi*, curiosity and inquiry, tacit and articulated knowing, phenomenological accounts of situated experience, social epistemology, and recent discussions of generative AI. Section 3 examines major kinds of knowledge and adjacent epistemic achievements, and clarifies why a taxonomy of knowledge does not by itself provide a theory of the genesis of knowing. Section 4 develops the relational account of epistemic formation through historically constituted subjects, curiosity, existential and affective salience, contingency, aesthetic interruption, and co-experience. Section 5 then reconstructs *gewu zhizhi* under contemporary conditions and examines the inversion through which an articulated proposition can precede the knowing and subsequently become an object of renewed investigation.

Section 6 considers the further complication that AI can generate representations of inquiry and revision alongside final answers, and distinguishes represented generativity from actual epistemic formation and downstream generative effects. Section 7 identifies the epistemic conditions that remain especially important when symbolic products become inexpensive to obtain. Section 8 develops implications for education, AI-assisted inquiry, world-directed and shared learning, and the preservation of generative provenance. The final discussion and conclusion return to the principal question: what should *gewu zhizhi* preserve when obtaining a developed symbolic result no longer requires an equivalent human trajectory of knowing?

2 Literature Review and Philosophical Background

The problem developed in this essay lies at the intersection of several literatures that are rarely organized around the same question. Classical discussions of *gewu zhizhi* concern the relation among investigation,

knowledge, cultivation, and action. Philosophical and psychological accounts of curiosity examine the emergence and motivation of inquiry. Work on tacit knowing, understanding, and pre-articulated experience complicates the identification of knowing with possession of propositions. Phenomenological approaches examine how a world becomes available through embodied and affective orientations. Social epistemology and research on joint attention establish that knowledge acquisition is deeply dependent upon other subjects and shared epistemic environments. More recent work on generative AI examines the increasing separation among linguistic performance, epistemic attribution, trust, authorship, and the processes through which knowledge claims are produced. This section reviews these resources while preserving the differences among their respective questions and theoretical commitments.

2.1 *Gewu Zhizhi* and Traditions of Epistemic Cultivation

The expression *gewu zhizhi* occupies a central place in the interpretive history of the *Great Learning*. Its later importance cannot be understood through a simple lexical translation of *gewu* as “investigating things” and *zhizhi* as “extending knowledge.” The expression became embedded within competing accounts of learning, moral cultivation, the relation between mind and principle, and the connection between knowing and acting. For that reason, the present essay treats the conventional English rendering as a useful entry point rather than as a complete statement of the concept’s historical meaning.

Zhu Xi’s reconstruction of the *Great Learning* gave *gewu zhizhi* a particularly influential place within a sequential programme of learning and self-cultivation. His interpretation, developed from earlier Cheng traditions, connects the extension of knowledge with the progressive investigation of the patterns or principles encountered in things. Zhu Xi’s account does not reduce investigation to passive inspection of isolated physical objects. The relevant practice includes the study of texts, examination of conduct and affairs, comparison among cases, and cumulative clarification of what remains insufficiently understood [31, 19]. In the *Zhuzi yulei*, investigation is repeatedly described as directed toward what has not yet been sufficiently understood, while accumulated inquiry is expected to expand the learner’s capacity to recognize principle across particular cases. This gives *gewu zhizhi* a developmental structure in which the extension of knowledge is inseparable from sustained learning rather than a single act of information acquisition.

The later contrast with Wang Yangming is equally important. Wang’s famous retrospective account of attempting to investigate bamboo has often been used to dramatize his dissatisfaction with an interpretation of Zhu Xi that seemed to require exhaustive inquiry into principle as located in external things. Wang’s mature philosophy increasingly relocates the work of investigation within the rectification of the mind and the realization of innate moral knowing, while developing a close relation between knowledge and action [31]. The historical and interpretive issues are more complex than a simple opposition between an externally oriented Zhu Xi and an internally oriented Wang. Contemporary scholarship has emphasized both the breadth of Zhu Xi’s conception of investigation and the ethical and practical dimensions shared across these traditions [19].

This history matters for the present essay because *gewu zhizhi* already resists a purely informational reading. Knowledge in these traditions is situated within practices through which a learner becomes differently capable of apprehending, judging, and acting. At the same time, the current paper does not treat classical Confucian cultivation as equivalent to contemporary epistemology or to the relational account developed later. The historical material provides a philosophical resource for reconsidering the relation between investigation and the formation of the knower. The specific problems introduced by generative AI remain contemporary problems and require their own analysis.

2.2 Inquiry, Curiosity, and Epistemic Motivation

A second body of literature concerns the origin and motivation of inquiry. Aristotle’s well-known association between human beings, wonder, and the desire to know provides an early formulation of the intuition that epistemic activity is motivated by more than the instrumental value of information. Modern

accounts have differentiated curiosity, wonder, uncertainty, information seeking, problem recognition, and inquiry, while disagreeing about the mechanisms through which these phenomena arise.

Dewey's theory of inquiry is especially relevant because inquiry does not begin with a fully stabilized question. An indeterminate situation precedes the determinate formulation of a problem, and inquiry transforms the situation through operations that progressively establish relevant distinctions and relations [6]. The question is therefore itself an achievement within inquiry rather than an epistemically transparent starting point. This feature is important for the present essay because AI systems are increasingly able to supply questions and conceptual distinctions at precisely the stage at which a human subject might otherwise still be experiencing an indeterminate situation.

Psychological research has often treated curiosity through more specific motivational mechanisms. Loewenstein's information-gap account describes curiosity as arising when a subject becomes aware of a gap between what is known and what the subject seeks to know [20]. The model has been influential because it explains why partial knowledge can increase rather than satisfy information seeking. It also directs attention to the situational determinants through which a knowledge gap becomes salient. Subsequent work has broadened the study of curiosity beyond a single mechanism. Kidd and Hayden review psychological and neuroscientific research in which curiosity is treated as a major motivation for information seeking, while also emphasizing the lack of a universally accepted definition and the value of studying information-seeking motivations within their contexts [17].

These approaches provide important resources without settling the problem addressed here. An information gap presupposes that some difference between known and unknown has already become cognitively available. Dewey's account allows greater attention to the preceding indeterminacy through which a problem becomes formulated. The present essay is concerned with a still broader set of conditions through which something becomes capable of eliciting curiosity in a particular subject. Memories, prior questions, affective orientation, relationships, practical concerns, and contingent encounters can participate in the transition from an unremarkable environment to an epistemically salient situation. The argument developed later therefore concerns the genesis of manifest curiosity without requiring that curiosity be reduced to one psychological mechanism.

2.3 Tacit Knowing, Articulation, and Understanding

The distinction between articulated epistemic products and the formation of a knower also draws upon literature that challenges an exclusively propositional picture of knowing. Polanyi's account of tacit knowing is built around the claim that human cognition relies upon forms of awareness and skill that cannot always be exhaustively specified in explicit propositions [23]. Recognition, skilled performance, scientific discovery, and perceptual organization frequently depend upon subsidiary awareness that supports focal attention without itself becoming completely articulated. Polanyi's formulation does not imply that explicit knowledge is unimportant. It identifies a relation in which explicit articulation depends upon capacities and forms of awareness whose operation exceeds the articulated statement.

Gendlin develops a different account of the relation between experience and language. His analysis of experiencing and felt meaning examines the movement between what has already been formulated and a more intricate experiential background from which further formulations can emerge [8]. A new formulation does not merely extract a pre-existing proposition from an internal store. Articulation can transform the experiential field from which further distinctions subsequently become possible. This makes the relation between pre-articulated experience and symbolic expression generative in both directions.

Contemporary epistemology has also renewed interest in understanding as an epistemic achievement whose value may differ from the value of possessing isolated items of knowledge. Grimm's review of this literature identifies several reasons philosophers have treated understanding as especially significant, including its association with grasping explanatory or structural relations and with forms of cognitive achievement that exceed the correctness of individual beliefs [10]. There remains substantial disagreement concerning whether understanding constitutes a species of knowledge, a distinct epistemic state, an ability, or a family of related achievements. The present essay does not require resolution of that debate.

Its relevance lies in the widely recognized possibility that a subject can possess a true or well-supported proposition without possessing the broader relational grasp ordinarily associated with understanding.

Together, these literatures complicate any direct inference from a symbolic result to a completed epistemic achievement. Tacit capacities can precede and support articulation. Articulation can reorganize subsequent experience. Understanding can involve relations among propositions, explanatory dependencies, abilities, or forms of grasp that are not exhausted by the possession of a sentence. These distinctions become particularly important when generative systems can supply increasingly sophisticated symbolic products independently of the recipient's prior epistemic trajectory.

2.4 Phenomenology, Feeling, and Situated Existence

A further resource comes from phenomenological accounts in which perception and cognition are situated within an embodied relation to a world. Merleau-Ponty's phenomenology of perception rejects a picture in which a detached subject first receives neutral sensory data and subsequently assigns meaning to them. Perception is already structured through bodily capacities, practical orientations, spatial relations, habits, and forms of directedness toward the world [22]. What becomes available for attention therefore depends partly upon the manner in which a subject is already situated.

Ratcliffe's account of existential feeling offers a more specific vocabulary for examining the felt background of situated existence. Existential feelings are described as ways of finding oneself in a world, including pervasive senses of familiarity, unfamiliarity, belonging, estrangement, possibility, or reality [24]. Such feelings are not simply evaluations of discrete objects. They can shape the background against which particular objects and possibilities become salient. Ratcliffe develops this account in both ordinary and psychiatric contexts, with particular attention to the manner in which alterations in existential feeling transform the experienced structure of a world.

The present essay draws from this literature cautiously. It does not claim that every question originates in an existential feeling, nor that affect supplies epistemic justification. Feeling can be epistemically consequential without serving as evidence for the truth of a proposition. A scene may interrupt attention because it appears beautiful, uncanny, disturbing, or personally significant. That interruption can become part of the history through which a question later emerges. The phenomenological literature therefore provides resources for describing a stage of epistemic genesis that is easily obscured when inquiry is reconstructed retrospectively as a sequence beginning with an already articulated problem.

This distinction is especially relevant to aesthetic experience. A subject can be arrested by a scene before possessing an explicit account of why the scene matters. The experienced significance may depend upon bodily orientation, memory, personal history, or earlier relations. The present essay does not develop an independent aesthetics from these observations. Aesthetic interruption functions instead as a limiting case in which the transition from world-disclosure to attention and later inquiry becomes especially visible.

2.5 Social Epistemology and Shared Epistemic Situations

Human knowing is also dependent upon other subjects. Contemporary social epistemology has extensively examined testimony, disagreement, collective knowledge, epistemic institutions, and the social organization of inquiry. Testimony is paradigmatic because much of what any individual knows depends upon the reports and epistemic authority of others. The philosophical problem therefore concerns the conditions under which such dependence is justified and the ways in which knowledge can be transmitted or generated through testimony [11]. The broader literature has made it increasingly difficult to treat epistemic dependence as a peripheral exception to self-sufficient individual knowing.

Testimony, however, does not exhaust the social dimensions relevant to the present essay. Joint attention provides another structure in which several subjects are directed toward a common object or situation. Work collected by Eilan and colleagues examines joint attention as a basis for communication, understanding other minds, common knowledge, and coordinated interaction [7]. More recent work by

Seemann argues that joint attention can provide a perceptual basis for forms of common knowledge, emphasizing the social mode in which an environment becomes jointly available to participants [27]. These accounts are relevant because the epistemic significance of a shared event cannot always be reduced to one participant transferring a completed proposition to another.

The present essay uses the broader term *co-experience* for cases in which subjects encounter something together and their responses become part of the developing significance of that event. Co-experience is not introduced as a replacement for the established concepts of joint attention, shared intentionality, common knowledge, or collective experience. It identifies a broader practical configuration relevant to epistemic formation. Participants can notice different features, draw one another’s attention to them, disagree about their significance, and later remember the event through the history of their interaction. A shared encounter can therefore contribute to the generation of a question rather than merely facilitate the circulation of an answer.

This distinction becomes important for the educational implications developed later. If knowing were principally a matter of receiving correct propositions, testimony and high-quality AI output might perform many of the relevant functions efficiently. If epistemic formation also involves the emergence of attention, questioning, judgment, and interpretation within shared situations, then forms of joint inquiry retain a role that cannot be evaluated solely by the amount of information transmitted.

2.6 Generative AI, Epistemic Appearance, and Knowledge Practices

Recent literature on large language models has increasingly examined the epistemic consequences of systems capable of producing fluent, contextually appropriate, and apparently knowledgeable language. Bender and Koller draw a foundational distinction between success at linguistic form and the conditions required for meaning, arguing against the inference from successful language modeling to human-like understanding [3]. Shanahan similarly cautions against unreflective application of human psychological and epistemic vocabulary to large language models, emphasizing the conceptual confusions that can arise when linguistic performance is treated as transparent evidence of corresponding human-like states [28].

More recent work has shifted from the capacities of the model alone toward the interaction between model outputs and human epistemic practices. Heersmink and colleagues analyze large language models as epistemic technologies whose interactional fluency can make appropriate calibration of trust difficult [12]. Their analysis emphasizes a combination of technical opacity and phenomenological transparency: users can interact with the system smoothly while remaining poorly positioned to assess the processes underlying its output. Kay, Kasirzadeh, and Mohamed broaden the concern to collective knowledge practices, arguing that generative AI can produce new forms of epistemic injustice by affecting testimony, hermeneutical resources, access, and the integrity of information environments [16].

The relation between generated language and authorship has also become a direct object of analysis. Srivastava argues that large-scale language generation can weaken established connections among text, human thought, intention, and authorship, introducing the concept of “epistemic doppelgängers” for AI-generated texts that are difficult to distinguish from human-authored counterparts [29]. The same paper develops hybrid authorship graphs and proof-of-interaction proposals as responses to the increasing difficulty of inferring provenance from linguistic artifacts alone. This work is particularly relevant to the present essay because it demonstrates that provenance and interaction are already becoming practical concerns once text ceases to function as a reliable indicator of a conventional human production history.

Baum develops a related organizational argument through the concept of the “appearance of knowing.” Generative epistemic technologies can reduce the cost of producing propositions that display many of the surface characteristics traditionally associated with knowledgeable agents, thereby disturbing organizational practices that rely on such appearances as evidence [2]. This formulation is close to one of the starting points of the present essay. The availability of apparently knowledgeable outputs weakens the inference from symbolic product to the epistemic history normally associated with the product.

The present paper therefore does not claim novelty for the general observation that generative AI can separate linguistic appearance from human understanding, authorship, or trustworthy epistemic agency. These concerns are already well established. Its focus lies elsewhere. Once the correspondence between

symbolic result and human epistemic trajectory becomes increasingly uncertain, the question arises as to which aspects of that trajectory continue to matter for the formation of a knower. The relevant objects include curiosity, world-directed encounter, felt salience, contingency, co-experience, judgment, revision, and the capacity to generate further questions.

2.7 Position of the Present Essay

The literatures reviewed above provide substantial resources for understanding individual components of the present problem. Classical interpretations of *gewu zhizhi* connect investigation with cultivation and the extension of knowledge. Theories of inquiry and curiosity examine the conditions that motivate information seeking and transform indeterminacy into determinate problems. Accounts of tacit knowing and understanding distinguish articulated results from broader epistemic capacities. Phenomenology examines the embodied and affective conditions through which a world becomes salient. Social epistemology and joint-attention research establish the constitutive importance of epistemic dependence and shared situations. Recent AI literature demonstrates that linguistic appearance, authorship, epistemic agency, and trust can become increasingly difficult to infer from generated symbolic products.

The present essay does not attempt to synthesize these traditions into a single general epistemology. Their concepts emerge from different theoretical projects, and several of their assumptions are mutually contestable. The more limited purpose is to place them around a contemporary transformation in the ordering of epistemic activity: a developed symbolic result can increasingly be supplied before the recipient has undergone a trajectory through which a similar result would otherwise have become salient, questionable, intelligible, and revisable.

This transformation motivates a shift of analytical emphasis from the availability of knowledge products toward the conditions of epistemic formation. The claim is not that curiosity, feeling, contingency, shared experience, or historical relation have become important for the first time. Each has an extensive intellectual history. The change concerns their relative epistemic significance under conditions in which the symbolic artifacts ordinarily associated with successful inquiry can be generated with decreasing dependence upon the recipient's own inquiry.

The resulting question is therefore narrower than a general philosophy of AI and broader than a theory of information acquisition. It asks what should remain of *gewu zhizhi* when the production or acquisition of an articulated epistemic result no longer requires an equivalent human trajectory of knowing. The following section first clarifies what epistemology ordinarily distinguishes as kinds of knowledge and adjacent epistemic achievements. That taxonomy is necessary for avoiding an indiscriminate use of the term "knowledge." It will also expose the limit that motivates the remainder of the essay: a taxonomy of what is known does not yet explain how something becomes an object of knowing for a historically and relationally constituted subject.

3 Kinds of Knowledge and Epistemic Achievement

The preceding discussion has repeatedly distinguished epistemic products from the formation of a knower. Before developing that distinction further, it is necessary to clarify what the term "knowledge" is being used to cover. Ordinary language permits a wide range of constructions: a person can know that a proposition is true, know another person or a place, know how to perform an activity, know why an event occurred, know what something is like, or be said to understand a subject matter. Epistemology has not produced a single taxonomy under which all of these expressions are uncontroversially classified. A customary introductory distinction nevertheless separates propositional knowledge, knowledge by acquaintance, and knowledge-how, while contemporary debates examine whether some of these categories can be reduced to others [25, 26, 30].

The purpose of the present section is not to adjudicate these debates. It uses a conventional taxonomy to establish a sufficiently stable conceptual background for the later argument. Understanding is treated separately as an adjacent epistemic achievement whose relation to knowledge remains contested. Per-

ception, memory, inference, testimony, teaching, and AI-mediated access are then distinguished from kinds of knowledge because they concern ways through which epistemic contents or capacities can be acquired, sustained, or transmitted. This separation is important for the argument of the paper. A technology can alter the mode through which a proposition becomes available without thereby determining what kind of epistemic achievement the recipient has attained.

3.1 Propositional Knowledge

Propositional knowledge, or knowing-that, concerns knowledge that something is the case. To know that water freezes under specified conditions, that a historical event occurred, that a mathematical theorem follows from certain premises, or that a particular interpretation has textual support is to stand in an epistemically successful relation to a proposition. Much of analytic epistemology has concentrated on this form of knowledge because propositions can be assessed for truth, belief, justification, evidence, reliability, and other conditions central to theories of knowledge.

The familiar analysis of propositional knowledge in terms of justified true belief provides a historical point of orientation, although Gettier's brief counterexamples demonstrated that truth, belief, and justification, understood in a straightforward manner, are not jointly sufficient for knowledge [9]. Subsequent epistemology has developed numerous alternatives involving defeasibility, reliability, safety, sensitivity, epistemic virtue, and other conditions. The present paper does not require a commitment among these competing analyses. It requires only the comparatively uncontroversial point that propositional knowledge is more demanding than the mere presence of a sentence that expresses a true proposition.

This point becomes particularly important in AI-mediated settings. Suppose a learner requests an explanation of a mathematical result and receives a correct statement of the theorem together with a valid derivation. The proposition is now available to the learner in a way in which it was not available moments earlier. Several epistemic possibilities remain open. The learner may read the statement without believing it, may believe it only because the system produced it, may possess adequate grounds for accepting it after verification, or may eventually integrate the result into a wider mathematical understanding. Availability of propositional content therefore does not by itself determine the recipient's epistemic standing toward that content.

The distinction also applies to the production side. A document can contain a large number of correct propositions without settling who, if anyone, knows them in virtue of the document's production. This problem is not unique to AI. Databases, automated measurement systems, calculators, and institutional reports have long generated or stored propositions whose epistemic status for particular human users depends upon additional relations of interpretation, validation, and justified reliance. Generative AI intensifies this separation because propositions can be produced together with explanations, objections, and contextual framing that make the resulting artifact resemble a completed episode of inquiry.

For the present argument, propositional knowledge is therefore necessary but insufficient as a model of epistemic formation. A subject who comes to know that p has attained an important epistemic result. The fact that the subject knows that p does not yet explain why p became significant, how the subject learned to discriminate the situations in which p applies, what prior relations made the question salient, or whether the acquisition of p changed the subject's capacity to continue inquiry. These further questions concern the genesis and organization of knowing rather than the classification of the resulting proposition alone.

3.2 Knowledge by Acquaintance

Knowledge by acquaintance provides a contrasting form of epistemic relation. Russell's classical distinction separates knowledge of truths from a more direct cognitive relation to things with which a subject is acquainted [25]. The precise objects and epistemological role of acquaintance in Russell's theory are historically specific and remain philosophically contestable. The distinction nevertheless preserves an ordinary intuition that knowing about something through descriptions differs from being directly familiar with the relevant person, place, sensation, practice, or object.

A person may possess extensive propositional information about Kyoto without having visited Kyoto. Someone can know that a particular fragrance contains certain chemical compounds without having smelled it. A student can learn a detailed historical description of a ritual without ever participating in or observing the practice. Such cases should not be used to establish a general hierarchy in which direct acquaintance is always epistemically superior to description. Descriptions can correct misleading experience, and many objects of knowledge are inaccessible to direct acquaintance. The distinction instead indicates that different relations to the same subject matter can support different forms of epistemic access.

This difference matters for *gewu zhizhi*. If investigation of things is interpreted exclusively as the acquisition of propositions about things, then a sufficiently capable informational intermediary can often substitute for direct encounter. If investigation can also involve becoming familiar with how a phenomenon appears, changes, resists expectation, or enters practical activity, then description and encounter perform different epistemic roles. A generated account of a city street, a physical material, an artwork, a social institution, or an interpersonal practice can prepare a subject for inquiry, yet it does not reproduce every relation available through encounter with the relevant phenomenon.

The distinction is especially visible in cases of epistemic salience. A person can know many propositions about a landscape without finding anything about the landscape question-worthy. A later encounter with the place can reorganize attention and make one feature suddenly significant. Conversely, an encounter can remain epistemically inert until a concept, description, or historical fact makes a previously unnoticed structure visible. Acquaintance and proposition therefore need not compete. They can enter a generative relation in which description reorganizes encounter and encounter reorganizes the significance of description.

AI-mediated knowledge makes this reciprocity increasingly important. A generative system can provide information about objects a user has never encountered and can direct attention toward features that the user might otherwise overlook. The resulting epistemic value can be substantial. The later argument consequently does not oppose mediated knowledge to direct experience. It asks which kinds of encounter remain significant when highly developed descriptions become inexpensive to obtain.

3.3 Knowledge-How

A third customary category is knowledge-how. Ryle's influential discussion distinguished intelligent performance from the possession and contemplation of propositions, challenging what he described as an intellectualist picture in which competent action requires prior application of explicit rules [26]. Knowing how to ride a bicycle, perform a surgical procedure, speak a language, improvise music, or conduct an experiment appears to involve capacities whose possession cannot be established simply by listing propositions that the agent can state.

The status of this distinction remains contested. Stanley and Williamson argue that knowledge-how can be analysed in propositional terms, developing an intellectualist account according to which knowing how involves knowing, of a way of performing an action, that it is a way to perform that action [30]. Subsequent literature has generated multiple forms of intellectualism, anti-intellectualism, and hybrid accounts. The present essay does not depend upon the claim that knowledge-how constitutes an irreducible species of knowledge.

What matters here is the practical difference between receiving an articulated instruction and acquiring the capacity ordinarily associated with competent performance. A person can read a detailed description of how to swim while remaining unable to swim. A student can possess the steps of a laboratory procedure while lacking the perceptual discrimination and motor coordination required to perform it reliably. A speaker can state grammatical rules while remaining unable to participate fluently in conversation. These cases are compatible with different theories of knowledge-how because even intellectualist accounts need not identify the possession of arbitrary verbal instructions with possession of the relevant knowledge.

Generative AI greatly increases the availability of procedural representation. It can produce instructions, demonstrations in textual form, troubleshooting sequences, practice plans, and adaptive explana-

tions. Such assistance can contribute directly to the acquisition of knowledge-how. It can also create an illusion of competence when the availability of procedural language is mistaken for the recipient's capacity to perform, discriminate, or adapt under changing conditions. The epistemically important question concerns what happens when the procedure encounters variation.

This point connects knowledge-how to the later emphasis on contingency. Competent practice often becomes visible when a situation departs from the example for which instructions were prepared. Materials behave differently, another person responds unexpectedly, an instrument produces an anomalous reading, or a familiar procedure fails. The subject must then discriminate which features matter and generate a response appropriate to the altered situation. The capacity to do so can depend upon accumulated practice, correction, perception, and prior failures. A procedural description can support this development without being identical to it.

For the present essay, knowledge-how therefore provides another example of the general distinction between symbolic availability and epistemic formation. AI can reduce the cost of accessing procedural representations while leaving open the extent to which interaction with those representations produces the capacities required for intelligent action.

3.4 Understanding

Understanding occupies a less settled position within epistemic taxonomy. Contemporary epistemologists distinguish several candidates, including propositional understanding, explanatory understanding, and objectual understanding of a subject matter. There is continuing disagreement over whether understanding is a form of knowledge, a distinct epistemic standing, an ability, a form of grasp, or a family of related achievements. Kvanvig's influential treatment argues for the distinctive epistemic value of understanding and emphasizes forms of coherent grasp that are not exhausted by the possession of isolated knowledge claims [18]. Subsequent literature has developed competing accounts of the factivity, gradability, value, and structural requirements of understanding [10].

The present paper therefore avoids treating understanding as an uncontroversial fourth kind of knowledge. It is more useful here as an adjacent epistemic achievement that exposes a limitation in identifying successful learning with the acquisition of correct propositions. A subject may know a number of propositions concerning a phenomenon while failing to understand how they relate. Conversely, scientific models and idealizations raise difficult questions about whether useful understanding can sometimes involve representations that are not literally true in every respect. These debates show that understanding concerns dimensions of epistemic organization that cannot be captured merely by counting known propositions.

The notion of grasp is particularly relevant to the current problem, even though grasp itself requires further analysis. To understand a phenomenon is often associated with being able to recognize dependencies, compare relevant alternatives, explain why a result changes when conditions change, identify which considerations are central, or reorganize information around an explanatory structure. Such capacities make understanding closely connected to what the present essay calls epistemic formation.

Generative AI creates an unusual environment for understanding because it can supply representations that already possess a high degree of apparent organization. A learner can receive a structured explanation before having identified which relations among the underlying propositions are difficult. The explanation may genuinely enable understanding. It may also remain an externally supplied organization that the learner can reproduce without being able to reconstruct, challenge, or transfer it. The difference becomes visible when the subject encounters a nearby case that requires reorganization rather than repetition.

Accordingly, the paper does not adopt the stronger claim that understanding requires independent discovery. Understanding acquired through testimony, teaching, diagrams, examples, or AI assistance can be genuine. The issue is whether the interaction produces a sufficiently integrated epistemic capacity in the recipient. This distinction will become important when the paper later considers AI-generated representations of questioning and discovery. An artifact can display the structure of understanding without establishing that the recipient has acquired the corresponding capacity.

3.5 Sources and Modes of Epistemic Acquisition

Kinds of knowledge should also be distinguished from sources or modes of epistemic acquisition. Perception, memory, introspection, reason, inference, and testimony occupy central places in epistemological accounts of how beliefs can become justified or knowledgeable [1]. These categories answer a different question from the distinction among propositional knowledge, acquaintance, and knowledge-how. A subject can acquire propositional knowledge through perception or testimony, preserve it through memory, extend it through inference, and integrate it into understanding through further reasoning and experience.

Testimony is especially important for the present essay because it demonstrates that epistemic dependence is normal. Much of what any individual knows could not be established through direct personal investigation. Hardwig emphasizes the depth of epistemic dependence created by modern divisions of cognitive labour, while contemporary epistemology of testimony examines whether testimony transmits knowledge, generates knowledge, or provides a basic source of justification [11]. The dependence of learners on teachers, researchers on specialists, citizens on institutions, and readers on authors therefore predates generative AI by a considerable margin.

Teaching introduces an additional level of organization. A teacher does more than provide testimony when selecting examples, arranging difficulty, redirecting attention, diagnosing misunderstanding, or constructing situations in which a learner can discover a relevant distinction. The same proposition can consequently reach a learner through very different pedagogical trajectories. Some modes of transmission principally deliver content; others also participate in shaping how the learner encounters and organizes the content.

AI-mediated acquisition should initially be placed at this level rather than treated as a new kind of knowledge. Generative AI can mediate access to propositions, instructions, examples, arguments, testimony-like reports, simulations, and representations of inquiry. Its epistemological role varies with the task. In one interaction it can function similarly to an information retrieval intermediary; in another it can synthesize propositions from multiple sources; in another it can provide dialogical scaffolding; in another it can generate an answer for which the user has little independent basis of assessment. These heterogeneous roles make “AI knowledge” an unhelpfully coarse category for the present purpose.

Treating AI mediation as a mode of epistemic acquisition also avoids a mistaken symmetry between source and achievement. A high-quality source does not guarantee knowledge in the recipient. A learner can misunderstand reliable testimony, forget an explanation, apply a rule outside its scope, or accept a true statement for poor reasons. Conversely, a mediated interaction can become the starting point of substantial later inquiry. The epistemic result depends upon relations among source quality, the recipient’s prior organization, verification, interpretation, judgment, and subsequent engagement.

This point is central to the normative argument developed later. The relevant question is not whether AI is an acceptable epistemic source in general. The question is which functions can be delegated to an AI-mediated process while preserving the forms of attention, discrimination, judgment, encounter, and revision required by the epistemic objective at issue.

3.6 The Limits of Taxonomy for Epistemic Genesis

The distinctions developed above prevent several confluences. Propositional knowledge should not be identified with knowledge by acquaintance. Knowledge-how has a contested relation to propositional knowledge and should not be reduced to the possession of procedural text without further argument. Understanding is an important epistemic achievement whose relation to knowledge remains disputed. Perception, memory, inference, testimony, teaching, and AI mediation concern routes through which epistemic contents and capacities can become available rather than a parallel list of kinds of knowledge.

These distinctions are necessary for analysing AI-mediated inquiry. A generated proposition, a description of an experience, a procedural instruction, and an organized explanation can contribute differently to propositional knowledge, acquaintance, knowledge-how, and understanding. The same generated artifact can also play different roles for different subjects. For an expert it may provide a concise reminder. For a novice it may introduce a new concept. For another user it may become an object of criti-

cism. For someone else it may remain an intelligible sequence of sentences without substantial epistemic integration.

The taxonomy nevertheless reaches a limit precisely where the principal question of this essay begins. Classifying an epistemic achievement does not yet explain its genesis. To say that a subject knows that p identifies a relation to a proposition. It does not explain why p became salient at a particular moment. To say that a subject is acquainted with a place does not explain why one feature of the place interrupted attention. To say that a subject knows how to perform an activity does not reconstruct the sequence of failures, corrections, bodily adjustments, examples, and social relations through which the capacity developed. To attribute understanding does not by itself identify the encounter through which previously disconnected propositions became organized into a meaningful structure.

The difference can be stated concisely:

A taxonomy of knowledge is not yet a theory of the genesis of knowing.

The distinction concerns explanatory level rather than competition between two epistemologies. Taxonomies of knowledge identify kinds of epistemic relation or achievement. A theory of epistemic genesis asks how a particular world, phenomenon, proposition, practice, or distinction becomes capable of entering such a relation with a particular subject. It therefore requires attention to temporal development, prior organization, salience, encounter, memory, curiosity, other subjects, practical engagement, and contingency.

This limit becomes especially visible under generative AI. If a proposition can be supplied before a question has become fully formed, knowing-that cannot by itself explain the epistemic significance of the interaction. If a description can precede acquaintance, the relation between description and later encounter becomes relevant. If procedural guidance can precede skilled practice, the formation of adaptive capacity becomes relevant. If an explanation can precede understanding, the later reorganization of the recipient's epistemic structure becomes relevant. AI therefore does not render the traditional distinctions obsolete. It reveals more clearly the difference between classifying an epistemic result and explaining how a knower becomes capable of attaining, using, revising, and extending that result.

The next section turns to this second problem. It develops an account of epistemic genesis in which the knower is treated as historically and relationally constituted. Curiosity is examined through the prior conditions of its manifestation; feeling through its role in epistemic salience; contingency through encounters that activate otherwise unrealized trajectories; and co-experience through relations in which subjects jointly participate in the formation of attention and questions. These considerations provide the basis for returning subsequently to *gewu zhizhi* as a process of epistemic formation rather than a procedure for accumulating informational products.

4 The Relational Genesis of Knowing

The preceding section distinguished several kinds of knowledge and epistemic achievement while identifying a limit shared by such taxonomies. To classify a subject as knowing that a proposition is true, being acquainted with an object, possessing a practical capacity, or understanding a domain does not yet explain how that epistemic relation became possible for this subject at this moment. The present section turns to this problem of genesis. Its objective is to develop a modest relational account of epistemic formation in which the emergence of knowing depends upon the history through which a subject, environment, other subjects, memories, practices, symbolic resources, and contingent events become locally connected.

The term "relational" is used analytically rather than as a commitment to a complete ontology. The argument does not require the claim that every epistemic phenomenon can be reduced to relations, nor does it assume that an individual subject disappears into a social environment. The narrower proposal is that a knower arrives at an epistemic situation with a historically formed organization. What becomes noticeable, significant, puzzling, familiar, beautiful, disturbing, or worth investigating depends in part upon that organization. Knowing therefore has a history before it has a proposition.

This account develops through several connected elements. The first concerns the historical and relational constitution of the knower. The second distinguishes manifest curiosity from the prior conditions through which curiosity becomes possible. The third examines existential and affective salience as part of the way a world can become epistemically significant. The fourth considers contingency and encounter. The fifth uses aesthetic interruption to illustrate the reactivation of relational history in present perception. The sixth examines co-experience and the manner in which several subjects can participate in the emergence of a shared epistemic field. The final subsection draws these elements together as an account of epistemic formation rather than a universal sequence through which all knowing must pass.

4.1 Historical and Relational Constitution of the Knower

A subject never encounters a phenomenon from an epistemically empty position. Before a question becomes explicit, the subject already possesses a language, a body, habits of attention, memories, practical concerns, conceptual resources, previous questions, institutional positions, social relations, and a history of prior encounters. Some of these conditions are available to reflection. Others operate without becoming focal objects of attention. Their combined organization affects which differences can be noticed and which events can become epistemically consequential.

Phenomenological approaches provide one important resource for describing this situated character of perception. Merleau-Ponty's account of the lived body places perception within an already operative relation between body and world, rather than treating perception as the reception of neutral sensory units that are subsequently organized by a detached intellect [22]. Habits, bodily capacities, spatial orientation, practical involvement, and the presence of others participate in the manner in which a world appears. The relevance of this perspective to the present essay lies less in any particular phenomenological doctrine than in the refusal to begin epistemic analysis from an abstract subject whose relation to the world is historically unconditioned.

Dewey's account of inquiry provides a related resource at the level of problem formation. Inquiry begins in an indeterminate situation whose problematic character is gradually transformed through investigation [6]. A determinate problem is therefore already a product of epistemic work. Something has become differentiated from the surrounding situation, and the subject has acquired enough orientation to formulate what requires resolution. This structure makes it possible to ask what precedes the question without presupposing that the relevant object was already present to the subject in a fully articulated form.

The historical character of this organization is especially important. A concept learned years earlier can alter what becomes visible in a later encounter. A previous failure can make a small anomaly immediately salient. An interpersonal relation can make a particular place, sound, gesture, or sentence carry significance that would be absent for another observer. A political institution, scientific discipline, religious practice, or artistic tradition can provide distinctions through which an environment becomes differently intelligible. Such conditions do not mechanically determine what a subject will know. They participate in configuring the field within which future epistemic events become possible.

This point can be stated without assuming a fixed inventory of relations that constitute every knower. Different epistemic situations recruit different parts of a subject's history. A physicist observing an experimental anomaly, a lawyer reading a judgment, a child encountering an unfamiliar animal, and a person unexpectedly recalling someone loved can each enter inquiry through different combinations of prior organization. The relevant relational history is therefore local to the epistemic event under examination, even though that local history can reach far beyond the immediate situation.

The relational constitution of a subject should also be distinguished from a claim that the subject is indefinitely transparent to historical reconstruction. The reasons why a particular event becomes salient can remain partly unavailable even to the subject experiencing it. Retrospective accounts can reorganize earlier events, overstate certain causes, or ignore conditions that were never articulated. A relational account of epistemic genesis therefore expands the objects relevant to explanation while preserving uncertainty about the completeness of any reconstruction.

4.2 Conditions of Curiosity

Curiosity provides an especially useful case because its manifestation is often experienced as a relatively discrete event. A subject who previously passed over a phenomenon without concern can suddenly want to know more. Something that had belonged to the unnoticed background becomes difficult to ignore. The transition can create the impression that curiosity itself appeared from nothing at the moment of questioning.

The present account separates that manifest episode from the conditions through which its manifestation becomes possible. This distinction should not be read as positing an already existing hidden quantity of curiosity waiting to be released. A subject need not have been secretly curious about a phenomenon before curiosity became manifest. The narrower claim is that the relational organization through which a phenomenon can become capable of eliciting curiosity may have developed before the recognizable episode of curiosity.

Information-gap theories provide one useful account of curiosity once a difference between what is known and what remains unknown has become salient [20]. Contemporary psychological research likewise treats curiosity as a major motivation for information-seeking behaviour while recognizing heterogeneous mechanisms and contexts [17]. For the present purpose, the relevant issue lies slightly earlier. A gap can motivate curiosity only after some structure has made the gap available to the subject. Two people can possess the same missing information while only one experiences the absence as a question.

Several kinds of prior organization can participate in this transition. A partially learned theory can make a counterexample visible. An unresolved personal concern can make an otherwise ordinary remark striking. Familiarity with one discipline can make an analogy in another discipline suddenly available. A remembered disagreement can cause a newly encountered text to be read differently. A practical failure can create sensitivity to a distinction that had previously seemed unnecessary. None of these conditions guarantees curiosity. They establish different possibilities for what an encounter can become.

The manifestation of curiosity can consequently have an event-like character while remaining historically conditioned. This structure helps explain a familiar phenomenon in intellectual life: a text, place, argument, or object can be encountered repeatedly without becoming a serious question, and then on a later occasion become unexpectedly generative. The object may have changed, the subject may have changed, the surrounding relation may have changed, or several of these changes may have occurred together. The relevant epistemic event is therefore situated at the intersection of present encounter and prior organization.

This distinction becomes important under generative AI. A system can formulate a research question before the user has experienced the phenomenon as question-worthy. The generated question can remain externally supplied, or it can interact with the user's prior organization and make something newly salient. In the latter case, the question becomes more than an item delivered to the user. It participates in the manifestation of curiosity. The same symbolic output can therefore occupy very different positions in different epistemic trajectories.

4.3 Existential Feeling and Epistemic Salience

The transition from an unnoticed environment to a question-worthy situation also requires attention to the manner in which things matter before they have been fully conceptualized. A subject does not always first determine what an object is and then assign it significance. Something can first become striking, strange, threatening, inviting, beautiful, uncanny, familiar, or otherwise capable of reorganizing attention. Only later can the subject determine what has become significant and why.

Ratcliffe's account of existential feelings provides a useful vocabulary for describing the background through which subjects find themselves situated in a world. Feelings of familiarity, estrangement, belonging, possibility, reality, and related orientations are not merely evaluations of isolated objects. They can structure the wider field within which particular objects and possibilities become available [24]. Ratcliffe's account is broader than the epistemic use developed here, and the present paper does not identify all epistemic salience with existential feeling. The relevant insight is that the felt organization of a world

can condition what is capable of becoming focally significant.

This point requires a distinction between epistemic salience and epistemic justification. The fact that something feels important does not establish the truth of any proposition concerning it. A disturbing observation can turn out to be irrelevant. A compelling pattern can be illusory. A beautiful explanation can be false. Feeling acquires epistemic importance here because it can participate in directing attention and initiating inquiry, while evidence, reasoning, criticism, and revision remain necessary for evaluating what subsequently becomes claimed.

The sequence can therefore begin before an explicit proposition. A subject can first experience that something is wrong with an argument without being able to locate the problem. A scientist can notice that an experimental result looks unusual before possessing an explanation for the anomaly. A reader can feel that two passages stand in tension before being able to formulate the difference. A person can be arrested by the beauty of a scene before being able to say what makes the scene beautiful. In each case, the initial orientation can become the beginning of epistemic work.

Gendlin's account of experiencing is relevant to this interval because it treats formulation as capable of developing from a background whose specificity exceeds what has already been explicitly stated [8]. The eventual proposition need not be imagined as an unchanged content that existed in complete form before articulation. Successive formulations can differentiate what the subject is able to notice and can alter the experiential organization from which later formulations emerge.

This reciprocal movement is important for the argument of the paper. Feeling can contribute to salience, and symbolic articulation can subsequently reorganize what is felt and perceived. An AI-generated distinction can therefore enter the process at multiple points. It can prematurely replace an indeterminate felt difficulty with a ready-made conceptual closure. It can also provide a formulation that allows the subject to return to the phenomenon and recognize more precisely what had previously remained indistinct. The epistemic consequence depends upon the relation between articulation and continued encounter.

4.4 Contingency and Encounter

If the knowing subject is historically organized, the actual path of inquiry still cannot be reconstructed from prior organization alone. Subjects continually encounter events that were not selected because their later epistemic significance was already known. A conversation introduces an unexpected comparison. A book is encountered outside the research plan. An experiment fails for an unforeseen reason. A stranger asks a question from a different conceptual background. A familiar street presents a scene that interrupts an unrelated line of thought. Such events can redirect inquiry without having been intentionally designed to do so.

The paper uses *contingency* for this aspect of epistemic genesis. The term does not imply absolute randomness, absence of causation, or independence from prior conditions. A contingent epistemic event can have an intelligible history once it has occurred. Its contingency lies in the fact that the subject's current trajectory did not require this particular encounter to occur in this particular way at this particular moment.

Contingency therefore operates through relation rather than in opposition to structure. The same event can have very different consequences for different subjects because it enters different histories. A sentence that appears banal to one reader can reorganize another reader's research programme. A failed experiment can be discarded as noise by one investigator and become the beginning of a new question for another. A scene can remain visually pleasant for one observer while activating a dense personal history for another. Epistemic generativity emerges through the coupling of encounter and prior organization.

This structure helps distinguish contingency from mere novelty. Something new does not automatically become epistemically productive. An endless stream of novel information can fragment attention without generating sustained inquiry. A contingent event becomes important when it changes what the subject can notice, ask, compare, or investigate. Serendipity can therefore be understood more precisely as a relation in which an unplanned encounter becomes generative within an already developing epistemic organization.

The role of contingency also complicates attempts to optimize inquiry entirely around predetermined objectives. If all attention is allocated only to already specified questions, events whose significance cannot yet be named can become systematically excluded. This does not imply that inquiry should maximize randomness or abandon planning. It indicates that some epistemic value depends upon maintaining sufficient openness for an encounter to redirect the trajectory from which its importance could not have been predicted in advance.

Generative AI can enter this structure in opposing ways. Recommendation and answer systems can reduce contingency by organizing attention around predicted relevance and rapidly resolving indeterminate situations. They can also increase contingency by introducing concepts, comparisons, literatures, or counterexamples outside the subject's immediate search path. The relevant criterion is therefore not whether an intervention is artificial or spontaneous. The question is whether the intervention expands or prematurely contracts the subject's capacity for subsequent inquiry.

4.5 Aesthetic Interruption and Relational Memory

Aesthetic interruption makes several of the preceding elements visible within a comparatively ordinary event. Consider a person engaged in conversation who suddenly notices evening light across a wall or street and stops speaking. For a brief period, the prior conversational trajectory loses its hold on attention. The person may initially say only that the scene is beautiful. Detailed explanation can follow later, or it may remain difficult to provide.

The epistemically relevant feature of the example is the interruption itself. The scene has acquired sufficient salience to reorganize the subject's current activity before a determinate inquiry has been formulated. Dewey's account of aesthetic experience emphasizes the continuity between aesthetic experience and the broader organization of experience rather than isolating art within a self-contained realm [4]. The present example extends no general aesthetic theory from this point. It uses aesthetic interruption to show how an encounter can become generative before its significance has been stabilized in propositional form.

Suppose further that the person later explains that the scene is beautiful because it recalls a similar evening once experienced with someone loved. The present perception now becomes connected with a previous co-experience. The earlier event has ended in chronological time, yet the relation formed through it remains capable of participating in present perception. The past does not return merely as an item of retrieved information. It can reorganize the experienced significance of the current scene.

This distinction can be expressed through the difference between remembering a fact and being presently affected through a remembered relation. A subject might know that a certain scene was encountered years earlier without the memory altering present attention. In another situation, a similar sensory configuration can unexpectedly reactivate the relation and interrupt ongoing activity. The same propositional description of the past can therefore understate the role that relational memory plays in the present epistemic event.

The example also clarifies why salience is subject-relative without becoming arbitrary. Another observer may perceive the same light without experiencing a comparable interruption because the scene enters a different history. The difference need not be explained by locating a fixed property of beauty solely inside the object or solely inside the observer. For the purposes of this essay, it is sufficient to recognize that the aesthetic significance of the event can emerge through the relation among present perception, past co-experience, memory, affect, and current orientation.

A further epistemic transition can follow. The subject can begin to ask why the scene became beautiful in precisely this way, why a memory was activated, why shared history alters perception, or how aesthetic value becomes entangled with interpersonal relation. What began as an interruption has become a question. The resulting inquiry did not originate from a prior decision to study aesthetics. A contingent encounter reorganized attention, reactivated a historical relation, and generated a new object of inquiry.

This example provides a particularly clear case of a broader principle: epistemic significance can be historically layered. What appears at the end of the process as a concise question can contain a generative history absent from the linguistic formulation of the question itself. Two subjects can therefore ask the

same sentence, “Why is this beautiful?”, while arriving at that sentence through substantially different epistemic trajectories.

The example also prepares the later reconsideration of AI-mediated inquiry. An AI system can generate the question “Why do memories of loved ones affect aesthetic experience?” without undergoing the particular encounter described above. The generated question can nevertheless become genuinely generative for a human recipient. The relevant distinction concerns the history through which the question was produced and the history through which it becomes epistemically active for another subject. These histories can differ while participating in the same later inquiry.

4.6 Co-Experience and Shared Epistemic Fields

The preceding example also points toward a social dimension of epistemic genesis. Some experiences become significant through relations in which several subjects attend to the same phenomenon and respond to one another. The resulting configuration is richer than the transmission of a proposition from one isolated knower to another. Participants can jointly constitute what becomes salient within the event.

The literature on joint attention provides one established framework for part of this phenomenon. Joint attention concerns forms of coordinated orientation toward a common target and has been connected to communication, shared perceptual access, social cognition, and forms of common knowledge [7, 27]. The concept of *co-experience* used here has a broader and deliberately less technical role. It refers to situations in which several subjects participate in an event, attend to aspects of a shared environment, and become responsive to one another’s responses in ways that affect the subsequent epistemic trajectory.

Consider two people viewing the same landscape. One notices a geological formation and directs the other’s attention toward it. The other recalls a historical event associated with the location. The first responds by revising the significance initially attributed to the scene. Neither participant simply transmits a completed interpretation. What the scene becomes for each subject develops through a sequence of mutually responsive acts of attention, description, memory, and questioning.

The same structure appears in research collaboration. One participant can notice an anomaly that another had normalized as noise. A question from one disciplinary background can expose an assumption that remained invisible within another. A disagreement can make a distinction necessary. A shared failure can produce a problem that no participant had formulated before the failure occurred. In such cases, the relation among participants is part of the generative history of the resulting knowledge.

Co-experience can therefore alter the distribution of epistemic salience. Something that was available to perception but insignificant for one subject can become salient when another subject responds to it. Attention itself can be socially redirected. The response of another participant becomes part of the environment through which a phenomenon is encountered. This makes epistemic formation relational in a stronger sense than simple dependence upon testimony.

A shared event can also remain operative after the immediate interaction ends. A later solitary encounter can recall a distinction first noticed together, a question once discussed, a failure jointly experienced, or an aesthetic scene associated with another person. The earlier co-experience thereby acquires a relational afterlife in later perception and inquiry. The phrase “relational afterlife” is used descriptively here for the continued operation of an earlier relation within subsequent epistemic states. It does not imply that the past relation remains unchanged or that participants remember it identically.

This temporal extension is relevant to education. A productive classroom, laboratory, field visit, seminar, or collaborative project can generate relations whose epistemic consequences appear later, when the learner encounters another situation through distinctions or sensitivities developed within the earlier shared event. Measuring educational value solely through immediate answer accuracy can therefore miss delayed forms of epistemic formation.

The same observation introduces an important boundary for the present paper. Human–AI interaction can also become historically extended and can influence a user’s later perception and inquiry. Whether such interaction constitutes co-experience in the same sense as human co-experience raises questions about the experiential status and relational constitution of artificial agents. Those questions are reserved

for subsequent work. The present argument requires only the less controversial point that AI-mediated interaction can enter the human participant's relational history and become one condition of later epistemic formation.

4.7 Epistemic Formation

The elements developed above can now be assembled without turning them into a fixed sequence. A knowing subject is historically and relationally organized. Within that organization, a present encounter can acquire salience. Salience can be affective, practical, conceptual, aesthetic, or socially mediated. Curiosity can subsequently become manifest, although explicit curiosity need not accompany every form of inquiry. A contingent event can redirect attention. Another subject can participate in making a feature noticeable. Memory can connect a present event to an earlier relation. Articulation can stabilize what was previously indeterminate, and the resulting proposition can in turn reorganize later perception and judgment.

These relations are recursive rather than linear. A concept acquired through earlier inquiry becomes part of the prior organization of later inquiry. A question can lead to an encounter that alters the original question. An explanation can transform what subsequently becomes perceptible. A shared experience can become a solitary memory and later re-enter another shared interaction. A failed articulation can clarify an indeterminate feeling. Epistemic formation therefore develops through repeated changes in the relations among subject, world, symbolic resources, and other subjects.

The concept of formation used here concerns capacities rather than accumulation alone. A subject can become better able to notice a relevant difference, form a question, identify an assumption, compare explanations, judge the scope of a claim, respond to a counterexample, return from a concept to the phenomenon it describes, or revise an earlier position. Such changes can accompany the acquisition of propositions, acquaintance, practical competence, and understanding, while remaining analytically distinguishable from the mere availability of those epistemic products.

This account also preserves the importance of articulation. The emphasis on pre-question salience, feeling, contingency, and encounter should not be read as assigning epistemic priority to an allegedly pure form of experience untouched by language or concepts. Historically formed subjects already inhabit symbolic environments. Words, theories, classifications, diagrams, and questions participate in what can become perceptible. The relevant contrast is therefore between different roles played by symbolic products within epistemic formation, rather than between language and an independent realm of unmediated experience.

A symbolic product can serve as a closure. It can supply a ready-made distinction that terminates an emerging inquiry before the subject develops a capacity to discriminate among alternatives. The same symbolic product can serve as an opening. It can direct attention back toward the world, expose an unnoticed difference, reactivate a prior concern, or create a new question. Its generativity depends partly upon what happens after the product enters the subject's relational field.

This conclusion is especially important for generative AI. The epistemic problem created by rapidly available answers cannot be resolved by requiring learners to reproduce every historical route through which knowledge was first developed. Nor can it be resolved by treating every received answer as the completion of knowing. The more productive question concerns what kinds of relations with propositions, things, other subjects, memories, and contingent events enable received symbolic products to participate in genuine epistemic formation.

The relational account developed in this section therefore provides the conceptual basis for returning to *gewu zhizhi*. Investigation can now be considered through the relations that make things epistemically available: encounter, attention, differentiation, testing, memory, comparison, co-experience, and revision. The extension of knowledge can correspondingly be examined through changes in the subject's capacities to see, question, judge, and continue inquiry. The next section develops this reconstruction while remaining explicit that it is a contemporary philosophical use of *gewu zhizhi*, rather than a claim to recover a single authoritative historical meaning.

5 Reconsidering *Gewu Zhizhi* under Generative AI

The relational account developed in the preceding section makes it possible to return to *gewu zhizhi* with a more precise contemporary question. If articulated epistemic products can increasingly be obtained before a recipient has undergone a corresponding trajectory of inquiry, the significance of investigation can no longer be assessed solely by asking whether it eventually produces a proposition that could have been supplied more efficiently by another source. The relevant issue becomes the role that investigation plays in forming the capacities through which propositions acquire significance, become open to judgment, and participate in further knowing.

This reconsideration requires historical restraint. The *Great Learning* does not offer a modern epistemology of artificial intelligence, and neither Zhu Xi nor Wang Yangming should be assimilated into the relational framework developed in this paper. Their disagreements concerning *gewu*, *zhizhi*, cultivation, principle, mind, and action belong to philosophical projects with their own historical contexts. Zhu Xi interprets *gewu* through the investigation of things and situations in relation to pattern or principle, while Wang Yangming develops a substantially different account in which investigation is closely connected with rectification, moral awareness, and the unity of knowing and acting [31, 19]. The interpretive openness of the expression itself makes a single exhaustive translation difficult.

The present section therefore develops a contemporary philosophical reconstruction. It treats *gewu* as a useful name for a family of relations through which things, situations, texts, practices, and symbolic objects are encountered, attended to, differentiated, tested, and reconsidered. It treats *zhizhi* through the extension and transformation of epistemic capacity. This reconstruction is justified by the contemporary problem rather than by a claim of historical equivalence. Its purpose is to ask what forms of investigation remain epistemically significant when an articulated result can arrive before the knowing through which that result would otherwise have been formed.

5.1 Investigation and Epistemic Contact

A narrow informational interpretation of investigation would assign *gewu* the function of obtaining facts about an object. Under such an interpretation, improvements in informational mediation reduce the need for many forms of direct inquiry. A user who needs the boiling point of a substance, the date of a historical event, the definition of a legal term, or the statement of a mathematical theorem often has no epistemic reason to reproduce the investigative route through which the relevant information was first established. Libraries, databases, experts, search systems, and generative AI can all provide epistemically valuable shortcuts.

The relational account developed earlier suggests a broader function for investigation. Contact with a thing or situation can participate in determining what becomes noticeable, which distinctions become necessary, and what forms of judgment the subject becomes capable of making. An investigation can therefore have consequences that exceed the informational content of its final answer. Repeated observation can develop perceptual discrimination. Practical engagement can expose variation suppressed by a general description. Encounter with a primary source can reveal ambiguity absent from a summary. A failed attempt can make a previously invisible constraint salient. Discussion with another subject can change the problem being investigated.

The epistemic significance of such contact does not depend upon an ideal of unmediated access. Human investigation is ordinarily mediated by language, instruments, concepts, institutions, traditions, and other subjects. A microscope mediates an encounter with a specimen. A translation mediates an encounter with a text. A map mediates an encounter with a place. A theoretical model mediates an encounter with experimental data. AI can enter the same broad field of mediation. The relevant question concerns what the mediation enables the subject to notice, discriminate, question, and revise.

This point is important because generative AI often changes the temporal order of epistemic contact. A learner can receive an interpretation before reading the source, a conceptual distinction before encountering the difficult case that makes the distinction useful, or a proposed explanation before observing the phenomenon to which the explanation applies. These inversions can be epistemically productive when

the received symbol directs attention toward features that subsequently become intelligible. They can also narrow the later encounter when the supplied interpretation determines in advance what the subject expects to find.

The contemporary significance of *gewu* therefore lies partly in the maintenance of epistemic contact between symbolic products and the phenomena to which they refer. Investigation allows a proposition to return to things. A generated explanation can be compared with a primary text. A conceptual classification can be tested against cases that resist it. A summary can lead back to an archive. A model can be confronted with observations. A philosophical distinction can be carried into situations in which its limits become visible. In each case, *gewu* names a relation through which the symbol remains answerable to further encounter.

5.2 Attention and Differentiation

Investigation also concerns the organization of attention. The preceding section argued that epistemic salience can precede explicit question formation. Once a phenomenon has become salient, inquiry requires further differentiation. A subject must determine which features of the situation matter, which differences should be preserved, which similarities are misleading, and which relations require examination.

This work of differentiation is easily obscured when a completed conceptual scheme is presented first. A textbook definition, expert explanation, or AI-generated taxonomy can make a distinction appear self-evident after it has already been stabilized. The learner sees the categories without seeing why the distinction became necessary. In many cases this is efficient and appropriate. In others, the absence of the underlying contrast makes the category fragile. The learner can repeat the distinction while remaining uncertain about where it applies or why nearby cases resist classification.

Investigation can provide the situations through which a distinction becomes epistemically anchored. A legal category becomes clearer when competing cases expose its boundary. A scientific variable acquires significance when changing it alters an observed result. A philosophical concept becomes more precise when a counterexample forces separation between two previously conflated meanings. A linguistic distinction becomes usable when the learner repeatedly encounters contexts in which substituting one expression for another changes meaning.

The relevant epistemic achievement is therefore more than exposure to a classification. The subject becomes increasingly capable of generating and revising distinctions in response to variation. This capacity is particularly important under generative AI because the system can supply highly articulated taxonomies before the user has developed the discriminative structure through which the taxonomy becomes independently usable.

Attention and differentiation also connect *gewu* with contingency. Planned investigation can establish an expected set of contrasts, while unexpected cases reveal differences that the initial conceptual organization did not include. A productive investigation therefore requires enough stability to sustain attention and enough openness for the object to resist the scheme through which it is being examined. The epistemic value of encounter often lies precisely in this possibility of resistance.

5.3 Zhizhi and Epistemic Formation

The preceding account of investigation changes the corresponding interpretation of *zhizhi*. If the extension of knowledge is represented only as an increase in the number of propositions available to a subject, generative AI appears to produce an extraordinary acceleration of *zhizhi*. A user can obtain explanations across unfamiliar domains, generate comparisons among theories, request objections, receive summaries of technical materials, and rapidly expand the set of propositions available for consideration.

Availability alone, however, provides an incomplete measure of epistemic extension. Section 3 distinguished propositional knowledge from acquaintance, knowledge-how, and understanding, while Section 4 examined changes in salience, curiosity, judgment, and the capacity to continue inquiry. These distinctions suggest another dimension of *zhizhi*: the extension of the subject's capacity to know.

Such extension can involve becoming able to perceive a relevant difference, recognize a problem in a new setting, formulate a question without external prompting, compare explanations, identify a hidden assumption, judge the scope of a claim, respond to a counterexample, or revise a conceptual framework. These capacities can be supported by received propositions, and the distinction does not require that the subject independently discover every result. Epistemic formation concerns what becomes possible for the subject after the interaction with the received knowledge.

This perspective makes transfer particularly important. A learner who understands a supplied explanation only within the exact wording in which it was presented has undergone a different epistemic change from a learner who can recognize the same structure in a new case. A researcher who accepts an AI-generated distinction can later discover whether the distinction has become part of the researcher's own epistemic organization by attempting to apply, criticize, modify, or abandon it under changing conditions. The later trajectory provides evidence concerning the extent to which the earlier symbolic product participated in epistemic formation.

The contemporary reconstruction of *zhizhi* developed here therefore places particular emphasis on generative continuation. An epistemic interaction has greater formative significance when it increases the subject's capacity to generate further appropriate attention, questions, judgments, and revisions. This criterion remains fallible and context-sensitive. More questions are not always better, and greater generativity does not guarantee truth. The point is that extension of knowledge can concern changes in epistemic capability as well as additions to epistemic content.

This interpretation also preserves an important connection between knowing and action without importing Wang Yangming's doctrine of the unity of knowing and acting into the present framework. A subject's epistemic organization becomes visible partly through what the subject can do with what has been learned: which cases can be recognized, which distinctions can be maintained, which claims can be challenged, and which new inquiries can be initiated. The comparison is structural rather than historical. The present essay uses performance under subsequent epistemic conditions as one indication that a symbolic result has become integrated into the capacities of the knower.

5.4 The Reordering of the Epistemic Sequence

Generative AI introduces a distinctive reordering into the relation between investigation and articulated knowledge. An idealized epistemic trajectory can be represented schematically as movement from encounter toward articulation:

$$\text{encounter} \rightarrow \text{salience} \rightarrow \text{question} \rightarrow \text{investigation} \rightarrow \text{judgment} \rightarrow \text{proposition.} \quad (1)$$

Equation 1 is not intended as a universal psychological sequence. The preceding section has already emphasized recursion, social mediation, and multiple entry points. The sequence serves only to make visible a familiar ordering in which articulated knowledge appears toward the later stages of inquiry.

Generative AI permits another ordering:

$$\text{generated proposition} \rightarrow \text{encounter} \rightarrow \text{salience} \rightarrow \text{question} \rightarrow \text{investigation} \rightarrow \text{possible knowing.} \quad (2)$$

Here the proposition precedes the human knowing to which it may eventually contribute. A user can first receive a claim and only later discover why the claim is interesting. A distinction can be supplied before the subject recognizes the confusion it resolves. An explanation can precede observation of the phenomenon. A research question can precede the curiosity through which the question becomes personally or intellectually compelling.

This inversion changes the role of the epistemic product. The proposition is no longer only the endpoint of an inquiry. It becomes one event within a later inquiry. It can redirect attention, provoke disagreement, expose unfamiliar vocabulary, stimulate comparison, or remain inert. Its epistemic status within the recipient's trajectory depends partly upon what follows.

The inversion also prevents a nostalgic reconstruction of *gewu zhizhi*. The availability of a proposition does not require the learner to pretend that the proposition has not been received and reproduce an older trajectory from the beginning. Such artificial reconstruction can consume attention without producing corresponding epistemic value. The more relevant task is to determine which subsequent encounters allow the received proposition to become integrated into a genuine trajectory of knowing.

This can involve returning from answer to phenomenon. A generated historical interpretation can lead the reader to primary documents. A mathematical solution can become the object of proof reconstruction, variation of assumptions, or comparison with alternative methods. A philosophical argument can be tested through counterexamples. A scientific explanation can be examined against observations or data. A legal interpretation can be compared with statutory language and cases. The prior existence of the answer changes the investigation without eliminating it.

5.5 The Proposition as an Object of Investigation

The possibility that a generated proposition can itself become an object of *gewu* deserves separate emphasis. Investigation is often imagined as directed from a subject toward an independently existing object, while the resulting proposition functions as a representation of what has been discovered. Under AI-mediated conditions, symbolic objects increasingly enter the world that the subject must investigate.

A generated answer has properties that can themselves be examined. It has a source or production process, a conceptual vocabulary, assumptions, omissions, scope conditions, relations to evidence, and possible consequences when accepted. It can be compared with other accounts, challenged by cases, revised, or rejected. The user therefore encounters the generated proposition as part of the epistemic environment rather than merely as a transparent window onto its referent.

This point is especially important because generative outputs often arrive with a high degree of rhetorical completeness. The answer may contain definitions, examples, qualifications, and apparent objections, creating an impression that the relevant conceptual space has already been surveyed. Treating the proposition as an object of investigation reopens this closure. The subject can ask where the distinctions came from, what alternatives remain excluded, which evidence would change the conclusion, and whether the proposed organization survives contact with the relevant phenomenon.

The proposition can also become generative through disagreement. A user may recognize that a generated answer is unsatisfactory without initially knowing why. The dissatisfaction can create the indeterminate situation from which a new inquiry develops. In such a case, AI has supplied an answer that becomes valuable precisely because the subject refuses to accept it as the completion of knowing.

The same structure applies when the output is correct. Correctness does not exhaust epistemic use. A correct proposition can be varied, connected with other domains, applied to new cases, or used to generate questions that were not part of the original request. The epistemic relation therefore remains open after correctness has been established.

This reconstruction provides a contemporary interpretation of investigation under conditions in which symbolic artifacts themselves increasingly populate the environment of inquiry. *Gewu* can include investigation of things, situations, texts, models, and generated propositions, together with the relations among them. The important continuity lies in the refusal to identify the first available articulation with the completion of inquiry.

5.6 Epistemic Pre-emption and Epistemic Activation

The reordered epistemic sequence permits two contrasting effects of generative AI. The first can be described as *epistemic pre-emption*. A subject encounters an indeterminate difficulty, yet an externally supplied articulation arrives before the subject has developed the distinctions through which the difficulty might have become a determinate question. The articulation can stabilize one interpretation and reduce the likelihood that alternative questions will become manifest.

Pre-emption does not require that the generated answer be false. A correct answer can still arrive at a stage in which its conceptual organization replaces an opportunity for the learner to develop a relevant

distinction. For example, a student who notices an unexpected experimental result can be immediately given the standard explanation before exploring which features of the result require explanation. The student gains information while potentially losing an opportunity to form the problem.

The second effect can be described as *epistemic activation*. A generated symbol can interact with prior organization and make a phenomenon newly question-worthy. An analogy can connect two domains that the user had never considered together. A counterexample can expose a hidden assumption. A historical reference can transform the significance of a contemporary event. A generated question can become genuinely interesting once it encounters a concern that the user had been unable to articulate.

Pre-emption and activation are relational effects rather than fixed properties of an output. The same answer can pre-empt inquiry for one subject and activate inquiry for another. The same user can experience both effects at different stages. An early answer can prematurely narrow one dimension of a problem while simultaneously introducing a concept that later opens another dimension.

This relational variability limits simple prescriptions concerning when AI should provide answers. A system that always withholds conclusions in order to force discovery can create unnecessary difficulty. A system that always maximizes immediate answer completeness can reduce opportunities for problem formation. The relevant design and educational question concerns the state of the inquiry, the capacities being cultivated, and the likely generative consequences of different interventions.

The distinction also clarifies the role of curiosity. A generated question is not equivalent to manifest curiosity in the recipient. It becomes epistemically formative when the recipient's relation to the phenomenon changes such that the question acquires significance and begins to organize further attention. AI can therefore supply a question without supplying curiosity, yet the supplied question can become one of the contingent conditions through which curiosity subsequently emerges.

5.7 The Contemporary Significance of *Gewu Zhizhi*

The preceding analysis suggests that the contemporary significance of *gewu zhizhi* cannot be measured by the quantity of information that investigation produces. Generative AI makes information, articulation, and conceptual organization increasingly available without requiring an equivalent human trajectory of inquiry. The resulting condition does not eliminate the epistemic significance of investigation. It changes the function for which investigation becomes valuable.

Gewu can be reconsidered as the maintenance and development of relations through which propositions remain answerable to things, situations, evidence, other subjects, and further experience. Its practices include attention, encounter, differentiation, comparison, testing, and revision. These practices allow received symbols to acquire, lose, or transform their significance through continued contact with the world.

Zhizhi can correspondingly be reconsidered through the extension of epistemic capacities. The relevant extension includes increased ability to notice differences, formulate questions, judge claims, transfer distinctions, respond to anomalies, revise interpretations, and initiate later inquiry. Possession of additional propositions can contribute to this extension without exhausting it.

Under this reconstruction, generative AI does not simply replace the movement from *gewu* to *zhizhi*. It changes the possible ordering among their elements. Symbolic articulation can arrive before investigation, and investigation can continue after articulation. A received proposition can become a new object of encounter. An answer can become a source of curiosity. A generated distinction can return the learner to a phenomenon with a different capacity for attention.

The normative implication is therefore selective. There is little reason to preserve difficulty merely because earlier generations encountered knowledge through more laborious routes. There is stronger reason to preserve the conditions through which subjects remain capable of converting inherited or generated symbolic products into continuing epistemic formation. These conditions include encounter, attention, curiosity, discrimination, judgment, contingency, co-experience, and revision.

The resulting formulation of *gewu zhizhi* is deliberately modest. It does not claim to replace classical interpretations or to establish a new general theory of knowledge. It offers a contemporary philosophical use of an old problem under altered technological conditions. When the proposition can arrive before

the knowing, the task of investigation shifts toward ensuring that the arrival of the proposition does not become indistinguishable from the completion of knowing.

The next section introduces a further complication. Generative AI can produce more than propositions and explanations. It can also generate questions, hesitations, objections, sequences of revision, and narratives that resemble the process through which an epistemic result was discovered. The distinction between product and process therefore becomes insufficient. Section 6 examines how the appearance of epistemic genesis can itself be generated and why the contemporary significance of *gewu zhizhi* must ultimately be located in actual epistemic formation rather than in the symbolic form of an apparent investigative trajectory.

6 Generated Epistemic Process and the Limits of Process Appearance

The preceding section reconsidered *gewu zhizhi* under a condition in which an articulated proposition can precede the human knowing to which it may later contribute. That inversion already weakens a simple identification between epistemic product and epistemic formation. A further complication now requires attention. Generative AI can produce more than conclusions, explanations, and propositions. It can also produce questions, tentative hypotheses, objections, counterexamples, revisions, apparent hesitation, self-criticism, and narratives of discovery. The symbolic appearance of an epistemic trajectory can therefore be generated together with the symbolic appearance of its result.

This development makes a simple recommendation to “look at the process” insufficient. A process-like representation can be pedagogically useful, conceptually illuminating, or genuinely generative for a later human inquiry. Its visible sequence nevertheless does not establish the historical process through which the representation itself arose, nor does it establish that the recipient has undergone the epistemic transformation represented within it. The relevant distinctions must therefore be drawn among represented epistemic process, actual generative provenance, and the downstream effects through which a representation becomes generative for another subject.

The present section develops these distinctions without making claims about the complete internal cognitive or computational states of generative models. Publicly produced rationales, critiques, revisions, and discovery narratives are treated as symbolic outputs. Their relation to the underlying mechanisms that produced them is an empirical and technical question. The philosophical problem addressed here concerns what can legitimately be inferred from their appearance and how they participate in human epistemic formation.

6.1 Process-Like Symbolic Outputs

A conventional distinction between result and process becomes unstable once the process itself can be represented and generated. Consider a sequence in which a system first proposes a hypothesis, then identifies a difficulty, produces a counterexample, qualifies the original claim, and offers a revised conclusion. The sequence resembles a compact record of inquiry. It contains temporal order, apparent responsiveness, conceptual change, and a distinction between an earlier and a later epistemic position.

Such sequences are increasingly ordinary within generative systems. Prompting can elicit stepwise explanations, explicit critique, comparison among alternatives, simulated debate, and iterative refinement. Systems can also be organized so that one generated output becomes the object of subsequent feedback and revision. Madaan and colleagues, for example, demonstrate a framework in which a model produces an initial response, generates feedback on that response, and iteratively refines the output [21]. The resulting interaction has a visible structure resembling correction and improvement over time.

The existence of such a structure matters independently of whether the model undergoes a human-like process of reflection. From the perspective of a user, the artifact can contain an intelligible sequence of epistemic moves. A learner can compare the initial claim with the revision, inspect the objection, identify what changed, and use the sequence as material for further thought. The representation can therefore function as a process-shaped epistemic artifact.

This possibility prevents the process from serving as a simple authenticity criterion. A paper that presents failed hypotheses, revisions, and eventual clarification can have originated through a genuine historical trajectory, a carefully reconstructed pedagogical narrative, a partially retrospective human account, an AI-assisted synthesis, or an entirely generated sequence. Similar process-like form can arise from substantially different production histories.

The same point applies at smaller scales. Expressions such as “I was initially mistaken,” “this objection changes the argument,” or “after reconsidering the evidence, the distinction should be revised” can represent epistemic change. Their linguistic occurrence does not by itself establish the occurrence of the corresponding historical change in the producer. A representation of revision and a revision in the generative history of a subject therefore require separate analysis.

6.2 Displayed Rationale and Generative Provenance

The distinction becomes especially important when a generated output includes a displayed rationale. A rationale can present a sequence of considerations that makes a conclusion appear intelligible. It can identify premises, intermediate steps, objections, and reasons for preferring one answer over another. For a human reader, such structure can be epistemically useful because it makes the output available for inspection and criticism.

The presence of a rationale nevertheless does not guarantee that the rationale faithfully reports the process responsible for the model’s prediction. Turpin and colleagues show that chain-of-thought explanations can systematically fail to disclose factors that influenced a model’s answer and can rationalize outputs produced under biased prompting conditions [32]. The importance of this result for the present essay is methodological. A plausible sequence of reasons should not be treated automatically as transparent access to the historical or computational process that generated the conclusion.

This caution has a broader philosophical analogue. Human retrospective accounts of discovery can also reconstruct, simplify, or reorganize the histories they describe. Scientific papers ordinarily present cleaned argumentative structures rather than complete chronological records of laboratory practice. Autobiographical explanations can assign significance to earlier events only after later developments make those events intelligible. A process narrative is therefore already a representation even before generative AI enters the picture.

Generative AI intensifies the issue because the representation can be produced without the represented history having occurred in the form described. A model can generate a plausible narrative in which an investigator begins with one view, encounters an anomaly, becomes uncertain, revises an assumption, and arrives at a new conclusion. The resulting narrative can be coherent and informative while remaining distinct from the actual production history of the text.

For the purposes of this essay, *generative provenance* refers to the historical conditions through which an epistemic product actually became possible. Such provenance can include prior texts, interactions, observations, questions, revisions, failures, tools, other subjects, and contingent events. A narrative about provenance is one possible representation of this history. It should not be identified with the history itself.

This distinction will later support the practical proposal concerning provenance preservation. At the present stage, its philosophical significance is narrower. If a generated artifact can contain a convincing account of how its own conclusion was supposedly reached, then the presence of a process narrative cannot by itself resolve the separation between symbolic appearance and epistemic genesis.

6.3 Revision and Self-Correction

Revision creates a particularly strong appearance of epistemic activity because change across successive states resembles learning. A system produces an answer, evaluates it, identifies a flaw, and generates an improved response. For a human observer, the sequence can look like the external trace of reflection.

Research on large language model self-correction shows that this appearance requires careful interpretation. Iterative refinement methods can improve outputs under some conditions [21]. At the same

time, Huang and colleagues report that models can struggle to improve reasoning through intrinsic self-correction in the absence of reliable external feedback, and can sometimes degrade their performance [13]. Kamoj and colleagues' later survey similarly emphasizes that the success of self-correction depends strongly upon the source and reliability of feedback, task structure, and training conditions [14].

The philosophical implication does not depend upon resolving the technical debate over which architectures or tasks support robust self-correction. The important distinction is between a visible sequence of revision and the capacity that the sequence is taken to indicate. A generated critique can be followed by a generated revision without establishing a general capacity to detect and repair errors under new conditions. The sequence records an output transition. The epistemic interpretation assigned to that transition requires additional evidence.

An analogous distinction applies to human learning. A student who changes an answer after being told that the first answer is incorrect has undergone a different epistemic event from a student who identifies the error independently, understands why the original reasoning failed, and can avoid the same mistake in a novel case. The visible revision may be identical at the level of final text. The capacities formed through the revision can differ substantially.

This comparison should not be used to impose independent self-correction as a universal standard of genuine knowing. Human epistemic development is profoundly dependent upon feedback, instruction, criticism, and collaboration. The relevant point is that revision acquires its epistemic significance through the relations that produce and follow it. A correction can represent external substitution, local repair, conceptual restructuring, or durable learning. The symbolic transition alone does not determine which of these has occurred.

6.4 Dimensions of Generativity

The preceding distinctions make the term "generative" itself potentially ambiguous. A generated artifact can look generative because it displays a sequence of inquiry. It can have an actual history through which its content was generated. It can also become generative for another subject by provoking new attention, curiosity, judgment, or action. These dimensions should remain separate.

The first can be called *represented generativity*. A text exhibits the form of epistemic development. It contains questions, branching possibilities, objections, failed attempts, revisions, and eventual stabilization. A reader can inspect a process-like organization even when the organization was constructed retrospectively or generated as a whole.

The second concerns *historical generativity*. An epistemic product has a real production history in which earlier states, events, relations, and interventions constrained what became possible later. A research claim may have emerged through repeated experiments, discussions, conceptual revisions, and accidental observations. An AI-assisted text may have emerged through successive prompts, retrieved sources, generated drafts, human objections, verification, rewriting, and further model interaction. Historical generativity concerns this actual trajectory rather than the narrative form in which the trajectory is later represented.

The third concerns *downstream generativity*. A representation can alter the epistemic possibilities available to another subject. A fictional dialogue can provoke a genuine philosophical question. A simulated objection can expose a real weakness in an argument. A generated counterexample can lead a researcher to investigate a phenomenon that had previously remained unnoticed. A pedagogically reconstructed discovery sequence can help a student understand a distinction that the historical discoverer reached through a very different route.

These three dimensions can coincide. A genuine historical inquiry can be represented accurately and can later become generative for readers. They can also diverge. A fabricated discovery narrative can have weak historical provenance while producing strong downstream epistemic effects. A rich historical process can be compressed into a final proposition with almost no represented generativity. A highly elaborate process-like explanation can remain epistemically inert for the recipient.

This threefold distinction prevents authenticity from becoming the sole criterion of epistemic value. A representation need not reproduce the original history in order to become useful for later knowing. It

also prevents usefulness from erasing provenance. A fabricated historical account can provoke valuable inquiry while remaining misleading if presented as a record of events that did not occur. Generative effect and provenance therefore raise different epistemic and ethical questions.

For *gewu zhizhi*, the most important point concerns downstream formation. The contemporary value of an epistemic artifact depends partly upon whether it can enter a subject's relation with things, evidence, other subjects, and future problems in a manner that extends the subject's capacity to know. The artifact's process-like appearance can support this role without guaranteeing it.

6.5 Generated Discovery and Human Epistemic Formation

The ability to generate discovery-like narratives raises an important pedagogical problem. A learner can now receive a sequence that imitates the shape of intellectual development without having participated in the uncertainty through which the sequence was historically formed. The system can present an initial misconception, a surprising observation, an objection, a revised hypothesis, and a final insight in a compact and coherent order.

Such reconstruction is not intrinsically defective. Education has always used designed examples, simplified histories, staged problems, dialogues, and carefully ordered demonstrations. A textbook proof rarely reproduces the complete historical circumstances of mathematical discovery. A classroom experiment can intentionally recreate only the features needed for a particular conceptual distinction. Pedagogical representation is therefore selective by design.

Generative AI greatly expands the flexibility of this practice. A process-like explanation can be adapted to the learner's vocabulary, prior questions, and current misunderstanding. Multiple alternative trajectories can be generated. A learner can request another objection, a more difficult counterexample, a different analogy, or a reconstruction from another conceptual perspective. Such capabilities can support epistemic formation when they become materials for active comparison and judgment.

The risk arises when a completed process representation substitutes for the learner's own participation in the epistemically important parts of the process. A sequence can contain a question without the learner becoming curious, a counterexample without the learner recognizing why it matters, and a revision without the learner developing the capacity to revise a nearby claim under altered conditions. The learner can consume the visible structure of inquiry while remaining largely external to its generative function.

The distinction is subtle because reading a representation can itself become a real epistemic event. A learner does not need to formulate every question before encountering it in order for the question to become genuinely important. An externally supplied objection can produce authentic doubt. A generated distinction can reorganize future perception. The relevant issue is therefore not chronological priority alone. What matters is whether the representation becomes integrated into the learner's subsequent epistemic activity.

This point connects generated process directly with the earlier distinction between epistemic preemption and epistemic activation. A complete simulated inquiry can pre-empt problem formation by resolving every tension before the learner experiences its significance. The same representation can activate inquiry when one of its steps conflicts with the learner's expectations or directs attention toward a previously unnoticed phenomenon. The pedagogical value of process representation depends upon the relation between the representation and the learner's ongoing formation.

6.6 From Process Appearance to Epistemic Formation

The preceding analysis allows the product-process distinction to be replaced by a more discriminating framework. A final proposition and a process-like narrative are both symbolic artifacts. Each can be inherited, generated, copied, reconstructed, or produced through a rich historical trajectory. Each can also become epistemically generative for a later subject.

The decisive issue for the present essay is therefore the role that the artifact plays within actual epistemic formation. Does the interaction increase the subject's ability to notice relevant differences?

Does it produce a question that reorganizes attention? Does it support judgment across cases? Does it create a capacity to identify when a distinction fails? Does it encourage return to the phenomenon, evidence, or primary material? Does it enable revision when new conditions arise?

These questions shift evaluation away from the visible complexity of the artifact. A short proposition can be deeply generative if it enters a prepared relational history and opens a new inquiry. A long simulated reasoning process can remain inert if the subject merely accepts its organization. The amount of displayed process therefore provides no simple measure of epistemic formation.

The distinction also discourages a pedagogical strategy that responds to AI by requiring increasingly elaborate displays of reasoning. Asking a learner or system to produce more intermediate steps can have value for diagnosis, communication, and criticism. It cannot by itself establish that the relevant capacities have developed. The possibility of generating those steps makes the limitation especially visible.

For this reason, the paper does not identify the preservation of process with the preservation of epistemic formation. Historical records of inquiry can provide valuable evidence and educational resources, and later sections will argue for greater attention to generative provenance. Such records remain representations of selected aspects of a trajectory. Their value depends upon how they are interpreted, verified, and reused.

6.7 Implications for *Gewu Zhizhi*

The ability to generate process-like epistemic artifacts clarifies what *gewu zhizhi* cannot be reduced to under contemporary conditions. Investigation cannot be identified merely with the presence of visible steps between question and answer. A generated sequence can reproduce those steps. Nor can the extension of knowledge be inferred from the rhetorical appearance of reflection, revision, or discovery.

The continuing significance of *gewu* lies instead in the relations through which symbolic representations are brought into contact with things, situations, evidence, other subjects, and changing conditions. A displayed objection becomes epistemically significant when the subject can examine the case to which it refers. A generated revision becomes formative when the subject becomes able to recognize why revision was required and how the relevant distinction behaves elsewhere. A discovery narrative becomes useful when it opens rather than closes later investigation.

The corresponding significance of *zhizhi* lies in what becomes possible for the subject after engaging with the representation. An epistemic product has participated in formation when it contributes to capacities for further attention, question formation, judgment, transfer, criticism, and revision. The visible form of the process can support these capacities without serving as their proof.

This conclusion further weakens any attempt to restore an older epistemic order by requiring human learners to reproduce process for its own sake. If the symbolic appearance of process can itself be generated, then formal compliance with a sequence of questioning, objection, and revision cannot guarantee genuine inquiry. The normative task must move one level deeper toward the conditions under which encounters actually remain generative for the subject.

The next section therefore asks what should be preserved when both epistemic products and epistemic process representations become inexpensive to obtain. The answer will focus on the conditions through which knowing remains capable of emerging: curiosity, world-directed encounter, existential and affective salience, contingency, co-experience, judgment, revision, and the capacity to form further questions. These conditions provide a more appropriate object of preservation than difficulty or process appearance alone.

7 Conditions of Continuing Epistemic Formation

The preceding section introduced a further complication into the contemporary problem of *gewu zhizhi*. Generative AI can supply developed epistemic products, and it can also supply representations of inquiry itself. Questions, objections, apparent hesitation, counterexamples, revisions, and discovery-like

sequences can all become available as symbolic artifacts. The preservation of a visible “process” therefore provides no sufficient criterion for the preservation of epistemic formation.

The normative problem must be stated at another level. If both results and process-like representations can increasingly be obtained without an equivalent human trajectory of knowing, which conditions remain important because they support the continuing formation of a knower? This section develops a provisional answer through seven connected dimensions: curiosity and question formation, world-directed encounter, existential and affective salience, contingency and serendipity, co-experience, judgment and revision, and the capacity to generate further questions.

The term “preservation” requires care. It does not imply that every historical route through which knowledge once emerged should be reproduced. It also does not imply that older forms of effort, delay, or uncertainty possess intrinsic epistemic value. A condition is worth preserving insofar as its removal would substantially weaken capacities relevant to later knowing. The relevant object is therefore functional and generative. What matters is whether an epistemic practice leaves the subject more capable of encountering, discriminating, questioning, judging, revising, and extending what has been learned.

This orientation follows naturally from the account developed in the preceding sections. The value of *gewu* lies partly in the relations through which symbolic products remain answerable to things and situations. The value of *zhizhi* lies partly in the extension of capacities through which a subject can continue to know. The contemporary question is therefore how those relations and capacities can remain operative when the delivery of articulated knowledge becomes increasingly efficient.

7.1 Curiosity and Question Formation

Curiosity occupies a distinctive position because it converts epistemic availability into epistemic orientation. A subject can possess access to an answer without caring about the question to which the answer responds. A generated research question can be linguistically clear while remaining external to the recipient’s own field of concern. Curiosity marks one way in which a phenomenon becomes capable of organizing attention from within the subject’s developing epistemic trajectory.

The argument does not require every successful inquiry to begin in curiosity. Professional obligation, moral responsibility, institutional duty, practical necessity, or the questions of others can all initiate serious investigation. Curiosity nevertheless has particular importance for continuing epistemic formation because it can generate inquiry beyond the immediate demands imposed upon the subject. A learner who has developed the capacity to become curious can continue to form questions after the original teacher, text, or AI system has ceased to supply them.

This capacity becomes especially significant under generative AI. A system can produce plausible questions indefinitely. The numerical abundance of questions therefore ceases to provide a useful measure of an inquiry’s vitality. The relevant issue concerns whether the subject can recognize why a question matters, connect it with a phenomenon or unresolved tension, and sustain enough attention to investigate it.

The distinction can be illustrated by two interactions that yield the same sentence. In the first, a user asks an AI system to generate possible research questions and selects one because it appears publishable. In the second, the same generated sentence connects with an anomaly the user has repeatedly encountered but has not yet been able to articulate. The question reorganizes earlier observations and becomes difficult to set aside. The symbolic product is identical while its position within the two epistemic trajectories differs substantially.

Preserving curiosity therefore means preserving conditions under which questions can become genuinely significant to the learner. Such conditions can include time for attention, exposure to unresolved phenomena, permission to follow an unexpected connection, conceptual resources sufficient to recognize a gap, and interaction with other subjects who direct attention toward previously unnoticed features. The relevant educational objective is not to maximize curiosity as an abstract quantity. It is to sustain the possibility that the subject can still become the origin of further inquiry.

This objective also places limits on excessive anticipatory assistance. A system that supplies the next question whenever uncertainty appears can gradually reorganize inquiry around externally generated

problem formation. The user can remain highly productive while becoming less practiced at recognizing what is worth asking without such intervention. This is one form of the epistemic pre-emption described in Section 5.6.

The opposite possibility remains equally important. An AI-generated question can activate curiosity that would otherwise not have emerged. The preservation of curiosity therefore does not require withholding questions. It requires attention to whether externally supplied questions become occasions through which the subject's own capacity for question formation develops.

7.2 World-Directed Encounter

A second condition concerns continuing contact with the phenomena to which symbolic products refer. Generative AI makes it increasingly easy for one representation to be explained through another representation. A summary can be generated from a paper, an explanation from the summary, an analogy from the explanation, and a further conceptual framework from the analogy. Such chains can be extremely useful, especially when access to primary material is difficult. They can also allow an inquiry to become progressively detached from the objects, cases, practices, and evidence that originally constrained the symbols.

World-directed encounter provides one means of reopening that relation. The term "world" is used broadly here. It includes physical objects and environments, primary texts, archival documents, empirical data, social practices, legal cases, mathematical structures, experimental systems, artworks, languages in use, and other phenomena capable of constraining an inquiry beyond the latest generated description of them.

The relevant encounter varies by domain. A historian can return from an AI-generated interpretation to primary documents. A scientist can compare a generated explanation with measurements. A legal researcher can examine the text of legislation and judgments. A language learner can test a generated rule against actual usage. A philosopher can compare a conceptual distinction with cases that resist it. A mathematician can reconstruct a proof or vary its assumptions. The common feature is renewed exposure to something that can push back against the symbolic organization already supplied.

Such resistance has epistemic value because it creates opportunities for differentiation. A generated answer can organize a phenomenon elegantly while omitting a boundary case. A primary source can contain an ambiguity that the summary removed. A measurement can fail to match the predicted tendency. A social situation can expose a practical consequence absent from the conceptual model. Continued encounter allows the subject to discover that the symbolic representation has a scope rather than functioning as an unrestricted substitute for the represented phenomenon.

World-directed learning should not be romanticized as epistemically pure. Direct experience can mislead, primary sources require interpretation, observation is theory-laden, and many important phenomena are accessible only through sophisticated mediation. The point concerns continuing answerability. An epistemic system remains healthier when symbolic products can be brought into relations through which their assumptions, scope, and adequacy remain open to examination.

This condition provides a contemporary meaning for *gewu*. Investigation can involve returning from the proposition to the thing, from the explanation to the phenomenon, and from the generated classification to the cases through which the classification becomes usable or revisable. AI assistance can become part of this movement rather than its endpoint.

7.3 Existential and Affective Salience

A third condition concerns the manner in which a phenomenon becomes capable of mattering to the subject. Section 4.3 argued that epistemic activity can begin before explicit question formation. Something can first become strange, beautiful, troubling, familiar in a new way, or otherwise capable of interrupting attention. The later inquiry can grow from this change in salience.

This dimension is easily marginalized in systems organized around explicit requests. A conversational AI ordinarily responds once a user has already formulated an input. Yet many important intellec-

tual developments occur before a request is available. The subject notices that something does not fit, pauses at an unexpected image, becomes uneasy about an assumption, or finds that a previously ordinary object has acquired new significance. Such events concern the formation of the question space itself.

Preserving affective and existential salience does not mean treating feeling as a source of truth. The distinction developed earlier remains essential. A feeling of significance can direct inquiry while providing no guarantee that the resulting interpretation is correct. The normative value lies in retaining the subject's susceptibility to interruption by the world.

The aesthetic example from Section 4.5 makes this susceptibility visible. A person can stop in the middle of a conversation because evening light reactivates a scene once shared with someone loved. The interruption carries no completed theory of beauty. It reorganizes attention and can later become the provenance of a new question. A system optimized only for efficient completion of the prior conversational task might treat the interruption as irrelevant. For the subject, it can become the beginning of an inquiry that could not have been specified in advance.

This example suggests a broader point. Epistemic development depends partly upon the possibility that the subject's current priorities can be displaced. A learner whose attention is continuously organized by externally selected objectives can acquire substantial information while losing opportunities for a phenomenon to become important in an unforeseen way. Preserving salience therefore involves preserving some openness in the allocation of attention.

The practical form of this openness need not be dramatic. Walking through a city, observing an experiment before reading the interpretation, spending time with an artwork, reading beyond the paragraph required for an immediate task, listening to another person's account without immediately classifying it, or returning to a difficult primary text can all create conditions in which significance emerges before it has been optimized into a query.

The relevance to AI is consequently wider than the quality of generated answers. The organization of attention around AI-mediated requests can itself shape which phenomena ever become eligible for inquiry. A system that supports epistemic formation should therefore leave room for the user to notice what the system did not predict would matter.

7.4 Contingency and Serendipity

Contingency acquires a related importance. A planned curriculum, research programme, or AI-assisted workflow necessarily selects goals and structures attention. Selection is indispensable because human time and cognitive resources are finite. Complete optimization around prior objectives, however, risks excluding events whose later significance cannot yet be represented within those objectives.

A contingent encounter can redirect a trajectory because it introduces a relation that was absent from the subject's current plan. A failed experiment, an accidental conversation, an unfamiliar disciplinary concept, a mistaken search result, a question from a stranger, or a scene encountered while walking can connect with prior organization and make a previously unavailable inquiry possible. The epistemic value lies in the transformation produced through the encounter rather than in contingency considered in isolation.

For this reason, serendipity should be distinguished from unrestricted novelty. Continuous novelty can overwhelm attention. Random information is often simply irrelevant. A serendipitous event becomes epistemically consequential when an unplanned encounter interacts with the subject's history in a manner that changes what can subsequently be noticed, questioned, or connected.

The increasing use of predictive systems makes this distinction practically important. Recommendation systems can efficiently place users near material that resembles their prior interests. Generative AI can further synthesize the most apparently relevant material into a coherent answer. Such efficiency can reduce search costs considerably. It can also contract the number of unanticipated encounters through which an inquiry might have changed direction.

AI can equally become a source of serendipity. A model can generate an analogy across domains, introduce an unfamiliar concept, or retrieve a connection that the user would not have discovered through an existing disciplinary vocabulary. The relevant criterion again concerns downstream generativity. An

unexpected output becomes valuable when it opens a relation that the subject can subsequently investigate.

Preserving contingency therefore means maintaining some epistemic permeability to events that have not already been ranked by known relevance. This principle supports a mixed ecology of planned and unplanned inquiry. Structured reading, goal-directed research, and efficient AI assistance can coexist with exploration, wandering, interdisciplinary exposure, conversation, observation, and other practices in which the eventual value of an encounter is not fully specified beforehand.

This point also clarifies the relation between contingency and *gewu zhizhi*. Investigation has a direction, yet its object can change through the investigation. A practice of *gewu* that remains responsive to contingency allows things and situations to modify the inquiry rather than serving only as inputs to a predetermined question.

7.5 Co-Experience and Shared Inquiry

A fifth condition concerns epistemic relations among subjects. AI can provide individualized explanations, feedback, dialogue, and simulation with a degree of availability difficult for human teachers or collaborators to match. This capacity creates substantial educational and research value. It also makes it important to clarify what forms of epistemic formation can arise through shared human inquiry.

Co-experience, as developed in Section 4.6, concerns more than simultaneous exposure to the same information. Several subjects can encounter a phenomenon together, notice different aspects of it, direct one another's attention, disagree, revise interpretations, and later carry the shared history into other situations. The responses of the participants become part of the environment through which the event develops.

The epistemic importance of such interaction lies partly in distributed salience. One subject can notice what another has overlooked. A disciplinary assumption that is invisible from inside one framework can become visible when another participant responds from a different background. An objection can change the conceptual structure of both participants. A joint failure can create a problem that none of them had formulated in advance.

Shared inquiry also exposes the learner to questions whose timing and form are not completely controlled by the learner. Another subject can misunderstand, resist, redirect, or reinterpret what has been said. Such responses create contingencies within the interaction itself. The epistemic field becomes partially open because each participant is also a source of perturbation for the others.

The significance of human co-experience should not be established through a general claim that AI interaction is incapable of producing analogous effects. Human–AI interaction can certainly redirect attention, provoke questions, generate disagreement, and become part of the human participant's later epistemic history. The experiential and ontological status of the artificial participant raises a separate set of questions reserved for later work. The present argument concerns the positive value of maintaining forms of shared human inquiry whose relational structure is already well established.

This value becomes especially clear in education. A learner can receive a perfectly adapted explanation alone, yet encounter a different epistemic situation when another learner interprets the same material unexpectedly. Discussion can reveal that several apparently identical understandings diverge once applied to a case. Collaborative observation can show that attention itself is distributed. Shared creation can produce problems unavailable within a pre-authored exercise.

Preserving co-experience therefore means retaining spaces in which knowing develops among subjects rather than treating every epistemic problem as an individual request-response transaction. Seminars, laboratories, field visits, collaborative projects, peer discussion, collective reading, and informal conversation can remain valuable even when an AI system could provide a more complete immediate explanation.

The criterion remains generative rather than nostalgic. A poorly organized group activity can consume time without producing meaningful epistemic development. A solitary AI-assisted inquiry can be exceptionally generative. The argument supports preservation of relational conditions where the in-

teraction among participants contributes materially to attention, judgment, question formation, or later inquiry.

7.6 Judgment and Revision

A sixth condition concerns the capacity to judge what has been received. Generative AI can reduce the cost of obtaining claims and explanations much faster than it reduces the need to decide when those claims should be accepted, qualified, transferred, rejected, or investigated further. The resulting asymmetry makes judgment increasingly important.

Judgment becomes visible when a symbolic product encounters variation. A claim that appears persuasive in its original context can fail under another set of conditions. A generated summary can omit a qualification important to the reader's purpose. A conceptual distinction can work well for paradigmatic cases and become unstable at the boundary. An explanation can remain correct while being irrelevant to the actual problem. The subject must therefore learn to evaluate relations among proposition, evidence, scope, context, and purpose.

Revision follows from this capacity. A subject capable of revision does more than replace one sentence with another after receiving correction. Revision can involve recognizing which part of the earlier organization failed, preserving what remains useful, introducing a new distinction, or changing the question itself. The epistemic significance lies in the reorganization of later possibilities.

This distinction is especially important in an environment where visible revision can be generated automatically. Section 6.3 showed that a sequence of correction does not establish durable epistemic change. The relevant human capacity becomes visible when the subject can respond to a new case whose relation to the earlier correction has not been explicitly supplied.

Judgment and revision also protect against passive dependence on epistemic authority. Human knowledge necessarily depends upon testimony and expertise, and responsible inquiry does not require every person to verify every claim independently. The capacity for judgment instead concerns calibrated dependence: recognizing when trust is reasonable, when expertise lies outside its domain, when primary verification matters, and when uncertainty should remain open.

AI-mediated inquiry intensifies the importance of this calibration. The system can produce fluent explanations across domains whose reliability varies substantially. A learner who has acquired sophisticated judgment can use this availability as an epistemic resource. A learner who equates fluency with adequacy can acquire large amounts of unstable symbolic content.

Preserving judgment therefore requires opportunities to compare, test, disagree, encounter failure, and revise. Some of these opportunities involve difficulty, but their value lies in the capacities they form. Research on productive failure provides an instructive example: under particular instructional conditions, early unsuccessful problem solving can prepare learners for stronger subsequent learning and transfer [15]. The relevant lesson is conditional. Failure can be productive when its place within a wider learning design produces later epistemic gains.

Dewey's account of experience makes a related point at a broader educational level. Experience acquires educational significance through its consequences for later experience and growth rather than through experience considered as an undifferentiated good [5]. This perspective fits the criterion adopted here. An epistemic difficulty, failure, or delay deserves preservation when it contributes to later capacities, while obstacles that merely consume resources can be removed.

7.7 The Capacity for Further Questions

The seventh condition concerns what happens after an answer has been obtained. A completed response can satisfy the immediate informational request while leaving the subject's future question space unchanged. Another interaction can produce a new distinction, expose a tension, or create a relation that enables questions unavailable before the interaction. The latter form of change is especially important for epistemic formation.

The ability to formulate further questions should not be equated with producing a larger number of interrogative sentences. Generative AI can already do this with ease. The relevant capacity concerns recognizing new problem structures. A subject who has learned a concept well enough to discover where it fails has undergone a deeper change than a subject who can request five related questions. A researcher who can identify a new variable because earlier inquiry changed what is perceptible has acquired a different epistemic capacity from one who selects a generated question from a list.

Further question formation therefore provides one indication of transfer. The epistemic effect of an earlier inquiry continues beyond its original object. A distinction learned in one domain reorganizes perception in another. A methodological criticism becomes applicable to a new dataset. An encounter with one historical case changes which questions are asked of another. The subject's epistemic landscape has changed.

This generative continuation provides a useful criterion for AI-assisted learning. An interaction is especially valuable when the user becomes capable of asking a question that neither the original task nor the AI response explicitly supplied. Such a question indicates that the symbolic material has entered a wider organization of attention and judgment.

The criterion remains open-ended. A new question can be confused, trivial, or based on a false assumption. The value lies in the capacity for continued epistemic activity rather than in automatic correctness. Judgment and verification remain necessary at every later stage.

This capacity also returns the argument to *zhizhi*. Extension of knowledge can be understood partly through enlargement of the space within which the subject can continue to discriminate and inquire. A subject whose knowledge has been extended becomes capable of entering future situations with a richer set of generative possibilities.

7.8 Epistemic Friction and Generative Conditions

The seven dimensions developed above clarify why the normative response to generative AI should avoid a general defence of epistemic friction. Learning has always involved effort, uncertainty, delay, error, and repetition. Some of these conditions contribute to durable capacities. Others reflect limitations of older technologies, institutional scarcity, poor pedagogy, inaccessible materials, or avoidable inefficiency.

Generative AI can remove many such burdens. It can translate unfamiliar terminology, provide examples immediately, adapt explanations, generate practice materials, compare arguments, summarize long documents, and expose connections across fields. Removing these costs can release attention for more valuable forms of inquiry. Requiring learners to reproduce the same costs solely because earlier generations encountered them would confuse historical difficulty with epistemic necessity.

The more discriminating principle developed here concerns the consequences of removing a difficulty. If an AI tool removes tedious calculation while allowing the learner to focus on model construction and interpretation, epistemic formation can be strengthened. If it removes every occasion on which the learner must decide what should be calculated, whether the result is plausible, or which assumptions matter, relevant capacities can weaken. The same technological shortcut can therefore be valuable in one pedagogical relation and pre-emptive in another.

The object of preservation is consequently the set of generative conditions through which a subject remains capable of further knowing. Curiosity matters because inquiry can continue beyond supplied questions. World-directed encounter matters because symbols remain answerable to phenomena. Existential and affective salience matter because objects of inquiry can emerge before they have been specified as tasks. Contingency matters because unforeseen relations can change the trajectory. Co-experience matters because other subjects can participate in the formation of attention and questions. Judgment and revision matter because inherited and generated propositions require evaluation under changing conditions. Further question formation matters because epistemic development should remain capable of extending itself.

These conditions need not appear together in every episode of knowing. A routine factual query can be appropriately completed through efficient information delivery. A mature expert can delegate steps that would be formative for a novice. A learner can sometimes benefit from immediate explanation

and at other times from sustained uncertainty. The relevant configuration depends upon the epistemic objective, the subject's prior organization, and the role that the interaction is intended to play.

This contextual character prevents generativity from becoming a simple optimization metric. Maximizing curiosity, uncertainty, interaction, or contingency independently could produce distraction and instability. The normative task is to maintain sufficient conditions for continuing epistemic formation while allowing efficient delegation where delegation does not substantially undermine the relevant capacities.

The contemporary significance of *gewu zhizhi* can now be stated more precisely. Its value does not lie in reproducing an older sequence in which a human subject must personally traverse every step before obtaining an answer. Its value lies in preserving relations through which an answer can still become part of the formation of a knower. A proposition received first can return to the world, become entangled with experience, generate curiosity, encounter resistance, enter shared inquiry, undergo judgment, and produce further questions.

The next section turns from this philosophical criterion to several practical implications. It considers how non-substitutive education, AI-assisted inquiry, shared and world-directed learning, and public knowledge practices might be organized when the objective is the preservation of generative epistemic conditions rather than the reproduction of epistemic friction.

8 Practical Implications

The preceding sections have argued that the contemporary significance of *gewu zhizhi* lies less in reproducing historically familiar routes toward epistemic products than in preserving conditions through which subjects remain capable of continuing epistemic formation. This conclusion has practical consequences, yet those consequences should remain proportionate to the philosophical argument. The present section does not propose a complete educational model, a technical architecture for AI systems, or a regulatory framework. It identifies several directions that follow if curiosity, world-directed encounter, contingency, co-experience, judgment, revision, and further question formation are treated as epistemically significant under conditions of inexpensive symbolic production.

The central practical distinction is between assistance that supports an epistemic trajectory and assistance that substitutes for functions whose development remains important to the subject. This distinction is necessarily contextual. The same intervention can be substitutive for a novice and appropriately delegative for an expert. An immediate answer can prematurely close one inquiry and open another. A generated explanation can replace an opportunity for discrimination or provide the conceptual resource through which discrimination becomes possible. The practical problem is therefore not whether AI should be used, but which functions can be delegated under which epistemic objectives without substantially weakening the capacities that the activity is intended to form.

8.1 Non-Substitutive Education

Education provides the most direct application because it has always involved a tension between transmitting what is already known and forming subjects capable of later knowing without continuous external direction. Generative AI makes the transmission side dramatically more efficient. A learner can request explanations at different levels, translations, examples, counterexamples, practice questions, summaries, comparisons, revisions, and feedback without waiting for a human instructor. This availability can widen access to intellectual resources and reduce many forms of avoidable educational friction.

The same availability creates a risk of substitution. If every indeterminate situation is immediately converted into a well-formed question, every question into an explanation, every failed attempt into a correction, and every uncertainty into a completed conceptual organization, the learner can move rapidly through symbolic content while receiving fewer opportunities to develop the capacities through which those epistemic transitions would otherwise be generated.

The term *non-substitutive education* is used here for pedagogical arrangements that distinguish between assistance with an epistemic task and replacement of a formative function of that task. The distinction is not equivalent to a prohibition on giving answers. A learner does not need to rediscover a theorem before using it, reconstruct the complete history of a scientific concept, or remain confused merely because confusion once preceded a discovery. The relevant question concerns what the learner is supposed to become capable of doing after receiving assistance.

Suppose, for example, that the educational objective is to understand a philosophical distinction. An AI system can provide the distinction immediately. If the objective is only recognition of the terminology, this may be sufficient. If the objective includes the capacity to identify cases in which the distinction matters, the learner still requires opportunities to compare cases, misclassify boundaries, encounter objections, and revise the initial understanding. The answer can therefore be delivered without allowing the answer to terminate the activity.

A similar distinction applies to mathematics. A generated solution can remove unproductive algebraic burden while allowing attention to remain on model construction, proof strategy, or interpretation. The same solution can become substitutive when the central educational objective is precisely the capacity to select the relevant transformation or recognize why one step follows from another. The epistemic value of delegation depends upon the locus of the capacity being cultivated.

This approach is compatible with research showing that difficulty can support learning under appropriate conditions. Productive failure, for example, can prepare learners for later instruction and transfer when unsuccessful problem solving makes relevant structures available for subsequent learning [15]. The lesson is not that failure should be maximized. Failure has educational value when it contributes to later epistemic organization. The same criterion applies to AI-mediated intervention.

Non-substitutive education can therefore be organized around selective delegation. Information retrieval, repetitive transformation, preliminary summarization, language assistance, and routine feedback can often be delegated extensively. Activities central to the intended epistemic capacity may require greater learner participation. These can include identifying what is question-worthy, choosing between competing interpretations, determining which evidence matters, recognizing boundary cases, responding to unexpected results, and deciding when an explanation should be revised.

The practical ideal is therefore neither an AI-free classroom nor a classroom in which every cognitive operation is delegated to an adaptive system. It is an educational environment capable of distinguishing epistemic efficiency from epistemic formation.

8.2 AI-Assisted Inquiry

The same principle applies beyond formal education. Researchers, professionals, and independent learners increasingly use generative AI during ordinary inquiry. The relevant activities can include brainstorming, literature orientation, conceptual comparison, translation, coding, drafting, source discovery, objection generation, and dialogue. Evaluating such use only through a binary distinction between independent and AI-assisted work obscures the different epistemic functions performed within an inquiry.

A more useful analysis begins with the trajectory. AI can enter before the question is formed, after the question is formed but before evidence is collected, during comparison among explanations, after a preliminary judgment, or during revision. Its effect differs at each position. Early intervention can expand the question space or prematurely stabilize it. Later intervention can expose an objection, identify a missing literature, or merely rephrase a judgment the researcher has already reached.

The distinction between epistemic pre-emption and epistemic activation provides one practical diagnostic. Before requesting a complete conceptual organization, a researcher can sometimes benefit from remaining briefly with an indeterminate observation and recording what appears strange, unresolved, or significant. At other times, the absence of a relevant concept can prevent any productive inquiry from beginning, and an AI-generated distinction can become the contingency through which the phenomenon becomes intelligible.

The criterion is therefore not chronological purity. There is no general rule that a human must always think first and consult AI later. A generated proposition can precede knowing and still participate in gen-

uine epistemic formation. What matters is whether the subsequent trajectory remains open to encounter, verification, disagreement, and revision.

One practical implication is the deliberate return from generated representation to relevant objects of inquiry. A researcher who receives an AI-generated account of a philosophical position can inspect the cited or primary texts. A generated historical claim can be checked against sources. A suggested scientific interpretation can be compared with data and methods. A legal summary can be returned to statutes and judgments. An argument can be tested through counterexamples rather than accepted because its organization is rhetorically complete.

This movement can be expressed as a recurrent cycle:

$$\text{generated articulation} \rightarrow \text{encounter} \rightarrow \text{judgment} \rightarrow \text{revision} \rightarrow \text{further articulation.} \quad (3)$$

Equation 3 is again schematic rather than procedural. Its purpose is to emphasize that generated articulation need not terminate inquiry. A mature AI-assisted practice can repeatedly return symbolic products to phenomena capable of constraining and modifying them.

Another implication concerns recording unresolved questions. The efficiency of generative systems makes it easy to convert every uncertainty into a request. Some uncertainties are better preserved temporarily because their unresolved form contains information about what the subject has not yet differentiated. Recording the uncertainty before requesting an answer can preserve part of the epistemic trajectory and make later changes easier to recognize.

This practice should not become ritualized delay. The value lies in preventing automatic closure where the indeterminate state itself remains epistemically productive.

8.3 Shared and World-Directed Learning

The analysis of co-experience and contingency also supports continued attention to shared and world-directed forms of learning. Generative AI can create highly individualized epistemic environments. A user can receive explanations, examples, and dialogue tailored to a personal history and level of expertise. Such personalization has substantial value. It can also make the request-response interaction between one user and one system an increasingly dominant form of learning.

Some epistemic developments require different structures. Other human participants can notice features that the learner did not think to request. They can misunderstand in unexpected ways, challenge implicit assumptions, redirect attention, and introduce concerns outside the learner's current conceptual organization. Shared inquiry therefore provides forms of contingency that are difficult to reduce to optimized personalization.

This gives continuing importance to seminars, collective reading, laboratories, fieldwork, collaborative creation, peer discussion, and informal intellectual conversation. Their value does not lie in the physical co-presence of human participants as such. It lies in the possibility that several historically different subjects encounter a common object or problem and become sources of epistemic variation for one another.

World-directed activity provides another dimension of this openness. A field visit can expose features absent from descriptions. An experiment can fail. A primary text can resist the interpretation through which it was introduced. A musical performance can generate a question that no participant had planned. An unfamiliar neighborhood, natural environment, artwork, or social practice can reorganize attention before a formal inquiry begins.

The importance of such events becomes clearer when compared with a fully prestructured educational environment. If every relevant distinction, example, difficulty, and response has already been selected because its pedagogical function is known, the learner receives an efficiently designed trajectory. This can be highly effective. It also contains less room for an event whose importance becomes visible only after it has occurred.

Dewey's emphasis on the continuity of experience is useful here because the educational value of an experience depends partly upon what it makes possible for later experience [5]. Shared and world-

directed learning should therefore be evaluated through their downstream effects. A field visit that produces no further attention or inquiry is not automatically valuable. A brief unexpected observation that reorganizes years of later thinking can be highly formative.

The practical implication is to preserve an epistemic ecology containing both designed and undesigned encounters. Structured instruction, AI-supported personalization, direct observation, collaborative inquiry, independent wandering, and exposure to unfamiliar domains can perform complementary functions. The relevant balance will differ across subjects and objectives.

8.4 Preserving Generative Provenance

The preceding implications concern the formation of present knowers. A further question concerns what later learners and researchers inherit from an epistemic process. Modern scholarly systems preserve final papers, books, datasets, software, citations, publication dates, and increasingly detailed version histories. These forms of preservation make knowledge transmissible and contestable across time.

The analysis developed in this paper suggests that some dimensions of epistemic genesis can also become worth preserving. When a polished symbolic product is increasingly easy to generate, the history through which a question became salient, a distinction was introduced, an objection changed the argument, or a failed attempt redirected the inquiry can provide information absent from the final artifact.

The present paper uses *generative provenance* for this broader historical dimension. Generative provenance can include selected records of questions, events, relations, observations, revisions, disagreements, failed attempts, source encounters, and contingent developments through which an epistemic result became possible. The relevant proposal is additive. Final products, citations, evidence, and conventional provenance remain indispensable. Generative provenance concerns information that can supplement rather than replace them.

The proposal follows from the distinction between epistemic product and epistemic formation. A final paper can preserve a conclusion while compressing the history through which the problem became visible. This compression is often necessary. Scholarly communication would become unusable if every publication included a complete chronological record of all discussions, abandoned ideas, personal experiences, and intermediate drafts. The practical problem is therefore one of selective preservation.

The appropriate principle can be described as *sufficient generative provenance*. The objective is to preserve enough of a trajectory to serve a specified epistemic purpose without treating total capture as either possible or desirable. What counts as sufficient depends upon the purpose. A dispute over priority may require different evidence from an educational reconstruction of an inquiry. A philosophical archive may preserve different events from an experimental reproducibility record. A public history project may require multiple conflicting accounts rather than one canonical narrative.

This qualification is especially important because provenance claims are themselves epistemically situated. A researcher may later interpret an accidental conversation as the origin of an idea, while another participant may remember the event differently. A later discovery can change which earlier event appears significant. Recording generative provenance should therefore not require transforming retrospective interpretations into unquestionable causal facts.

The philosophical principle is straightforward: preserving a history of knowing should preserve its revisability where the historical interpretation is itself revisable.

This proposal also follows from the role of contingency developed earlier. Final epistemic products tend to preserve what survived the inquiry. The contingent event that redirected the inquiry can disappear precisely because it does not fit the final conceptual organization. Preserving selected generative history can retain access to alternative trajectories that later researchers may interpret differently.

Generative provenance can also have educational value. A learner can encounter not only the stabilized result but selected moments at which a problem changed, an assumption failed, a distinction was introduced, or an unexpected event opened another path. Such material can support reconstruction of epistemic trajectories without requiring the learner to repeat the complete original history.

The proposal should remain modest within the present essay. The value of generative provenance does not imply that current scholarly systems should attempt immediate comprehensive capture of intel-

lectual activity. Recording creates costs, privacy risks, interpretive problems, and possible distortions of research behaviour. It also creates difficult questions concerning ownership, access, attribution, disagreement, and deletion. These problems require separate treatment.

8.5 Event-Selective Recording

One preliminary direction can nevertheless be stated. If generative provenance is worth preserving, continuous recording of complete epistemic life is neither necessary nor desirable. A more plausible approach is selective and event-oriented.

Many forms of inquiry already contain recognizable epistemically consequential events. In philosophical discussion, a participant can propose a claim, offer support, introduce a counterexample, reject an assumption, distinguish two concepts, revise a position, or synthesize previously competing accounts. In experimental research, a measurement can contradict an expectation, a method can fail, a variable can be redefined, or a replication can change confidence in a result. In education, a learner can manifest a misconception, encounter a counterexample, reformulate a question, or transfer a distinction to a new case.

Such events do not constitute a universal ontology of epistemic activity. Their types differ across domains, and identifying an event can itself require interpretation. They nevertheless suggest a practical alternative to total capture: preserve selected transitions that materially change the epistemic structure of an inquiry.

An event-oriented approach also makes the distinction between state and change more explicit. A current manuscript can be treated as one state of an artifact, while a conceptual revision records an event through which a later state became possible. A researcher's current judgment can change after a counterexample. A question can be reformulated after another participant introduces a distinction. The resulting historical structure can provide a more informative account of epistemic development than a sequence of final files alone.

Version-control systems already preserve important aspects of artifact evolution. They are especially effective at recording changes among textual or computational states. The broader problem of generative provenance includes relations and events that are not reducible to artifact modification: an unexpected observation, a discussion, a shared encounter, a retrospective reinterpretation, or a shift in the question being investigated. The possible integration of these dimensions belongs to future infrastructure research.

The present essay therefore stops before specifying a formal event vocabulary, data model, or implementation. Event-selective recording is introduced only as one plausible consequence of the broader philosophical proposal that the history through which knowing became possible can itself possess epistemic value.

8.6 Boundaries of the Infrastructure Proposal

The infrastructure implications developed above can easily expand beyond the scope of the present paper. A system capable of representing generative provenance would require decisions concerning entities, properties, relations, states, processes, events, temporal structure, uncertainty, interpretation, and domain-specific vocabularies. A usable implementation would additionally raise problems of storage, interoperability, querying, visualization, access control, security, and long-term preservation.

The governance problems are equally substantial. Rich provenance can expose private relationships, unpublished ideas, intellectual dependencies, disagreements, and personal histories. Immutability can conflict with privacy and correction. Attribution can become contested. The economic value of high-quality research trajectories can encourage enclosure by platforms that control the interactions through which those trajectories are generated. Educational reuse introduces further questions concerning selection, compression, and contextualization.

These issues are important precisely because generative provenance should not be mistaken for neutral metadata. A representation of how knowledge emerged is already a selection and interpretation of an

epistemic history. Infrastructure design therefore becomes inseparable from questions of epistemology, jurisprudence, governance, security, political economy, and education.

Their full treatment would transform the present essay into a substantially different project. Formal modeling of entities, properties, relations, states, processes, and events; domain-extensible epistemic event grammars; a possible domain-specific language for recording epistemic trajectories; privacy-preserving verification; legal treatment of contested provenance; and the political economy of generative histories are therefore reserved for a separate interdisciplinary research programme.

The contribution of the present paper is prior to these technical questions. It provides a philosophical reason for asking them. If generative AI changes the relative epistemic value of final symbolic products and the histories through which knowing develops, then public knowledge practices may eventually need infrastructures capable of preserving more than the final artifact.

8.7 From Efficient Answers to Generative Practice

The practical implications of the paper can now be stated without requiring a single institutional prescription. Generative AI should not be evaluated solely by the amount of epistemic labour it removes. Removal of labour can be highly beneficial. The more relevant question is which relations and capacities remain after that labour has been delegated.

In education, this means distinguishing content delivery from formation of attention, judgment, and question-generating capacity. In individual inquiry, it means allowing generated answers to return to phenomena, sources, evidence, and changing cases. In collective learning, it means retaining forms of co-experience through which historically different subjects become sources of epistemic variation for one another. In public knowledge practices, it means considering whether selected parts of epistemic genesis deserve preservation alongside stabilized products.

None of these implications requires restoring artificial scarcity to answers. A proposition that can be obtained in seconds should not be made difficult to obtain merely because it once required hours of search. The challenge is to prevent efficient access from being confused with completed epistemic formation.

The practical orientation proposed here can therefore be summarized through a single criterion: preserve the conditions through which epistemic products can remain generative after they have been received.

Under this criterion, AI can be deeply integrated into *gewu zhizhi*. It can provide propositions, distinctions, comparisons, objections, translations, and new contingencies. Investigation continues when these artifacts are returned to things, situations, evidence, other subjects, and later questions. Extension of knowledge continues when the interaction changes what the subject can subsequently notice, judge, revise, and investigate.

The resulting practice is neither a defence of pre-AI scholarship nor an endorsement of answer delivery as a sufficient model of knowing. It treats generative AI as a new participant in the epistemic environment while retaining the formation of the knower as the principal normative concern.

The following discussion draws together the argument developed across the paper. It returns to the distinction between possession and formation, clarifies why neither product nor process appearance provides a sufficient criterion of knowing, and considers how *gewu zhizhi* can be understood when articulated knowledge increasingly arrives before the human knowing to which it may later contribute.

9 Discussion: From Answer Acquisition to Epistemic Formation

The argument developed across the preceding sections began from a comparatively simple technological observation. Generative AI can provide propositions, explanations, distinctions, questions, and structured responses before a human recipient has undergone the trajectory through which similar epistemic products might previously have emerged. The philosophical significance of this change becomes clearer

once several distinctions are kept apart. Availability of a proposition differs from propositional knowledge. Propositional knowledge differs from broader epistemic achievements such as understanding and practical capacity. A representation of inquiry differs from the history through which an epistemic result actually arose. A historically rich process differs from the later generative effect that its representation may have on another subject.

These distinctions do not diminish the epistemic value of inherited or AI-generated symbolic products. Human knowledge has always depended upon epistemic inheritance, mediation, testimony, teaching, division of labour, and the ability to begin from results that others have already established. The contemporary transformation lies in the increasing distance that can exist between the apparent completeness of an epistemic product and the formation of the human recipient who encounters it.

This section draws together the implications of that transformation. It first returns to the distinction between epistemic possession and epistemic formation. It then considers the significance of pre-propositional salience and question formation, the insufficiency of process appearance, the dual role of AI in epistemic pre-emption and activation, and the relation between generative provenance and epistemic formation. The final subsection clarifies the scope of the present argument and identifies the further problems that follow once epistemic appearance itself becomes increasingly generable.

9.1 Epistemic Possession and Epistemic Formation

The distinction between possession and formation provides the central axis of the paper. A subject can obtain a proposition, explanation, definition, or argument without undergoing all of the epistemic changes that the artifact might conventionally suggest. This claim is unsurprising in isolation. Students have always memorized without understanding, readers have always repeated arguments they could not independently reconstruct, and experts have always relied upon results whose complete provenance they did not personally reproduce.

Generative AI changes the practical significance of this familiar distinction because increasingly sophisticated symbolic products can be produced with very low marginal effort from the recipient. The output can contain conceptual organization, caveats, examples, objections, revisions, and a polished explanatory structure. The traditional cues through which a reader might infer substantial prior epistemic labour from the form of the artifact therefore become less reliable.

The relevant distinction can be represented schematically as follows:

$$\text{epistemic product available to subject} \not\Rightarrow \text{corresponding epistemic formation of subject.} \quad (4)$$

Equation 4 states a non-implication rather than a separation. A received product can participate deeply in epistemic formation. A clear explanation can reorganize understanding. A generated question can activate curiosity. A distinction can make previously invisible cases perceptible. The point is that the relation must be established through what the interaction subsequently makes possible for the subject.

This shifts attention toward capacity. A subject who has undergone epistemic formation becomes differently able to encounter later situations. The subject may identify a distinction without being prompted, recognize when a claim falls outside its scope, generate an objection, connect a concept with an unexpected case, revise a previous position, or return from an abstract representation to the phenomenon that constrains it. These changes concern the organization of future epistemic possibility.

Epistemic formation therefore has a diachronic dimension. It cannot always be assessed at the moment an answer is received. A concept that appears only partially understood today can reorganize attention months later when another encounter makes its significance visible. A question that initially arrives from an external source can become deeply generative after being connected with a personal history of unresolved observations. Conversely, an explanation that appears fully understood during immediate interaction can later prove fragile when the subject encounters variation.

This temporal dimension also explains why epistemic formation should not be equated with immediate performance. Correctly reproducing an answer shortly after receiving it provides some evidence of

learning, yet it does not exhaust the capacities at issue. Transfer, revision, spontaneous question formation, and judgment under changing conditions provide different forms of evidence concerning whether the symbolic product has entered a more durable epistemic organization.

The distinction is particularly important for the contemporary interpretation of *zhizhi*. Extension of knowledge can include additional propositions, and the present paper has no reason to depreciate such acquisition. The extension becomes philosophically richer when it also includes expansion of the subject's capacity to continue knowing. The quantity of accessible symbolic content and the generative organization of the knower can therefore develop at different rates.

9.2 Before the Explicit Question

The paper has also argued that epistemic formation cannot be reconstructed adequately from explicit questions alone. Inquiry is frequently narrated in a form that begins with a determinate question and proceeds toward an answer. Such narratives are useful because questions provide clear units around which research can be organized. They can nevertheless conceal the preceding development through which something first became question-worthy.

A subject can experience a discrepancy before being able to state it. A scene can interrupt attention before becoming an aesthetic question. A result can feel anomalous before the relevant variable has been identified. A conversation can leave an unresolved tension whose conceptual importance becomes visible only later. These episodes indicate that epistemic genesis can begin within salience, disturbance, attraction, familiarity, or incongruity before it becomes organized as explicit inquiry.

This point matters especially when AI can generate questions as efficiently as answers. The presence of a well-formed question can no longer be treated as strong evidence that the recipient has passed through the conditions that made the question epistemically significant. A user can receive an excellent research question without yet possessing the observations, tensions, or conceptual history through which the question would become genuinely connected to an object of concern.

Yet externally supplied questions should not be dismissed. Human learning has always involved encountering questions formulated by teachers, authors, traditions, institutions, and earlier researchers. The important distinction concerns what happens after the question is received. A question can remain an assigned sentence, or it can reorganize the subject's relation to a phenomenon.

The aesthetic interruption discussed earlier illustrates this transition particularly clearly. A person can first stop because something appears beautiful, later connect that experience with a remembered relation, and only afterward formulate a question concerning beauty, memory, or relational experience. The explicit question appears late in the trajectory even though the epistemic process began earlier.

This structure reverses a common assumption about inquiry. An explicit question does not always generate the encounter. An encounter can generate the explicit question. AI introduces a further possibility: a generated question can itself become an encounter from which curiosity subsequently develops. The temporal order among question, encounter, curiosity, and knowing is therefore variable.

This variability supports the broader relational account developed in Section 4. Epistemic genesis is better understood through relations among historically formed subjects, present situations, symbolic resources, memories, affective orientations, other subjects, and contingent events than through a single universal pipeline from question to answer.

9.3 The Limits of Process Appearance

The ability of generative AI to produce process-like representations creates a second major consequence. A common response to the decreasing reliability of final outputs as evidence of human knowing is to place greater emphasis on process. Students can be asked to show their reasoning, researchers can preserve drafts, and writers can provide accounts of how a conclusion developed. These practices can remain valuable. The preceding analysis shows that the presence of a process representation cannot by itself establish epistemic formation.

Generative systems can produce plausible sequences of uncertainty, objection, revision, and discovery. A polished reasoning trace can therefore be as symbolically available as a polished conclusion. This does not render process records useless. It changes the epistemic inference that can reasonably be drawn from them.

The distinction can be expressed in three layers developed in Section 6.4:

$$\text{represented generativity} \neq \text{historical generativity} \neq \text{downstream generativity}. \quad (5)$$

Represented generativity concerns how an epistemic trajectory appears within an artifact. Historical generativity concerns the actual trajectory through which the artifact or epistemic result arose. Downstream generativity concerns the capacity of that artifact to produce further epistemic development in another subject.

These dimensions can interact without collapsing into one another. A historically inaccurate discovery narrative can produce genuine insight in a reader. A genuine research history can be compressed into a short final paper with little visible process. A generated dialogue can create an authentic philosophical problem for a human participant even when the represented dialogical development has no corresponding human-like experiential history on the system side.

This distinction provides an important safeguard against nostalgia for procedural authenticity. Requiring visible struggle, hesitation, or revision does not automatically restore the epistemic conditions disrupted by generative AI. Those signs can themselves become performable symbolic forms.

The more relevant criterion concerns whether the interaction changes the subject's later epistemic capacities. A process representation earns formative importance when it helps a learner see a distinction, recognize an assumption, understand why an objection matters, or respond more intelligently under a new condition. The value lies in the relation between representation and later epistemic activity.

This conclusion also reframes educational assessment. Increasing the amount of visible reasoning can improve diagnostic access to a student's understanding, and it can support reflection. Such practices should be interpreted as evidence whose reliability depends upon context, rather than as transparent proof of an underlying epistemic trajectory. Assessment under generative AI will therefore increasingly require interaction with variation, application, transfer, judgment, and revision rather than reliance upon the textual shape of a reasoning process alone.

9.4 Epistemic Pre-emption and Activation Reconsidered

The distinction between epistemic pre-emption and epistemic activation allows the argument to avoid a general opposition between AI assistance and authentic knowing. The same technological capacity can contract one trajectory and open another.

Pre-emption occurs when a symbolic organization arrives at a stage where the subject might otherwise still be differentiating the problem. An explanation can determine what counts as relevant before the learner has encountered the variation that made relevance difficult. A research question can establish the problem before the researcher has developed a relation with the material. A generated interpretation can become the lens through which a primary source is read before alternative features have had an opportunity to become salient.

This effect is especially important because pre-emption can be experienced as efficiency. The subject moves quickly from uncertainty to articulation. The immediate cognitive burden decreases. The epistemic cost, where one exists, appears later in reduced capacity to recognize, generate, or revise the distinction independently.

Activation has the opposite direction. A generated concept can make an unnoticed feature perceptible. An unfamiliar analogy can connect two previously separate histories of inquiry. A suggested counterexample can expose an assumption that the subject had repeatedly relied upon without recognizing it. A generated question can encounter a pre-existing but unarticulated concern and allow curiosity to become manifest.

The distinction should therefore be applied to trajectories rather than tools. AI is neither intrinsically pre-emptive nor intrinsically activating. Its epistemic role depends upon timing, prior organization, the object of inquiry, the capacity being developed, and what opportunities remain afterward.

This conclusion has two practical consequences. First, epistemic efficiency cannot serve as the sole criterion of good assistance. Faster completion can occasionally remove conditions relevant to formation. Second, the preservation of formation does not require systematic delay. Immediate assistance can produce greater generativity when the subject lacks the conceptual resources needed for productive engagement.

The normative task is therefore one of differential intervention. Assistance should be sensitive to the epistemic function of the difficulty currently encountered. A difficulty that merely consumes attention can be removed. A difficulty that is currently forming discrimination, judgment, or question capacity may deserve partial preservation or a different form of assistance.

This principle remains intentionally less determinate than a universal pedagogical algorithm. The present essay provides a criterion for analysis rather than a decision rule capable of specifying the correct intervention in every case.

9.5 Generative Provenance and the History of Knowing

The proposal concerning generative provenance follows from the same shift from product toward formation. If a final artifact increasingly provides limited information about the history through which an epistemic result arose, selected parts of that history can acquire greater epistemic value.

This claim requires two limitations.

First, provenance does not provide complete access to epistemic genesis. A recorded event captures some aspects of a trajectory while omitting others. Retrospective attribution can change. Participants can disagree about which encounter mattered. Tacit changes in perception or salience may never have been recorded. The complete historical genesis of knowing is therefore unlikely to be recoverable through any archive.

Second, provenance representation can itself be generated. A coherent account of discovery does not guarantee that the narrated events occurred. The preservation of provenance therefore cannot be reduced to preserving narratives that claim to describe provenance.

These limitations support the more modest notion of *sufficient generative provenance*. The objective is to preserve selected, contestable, purpose-relative evidence concerning important transitions in an epistemic trajectory. Such evidence can include contemporaneous versions, primary materials, records of objection and revision, interaction histories, observed events, and later retrospective interpretations whose status is explicitly identified.

The proposal therefore shifts provenance from an ornamental history of discovery toward a potentially useful epistemic resource. A later reader can examine why a distinction became necessary, which alternatives were abandoned, which event changed the research direction, and how the final organization compressed earlier uncertainty. This information can support interpretation, education, accountability, and later inquiry.

Generative provenance should nevertheless remain subordinate to the principal concern of the paper. Preserving a rich trajectory does not itself produce a knower. An archive becomes epistemically valuable through the later relations formed around it. A record of failed reasoning can remain inert, while a single well-chosen event can reorganize a reader's understanding.

The importance of provenance therefore returns to downstream generativity. Its value lies partly in allowing later subjects to re-enter selected transitions through which knowledge changed, rather than encountering only the stabilized result.

9.6 The Reorientation of *Gewu Zhizhi*

The analysis now permits a more direct answer to the principal question of the paper. The contemporary problem of *gewu zhizhi* is not that artificial intelligence has made investigation obsolete. It has altered

the relation between investigation and articulated epistemic result.

Under conditions of scarce symbolic production, investigation frequently preceded access to a developed answer. Under generative AI, an answer can arrive first. This temporal inversion changes the possible object of investigation. The proposition itself can become something encountered.

A generated proposition can therefore enter a renewed practice of *gewu*. The subject can examine its assumptions, compare it with evidence, test it against cases, trace it to primary sources, identify where it fails, connect it with prior experience, or allow it to generate a new question. Investigation continues after articulation.

The corresponding reinterpretation of *zhizhi* concerns formation rather than numerical accumulation alone. Extension of knowledge can include the development of capacities through which a subject becomes differently able to notice, discriminate, question, judge, and revise. This extension can occur through AI assistance, teaching, testimony, direct encounter, co-experience, or combinations of these.

The resulting structure can be summarized schematically:

received articulation $\rightarrow$ *gewu* $\rightarrow$ epistemic formation $\rightarrow$ further articulation and inquiry. (6)

The sequence should again be read as schematic. In practice, the relations are recursive. A generated proposition can produce curiosity, investigation can change the proposition, another subject can redirect the inquiry, and a later encounter can reactivate a question that had temporarily disappeared.

What matters is that receiving an epistemic product remains compatible with continued formation. The challenge of AI is therefore not to restore the old temporal order. It is to prevent the availability of articulation from being mistaken for the completion of knowing.

This reorientation also changes the normative object of preservation. The relevant task is not the preservation of difficulty, slowness, or visible process. It is the preservation of generative epistemic conditions. Curiosity, world-directed encounter, affective and existential salience, contingency, co-experience, judgment, revision, and further question formation matter because they help maintain the possibility that inherited symbolic products can continue to transform the knower.

9.7 Scope and Further Problems

The argument developed here deliberately stops before several problems that become visible once symbolic epistemic appearance is treated as increasingly generable.

The first concerns recognition of the knower. If knowledgeable language, hesitation, revision, humility, and even narratives of discovery can all be generated, the question arises as to what evidence remains available for recognizing another subject's epistemic history. This problem concerns diachronic recognizability, relational history, and trust. It requires a different analytical centre from the present paper.

The second concerns human–AI relation. Repeated interaction with an artificial system can become part of a human subject's actual history. A remembered conversation with a system can influence later attention, interpretation, and decision. Persistent interaction can therefore become relationally significant for the human participant even before difficult questions concerning artificial experience, subjectivity, or consciousness have been resolved.

The third concerns relational reality. If an entity can acquire causal significance through historically developing relations, artificial systems create a difficult boundary case for distinctions between artificiality and reality. Addressing that issue would require careful separation among causal efficacy, experiential status, normative agency, moral standing, and legal responsibility. The present argument does not depend upon resolving any of these questions.

The fourth concerns infrastructure. A serious system for preserving generative provenance would require formal semantics, event representation, uncertainty, revisability, privacy, security, attribution, governance, legal safeguards, and political-economic analysis. Section 8 identifies the philosophical motivation for such work while leaving the technical and institutional programme open.

These problems should remain separate because their conflation would obscure the narrower contribution of the present essay. The object examined here is human epistemic formation under conditions in which epistemic products and process-like symbolic representations can increasingly precede the knowing to which they may later contribute.

Within that scope, the central conclusion is comparatively modest. Generative AI does not make curiosity, contingency, shared experience, judgment, or world-directed encounter newly important. Their importance has long been recognized in different philosophical and educational traditions. The technological change alters their relative position. When symbolic products provide decreasing evidence about the epistemic genesis associated with them, the generative conditions of knowing become more visible as objects of philosophical and practical concern.

The next and final section returns directly to *gewu zhizhi*. It summarizes the argument that the contemporary challenge lies in sustaining the relations through which a proposition received in advance can still become an occasion for investigation, transformation, and further knowing.

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