New Ideas in Child and Educational Psychology
Volume 5, Issue 3–4, 2025

NEW IDEAS IN
CHILD AND EDUCATIONAL
PSYCHOLOGY

Digital Childhoods: Synthetes, A-Voiders, and Equilibrants in the Age of AI

Constantine Andoniou*

Department of Education and Social Sciences, Abu Dhabi University, Abu Dhabi, UAE

*Corresponding author. E-mail: constantine.andoniou@adu.ac.ae

ABSTRACT

Background. The increasing integration of artificial intelligence (AI) into early childhood education signals more than a technological milestone—it represents a structural transformation in human development. Nations across the globe, including China, the United States, the Russian Federation, and the European Union, are incorporating AI literacy from the earliest stages of education. This shift warrants a reevaluation of developmental psychology, as children now engage with non-human agents in cognitive, emotional, and moral learning processes.

Objective. This paper explores how varying degrees of exposure to AI during childhood generate divergent developmental trajectories. A new taxonomy of childhood development is proposed, identifying three types: *Synthetes* (children immersed in AI ecosystems), *A-Voiders* (children with minimal or no AI exposure), and *Equilibrants* (children who critically navigate both AI and human domains). Through this typology, the study examines how AI-mediated experiences shape cognitive structure, emotional depth, and ethical agency.

Design. The conceptual framework is constructed around four interrelated dimensions: level of *AI exposure, cognitive modification, socio-emotional restructuring,* and *ethical agency formation*. Drawing upon classic psychological theories including Piaget's cognitive stages, Vygotsky's social mediation, Erikson's identity development, and Bandura's social learning, the paper analyzes how AI disrupts and reconfigures each dimension. These disruptions are not merely additive but transformative, challenging traditional models of childhood development.

Results. Synthetes often exhibit enhanced computational thinking and pattern recognition but may lack reflective depth and authentic emotional capacity. A-Voiders preserve traditional interpersonal and ethical frameworks but risk marginalization in AI-dominated systems. Equilibrants demonstrate the most adaptive profile, developing hybrid competencies that include both technical fluency and critical, ethical judgment. The framework reveals that AI is not a neutral educational tool but a co-constitutive agent in the formation of human identity. The typology enables stakeholders to recognize how education systems shape future societies not only through curriculum but also through the ontological environments they create.

© Andoniou, C., 2025

The journal content is licensed with CC BY-NC "Attribution-NonCommercial" Creative Commons license

Conclusion. The emergence of *Digital Childhoods* demands a radical transformation in educational psychology. Future research and policy must focus not just on integrating AI tools but on rethinking developmental models to ensure that children grow into autonomous, reflective, and ethically grounded individuals. The future of human development will be influenced by how deliberately and critically societies design AI-mediated environments for children.

Keywords: Digital childhoods; AI-mediated development; educational psychology; ethical agency formation; developmental taxonomy

Highlights:

- Introduces a developmental taxonomy distinguishing Synthetes, A-Voiders, and Equilibrants based on AI exposure and cognitive adaptation.
- Reveals how AI alters core aspects of child development: cognition, emotional intelligence, and moral reasoning.
- Proposes a four-dimensional framework to illustrate and analyze the effects of AI on childhood development: exposure, cognition, emotion, and ethics.
- Advocates for the urgent adaptation of educational psychology to address hybrid human-AI developmental ecologies.
- Emphasizes the need for deliberate ethical planning in AI literacy to preserve human agency, relational depth, and interpretive independence.

АННОТАЦИЯ

ЦИФРОВОЕ ДЕТСТВО: «СИНТЕТЫ», «А-ВОЙДЕРЫ»
И «ЭКВИЛИБРАНТЫ» В ЭПОХУ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА

Актуальность. Интеграция искусственного интеллекта (ИИ) в образование детей младшего возраста знаменует собой смену парадигмы в человеческом развитии. Основные мировые державы, такие как Китай, Соединенные Штаты, Российская Федерация и Европейский союз, внедряют грамотность в области ИИ с самых ранних этапов образования. Теперь дети взаимодействуют с искусственными агентами в процессе своего когнитивного, эмоционального и морального развития в процессе обучения, что дает основания для пересмотра методологии психологии развития.

Цель. В данной работе обосновывается идея о том, что различия в степени воздействия искусственного интеллекта в детстве формируют различные траектории развития ребенка. Предлагается новая таксономия детского развития, выделяющая три типа таких траекторий: «синтеты» (дети, погруженные в экосистемы ИИ), «а-войдеры» (дети с минимальным или нулевым воздействием ИИ) и «эквилибранты» (дети, которые сбалансированно осваивают как сферы ИИ, так и сферы человеческой деятельности). Через эту типологию анализируется, как именно опыт, опосредованный искусственным интеллектом, формирует когнитивную структуру, эмоциональную глубину и этическую свободу действий.

Дизайн. Концептуальная основа построена вокруг четырех взаимосвязанных областей: уровень воздействия ИИ, когнитивная модификация, социально-эмоциональная перестройка и формирование этического сознания. Опираясь на классические психологические теории (теорию когнитивного развития Ж. Пиаже, теорию социального опосредования Л.С. Выготского, теории развития идентичности Э. Эриксона и социального научения А. Бандуры), мы утверждаем, что ИИ перестраивает каждую из выделенных сфер, причем эти изменения носят не просто дополняющий, но и преобразующий характер, бросая вызов традиционным моделям детского развития.

Результаты. «Синтеты» часто демонстрируют развитое вычислительное мышление и высокий уровень образного восприятия, но могут испытывать недостаток рефлексивной глубины и способности к подлинным эмоциям. «А-Войдеры» находятся в традиционных межличностных и этических рамках, но рискуют оказаться маргинализированными в системах, где доминирует ИИ. «Эквилибранты» демонстрируют наиболее адаптивный профиль, развивая гибридные компетенции, которые включают как свободное владение технической стороной, так и критические этические суждения. Анализ показывает, что ИИ нельзя считать нейтральным образовательным инструментом, он выступает в качестве конституирующего агента в формировании человеческой идентичности. Предложенная типология позволяет понять, как системы образования формируют общества будущего не только с помощью учебных программ, но и с помощью создаваемой ими онтологической среды.

Выводы. Возникновение цифрового детства требует радикальных преобразований в педагогической психологии. Будущие исследования и политика должны быть сосредоточены не только на интеграции инструментов ИИ, но и на переосмыслении моделей развития, чтобы гарантировать, что дети вырастут самостоятельными и рефлексивными личностями, опирающимися на этические нормы. Будущее человеческого развития будет зависеть от того, насколько сознательно и критически общество будет создавать среду для детей, основанную на искусственном интеллекте.

Ключевые слова: Цифровое детство; развитие, опосредованное ИИ; педагогическая психология; формирование этического сознания; таксономия развития

Ключевые положения:

- Предложена таксономия развития, различающая три типа траекторий развития («синтеты», «а-войдеры» и «эквилибранты») на основе воздействия ИИ и особенностей когнитивной адаптации к такому воздействию
- Выявлено, как ИИ изменяет основные аспекты развития ребенка: познание, эмоциональный интеллект и особенности моральных суждений
- Предложена четырехмерная модель влияния ИИ на развитие детства: воздействие, познание, эмоции, этика
- Обоснована необходимость адаптации педагогической психологии к гибридным человеко-ИИ экологиям развития
- Подчеркнута важность продуманного этического планирования в рамках грамотности в области ИИ для сохранения человеческой агентности, глубины эмоциональных отношений и независимости интерпретации

RESUMEN

INFANCIAS DIGITALES: SINTETOS,
EVASORES-A Y EQUILIBRANTES EN LA ERA DE LA IA

Antecedentes. La creciente integración de la inteligencia artificial (IA) en la educación infantil temprana representa más que un hito tecnológico: simboliza una transformación estructural en el desarrollo humano. Diversas naciones alrededor del mundo, incluyendo China, Estados Unidos, la Federación Rusa y la Unión Europea, están incorporando la alfabetización en IA desde las etapas más tempranas de la educación. Este cambio justifica una reevaluación de la psicología del desarrollo, ya que los niños ahora interactúan con agentes no humanos en los procesos de aprendizaje cognitivo, emocional y moral.

Objetivo. Este artículo explora cómo distintos grados de exposición a la IA durante la infancia generan trayectorias de desarrollo divergentes. Se propone una nueva taxonomía del desarrollo infantil, identificando tres tipos: *Sintetos* (niños inmersos en ecosistemas

de IA), *Evasores-A* (niños con exposición mínima o nula a la IA) y *Equilibrantes* (niños que navegan críticamente tanto los dominios humanos como los de la IA). A través de esta tipología, el estudio examina cómo las experiencias mediadas por la IA moldean la estructura cognitiva, la profundidad emocional y la agencia ética.

Diseño. El marco conceptual se construye en torno a cuatro dimensiones interrelacionadas: el nivel de *exposición a la IA*, la *modificación cognitiva*, la *reestructuración socioemocional* y la *formación de la agencia ética*. Basándose en teorías psicológicas clásicas que incluyen los estadios cognitivos de Piaget, la mediación social de Vygotsky, el desarrollo de la identidad de Erikson y el aprendizaje social de Bandura, el artículo analiza cómo la IA interrumpe y reconfigura cada dimensión. Estas disrupciones no son meramente aditivas, sino transformativas, desafiando los modelos tradicionales del desarrollo infantil.

Resultados. Los Sintetos a menudo exhiben un pensamiento computacional y un reconocimiento de patrones mejorados, pero pueden carecer de profundidad reflexiva y capacidad emocional auténtica. Los Evasores-A preservan marcos interpersonales y éticos tradicionales, pero se arriesgan a la marginación en sistemas dominados por la IA. Los Equilibrantes demuestran el perfil más adaptativo, desarrollando competencias híbridas que incluyen tanto fluidez técnica como juicio crítico y ético. El marco revela que la IA no es una herramienta educativa neutral, sino un agente constitutivo en la formación de la identidad humana. La tipología permite a los actores clave reconocer cómo los sistemas educativos moldean las sociedades futuras no solo a través del currículo, sino también mediante los entornos ontológicos que crean.

Conclusión. La emergencia de las *Infancias Digitales* exige una transformación radical en la psicología educativa. La investigación y las políticas futuras deben centrarse no solo en integrar herramientas de IA, sino en repensar los modelos de desarrollo para garantizar que los niños se conviertan en individuos autónomos, reflexivos y con una base ética sólida. El futuro del desarrollo humano estará influenciado por cuán deliberada y críticamente las sociedades diseñen los entornos mediados por IA para los niños.

Palabras clave: Infancias digitales; desarrollo mediado por IA; psicología educativa; formación de la agencia ética; taxonomía del desarrollo

Disposiciones clave:

- Introduce una taxonomía del desarrollo que distingue Sintetos, Evasores-A y Equilibrantes según la exposición a la IA y la adaptación cognitiva.
- Revela cómo la IA altera aspectos centrales del desarrollo infantil: la cognición, la inteligencia emocional y el razonamiento moral.
- Propone un marco tetradimensional para ilustrar y analizar los efectos de la IA en el desarrollo infantil: exposición, cognición, emoción y ética.
- Aboga por la adaptación urgente de la psicología educativa para abordar las ecologías de desarrollo híbridas humano-IA.
- Enfatiza la necesidad de una planificación ética deliberada en la alfabetización en IA para preservar la agencia humana, la profundidad relacional y la independencia interpretativa.

RESUME

ENFANCES NUMÉRIQUES: SYNTHÈTES, ÉVITANTS
ET ÉQUILIBRANTS À L'ÈRE DE L'IA

Origines. L'intégration croissante de l'intelligence artificielle (IA) dans l'éducation de la petite enfance représente plus qu'une étape technologique — elle constitue une transformation structurelle du développement humain. Les nations du monde entier, dont la Chine, les États-Unis, la Fédération de Russie et l'Union européenne, intègrent la littératie

en IA dès les premiers stades de l'éducation. Ce tournant impose une réévaluation de la psychologie du développement, puisque les enfants interagissent désormais avec des agents non humains dans leurs processus d'apprentissage cognitif, émotionnel et moral.

Objectif. Cet article explore comment différents degrés d'exposition à l'IA durant l'enfance génèrent des trajectoires développementales divergentes. Une nouvelle taxonomie du développement de l'enfant est proposée, identifiant trois types : les Synthètes (enfants immergés dans les écosystèmes de l'IA), les Évitants (enfants ayant peu ou pas d'exposition à l'IA), et les Équilibrants (enfants naviguant de façon critique entre les domaines humains et ceux de l'IA). À travers cette typologie, l'étude examine comment les expériences médiatisées par l'IA façonnent la structure cognitive, la profondeur émotionnelle et l'agentivité éthique.

Méthodes. Le cadre conceptuel est construit autour de quatre dimensions interconnectées : le niveau d'exposition à l'IA, la modification cognitive, la restructuration socio-émotionnelle et la formation de l'agentivité éthique. En s'appuyant sur des théories psychologiques classiques, telles que les stades cognitifs de Piaget, la médiation sociale de Lev Vygotski, le développement identitaire d'Erikson et l'apprentissage social de Bandura, l'article analyse comment l'IA perturbe et reconfigure chacune de ces dimensions. Ces perturbations ne sont pas simplement additives mais véritablement transformatrices, remettant en question les modèles traditionnels du développement de l'enfant.

Résultats. Les Synthètes présentent souvent une pensée computationnelle et une reconnaissance des motifs accrues, mais peuvent manquer de profondeur réflexive et de capacité émotionnelle authentique. Les Évitants conservent les cadres interpersonnels et éthiques traditionnels mais risquent une marginalisation dans des systèmes dominés par l'IA. Les Équilibrants démontrent le profil le plus adaptatif, développant des compétences hybrides comprenant à la fois la maîtrise technique et le jugement critique et éthique. Le cadre révèle que l'IA n'est pas un outil éducatif neutre mais un agent co-constitutif dans la formation de l'identité humaine. La typologie permet aux parties prenantes de reconnaître que les systèmes éducatifs façonnent les sociétés futures non seulement par le biais des programmes scolaires mais aussi par les environnements ontologiques qu'ils créent.

Conclusion. L'émergence des enfances numériques exige une transformation radicale de la psychologie de l'éducation. Les futures recherches et politiques doivent se concentrer non seulement sur l'intégration des outils d'IA mais aussi sur la refonte des modèles développementaux afin de garantir que les enfants grandissent en individus autonomes, réfléchis et éthiquement solides. L'avenir du développement humain sera influencé par la manière dont les sociétés conçoivent, de façon délibérée et critique, les environnements médiatisés par l'IA pour les enfants.

Mots-clés: Enfances numériques; développement médiatisé par l'IA; psychologie de l'éducation; formation de l'agentivité éthique; taxonomie développementale

Points principaux:

- Introduit une taxonomie développementale distinguant les Synthètes, les Évitants et les Équilibrants selon l'exposition à l'IA et l'adaptation cognitive
- Révèle comment l'IA modifie des aspects fondamentaux du développement de l'enfant : cognition, intelligence émotionnelle et raisonnement moral
- Propose un cadre à quatre dimensions pour illustrer et analyser les effets de l'IA sur le développement de l'enfant : exposition, cognition, émotion et éthique
- Plaide pour une adaptation urgente de la psychologie de l'éducation afin de répondre aux écologies développementales hybrides humain-IA
- Met l'accent sur la nécessité d'une planification éthique délibérée dans la littératie en IA afin de préserver l'agentivité humaine, la profondeur relationnelle et l'indépendance interprétative

Introduction: A New Chapter in Human Development

The early 21st century has seen significant change in the conditions of childhood development. AI is moving from being a peripheral technological tool to being a significant participant in educational, cognitive, emotional and social environments across the globe. Nations such as China and the United States have initiated aggressive policies to introduce AI literacy from the earliest stages of schooling, signaling a global recognition that future citizens must not merely be consumers of AI but proficient navigators and creators within AI-saturated ecosystems (Hao, 2019; National Science Foundation, 2023). In China, AI curricula focusing on machine learning, robotics, and algorithmic thinking are now mandatory in primary schools, while in the United States, decentralized but intensifying efforts to integrate AI across K-12 education reflect a parallel urgency. Both, the Russian Federation, through initiatives like the Moscow Electronic School, and the European Union, through its emphasis on ethical AI literacy (European Commission, 2020), have also embarked on their own divergent paths.

The educational significance of these policies represents only one aspect of their total importance. These indicators demonstrate a recognition of fundamental shift occurring in human development processes. This research investigates how the worldwide adoption of early AI education functions as a crucial catalyst for examining the effects of AI integration on the cognitive development, socio-emotional growth, and ethical formation of future generations.

The paper develops a classification system that includes three developmental profiles: *Synthetes* who spend most of their time in AI-mediated environments, *A-Voiders* who avoid AI integration, and *Equilibrants* who learn to balance technological skills with emotional and ethical competencies. These categories show more than technological access because they depict separate human trajectories which emerge from different levels of AI interaction patterns.

Analysis begins by examining basic psychological theories including Piaget's cognitive development, Vygotsky's social mediation, Erikson's psychosocial stages, and Bandura's social learning, through the lens of AI disruption. The paper develops a conceptual framework through four dimensions which include: *level of AI exposure, cognitive modification, socio-emotional restructuring* and *ethical agency formation;* this framework is used to explore essential questions about AI literacy and unconscious, ethical and cognitive development, and human agency, in algorithmically designed spaces.

Contemporary educational psychology approaches need to undergo a fundamental transformation if it is to lead the development of humane education during the AI era. *Digital Childhoods* face a risk of developing technologically proficient, but morally hollow citizens, where there exists the absence of any critical evaluation and preemptive intervention. With a concerted effort aimed at educational and development practices, society may yet cultivate individuals capable of masterring synthetic futures with creative thinking, ethical understanding, and moral principles.

Results

Envisioning the Future: Divergent Childhoods

The implementation of AI technology in children's development spaces creates multiple distinct developmental pathways, instead of producing a single unified outcome. It is conceivable that different intensities of AI adoption across nations and regions, together with their varying philosophical approaches lead to the emergence of new human types. The three child development profiles – Synthetes, A-Voiders and Equilibrants – introduced in this paper, demonstrate more than a mere category of technological access, but rather a taxonomy of basic differences an individuals' cognitive, emotional and ethical foundations, according to the level of their AI exposure. Human societies face diverse psychological futures through these three distinct psychological developmental profiles which, this study suggests, will lead to separate and distinct outcomes.

Synthetes

Children who belong to the Synthetes type, experience AI integration throughout their entire developmental experiences. The fundamental structure of their daily life consists of AI-based learning systems, intelligent companions, predictive feedback technology and algorithmically designed experiences. The mandatory AI literacy programs in Chinese primary schools (Hao, 2019) and state-led AI education initiatives in the United States (National Science Foundation, 2023) have already produced Synthetes as an identifiable social group.

The cognitive abilities of Synthetes tend to become more advanced in algorithmic reasoning as well as adaptive learning and pattern recognition. The problem-solving methods of Synthetes are supported by AI systems that provide immediate feedback along with customized learning routes (Long & Magerko, 2020). However, because AI systems tend to optimize immediate problem resolution, the negative trade-offs may include a weakening of deep cognitive focus, the capacity for reflective and abstract thinking, and resilience when faced with ambiguity.

Emotionally, Synthetes often engage with AI companions including robots, chatbots, and virtual tutors, whose social simulation may significantly shape their understanding of relationships. Consequently, this can lead to *emotional flattening*, where authentic human affect becomes harder to interpret or discern as significant. The boundaries between real and simulated empathy blur, potentially restructuring the emotional architecture upon reaching adulthood (Sharkey, 2021).

Ethically, Synthetes may grow accustomed to algorithmic decision-making that prioritizes efficiency and the satisfaction derived from response conditioning rather than undertaking complex moral deliberation. Their sense of agency could be eroded by systems designed to predict and preempt choices, raising concerns about autonomy and moral maturation (Crawford, 2021). In the long term, Synthetes may dominate technological industries and drive future innovation. Yet they may also struggle with existential questions about meaning, authenticity, and relational depth in a world increasingly saturated with synthetic interactions.

A-Voiders

A-Voiders are children who, either due to socio-economic circumstances or cultural reasons, do not have any exposure to AI. In rural parts of the Russia Federation where access to AI-based educational resources is restricted relative to big cities (Lomovtseva & Popova, 2021), or in the global South where there is a lack of infrastructure, A-Voiders are the rule rather than the exception. Even in the developed world, certain groups of families and communities choose not to participate in the digital revolution because of moral, religious or philosophical reasons.

Cognitively, A-Voiders rely on the classical learning methods derived from the use of memory, manual problem solving and face-to-face education. Their intellectual growth might support certain cognitive qualities like sustained attention, narrative reasoning, and symbolic thinking that tend to fade in the presence of AI (Williamson & Eynon, 2020). Nevertheless, they may find it hard to fit into a world that is becoming increasingly disposed to the use of AI. Emotionally, A-Voiders are brought-up through human relations, which means that they learn through community work, guidance and in-person interaction. This can increase empathy and strengthen relationships, but it can also lead to feelings of isolation in environments where technology is the dominant force.

Ethically, A-Voiders tend to develop moral reasoning frameworks based on traditional community norms and direct human interaction. They may feel more in control and responsible, but may also feel detached when confronted with AI systems that operate beyond the familiar ethical codes. In the future global environment, A-Voiders might end up being minority groups if the rest of the population becomes predominantly AI-literate. Alternatively, they could act as a bulwark of humanistic values that AI-dominant societies may otherwise forget.

Equilibrants

Equilibrants are children who are exposed to AI in a controlled manner that emphasizes critical thinking, ethical reasoning, and humanistic development. In countries like Finland and Estonia, the education system seeks to include AI literacy as part of the curriculum while simultaneously developing traditional humanistic capacities (European Commission, 2020). Equilibrants are explicitly taught not just to use AI but how to question it, interpret it, and evaluate it ethically.

Cognitively, Equilibrants develop hybrid profiles: they are capable of navigating algorithmic systems but also trained to recognize their limitations. Metacognitive skills, critical thinking, and creative problem-solving are actively promoted alongside technical proficiency (Luckin, 2022). Emotionally, Equilibrants are socialized into environments that balance AI-mediated learning with strong human mentorship. They are encouraged to engage with AI as a tool, not as a substitute for genuine emotional bonds. Programs that combine AI use with socio-emotional education aim to produce individuals who can interact empathetically with humans and objectively with systems that simulate human interaction. Ethically, Equilibrants are explicitly trained in concepts of ethics, algorithmic bias, and moral agency in the context of digital environments. Their education emphasizes that human values must guide technological development, not vice versa. Equilibrants represent the aspirational model: adaptable,

critical, and ethically resilient individuals capable of thriving in AI-saturated societies without losing the core human capacities necessary for autonomy, creativity, and social cohesion.

Diverging Paths of Digital Childhood

The educational differences among these three types represent fundamental changes in human development. The technical expertise of Synthetes may lead to success in their domains yet they face challenges with understanding meaning, developing empathy and ethical understanding. The preservation of humanistic traditions exemplified by A-Voiders may come at the cost of their potential exclusion from AI-controlled economic systems. Equilibrants who receive proper developmental guidance may establish a path for human development that uses technology to boost instead of reduce human capabilities. The development of these groups results from deliberate decisions made by educators in collaboration with policymakers, parents and societies. The future of human integration with AI technology depends on intentional and ethically grounded approaches to childhood development during the AI era.

Foundations of Development: Psychological Theories Revisited

The integration of AI into children's developmental environments creates fundamental challenges to established psychological theories. Twentieth-century traditional educational frameworks were built on the assumption that all educational agents and tools would remain human and analog. The growth of child interaction with synthetic entities that perform dynamic interactions, simulate emotional responsivity and alter the process of cognitive scaffolding, require psychologists to reevaluate and reinterpret existing models and in some cases develop entirely new frameworks. The developmental paths of Synthetes, A-Voiders, and Equilibrants lead them through completely new experiential territories which classical theories are poorly equipped to anticipate or conceptualize.

Scaffolding Without Ground: Rethinking Cognitive Growth in AI Worlds

Jean Piaget's constructivist theory posits that children build knowledge through direct interaction with their environment, moving through a sequence of developmental stages—sensorimotor, preoperational, concrete operational, and formal operational (Piaget, 1952). Traditionally, these stages reflected embodied experimentation with the physical world and dialogical engagement with their human counterparts.

However, AI-mediated environments introduce a new form of *intelligent scaffolding* that may compress, bypass, or distort these traditional developmental sequences. Intelligent tutoring systems can present complex abstract problems to children long before they would traditionally be ready for them, based on predictive analytics of performance (Luckin, 2022). While this may accelerate the acquisition of certain formal operational skills, it risks hollowing the experiential foundation required for true cognitive depth.

For Synthetes, the sensorimotor grounding Piaget emphasized may be partially replaced by symbolic or virtual interaction. Their knowledge may thus be technically sophisticated but experientially shallow. In contrast, A-Voiders are more likely to follow Piagetian pathways in traditional form, but may lack the augmented cognitive agility prized in AI-mediated societies. Equilibrants may represent an optimal hybrid: children who develop traditional cognitive foundations enriched, but not overwhelmed, by AI support.

Mediated Minds: Social Learning and Synthetic Interlocutors

Lev Vygotsky's sociocultural theory stresses that cognitive development is fundamentally mediated by social interaction and cultural tools (Vygotsky, 1978). The Zone of Proximal Development (ZPD) describes the gap between what a child can do independently and what they can achieve with guided assistance.

AI agents now act as mediators within this zone. Intelligent tutors, adaptive learning companions, and emotionally responsive robots provide scaffolding, once exclusively offered by humans (Holmes et al., 2019). For Synthetes, the primary social mediator may increasingly be non-human — raising profound questions about the authenticity and depth of their internalization processes. Is the internalization of relational experience and the adoption of knowledge from AI fundamentally different from internalizing it from a human teacher? Early evidence suggests it may well be: AI's responses are contingent but not truly reciprocal, potentially altering the development of empathy, theory of mind, and collaborative reasoning.

A-Voiders continue to rely on human-mediated scaffolding, consistent with Vygotsky's original model, but may be less adaptable to future digital social structures. Equilibrants who engage both human mentors and with AI systems, in a critically thoughtful manner, may develop a richer, layered model of social cognition, recognizing the ontological differences between human and artificial others.

Fragmented Selves: Identity Development in Algorithmic Environments

Erik Erikson's psychosocial theory outlines stages of identity development centered around resolving conflicts such as trust versus mistrust, autonomy versus shame, and identity versus role confusion (Erikson, 1968). Identity formation, particularly during adolescence, is predicated on negotiating social roles, receiving feedback from peers and society, and crafting a coherent sense of self.

In AI-saturated environments, however, the sources of feedback and role modeling expand dramatically. Synthetes may receive constant algorithmic feedback on behavior, preferences, and performance — feedback that is designed to optimize satisfaction or conformity rather than promote authentic identity exploration (Kahai & Avolio, 2018). The risk is an identity forged through synthetic validation: children may come to see themselves primarily through algorithmic mirrors that lack depth, contradiction, or genuine emotional nuance.

A-Voiders, developing their identities in largely traditional human social ecosystems, may achieve more grounded senses of self but struggle with future roles that

demand navigation of AI-dominant structures. Equilibrants, critically aware of the difference between human and AI validation, may develop meta-cognitive resilience, maintaining agency amidst algorithmic architectures.

Watching Machines: Imitation and the Ethics of Synthetic Modeling

Albert Bandura's social learning theory emphasizes learning through observation, imitation, and modeling (Bandura, 1977). Children learn behaviors not only through direct instruction but by observing the actions and consequences experienced by others. However, AI agents including virtual assistants, chatbots, and educational robots must now be accounted for as potential models.

For Synthetes, significant portions of social learning may involve the observation of synthetic agents that perform tasks, express simulated emotions, or demonstrate problem-solving behaviors. Yet AI models do not possess consciousness, emotion, or ethical judgment. Thus, imitation may occur without true internalization of human emotional or grasping moral complexity (Zawacki-Richter et al., 2019). A-Voiders, who learn primarily through human modelling, tend to maintain a richer affective capacity that accommodates ethical layers in their social learning, but they may find AI-mediated environments confusing or alienating later in their development. Equilibrants, through explicit education on the constructed nature of AI models, may engage with imitation more critically, selectively adopting behaviors while maintaining human ethical frameworks.

Childhood Rewritten: The Need for a New Theoretical Synthesis

The foundational theories of Piaget, Vygotsky, Erikson, and Bandura remain vital touchstones for understanding human development, but they are no longer sufficient on their own, given that the fundamental conditions of development have changed. AI introduces new agents of learning, new forms of social interaction, and new feedback loops that fundamentally alter the developmental ecology itself. Children today do not merely engage with different tools; they develop within environments co-constructed by non-human intelligences that simulate, scaffold, and shape cognitive, emotional, and ethical development. It is insufficient to treat AI as an external addition to existing developmental models; rather, a new theoretical synthesis is required — one that conceptualizes development under conditions of synthetic mediation, algorithmic influence, and hybrid relationality. Without reconceptualizing human development in this transformed context, our psychological frameworks will remain partial and limited, unable to fully guide humane, reflective, and resilient futures for Digital Childhoods.

Interference and Transformation: How AI Impacts Each Child Group

AI technologies that integrate into children's developmental environments transform the fundamental processes of cognitive development, emotional growth and ethical formation. AI exposure, across the differing profiles presented by Synthetes, A-Void-

ers and Equilibrants, generate differentiated patterns of influence that alter and interfere with development trajectories. The analysis of these patterns allows scientists to determine the possible evolution of human identity along with social structures and ethical reasoning in a world dominated by AI technologies.

Cognitive Development

The advance of human cognitive abilities, including attention development, memory capabilities, problem-solving skills, creativity and critical thinking, undergo fundamental changes through AI technologies. Children that present as Synthetes, receive AI-enhanced learning from early ages and tend to develop superior abilities in processing data and recognizing patterns along with adaptive problem-solving skills (Luckin, 2022). The feedback systems generated by AI technology foster an understanding of thinking that emphasizes achieving optimal results and delivering fast and efficient solutions. These children show mastery in handling complicated systems, but their abilities for extended critical evaluation, along with cognitive emotional management of ambiguity, acceptance, doubt and questioning may remain underdeveloped.

The way AI presents customized content to users can create cognitive rigidity by strengthening current preferences while blocking exposure to contradictory ideas needed for deep learning and intellectual adaptability (Chen et al., 2020). The Synthetes face the dual threat of developing superior intellectual flexibility but with a limited depth of understanding—prepared to perform outstandingly in operations, yet struggle with complex and nuanced knowledge domains. A-Voiders achieve cognitive development through traditional approaches, such as exploratory play, narrative learning and human-assisted problem-solving. Their relatively deep memory, provides a capacity for narrative thinking and communication skills, but they may lack computational skills to succeed in AI-driven professions and within the civic roles of the future (Williamson & Eynon, 2020). A-Voiders might face negative perceptions because their way of thinking operates at a slower pace and lacks the algorithmic understanding needed in contemporary techno-economic systems. Conversely, Equilibrants aspire to master dual cognitive abilities that enable them to understand both AI systems and apply metacognitive methods to critically evaluate machine outputs. Equilibrant students develop the ability to question the fundamental assumptions underlying AI generated solutions as well as acquire the skills needed to resolve problems effectively.

Social and Emotional Development

AI-mediated environments cause fundamental changes in both socialization and emotional development processes. Synthetes spend their time with synthetic agents, such as robots and avatars and conversational AI platforms, that create social-like experiences, yet remain incapable of genuine emotional expression, consciousness and ethical understanding (Sharkey, 2021). Children show attachment behaviors toward computer agents because they mistakenly believe these systems possess human-like qualities. The emergence of artificial intelligence in social environments raises concerns about the proper development of authentic emotional connections and emotional regulation and advanced social understanding. Emotional reactions may develop through AI feedback systems that provide algorithmic validation instead of authentic relational validation. Synthetes perform empathic behaviors according to

metrics modelled by external systems, even though these systems are bereft of genuine emotion, nor rooted in authentic human connections.

The traditional socio-emotional capabilities of A-Voiders develop within their human-human social environments that foster an understanding of subtle nuanced emotions, a capacity to handle complex relationships, manage uncertain situations and address disputes. Social skills acquired by A-Voiders do not naturally transfer to AI-based communication systems that mostly use synthetic agents and algorithmically controlled social networks. The deliberate training of Equilibrants develops their ability to recognize synthetic social partners as distinct from genuine human relationships. The combination of AI education with socio-emotional guidance creates synthetic emotional intelligence which leads to the effective use of AI systems without mistaking simulations for genuine interactions. Such children learn to excel at managing dual social environments while keeping their emotional intensity and moral understanding intact while engaged in simulated spaces.

Moral and Ethical Development

Moral development — the formation of ethical reasoning, agency, and value systems—is particularly vulnerable to disruption by AI. Traditional moral education is rooted in human experiences of trust, betrayal, reciprocity, and community negotiation. AI systems, however, operate according to algorithmic logic oriented toward optimization, satisfaction prediction, and behavioral nudging, without moral deliberation (Crawford, 2021).

Synthetes may internalize models of decision-making derived from prioritizing efficiency and preference fulfillment through response conditioning over moral reasoning. Repeated exposure to systems that nudge behavior may subtly erode the experience of authentic choice and moral agency (Floridi, 2021). Children may come to perceive ethical questions not as dilemmas requiring reflection and responsibility, but as technical problems to be solved through preference-maximization algorithms.

A-Voiders, who develop moral frameworks through traditional human community experiences, may preserve richer senses of responsibility, empathy, and justice. Yet they may also find themselves ill-equipped to navigate the complex ethical terrains of AI-mediated societies where algorithmic biases, opaque decision-making, and synthetic influence challenge traditional moral values. Equilibrants, who are educated to recognize the ethical dimensions of AI architectures, may develop robust ethical agency capable of critical reflection in hybrid human-AI systems. Ethical education for Equilibrants emphasizes interpretation: reading AI outputs not as neutral givens but as constructed artifacts requiring moral evaluation.

Fragmenting Futures: A Critical Outlook

The divergence in cognitive, socio-emotional, and ethical development among Synthetes, A-Voiders, and Equilibrants signals the emergence of a range of different human modalities. Without deliberate interventions, we risk producing hyper-functional yet ethically hollow generations within our societies, or conversely, ethically grounded but technologically marginalized populations. The prospect for a future of human flourishing within an AI influenced society will depend not merely on access to technology, but on the conscious design of cognitive, emotional, and moral ecolo-

gies that nurture both technical proficiency and human depth. The challenge is not simply to teach children to use AI but to ensure that, amidst increasingly powerful simulations, they remain deeply reflective, and ethically human.

Building the AI–Child Development Framework

To adequately conceptualize the transformations unfolding in childhood development under the influence of artificial intelligence, a new analytical framework is necessary—one that systematically conceptualizes the multiple dimensions along which AI exposure reshapes cognition, socio-emotional capacities, and moral agency. Traditional developmental models, grounded in assumptions of human-to-human interaction and analog knowledge environments, lack the conceptual tools to address the synthetic, algorithmic, and hybrid contexts that now define Digital Childhoods. This framework proposes four primary dimensions for analysis: (a) *level of AI exposure*, *cognitive modification*, *socio-emotional restructuring*, and *ethical agency formation*. These dimensions are interrelated, interacting dynamically to produce distinct developmental outcomes across the Synthetes, A-Voiders, and Equilibrants profiles.

Level of AI Exposure

Level of AI exposure refers to the frequency, intensity, and diversity of a child's interactions with AI systems. High exposure implies daily, multi-contextual engagement with AI tutors, recommendation engines, virtual companions, and adaptive learning platforms (Luckin, 2022). Moderate exposure involves structured, critical engagement balanced with human-centered education, while low exposure indicates minimal contact with AI systems, often due to infrastructural, cultural, or intentional limitations (*Table 1*).

Table 1

*Level of AI **e**xposure across child profiles*

LEVEL OF AI EXPOSURE		
Synthetes	**A-Voiders**	**Equilibrants**
High daily exposure across educational, recreational, and emotional contexts; AI becomes a primary developmental environment.	Minimal exposure; primary learning and socialization occur through human agents and traditional media.	Structured, critical exposure; AI is integrated purposefully alongside human-centered pedagogy.
EXAMPLES		
A child uses AI tutoring platforms, receives AI-curated news, and interacts daily with AI-driven gaming companions.	A child learns math with a human tutor, reads printed books, and has high engagement with digital AI systems.	A child uses AI tools selectively under teacher guidance, critically reflecting on algorithmic biases and outputs.

Note. The varying degrees of exposure to AI technologies among Synthetes, A-Voiders, and Equilibrants, including exposure frequency, intensity, and the context of AI interactions define the unique developmental environments across these three profiles.

Cognitive Modification

Cognitive modification reflects how AI environments alter attention patterns, learning strategies, problem-solving approaches, and epistemic orientations. Early and intense AI engagement can recalibrate fundamental cognitive structures—optimizing rapid information retrieval and pattern recognition at the potential cost of deep critical inquiry and reflective metacognition (Chen et al., 2020) (*Table 2*).

Table 2

Cognitive modification patterns in AI-mediated development

COGNITIVE MODIFICATION		
Synthetes	**A-Voiders**	**Equilibrants**
Optimized for speed, pattern recognition, and algorithmic efficiency; potential reduction in deep critical reflection and philosophical inquiry.	Emphasis on memory, narrative reasoning, and deep contextual thinking; potential lag in computational fluency.	Balanced development combining AI fluency with critical metacognition and reflective abstraction.
EXAMPLES		
A child quickly consults AI for answers without engaging in independent problem-solving or extended reasoning.	A child tackles complex problems through discussion, storytelling, and reflection without immediate AI assistance.	A child uses AI outputs as information sources but applies independent critical evaluation before forming conclusions.

Note. The distinct cognitive trajectories emerging from different AI exposure profiles, highlight how early and intense AI engagement influences attention, problem-solving, epistemic orientation, and critical thinking capacities.

Table 3

Socio-emotional restructuring under AI influence

SOCIO-EMOTIONAL RESTRUCTURING		
Synthetes	**A-Voiders**	**Equilibrants**
High interaction with synthetic agents; risk of anthropomorphizing Al and developing shallow emotional models.	Traditional human-centered emotional development, depth in emotional negotiation and authentic relational experiences.	Hybrid emotional competence; ability to engage with AI critically while preserving authentic human relationality.
EXAMPLES		
A child forms emotional attachments to a social robot that simulates care but lacks true emotional reciprocity.	A child resolves emotional conflicts through tace-to-face dialogue and human empathy rather than digital mediation.	A child interacts with AI tools but is explicitly taught to distinguish simulated emotions from genuine human emotional experiences.

Note. A comparison of how Synthetes, A-Voiders, and Equilibrants develop social and emotional competencies, focusing on the effects of synthetic companionship, relational authenticity, and emotional regulation in hybrid learning environments.

Socio-Emotional Restructuring

Socio-emotional restructuring refers to changes in the development of empathy, relational depth, emotional regulation, and social cognition due to AI-mediated interactions (Sharkey, 2021). Simulated emotional engagement with synthetic agents may scaffold upon basic social behaviors but risks flattening emotional complexity and relational authenticity (*Table 3*).

Ethical Agency Formation

Ethical agency formation examines how children develop frameworks for moral reasoning and decision-making in environments increasingly structured by algorithmic nudges and predictive personalization (Crawford, 2021; Floridi, 2021). Authentic ethical development requires experiences of moral ambiguity, responsibility, and negotiation — experiences that AI environments often obscure (*Table 4*).

Table 4

Ethical Agency Formation in AI-structured environments

LEVEL OF AI EXPOSURE		
Synthetes	**A-Voiders**	**Equilibrants**
Ethical reasoning shaped by optimisation and preference satisfaction potential erosion of reflective moral judgment.	Moral development grounded in direct human experiences and community-based negotiation; strong sense of responsibility but potential difficulty adapting to AI-driven ethical landscapes.	Critical ethical agency cultivated through AI literacy; ability to interrogate algorithmic outputs and uphold autonomous moral reasoning.
EXAMPLES		
A child accepts AI-recommended actions without questioning the ethical assumptions embedded in the algorithm..	A child makes moral decisions through face-to-face dialogue and shared cultural values, without reliance on AI inputs	A child critically evaluates AI suggestions, recognizing hidden biases and making independent ethical choices.

Note. The development of moral reasoning and ethical agency diverge across child profiles, depending on whether ethical frameworks are grounded in human social experiences, algorithmic optimization, or critical AI literacy.

From Profiles to Futures: Applying the Framework

Applying this framework (*Table 5*) reveals that the profiles of Synthetes, A-Voiders, and Equilibrants are not simply technological labels but *deep developmental archetypes* that portend long-term implications for society. Policymakers, educators, and psychologists can use these dimensions to assess and design interventions tailored to cultivate balanced, humane development:

Table 5

Developmental trajectories of Synthetes, A-Voiders, and Equilibrants: a summary integrating the four developmental dimensions (comparative overview of the long-term human futures emerging from each profile)

	Synthetes	**A-Voiders**	**Equilibrants**
Level of AI exposure	High	Low	Moderate
Cognitive Modification	Algorithmic optimization	Contextual narrative reasoning	Hybrid critical cognition
Socio-Emotional Restructuring	Synthetic interaction modeling	Human relational depth	Hybrid emotional comprehension
Ethical Agency Formation	Efficiency-based reasoning	Community-based reasoning	Critical human-centered ethics

The implementation of such a framework becomes essential to move beyond vague fears and hopes about AI in the context of education, as it supports a coherent conceptualization of its prospective cognitive and emotional affects on childhood development and provides a basis for actionable policy regarding the trajectory of human society in the digital age.

What Kind of Humans Will We Become? Four Critical Questions

The fast-paced and evolving interconnections between AI technology and childhood development creates pertinent questions which require more than technological optimism or educational pragmatism to resolve. The future of human society, influenced by this era of Digital Childhood, will be profoundly impacted by AI's affect on fundamental aspects of human cognitive function, ethical conduct and personal agency. These effects will shape societies for centuries to come. The future of societies will be shaped by determinant that extend beyond AI access differences, given that AI-mediated development generates fundamental mental frameworks that shape cognition, emotion, and moral judgment. Several critical questions, therefore, must be addressed urgently.

AI Literacy: How Early? What Kind?

The development of AI literacy represents a fundamental competence for 21st century citizens, yet experts disagree about whether priority should be given to training in coding, machine learning or to the development of a critical understanding of AI biases and other ethical implications. Education programs for young students focus mainly on coding abilities without teaching students to analyze how algorithms maintain power structures (Touretzky et al., 2019). Teaching Synthete children to code through code-writing instruction alone, without fostering critical thinking and

the development of values pertaining to the purpose and implications of their digital works, leads to technical competence, but diminished ethical awareness in citizens. A child who constructs AI systems without considering the implications of data bias or understanding the significance of surveillance on societal structures may unintentionally maintain inequality, even with good intentions. Critical AI literacy must become a priority in educational settings since technical skills alone are insufficient. Educational programs need to merge technical expertise with ethical instruction by integrating AI learning into comprehensive humanistic curriculum instead of treating AI as an exclusively technical subject. The actual question extends beyond the timing of AI instruction, it concerns developing children into AI system builders who can both use and evaluate these systems, rather than functioning as passive users.

AI Impact: Unconscious Shaping of Cognition and Ethics

AI's influence extends beyond classrooms into the fabric of everyday life, shaping children's cognition and ethical sensibilities through recommendation algorithms, adaptive platforms, and predictive environments (Crawford, 2021). These systems reinforce preferences and reduce cognitive dissonance, weakening resilience, empathy, and intellectual flexibility over time. Children growing up within such predictive architectures may unconsciously prioritize preference maximization over critical inquiry. For instance, a Synthete child whose educational resources are entirely algorithmically curated may never encounter contrary perspectives or worldview-expanding material, unless deliberate educational countermeasures are implemented. Thus, the challenge is twofold: we must teach children to recognize when their preferences are being engineered by algorithms, and we must design educational environments that disrupt algorithmic echo chambers, intentionally introducing cognitive dissonance and encouraging expansive, critical thinking. Addressing the long-term cognitive effects of growing up in such environments, in which the world is increasingly pre-filtered and pre-shaped, urgently demands new metrics and research attention.

AI Ethics: Can Children Develop True Agency?

True agency, the capacity for autonomous and reflective decision-making, requires confronting ambiguity, negotiating conflicting values, and accepting responsibility; but AI systems subtly erode these experiences by engineering choices geared toward optimized outcomes (Floridi, 2021). If children's choices are consistently nudged invisibly by algorithmic architectures, they risk mistaking automated convenience for genuine autonomy. The Equilibrant child would learn to evaluate algorithmic suggestions by asking questions such as *Why is this recommendation made for me?* and *What beliefs or principles are present in this recommendation?* — a subtle yet transformative act that supports the maintenance of independent thought. A Synthete who lacks critical thinking will automatically follow optimized directions without noticing the hidden forces that steer their actions. The education system needs to develop psychological competencies including meta-cognitive awareness and ethical reflection to help children detect when their choice options have been restricted and to protect their deliberative agency when algorithms influence them.

Synthesis Question: Will Mastery of AI Tools Be Enough?

Current trends in training children to become AI experts do not ensure safety because technical expertise needs to be combined with ethical knowledge for overall effectiveness. The future generation of Synthetes who excel at optimizing AI systems risk perpetuating biases, misinformation and addiction loops, because they lack critical awareness. A Synthete who excels at platform user engagement optimization lacks the ability to identify when this practice leads to harmful addiction. A-Voiders maintain their ethical understanding, yet they lack sufficient technical skills to effectively modify AI-based systems. Equilibrants stand as the only sustainable model of future citizenship because they unite technical proficiency with critical thinking and emotional intelligence and ethical awareness. The educational system should focus on developing *AI stewards* who can construct and evaluate systems at the same level as they protect human dignity and autonomy and ethical responsibility in synthetic environments.

The Future We Choose: Toward Ethical and Reflective Childhoods

The central question for the future is not whether AI will transform childhood — it already is transformed. The question is what kind of humans we cultivate in response. Will we engineer technically brilliant but ethically hollow beings, or will we consciously design educational, social, and cognitive environments that nurture fully realized human persons — technologically fluent and ethically grounded with emotional depth? The answer will not emerge automatically from technological advancement; it must be forged through deliberate, sustained cultural, educational, and psychological work. The stakes are nothing less than the future character and architecture of human identity.

Beyond Human Models: Reconstructing Educational Psychology for Digital Childhoods

The infiltration of artificial intelligence into the environments where children grow, learn, and form their identities demands a radical rethinking of educational psychology as a field. Existing models of learning, development, and intervention, grounded in human-human interaction, no longer fully capture the realities of Digital Childhoods. As Synthetes, A-Voiders, and Equilibrants emerge as distinct developmental archetypes, educational psychology must evolve — not incrementally, but fundamentally, if it is to guide human flourishing within an AI-saturated future.

This transformation requires innovations along three critical axes: *new models of AI-mediated development, new research methodologies,* and *new professional training for psychologists*.

New Models of AI-Mediated Development

Theories of learning and development must urgently evolve beyond the assumption of exclusively human agency within analog environments and recognize that AI is not simply a passive tool, but an active developmental participant — shaping cognition, modulating emotion, and influencing ethical reasoning (Holmes et al., 2019).

Existing models, such as Piaget's constructivism and Vygotsky's social mediation, offer critical foundations but require extension to conceptualize synthetic environments. Future models must account for (a) *synthetic scaffolding,* understanding how AI companions, adaptive systems, and virtual tutors alter the social construction of knowledge; (b) *algorithmic mediation*, analyzing how predictive systems selectively filter children's access to information and experiences; and (c) *synthetic emotional environments*, examining how affective simulations by AI agents reshape emotional development. Without distinguishing interactions with conscious human agents from engagements with synthetic systems, educational psychology risks normalizing developmental ecologies that systematically erode empathy, agency, and relational depth. For instance, a child who learns negotiation skills through an AI companion must be conceived of as distinct from another individual learning these skills with a human peer — the relational substrate, and thus the internalized cognitive and emotional processes, are fundamentally different.

New Research Methodologies

Research methodologies in educational psychology must be radically expanded to meet the complexity of hybrid human-AI developmental environments. Future studies must address (a) *hybrid developmental settings*, where children interact simultaneously with humans and AI agents; (b) the *measurement of algorithmic influence,* evaluating the correlational affects on cognition, emotion, and decision-making processes; and (c*) synthetic-to-human transfer effects*, investigating how behaviors learned through AI interactions translate, or fail to translate, into human social contexts.

Mixed-methods designs that combine behavioral observation, AI system analysis, and qualitative inquiry will be essential, alongside interdisciplinary collaboration with fields like computer science, cognitive science, and digital ethics (Luckin et al., 2022). For example, a longitudinal study tracking differences between children educated primarily by AI tutors versus human teachers would need to assess not only academic performance but also emotional resilience, ethical reasoning, and agency development over a decade. Without such broadened methodologies, educational psychology risks becoming obsolete, increasingly detached from the synthetic developmental realities of Digital Childhoods.

New Training for Psychologists

The professional training of educational psychologists must be revolutionized to prepare practitioners for AI-saturated environments. Psychologists must now: (a) achieve a working understanding of AI architectures and basic AI literacy; (b) develop the ability to recognize algorithmic biases, data ethics issues, and systemic inequities embedded in technology (Floridi, 2021); (c) critically assess the developmental impacts of synthetic agents on cognition, socio-emotional capacities, and moral agency; and (d) develop a capacity to address the importance of AI literacy including the importance of critical thinking, resilience against algorithmic manipulation, and the preservation of humanistic competencies. In addition, psychologists must be equipped to advise educators, policymakers, and parents on ethical, developmentally appropriate

strategies for AI integration. For example, the future educational psychologist must not only have a role in the design of human-centered interventions but also provide expertise in the audit of AI-based educational platforms so that hidden human safety risks can be identified, ensuring that algorithms align with ethical and developmental priorities. This expanded training marks a profound transformation: from mere assessors of human performance to architects and guardians of hybrid human-AI developmental ecosystems.

Reconceptualizing Human Development for the AI Age

The integration of artificial intelligence into environments where children grow, learn, and form their identities demands a profound reconceptualization of early human development itself. It is not simply that educational psychology must adjust its models; it is that the fundamental processes of cognition, emotional formation, and ethical agency are now unfolding within hybrid human — AI ecologies that were unimaginable to earlier theorists. Existing developmental frameworks, built on the assumption of exclusively human-mediated environments, can no longer fully explain or guide the trajectories emerging in Digital Childhoods. Understanding human development in the AI age, requires that research embark on theorizing synthetic mediation as a core condition of early experience — rather than a mere superfluous influence. Educational psychology must evolve. However, this evolution must be grounded in the recognition that the nature of development has already shifted: cognitive scaffolding, social learning, emotional attachment, and moral formation are now being shaped not solely by human counterparts but by algorithmic agents whose architectures differ fundamentally from human consciousness. Without a reimagining of development itself, any efforts to adapt educational systems or psychological practices will remain superficial, treating symptoms rather than addressing the new underlying developmental reality.

Conclusion: Rewriting Human Development: Choosing Our Future in the Age of AI

The emergence of Digital Childhoods, classified into Synthetes, A-Voiders, and Equilibrants, marks not merely a technological shift but a profound transformation in the architecture of human development itself. Artificial intelligence is no longer an external tool operating at the periphery of childhood experience; it has become a co-creator of cognitive, emotional, and ethical formation, altering the conditions under which identity, agency, and meaning emerge. The decisions we make today about how children engage with AI systems are existential decisions that concerns the kind of human beings we will cultivate. Synthetes may embody extraordinary technical fluency but risk losing critical reflection and relational depth; A-Voiders may preserve humanistic capacities but face exclusion from AI-saturated economies; Equilibrants, if conscientiously nurtured, offer a fragile hope of integrating technological mastery with ethical and emotional wisdom.

The stakes are immense: if our models of development remain blind to synthetic mediation, we risk raising generations optimized for systems they do not understand

and values they have not critically chosen. Yet the future is not predetermined. There remains a critical opportunity to rethink developmental environments, theories, and practices to ensure that children grow not only technologically adept but also critically aware, ethically grounded, and emotionally resilient. The future of humanity will not be authored by AI alone; it will be authored by how consciously we redesign the conditions of early development in the face of synthetic realities, preserving and expanding the deep capacities that make human life rich, ethical, and free.

Conflicts of interest

The author declares there is no conflict of interests.

References

Bandura, A. (1977). *Social learning theory*. Prentice-Hall.

Chen, X., Zou, D., Xie, H., & Wang, F.L. (2020). Developing computational thinking through integrating AI into project-based learning: A systematic review. *Computers & Education*, *163*, 104097. https://doi.org/10.1016/j.compedu.2020.104097

Crawford, K. (2021). *Atlas of AI: Power, politics, and the planetary costs of artificial intelligence*. Yale University Press. https://doi.org/10.12987/9780300252392

Erikson, E.H. (1968). *Identity: Youth and crisis*. Norton.

European Commission. (2020). *Digital Education Action Plan 2021–2027: Resetting education and training for the digital age*. Publications Office of the European Union. https://doi.org/10.2766/887631

Floridi, L. (2021). *The ethics of artificial intelligence*. Oxford University Press.

Hao, K. (2019, October 31). China has started a grand experiment in AI education. It could reshape how the world learns. *MIT Technology Review*. Retrieved from https://www.technologyreview.com/2019/10/31/132228/china-squirrel-has-started-a-grand-experiment-in-ai-education/

Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.

Kahai, S.S., & Avolio, B.J. (2018). Addressing the challenges of leading in virtual contexts: The role of transformational leadership and trust. *Leadership Quarterly*, *29*(2), 193–196. https://doi.org/10.1016/j.leaqua.2017.12.004

Lomovtseva, N., & Popova, E. (2021). Digital transformation in education in Russia: Prospects and limitations. *International Journal of Cognitive Research in Science, Engineering and Education*, 9(3), 421–428. https://doi.org/10.23947/2334-8496-2021-9-3

Long, D., & Magerko, B. (2020). What is AI literacy? Competencies and design considerations. *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1–16). https://doi.org/10.1145/3313831.3376727

Luckin, R. (2022). *Enhancing Learning and Teaching with Artificial Intelligence: Future Visions and Educational Realities*. Routledge.

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L.B. (2022). *Intelligence unleashed: An argument for AI in education*. Pearson.

National Science Foundation. (2023). *Strengthening AI education and workforce development across all levels*.
Retrieved from https://new.nsf.gov/news/strengthening-ai-education-workforce-development

Piaget, J. (1952). *The origins of intelligence in children*. International Universities Press. https://doi.org/10.1037/11494-000

Sharkey, A. (2021). Ethical challenges in AI-based child–robot interaction: A critical review. *AI & Society*, *36*(2), 511–526. https://doi.org/10.1007/s00146-020-01093-8

Touretzky, D.S., Gardner-McCune, C., Martin, F., & Seehorn, D. (2019). Envisioning AI for K-12: What should every child know about AI? *Proceedings of the AAAI Conference on Artificial Intelligence*, *33*, 9795–9799. https://doi.org/10.1609/aaai.v33i01.33019795

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Williamson, B., & Eynon, R. (2020). Historical threads, missing links, and future directions in AI in education. *Learning, Media and Technology*, *45*(3), 223–235. https://doi.org/10.1080/17439884.2020.1798995

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education — Where are the educators? *International Journal of Educational Technology in Higher Education*, *16*(1), 1–27. https://doi.org/10.1186/s41239-019-0171-0

Zou, D., Kong, D., & Lee, K. (2022). Artificial intelligence education for young children: A systematic review. *Computers and Education: Artificial Intelligence*, *3*, 100074. https://doi.org/10.1016/j.caeai.2022.100074

Original manuscript received July 06, 2025
Revised manuscript accepted August 25, 2025
First published online October 20, 2025

To cite this article: Andoniou, C. (2025). Digital Childhoods: Synthetes, A-Voiders, and Equilibrants in the Age of AI. *New Ideas in Child and Educational Psychology, 5*(3–4), 3–25. DOI: 10.11621/nicep.2025.0506