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EXTENDED GUIDE · RESEARCH 2024–2026

10 Principles of UX for U18

A user experience design guide for building digital products that respect, protect, and empower audiences under 18 years old. Consolidated research 2024–2026.

AGE SEGMENTATION
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INTRODUCTION

Why UX for U18 is a distinct discipline

Designing digital experiences for people under 18 is not simply "making the interface more colorful" or "simplifying the text." It is a discipline with its own foundations in developmental psychology, cognitive neuroscience, pedagogy, and regulatory ethics. Mistakes in this field have consequences ranging from product failure to real harm to children and adolescents.

This guide brings together the ten fundamental principles derived from the most up-to-date research available (2022–2025), consolidating academic sources, international regulatory bodies, and UX studies specialized in pediatric and adolescent audiences.

> **Scope:** This guide covers the 3–18 age range, divided into four distinct design groups: preschoolers (3–5), early school age (6–8), pre-teens (9–12), and teenagers (13–18). Each group requires radically different design decisions regarding touch dimensions, visual language, gamification, interface writing, and ethical considerations.

The document is organized as a practical reference for designers, product managers, developers, and content teams working on digital products aimed at U18 audiences. Each principle includes theoretical foundations, practical implications, concrete examples, and validation criteria.

01 SEGMENTATION

There is no "one-size-fits-all child"

Cognitive, motor, and linguistic development varies radically between ages 3 and 18. Designing for "children in general" is the number one cause of failure in digital products aimed at young audiences.

Piaget established the foundations of children's cognitive development in four stages: sensorimotor (0–2), preoperational (2–7), concrete operations (7–11), and formal operations (11+). UX design must reflect these structural differences in how users process, navigate, and interact with digital information.

Nielsen Norman Group research (2024) on children's UX documents that children under 7 have a fundamentally different mental model from adults: they do not clearly distinguish between editorial content and advertising, do not understand abstract icons, and have zero comprehension of hierarchical navigation.

GROUP	AGE	TOUCH TARGET	KEY COGNITIVE PATTERN	REAL EXAMPLES
Preschoolers	3–5	60–80pt	Immediate cause-effect · no text	YouTube Kids, PBS Kids, Starfall
Early school	6–8	48–60pt	Scaffolding · emerging reading	Duolingo ABC, Scratch Jr, Epic!
Pre-teens	9–12	44pt	Autonomy · early abstract thinking	Minecraft, Prodigy, Khan Academy
Teenagers	13–18	Thumb-optimized	Social identity · privacy central	TikTok, Roblox, Discord, GitHub

Practical design implications

Segmentation is not just a matter of aesthetics: it affects touch dimensions, interface vocabulary, information density, navigation depth, gamification type, and privacy model. A product designed "for all minors" will be poorly designed for each one of them.

KEY FINDING

Eye-tracking studies with children aged 4–6 (Nielsen Norman Group, 2022) show that recognition of conventional icons (hamburger menu, settings, search) is below 12% in this group. For adults, the same value is 94%.

> **“A designer who creates "for children" without defining the specific age range is not designing for anyone in particular. Segmentation is not optional: it is the foundation of every subsequent decision.”**
>
> KIDSCORP DIGITAL RESEARCH, 2025

02 TOUCH TARGETS

Anatomy of the touch

Fitts's Law applied to children's motor development radically changes minimum interaction dimensions. Platform standards (44pt iOS, 48dp Android) were designed for adults and are insufficient for U12 audiences.

Fitts's Law (1954) states that the time required to move a pointer to a target is a function of the target's size and the distance traveled. In children, this relationship is compounded by three factors: lower fine motor control, lower precision in finger trajectory, and lower ability to correct errors in real time.

Preschoolers (3–5 years) primarily use their full palm or extended fingers, not the fingertip. Their movements are palmar, not precision-based. The minimum touch target for this group, according to AAP and multiple laboratory studies, is **60–80pt (43–57mm)** with at least 8pt of empty space around it.

Recommended minimum sizes by age group

GROUP	MIN TARGET	SPACING BETWEEN TARGETS	BASIS
3–5 years	60–80pt (43–57mm)	≥10pt	Palmar motor skills, frequent precision errors
6–8 years	48–60pt (34–43mm)	≥8pt	Emerging index finger use, developing coordination
9–12 years	44pt (31mm)	≥6pt	Platform standard is sufficient
13–18 years	44pt + thumb zone	≥6pt	Predominantly one-handed use, thumb-primary

Thumb reach zone (13–18 years)

Teenagers operate their devices predominantly with one hand. The comfortable thumb reach zone on a 6-inch screen covers approximately the bottom 40% of the area.

Primary actions should be in this zone; secondary actions can be placed higher with awareness of the additional effort this requires.

VALIDATION RULE

If an interactive element takes more than 3 attempts to be correctly activated by 80% of children in the target group during a moderated usability test, its size or position is insufficient. It is not a user problem — it is a design problem.

Touch errors vs. comprehension errors

It is critical to distinguish between a touch error (the child understood what to do but could not execute it precisely) and a comprehension error (the child did not understand what to do). The former is solved with larger touch targets; the latter requires information redesign. Confusing the two is a frequent methodological error in usability testing with minors.

03 COGNITIVE LOAD

Less is neurologically more

Children's working memory handles 3–5 simultaneous items versus 7±2 in adults. Mayer's Cognitive Theory of Multimedia Learning shows that information overload collapses attention and reduces comprehension by up to 40%.

Cognitive Load Theory (Sweller, 1988) establishes that working memory has limited capacity and that learning degrades when intrinsic load (material complexity), extraneous load (poor design), and germane load (constructive processing) together exceed available capacity.

In children, working memory is structurally smaller than in adults. Studies by Baddeley and Hitch (revised by Gathercole, 2007) show that capacity develops linearly from childhood to ages 14–16, at which point it reaches adult levels. This has direct implications for the design of educational and entertainment interfaces.

Mayer's principles applied to U18 design

- **Modality principle:** Replace on-screen text with synchronous audio narration. Visual and auditory channels work in parallel, distributing cognitive load. Especially critical for users with dyslexia.
- **Segmentation principle:** Break complex content into user-controlled parts. Never present step N+1 before confirming mastery of step N.
- **Signaling principle:** Use visual cues that direct attention toward the most relevant information. Without them, the user must decide what to process, increasing extraneous load.
- **Redundancy principle:** Avoid presenting the same information simultaneously in text and image when text alone is sufficient. Redundancy increases, not reduces, cognitive load.
- **Pacing control:** The user decides when to advance. No forced automatic flows. This boosts retention by up to 35% in studies with children aged 7–10.

ALERT: FLASHING AND PHOTOSENSITIVE EPILEPSY

No interface element should flash at more than 3 Hz. The risk of photosensitive epilepsy is real and compounded in minors. Validate against WCAG 2.2 guidelines, criterion 2.3.1 (Three Flashes or Below Threshold). Heavy parallax and rapid rotation animations can also cause digital motion sickness, especially in users sensitive to motion.

Designing for neurodivergence

15–20% of children present some form of neurodivergent profile (ADHD, dyslexia, ASD, or others). For these users, the extraneous cognitive load of a poorly organized design can be paralyzing. Always implement: full predictability, no autoplay, visible controls to mute effects, respect for `prefers-reduced-motion`, and adjustable contrast.

04 INFORMATION ARCHITECTURE

From hierarchical tree to Hub & Spoke

Children under 12 have no mental model of "folders" or "hierarchies." They have models of worlds and places. Deep tree-based navigation is incomprehensible for this age group.

Nielsen Norman Group research (Loranger & Nielsen, 2013, updated 2024) documents that the hamburger menu has 0% recognition in children aged 3–4 (they confuse the image with real food) and increases gradually to 82% in teenagers aged 14+. This 82-percentage-point difference in a single navigation element perfectly summarizes the problem of unsegmented design.

Why Hub & Spoke works for U18

The Hub & Spoke model replaces hierarchy with a clear visual center (hub) connected to content spokes. Each spoke is a "place" the user goes to, not a position in a tree. This spatial metaphor is consistent with how pre-adolescent children represent digital space.

Successful examples: the Minecraft Education map, the Roblox home screen, the PBS Kids interface. All use explicit spatial navigation where visual position communicates function.

✓ ARCHITECTURES THAT WORK

- Central visual hub with clearly differentiated spokes
- Navigation as a map or world with permanent location cues
- Visual breadcrumbs (icons + color), never text-only
- Maximum 2 levels of depth for ≤12 years
- Always-visible return to main hub

✗ ARCHITECTURES THAT FAIL

- Hamburger menu for users under 9
- 3+ level hierarchies with no visual orientation
- Text-only breadcrumbs
- Navigation with unsignaled gestures
- Architectures that don't answer "where am I?"

Search as alternative navigation (9+)

From ages 9–10, children begin to conceptualize search as a navigation tool. This ability increases exponentially in teenagers. For this group, well-implemented search can replace complex hierarchical navigation, as long as the system tolerates spelling errors and concept-based searches.

05 VISUAL LANGUAGE

Behavioral icons, not metaphorical

20th-century physical references have lost all meaning for Gen Alpha. Icon and color palette design must be grounded in current behaviors and states, not in objects from the past.

The floppy disk as a "save" icon perfectly illustrates the problem: it is a metaphor based on a physical object that children born after 2005 have never seen. Its interpretation requires cultural memorization, not logical inference, which increases extraneous cognitive load with no benefit.

Behavioral icons solve this problem by mapping the system state or resulting action, not the historical object. "Save" = cloud + checkmark (synced). "Share" = arrow leaving a point (send action). "Delete" = object disappearing (visible result).

Emoji interpretation: Gen Z vs. Gen Alpha

A critical finding from recent research (Vosloo, Common Sense Media, 2024): emoji interpretation diverges dramatically between generations. Gen Z (born 1997–2012) uses many emojis ironically or hyperbolically. Gen Alpha (born 2013+) interprets them predominantly literally.

EXAMPLE OF DIVERGENT INTERPRETATION

The 😭 "crying face" emoji is used by Gen Z to mean "this is so funny it makes me cry" or emotional hyperbole. Gen Alpha interprets it literally as "I am very sad." The same glyph communicates opposite messages depending on the recipient. Never use emojis as critical status signals in a multi-generational U18 interface.

Color psychology by age group

GROUP	EFFECTIVE PALETTE	FUNCTION OF COLOR	AVOID
3–8 years	Saturated primaries + high contrast	Functional: maps hierarchy without text	Pastel palettes, low contrast
9–12 years	More complex palettes, secondary colors	Signal of maturity, complexity	Saturated primaries (perceived as childish)
13–18 years	Gen Z: neobrutalism / Alpha: vibrant	Identity, values, authenticity	"Corporate" palettes, unintentional pastels

Dark mode is a non-negotiable standard for the 13–18 range. Reducing eye fatigue is a real need for users who consume content for hours. Implement with WCAG 2.2 contrast ratios: minimum 4.5:1 for normal text, 3:1 for large text and UI components.

06 SCAFFOLDING & GAMIFICATION

Scaffolding as the core mechanic

Vygotsky's Zone of Proximal Development applied to UX: the system must operate exactly at the threshold between what the child can do alone and what they can achieve with help. Too easy bores; too hard abandons.

Scaffolding (cognitive scaffolding) is the principle by which the system provides support precisely calibrated to the user's current abilities, gradually withdrawing that support as the user demonstrates mastery. Originating in pedagogy (Vygotsky, 1978; Wood, Bruner, and Ross, 1976), it is the most validated progression model in the design of educational and gaming experiences.

The scaffolding cycle in UX

The cycle has four phases that must be implemented as a systemic mechanic, not as an arbitrary difficulty level:

- **Simple action (01):** A task the user can fully master with current cognitive resources. No possibility of unrecoverable failure.
- **Immediate feedback (02):** Audiovisual response in under 300ms. No penalty for failure. The error is information, not punishment.
- **Mastery verification (03):** The system confirms understanding before advancing. Can be explicit (confirmation) or inferred (repeated pattern of successful behavior).
- **Controlled unlock (04):** New complexity accessible only after confirming prior mastery. The user never faces something they are not prepared for.

Ethical gamification vs. extractive gamification

Gamification in U18 products can be a powerful tool for intrinsic motivation or a tool for behavioral manipulation. The difference is ethical and legal.

✓ ETHICAL GAMIFICATION

- Visible and permanent progress (bars, trophies)
- Collectibles with no monetary value
- Unlimited retries with no severe penalty
- Achievements intrinsic to learning
- Real autonomy in customization

✗ EXTRACTIVE GAMIFICATION (PROHIBITED)

- Loot boxes with real money for minors
- Fake urgency countdowns (FOMO)
- Daily streaks with severe penalty for failure
- Infinite scroll with no stopping point
- Virtual currency designed to obscure real value

LEGAL FRAMEWORK

The ICO Children's Code (UK) and multiple equivalent regulations in the EU explicitly prohibit dark patterns targeting minors, including artificial FOMO, designs that foster compulsive dependency, and mechanisms that make disconnection difficult. Non-compliance can result in fines of up to 4% of global annual turnover.

07 UX WRITING

Errors as invitations

Interface writing for U18 has its own rules: maximum 20 words per sentence, progressive disclosure, genuinely empathetic tone, and turning every error into motivation to keep trying.

Microcopy (the text on buttons, error messages, confirmations, and contextual help) is the most direct communication channel between the system and the user. In U18 audiences, this channel can be decisive for product retention or abandonment.

Writing principles for U18

- **Brevity:** Sentences of ≤20 words for children under 12. For preschoolers and early school age, the target is 5–10 words maximum per instruction.
- **Active voice:** "Choose your character" instead of "The character must be selected." Verb before object, always.
- **Progressive disclosure:** Show only the instruction needed at the exact moment. Additional details behind "How does this work?" accessed voluntarily.
- **No condescension:** Pre-teens (9–12) are extremely sensitive to infantilizing tone. A condescending tone generates active rejection of the product.

ERROR MESSAGE TRANSFORMATION

❌ **Traditional error:** "Invalid password. Please enter a valid password."
✓ **Empathetic microcopy:** "Almost there! Your password needs at least one number to be stronger 💪 "

❌ **Traditional error:** "Error 404: Resource not found on server."
✓ **Empathetic microcopy:** "Oops, that page went exploring. Head back home? 🗺️ "

Gen Alpha's lexicon: don't imitate it without research

Gen Alpha (born 2013+) has developed a compressed digital vocabulary that changes rapidly: "W" = win, "L" = loss, "bussin" = very good, "no cap" = seriously, "slay" = excellence. This vocabulary has a short shelf life and a specific cultural geography.

The most common mistake: marketing or design teams incorporating youth slang without validating it with the target group. The result is perceived by teenagers as "cringe" and generates active rejection of the brand. If slang is used, it must be validated with real users from the target group and updated regularly.

VALIDATION TOOL

The Flesch-Kincaid Reading Ease index is a useful but insufficient tool for U18 UX writing. Complement with direct comprehension tests: show the text to the target user and ask them to explain what it means in their own words. If the explanation diverges from the intent, the text needs revision.

08 SENSORY FEEDBACK

Sound as the primary semiotic channel

For children under 8, audio is not decoration: it is the primary communication channel. Earcons (auditory icons) must be proportionally calibrated to the importance of each action.

Auditory semiotics in children's interfaces has been documented since the 1990s (Brewster, 1994), but has gained critical relevance with the proliferation of touch interfaces. An earcon is a brief non-verbal sound that conveys information about system state or the result of an action. In pre-literate children, earcons are frequently the primary semiotic channel.

Earcon hierarchy by importance

TYPE	RELATIVE VOLUME	CHARACTERISTICS	FUNCTION
Micro-feedback	Very low (5–10%)	High frequencies, fast decay	Subconscious confirmation of tap, hover
Transition	Low-moderate (20–30%)	Mid tones, soft percussion	Screen change, spatial orientation
Achievement/Reward	Moderate (30–45%)	Ascending arpeggio, rich harmonics	Unlock, level complete, success
Error/Redirect	Low-neutral (15–25%)	Neutral tone, no dissonance	Action unavailable, redirect behavior

PROHIBITED SOUNDS: BUZZERS AND ALARMS

Dissonant or alarm sounds in response to errors induce cortisol stress and paralyze exploration. An error in an educational or entertainment U18 product is not a failure — it is part of the learning and exploration process. The error sound must communicate "this doesn't work here, try something else," never "you have failed."

Haptics and vibration

Modern devices allow haptic feedback (tactile vibration) as an additional channel. For users with hearing impairments, haptics can be the primary confirmation channel. Implement proportional haptics alongside audio: micro-vibration for minor actions, stronger vibration for achievements or important errors.

User control over audio

Every U18 product must offer granular control over audio: general mute, independent volume control for effects separate from music/narration, and automatic respect for OS accessibility settings. Parents should be able to set volume limits from the parental control panel.

09 PRIVACY & SAFETY

Safety by design, not by patch

Violating children's privacy regulations is an offense with million-dollar penalties in multiple jurisdictions. Safety cannot be an afterthought: it must be embedded from the very first design decision.

The global regulatory framework on children's digital privacy has evolved rapidly since 2019. The three fundamental regulations are: COPPA (Children's Online Privacy Protection Act, US, updated 2023), GDPR-K (extension of European GDPR for minors, Art. 8), and the ICO Children's Code (UK, 2021, also known as the Age Appropriate Design Code).

The three regulatory design imperatives

- **Privacy by default:** Registration must result in maximum automatic restriction. Nothing should be public by default. Active geolocation and behavior-based targeted advertising to minors are prohibited without verified parental consent.
- **Just-in-time transparency:** Permission requests (camera, microphone, location, contacts) must be accompanied by visual micro-explanations at the exact moment of the request, adapted to the user's cognitive level — not at login in a block of legal text nobody reads.
- **Transparent parental supervision:** If active parental monitoring exists, the UI must indicate this permanently and visibly to the minor. Covert monitoring is inconsistent with children's wellbeing according to UNICEF and Save the Children guidelines.

REAL CASE: CONSEQUENCES OF NON-COMPLIANCE

TikTok vs. FTC (2019): $5.7M fine for COPPA violation — collecting personal data from children under 13 without verified parental consent. Order to delete all collected data.

YouTube (Google) vs. FTC (2019): $170M fine for collecting children's data to serve targeted advertising. The largest fine under COPPA since its enactment.

Epic Games (Fortnite) vs. FTC (2023): $275M fine for manipulative design and COPPA violations. Includes purchase dark patterns and accidental charges.

Taxonomy of dark patterns prohibited for U18

PATTERN	DESCRIPTION	REGULATION VIOLATED
Confirmshaming	Negative options framed in a humiliating way ("No, I prefer to ignore my security")	ICO Children's Code §12
Artificial FOMO	Urgency counters, fake inventory, manufactured limited time	ICO Code, DSA Art. 25
Privacy zuckering	Privacy options buried, confusing configuration, maximum default permissions	GDPR Art. 25, COPPA
Roach motel	Easy to enter, hard to exit. Account deletion hidden or complicated	GDPR Art. 17, ICO Code
Disguised ads	Advertising disguised as organic content, without clear labeling	FTC Guidelines, ASA UK

10 ACCESSIBILITY & NEURODIVERSITY

1 in 5 children is neurodivergent

ADHD, dyslexia, and autism spectrum disorders affect 15–20% of the child population. They are not edge cases: they are a central part of the target audience. Designing for them improves the experience for everyone.

Universal Design (Mace, 1997) establishes that solutions designed for users with specific needs benefit all users. This premise, repeatedly confirmed in digital products, is especially relevant in U18 audiences where cognitive variability is at its maximum.

Neurodiversity profiles and their design needs

- **ADHD (5–10% of children):** Difficulty with sustained attention and impulse control. They need: immediate and frequent feedback, task segmentation, visible progress indicators, avoid long flows without save points, no peripheral distractions during task moments.
- **Dyslexia (5–17% of population):** Difficulty with text decoding. They need: highly legible fonts (sans-serif, spaced typography), short lines (45–75 characters), generous line spacing (1.5+), avoid justified text, audio as a permanent alternative.
- **Autism Spectrum Disorder (1–2% of children):** They need absolute consistency in navigation patterns, no unexpected context changes, literal language without irony or ambiguous metaphors, predictable routines, options to reduce sensory stimulation.
- **Visual impairments:** High contrast (minimum 4.5:1), screen reader support (ARIA labels), resizable text without content loss, never use color alone as an information signal.
- **Motor impairments:** Fully keyboard-navigable interfaces, sufficiently large targets, tolerance for tremor or involuntary movement.

THE UNIVERSAL DESIGN PRINCIPLE IN PRACTICE

Accessibility solutions do not degrade the experience for users without disabilities — they improve it. Synchronous audio benefits everyone in noisy environments. Pacing controls benefit everyone during moments of distraction. Highly legible fonts benefit everyone under visual fatigue. Accessibility is high-quality UX, not a lesser variant.

WCAG 2.2: critical criteria for U18

WCAG 2.2 CRITERION	REQUIREMENT	U18 RELEVANCE
1.4.3 Contrast (AA)	Minimum ratio 4.5:1 normal text, 3:1 large text	Critical for dyslexia and low vision
2.3.1 Three Flashes	No flashing >3Hz in any area ≥25% of screen	Photosensitive epilepsy
2.5.8 Target Size (AA)	Minimum 24×24 CSS px for interactive elements	Base minimum, increase for <12
1.2.1 Audio Only	Text alternative for audio-only content	Deafness, no-audio environments
2.2.2 Pause/Stop/Hide	Control over autonomous moving content	ADHD, motion sensitivity

SYNTHESIS

U18 validation checklist

#	PRINCIPLE	KEY VALIDATION CRITERION
01	Segmentation	Is the specific age group defined? Do design decisions derive from that profile?
02	Touch Targets	Are all interactive elements ≥60pt for <6 years? Was the touch test conducted with real users from the target group?
03	Cognitive load	Is one critical instruction presented at a time? Is there pacing control? Is prefers-reduced-motion respected?
04	Architecture	Does navigation have ≤2 levels for <12? Is there a permanent visual location signal?
05	Visual language	Were icons validated with the target group? Do colors meet WCAG 2.2 in the use context?
06	Scaffolding	Does the system verify mastery before presenting new complexity? Is the error treated as information, not punishment?
07	UX Writing	Are sentences ≤20 words? Were error messages tested with users from the target group?
08	Feedback	Are error earcons neutral (not punitive)? Is there granular volume control for the user/tutor?
09	Privacy	Is the default configuration the most restrictive? Is COPPA/GDPR-K/ICO Code compliance met per jurisdiction?
10	Accessibility	Was WCAG 2.2 AA validated? Is there an audio alternative for all critical textual content?

References

[1] **American Academy of Pediatrics (AAP)**. *Children and Adolescents and Digital Media.* Pediatrics, 138(5), 2016. Updated 2024. DOI: 10.1542/peds.2016-2593

[2] **Baddeley, A., & Hitch, G.** *Working Memory.* Psychology of Learning and Motivation, 8, 47–89. 1974.

[3] **Brewster, S.A., Wright, P.C., & Edwards, A.D.N.** *A detailed investigation into the effectiveness of earcons.* ICAD 1994. 1994.

[4] **Common Sense Media.** *The Common Sense Census: Media Use by Tweens and Teens.* San Francisco: Common Sense Media. 2023.

[5] **Druin, A. (Ed.).** *Mobile Technology for Children: Designing for Interaction and Learning.* Morgan Kaufmann. 2009.

[6] **Federal Trade Commission (FTC).** *COPPA Rule Enforcement Actions 2019–2023.* FTC.gov. 2023.

[7] **Fitts, P.M.** *The information capacity of the human motor system in controlling the amplitude of movement.* Journal of Experimental Psychology, 47(6), 381–391. 1954.

[8] **Gathercole, S.E., Pickering, S.J., Ambridge, B., & Wearing, H.** *The structure of working memory from 4 to 15 years of age.* Developmental Psychology, 40(2), 177–190. 2004.

[9] **ICO (Information Commissioner's Office, UK).** *Children's code: age appropriate design.* ico.org.uk. 2021, updated 2024.

[10] **Loranger, H., & Nielsen, J.** *Children's Websites: Usability Issues in Designing for Kids.* Nielsen Norman Group. 2013, updated 2024.

[11] **Mayer, R.E.** *Multimedia Learning (2nd ed.).* Cambridge University Press. 2009.

[12] **Mayer, R.E.** *The Cambridge Handbook of Multimedia Learning (3rd ed.).* Cambridge University Press. 2021.

[13] **Moreno, R., & Mayer, R.E.** *Interactive multimodal learning environments.* Educational Psychology Review, 19(3), 309–326. 2007.

[14] **OECD.** *Digital Education Outlook 2024: Towards an AI-Integrated Learning Environment.* OECD Publishing. 2024.

[15] **Ofcom.** *Children and Parents: Media Use and Attitudes Report 2024/25.* Ofcom.org.uk. 2025.

[16] **Piaget, J.** *The Psychology of Intelligence.* Routledge. 1950.

[17] **Read, J.C., & Markopoulos, P. (Eds.).** *Child-Computer Interaction (IDC Proceedings).* ACM. 2019–2024.

[18] **Schell, J.** *The Art of Game Design: A Book of Lenses (3rd ed.).* CRC Press. 2019.

[19] **Sweller, J.** *Cognitive Load during Problem Solving: Effects on Learning.* Cognitive Science, 12(2), 257–285. 1988.

[20] **UNICEF Office of Research – Innocenti.** *Policy Guidance on AI for Children.* UNICEF. 2021.

[21] **Vosloo, S.** *Digital Literacy for Children: Exploring Definitions and Frameworks.* UNICEF. 2012, updated 2024.

[22] **Vygotsky, L.S.** *Mind in Society: Development of Higher Psychological Processes.* Harvard University Press. 1978.

[23] **W3C.** *Web Content Accessibility Guidelines (WCAG) 2.2.* W3C Recommendation. w3.org/TR/WCAG22. October 2023.

[24] **Wood, D., Bruner, J.S., & Ross, G.** *The role of tutoring in problem solving.* Journal of Child Psychology and Psychiatry, 17(2), 89–100. 1976.

[25] **Kidscorp Digital.** *UX for Children and Adolescents: Design Principles Guide.* Consolidated internal research. 2024–2025.