

Kids and the Internet: A Developmental Summary

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When planning and developing successful internet programs for children, it is vital to clearly understand and carefully consider kids' innate developmental capabilities and proclivities. It is necessary to keep in mind that children of different ages have vastly different physical, cognitive, and psycho-social characteristics, as well as disparate interests, likes, dislikes, and fears. A four-year old child may not possess the manual dexterity to operate a complex internet game; an eight-year old's growing ability to reason logically gives him the opportunity to take part in strategy-based activities and contests; twelve-year old preteens may be put off by a topic they believe to be "uncool." The following article provides a brief summary of the developmental stages of children and young teens – from age two to age fourteen – and the relationship of these stages to kids' use of electronic media. This summary is based on research in the areas of child development, psychology, education, and technology.

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PRESCHOOL: AGES 2 to 5

The preschool years are the time that children progress from being wholly dependent to being somewhat independent. They develop a sense of themselves, which they unabashedly project to the world.

Physical Characteristics

From ages two to five, children's growth rates slow to about half of what they were between birth and age two. Boys tend to be somewhat taller and heavier than girls. Children gradually lose their toddler look and pot bellies, trimming down to the more slender, athletic appearance of young childhood.

A vital factor in the preschooler's physical development is the maturation of the brain. The brain of a five-year old has attained approximately 90% of its adult weight. Myelination is the development of the fatty sheath that covers nerves, allowing for faster and more controlled transmission of nerve impulses. The myelination of nerve fibers in the spinal cord is complete after age two, but neurons in the brain will not be completely myelinated until near the end of adolescence. The ongoing process of myelination contributes significantly to the improvement of the preschooler's abilities. For example, visual motor functioning and control of eye movements increase as

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myelination increases, so that by age six the majority of children have adequate focusing and scanning skills. Up to this age, many children are slightly farsighted.

Hemispheric specialization whereby the brain is organized into right and left hemispheres, each with specific functions and duties, is complete by age six as well, and is demonstrated by the emergence of hand preference. By age five, over 90% of children show a right- or left-hand preference. Plasticity of the brain (i.e., the flexibility of parts of the brain to take over functions from other damaged parts) has been slowing from infancy on.

Gross motor skills, employing the large muscles of the body, generally involve movement of the body through space: running, jumping, climbing. With both maturation and practice, these skills improve dramatically during the preschool years. Activity levels, or the amount and frequency of body movement, show a definite age-related pattern in the preschool years. Activity peaks at about age three and then decreases throughout the remainder of childhood. Experts believe this pattern is related to the maturation of the brain itself.

Cognitive Characteristics

Physical development in the preschool years ushers in a major shift in thinking, or cognitive skills. Children have increased their use of symbols – primarily in the form of language. Language develops quickly throughout the preschool years, with children making great strides in vocabulary and in understanding the rules of grammar. Improving symbol use is also apparent in changes in children's pretend play. Children progress from mimicking the real use of objects (e.g., using a cup and saucer for drinking tea) to expanding symbol meanings beyond their real use (e.g., using the same cup and saucer as a bathtub for fairies). Preschoolers also show increasing control over attention and memory.

But with progress come cognitive difficulties as well. Piaget defined a number of thinking problems that are hallmarks of a child of this age, including

- inability to see more than one aspect of an object, known as centration;
- difficulty in understanding another's perspective: egocentrism;
- ascribing personality to inanimate objects: animism;
- belief that fantasy is the same as reality;

The preschooler's inability to understand these concepts does not mean that the rudiments of the concepts are not present. For example, a preschooler's capacity for deceiving another child implies the beginnings of an understanding of the other child's beliefs and perspective.

In general, the preschool child is still tied to the real world, meaning that he or she is still a long way from thinking abstractly.

Psycho-social Characteristics

The preschooler's psycho-social characteristics show a marked development of self-concept and a dramatic increase in social interactions. During this period children develop a strong sense of who they are.

At this age, play helps young children learn about their social world, begin to develop friendships and relationships, learn social rules, and grow creativity.

Pro-social (i.e., socially positive) behavior in children is encouraged by exposure to parents and other caregivers acting in pro-social ways, and by viewing pro-social images on television, CD-roms, and the internet. Pro-social behavior tends to increase with age and the stage of mental reasoning.

During the preschool years children also begin to gain an understanding of gender (what gender they belong to) and sex roles (the characteristics of their gender group). Sex role development is influenced by both biology and environment.

Likes, Dislikes, and Fears

In general, preschool children are attracted to exploration and mastery; they test their limits and the limits of the physical world around them. They examine blocks and move on to building a tower; they try to manipulate a mouse to hear a favorite internet-based story.

Preschoolers revel in finding out who they are and in asserting their independence. The words, "me," "mine," and "no" are familiar to every parent of a preschooler. Preschoolers want to choose their own clothing and their own books – even if they can't read.

For the preschooler this is a time of discovery and a time of frustration and travail as well. The preschooler comes face to face with his or her limitations on a daily basis: She will try to pull her toy-filled wagon too fast and tip the whole thing over; he wants to tie his own shoes, but ends up attaching one shoe to the other.

These frustrations are prone to lead to the beginnings of conflict and fear. At this age, children's greatest fears are likely to involve the loss of a parent, being alone, getting lost, being in the dark, and so on. Even though preschoolers desperately seek mastery, they are faced with the reality of their incapacity every day. This is the reason why preschoolers are fascinated by stories of children or creatures who confront these fears and overcome them. Bambi, Babar, and Cinderella were orphaned as children; Hansel and Gretel lose their way in the woods.

During the preschool years, children also discover their sense of humor, although, as yet, it is largely unsophisticated. Preschoolers like things that are silly, and sometimes even base. They have found out that by mispronouncing words or by putting their clothes on backward, they can elicit laughter from their family, and so they do these things over and over.

Preschool Kids and the Internet

The above discussion has obvious implications for preschoolers' preferences and use of the internet. Preschoolers are attracted to internet activities that are interesting to them and that offer opportunities for learning, mastery, and silly fun. Preschoolers are interested in stories with familiar and attractive characters. If they are "Rolie Polie Olie" TV fans, they will welcome seeing the character in an internet-based story. If they enjoyed the "Pocahontas" movie, they are apt to favor a game based on Meeko and his animal friends. In the area of learning, the preschool user is eager to participate in

programs in which they can learn useful things: the sounds of the letters of the alphabet, names of colors, and how to manipulate keyboard arrows to master directionality. Preschoolers, furthermore, love to demonstrate new skills to their parents or caregivers, and, of course, in turn their parents and caregivers revel in this new mastery. Activities and stories wrapped in the warm blanket of fun are always preferred.

Preschoolers are, nevertheless, limited by their physical capabilities in the internet activities that they can successfully undertake. They have minimal tolerance for frustration or technical difficulties; their attention span is brief; and their manual skills are not fine-tuned. Stories, activities, and games must be simple to access. Visual images should be clear and bright to appeal to the preschooler's sometimes imperfect eyesight. Activities should be sufficiently limited so that preschoolers can achieve their aim within a relatively short time. To achieve a result, preschoolers should be required to perform only the easiest manual tasks, such as a click on any key; feedback should be immediate and readily available.

Even though it is obviously best that preschool internet users have a parent or other concerned caregiver available for support and reinforcement, preschoolers are delighted to independently handle as much of a program as feasible. It is best that reading is not required; simple directions, where necessary, should be verbal. Clear demonstrations can also be a useful adjunct; feedback should be available within the program.

YOUNG CHILDHOOD: AGES 6 to 9

During this period, youngsters become immersed in the world of school and peer relationships, gaining in autonomy and individuality.

Physical Characteristics

Young children show distinctive growth and activity patterns. During young childhood the rate of growth is slower than either the preschool years or adolescence. At this time, girls are generally heavier than boys and have more fat tissue. Strength, physical ability, and performance in sports are increasing, but are still influenced by cultural edicts that, for instance, girls are less physically skilled than boys.

Cognitive Characteristics

During early childhood, thinking skills improve significantly. According to cognitive theory, this is largely due to interactions within the competitive schoolroom environment. According to Piaget, the young child is making a gradual shift toward becoming what he terms the concrete, operational child, who has the distinct ability to

- reason logically;
- decenter, that is, understand the perspectives of others;
- grasp the concepts of conservation and mathematics;

In essence, at the end of this school-age shift, the child becomes similar to the adult in logical thinking and memory capacity. The main differences fall primarily into areas of knowledge and practice.

Language skills blossom during young childhood, to a large extent because the child now has the ability to read. The young child is no longer restricted to verbal

communication in order to learn vocabulary, syntax, and grammar. Language use shows the child taking into account the perspectives of others, as evidenced by the child's ability to tell jokes and use pragmatics (i.e., the ability to adjust one's speech to listeners and their perspectives).

Psycho-Social Characteristics

Socially and emotionally, early childhood is a complex time, when children become less dependent on their parents and more enmeshed in the broader society. During this time, children are profoundly affected by a myriad of environmental circumstances at school, changes in peer groups, in families, neighborhoods, and even in the types of media. Pro-social behavior develops and is influenced by the pro-social behavior youngsters see and experience around them.

At this age, a child's school experiences are important in reaffirming and reestablishing a sense of self-worth outside of the home. Children in this age range develop meaningful school-based social groups and friendships with unique rules, values, language and codes of behavior. Depending on their home-life and need for additional nurturing, the child's teacher is apt to take on multiple roles from surrogate parent to teacher of morality.

The self-concept of children between the ages of six and nine begins to include abstract qualities as well as comparisons with other children. [Given that environmental feedback regarding children's abilities may be contradictory, they now have the logical ability to test their self-concept against reality. Hence, self-esteem affects social interactions; for example, high self-esteem in early childhood is commonly related to high popularity.

With regard to conflict in general, the amount of stress experienced by school-age children is handled differently by different children, with some being more resilient and adaptive to stressful situations than others. For the most part, good experiences and a supportive family enhance resilience for young children.

Likes, Dislikes, and Fears

Young children like many of the same kinds of activities that preschoolers do, albeit often on a different and more complex level. They continue to favor activities from which they can learn, grow, and test their mastery. Based on their increasing capabilities and capacity for challenge and ambiguity, they are ripe for activities involving higher levels of difficulty. They need not "get it" on the first try; they are drawn to social situations in which they can interact with their peers; they like games and organized sports.

Young children are at the beginnings of their push-pull toward independence. They dislike intrusion on their autonomy and fear looking "babyish," while at the same time desiring nurture and care. As their social awareness grows, young children fear exclusion by their peers and siblings.

During young childhood, more than in the preschool years, there is a significant schism between the likes and dislikes of younger group members (i.e., six- and seven-year olds) and older ones or preadolescents (i.e., ages eight and nine). Younger members of the early childhood group continue to favor fun, humor, simplicity, and familiarity. They are drawn to characters they know who behave in understandable ways; they love

jokes and riddles. Eight- and nine-year olds are apt to prefer challenge and competition; their sense of humor is more sophisticated and subtle.

Also, as gender identification takes stronger hold, there are far greater gender differences than before. This is the time when girls bond strongly with girls, and boys with boys, tending toward gender-based activities.

Young Children and the Internet

Young children continue to be drawn to internet activities from which they can learn, have fun, and gain in self-esteem through accomplishment and positive reinforcement. The burgeoning physical, cognitive, and psycho-social capabilities of this age group open a plethora of internet possibilities. By the conclusion of the young childhood years, most have sufficient fine motor skills and hand-to-eye coordination to operate all computer functions with dexterity. Growing reading ability allows for written directions and composition-based activities (e.g., fill in the blanks, write the story ending, practice reading) and written feedback; enhanced memory capacity allows for memory-based games (e.g., concentration, matching). The growing ability to reason logically gives them the opportunity to take part in strategy-based activities and contests; mathematical understanding allows for more complex number-based play and more advanced forms of scoring. Youngsters in this age group can handle novelty and challenge, and desire it in internet activities.

TWEENS: AGES 10 to 14

The tween years are truly that: a time bridging the gap between the dependence of early childhood and the independence of the adult world.

Physical Characteristics

During the tween years, youngsters gradually gain much or all of the physical size, strength, agility, and coordination that they will ever have. Girls mature more rapidly than their male counterparts, and are usually taller (and look and act more maturely than boys). Tweens are also undergoing the physical and emotional process known as adolescence. The two primary physical aspects of adolescence involve

- maturation of the body, so that it looks more like that of an adult. The adolescent develops secondary sex characteristics and goes through a growth spurt;
- development of primary sex characteristics, making sexual reproduction possible.

Secondary ephemeral changes associated with adolescence during the tween years include skin eruptions, fat deposits, and alterations in texture of hair and nails

Cognitive Characteristics

Cognitive capacity continues to grow and develop in the tween years. According to Piaget, adolescents, unlike younger children, develop the ability to think abstractly. Tweens can explore different solutions to problems as they arise, and can begin to conceptualize future options and possibilities. Youngsters begin to think more

realistically and critically about their own future, including potential employment, parenthood, and geographic location.

Adolescents also grow in their ability to reason morally. It is important to note, nevertheless, that moral thinking and moral behavior do not necessarily correspond. Whereas tweens are vastly more capable of knowing right from wrong than younger children, they also have more opportunities and pressures to act in ways they know they should not.

The appearance of adolescent egocentrism is related to the onset of formal operational thinking, which takes place when adolescents are preoccupied with how others view them. Operational thinking occurs most often with regard to the so-called “imaginary audience.” Each adolescent assumes that he or she is the focus of attention of all other adolescents. Related problems in thinking include the following:

- *the invincibility fable*: tweens assume that rules of nature do not apply to them.. For example, they know rationally that it is dangerous to drive fast, but feel that they can, and will not be injured by doing so;
- *the personal fable*: tweens assume that their lives have mythic proportions. Like infants, they feel that they are the center of the universe; their problems, concerns, and joys overshadow those of others.

Psycho-Social Characteristics

During these years, the social interactions of the tween represent a switch in emphasis. As time progresses, parents become less important than peers as sources of information and reference. Peer pressure becomes prevalent, with peers intentionally or unintentionally causing their cohorts to conform to rigid standards of behavior, dress, and sexual identity in order to gain acceptance.

Adolescence encompasses other unique features that challenge the individual. There has obviously been an ongoing revolution in tween and teen attitudes toward drugs and sex. Adolescents are naturally tempted by the “feel-good” properties of illicit drugs and sex. Whereas they normally know consciously that they should not partake, they are developmentally limited in their ability to make a rational decision and to consider the consequences.

Another major change during adolescence is the “parenting perspective.” That is, the simpler parenting styles appropriate for preschoolers and youngsters need to become more complex as tweens want and need to play a larger role the decision-making process. Effective parenting now becomes less one-sided and more of an interaction between the parents and the tween.

Likes, Dislikes, Fears

The rapid changes that come with adolescence lead to a plethora of fears. Adolescence is a social time in which tweens are afraid of rejection and not fitting in with the group. For most tweens, the more they have in common with their peers, the better it is. Yet the combination of brain development and egocentrism make tweens almost too aware of their shortcomings. The often ungainly body changes associated with adolescence bring on fears of sexual unacceptability. The myriad fears and insecurities lead tweens, perhaps for the first time, to question their capabilities, and maybe even their futures. Even

though tweens may act blasé and actually do things to undermine future prospects, this is often a defense mechanism to deal with fears of failure.

Tween likes and dislikes are in large part determined by their fear of rejection. Ultimately tweens like the same things their peers like, and generally what their parents do not like. Tweens gravitate toward the same music, the same clothes, and the same films; they like things that they can relate to and that make them feel safe. This is a time to belong to groups, clubs, and to go to group gatherings and parties. Tweens begin to feel a fervent interest in the opposite sex. They like things they can learn from, but unlike younger children, tweens may be more interested in social, rather than academic, learning. They have a drive toward independence and an interest in things that can aid them to become independent: money, cars, gambling. Male tweens still favor sports and competition; female still favor romance, beauty, and clothes.

In terms of dislikes, tweens particularly do not like anything that will set them apart, or that is sanctioned by authority figures.

TWEENS AND THE INTERNET:

By the tween years, youngsters have garnered the cognitive power and manipulative skills to employ all aspects of internet programs and products at will. Like younger children, tweens continue to favor activities that are technically sound and readily usable, but also generally have the capability and patience to trouble-shoot when necessary.

Just as their younger counterparts, tweens frequent sites where they can learn, grow, and have fun. Learning for tweens prominently includes social learning. Tweens frequent chat rooms in which they have a chance to meet and know their peers; they enjoy stories dealing with relationship issues. The net provides them with a handle on what's new and "in" -- the latest fashion and beauty trends; movie, TV and music reviews; interviews with teen stars. Tweens favor sites and informat content that they can talk about with their peers; they employ the net for information gathering, to fulfill school-based assignments, and to bypass what they commonly see as laborious library research. Tweens favor programming that is, to some extent, out-of-the-mainstream or rejected by authority.

Because of their expanded level of capability, games and contests aimed at a tween audience should be of a higher level of difficulty, presenting the challenge and excitement necessary for optimal engagement. Tweens favor games that call upon them to use logic, strategy, and abstract thinking.

There is more of a dichotomy in the way tween males and females use the internet than there commonly is for younger boys and girls. Tween males gravitate to games and activities involving violence, sports, danger, and competition. Tween girls are more interested in activities centering on relationships, looks, and trends.

In keeping with their growing need for independence and exclusivity, tween internet sites need to be responsive to who they are. Tweens do not want to use sites that they know are used by younger children or by their parents and teachers.

SUMMARY AND RECOMMENDATIONS

There are a number of rudimentary things to remember regarding children's likes and dislikes as they pertain to internet capabilities and use. Kids like things that

- are new and different
- they can learn from
- they can relate to
- they can use to confront real fears and in some way resolve them
- are well done technically
- that are easy to use
- that are, to some extent, forbidden and/or secret.
- that are, above all, *fun*

In these ways, children are just like adults. We all tend to like things that are enjoyable, new, interesting, that help us achieve our aims, and have a touch of the forbidden.

We must remember that children, like adults, are not all the same. The preceding summary deals with the likes and dislikes of the majority. But there is a minority, too. For every great children's internet site, there are some kids who will hate it; and conversely even troubled sites will likely find an audience.

It is obviously a complex and often difficult task to gear overall sites and individual programs and activities to childhood audiences. In many ways, it may be growing more difficult all the time. All children, even those considered disadvantaged, are becoming more and more sophisticated. They see and hear so much, both entertainment and in the real world. Today's children have an abundance of sites and other activities vying for their attention on a daily basis.

Nevertheless it is important to keep in mind that creating quality sites for young audiences is an important and highly worthwhile task. Studies have shown that unsupervised and prolonged exposure to passive internet activities can be deleterious for children, leading to lowered creativity, motivation, physical strength and endurance, along with a gain in weight. Studies have also shown that well done internet programming has much to offer a young audience--fun, diversion, relaxation, information, and overall education. High quality internet programming gives kids a chance to hone their manipulative skills. It provides them with practice at functioning independently, and working collaboratively with peers, teachers, and parents. It provides academic information and teaches nonacademic skills, and presents positive role models and promotes pro-social behavior. The internet can be an outlet for idle time, a place to exercise one's creativity, and an acceptable source of excitement and challenge. Kids are a ready and eager market for well-produced internet products and programs that best address their preferences and meet their needs.

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