Human Computer Interaction for Kids

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What is a kids?

Piaget (1970) showed that children do not just lack knowledge and experience, but also fundamentally experience and understand the world differently than adults.

It divided into a series of stages, as follows:

◦ Sensori-motor (birth—2 years) ex. Can hold one thing in memory at a time

◦ Pre-operational (ages 2–7)

◦ Concrete operational (ages 7–11) ex. Concrete operational children are old enough to use relatively sophisticated software

◦ Formal operational (ages 11 and up) ex. Designing for this age group is much less challenging

Characteristics of Children That are relevant for HCI

Dexterity (keterampilan)

Speech (berbicara)

Reading (membaca)

Background and Knowledge

Interaction Style

Dexterity

Anak-anak mengalami kesulitan menekan tombol mouse untuk waktu yang lama dan mengalami kesulitan melakukan gerakan menyeret (Strommen 1994).

Anak-anak mungkin memiliki kesulitan mengklik dua kali, dan tangan kecil mereka mungkin memiliki kesulitan menggunakan mouse tiga tombol (Bederson et al. 1996).

Anak-anak kecil tidak dapat membedakan kiri dan kanan, interface untuk anak-anak tidak harus bergantung pada perbedaan itu(Strommen 1998)

Surprisingly, They found that children were faster and more successful with the tangible-based approach (Antle, Droumeva, and Ha 2009) ex. Mobile phone Touch Screen

Speech

Pengenalan suara yang dikembangkan untuk orang dewasa tidak akan bekerja dengan anak-anak yang sangat muda

Mereka bisa menghasilkan teks lebih cepat dan akurat dibandingkan dengan mengetikkan (O'Hare and McTear 1999).

Anak-anak lebih cepat frustasi dalam belajar sesuatu.

Reading

Kata atau Huruf harus dipilih yang berada pada tingkat bacaan yang sesuai untuk populasi sasaran.

Ukuran Huruf dan Angka yang lebih besar umumnya lebih disukai.

Merancang untuk anak-anak yang belum melek huruf dan angka menyajikan tantangan khusus.

Audio, grafik, dan animasi harus menggantikan semua fungsi yang seharusnya dapat dikomunikasikan secara tertulis ard et al. (2001)

Background Knowledge

Dalam merancang sebuah sistem animasi untuk anak-anak, Halgren, Fernandes, dan Thomas (1995) menemukan banyak anak-anak menjadi terbiasa dengan perumpamaan film strip-bingkai berbasis. Hal ini membantu untuk memilih kiasan yang akrab bagi anak-anak, meskipun anak-anak sering memiliki keberhasilan dalam antarmuka berdasarkan metafora asing belajar jika mereka jelas dan konsisten (Schneider 1996).

Interaction Style

Hanna, Risden, dan Alexander (1997) menggunakan suara lucu sebagai pesan kesalahan dan menemukan bahwa anak-anak berulang kali dihasilkan kesalahan untuk mendengar suara.

Halgren dan rekan (1995) menemukan bahwa anak-anak akan klik pada fitur mudah terlihat hanya untuk melihat apa yang akan terjadi, dan mereka mungkin klik berulang kali jika dihasilkan suara atau gerakan dalam umpan balik. Perilaku ini menyebabkan pengguna muda terjebak dalam mode maju mereka tidak mengerti

Mereka memperingatkan terhadap "fungsi merayap" dan menyarankan menghapus features yang canggih jika tidak jelas diperlukan untuk mendukung upaya-upaya kreatif anak-anak.

interaction styles to online environments (cont)

The Nielsen Norman Group found that kids were often unable to distinguish between site content and advertisements

They rarely scrolled down to find content; instead they chose to interact with site elements that were immediately visible

Children were willing to hunt for links in the content by "scrubbing the screen" with the mouse instead of relying solely on visual cues (Gilutz and Nielsen 2002)

Using search on the web presents some unique challenges for children. Example, Druin et al. found that children did not look at the screen while typing their search query, missing out on auto complete features that could help correct spelling or lead them to search results (Druin et al. 2009).

Children also had difficulty constructing queries that required more than one search step

Children with special needs

Visual Impaired Children

Speech and Hearing Impairments

Autistic Children

Learning Impairments

Motor Impairments

Hospitalized Children

Visual Impaired Children

Developing Audio-based learning environments that focus on mathematics and memory (Sanchez and Saenz 2005)

Building a mobile haptic and sound device for learning orientation and mobility skill (Sanchez, Saenz and Ripoll 2009)

Designing toys with both tactile and audio interactions, taking advantage of multiple stimuli (Mc Elligott et al 2004)

Speech and Hearing Impairments

Speech Impairment kids, Detecting the inaccuracies in mispronuciation

Reinforcing the production of sysllabic noises which later language and cognitive development

For Deaf kids, focuses on sign language

Game uses gesture recognition technology

Teaching Temporal reasoning through web system

Speech and Hearing Impairments

For Both, Wizard of Oz techni provides a system of gesture or voice recognition which may have a high error rate in early stages of development which may be frustrating for children who are testing the system.

Autistic Children

Developing a cooperative game that runs on tabletop technology, which was found to be an effective tool for group work with teenagers on the autistic spectrum (Piper et al. 2006).

Mobile application to help autistic kids manage social interactions in situ (Leo and Leroy 2008).

Merryman et al. use virtual peers for autistic children to learn social skills (Merryman et al. 2008).

Putnam and Chong surveyed autistic children and parents and found that designing for the strengths of autistic children would be worthwhile; this includes abilities in math and reading (for children in the 7–10 age range), good memory, and a desire to be social

Learning Impairments

Specifically, for children with Down syndrome, Feng et al. surveyed 600 children with Down syndrome to explore technology use and potential design considerations for this population (Feng et al. 2010).

They found that the children not only had cognitive difficulties such as reading and navigating, but also physical difficulties with controlling input devices, and security and privacy issues such as downloading viruses and releasing information.

Motor Impairments

Technology offers opportunities to interact with their environment differently. EyeDraw, an eye-tracking application, enables children with severe motor impairments to create drawings using their eyes (Hornof and Cavender 2005).

VoiceDraw uses variations in vocal tones to generate free-form drawings (Harada, Wobbrock, and Landay 2007).

Hornof describes a project in which he works with children that have severe motor impairments as design partners to learn how they wish to communicate (Hornof 2008)

Hospitalized Children

Technologies can provide opportunities to socialize and offer support. Tarrin et al. partnered with hospitalized children to create haptic games to be played with other people (Tarrin, Petit, and Chêne 2006).

Others have created robotic companions for hospitalized children to mitigate fear and loneliness (Stiehl et al. 2009).

Virtual environments also offer children opportunities to socialize within hospital settings.

Bers describes an online environment where children undergoing dialysis are able to explore their identity and socialize online (Bers, Gonzalez-Heydrich, and DeMaso 2001).

Children and Design Process

Video including camera

Methods for Designing and Testing with Kids

As users, children interact with existing technologies and have no direct impact on the design of the technology, except in the form of recommendations for future designs.

As testers, children are asked to provide feedback about technology in development so that it can be refined before it is released; however, the goals of the technology itself are determined much earlier by adult designers

As informants, children play an earlier, more active role in determining the goals and features of new technologies

GENRES OF TECHNOLOGY FOR KIDS

Entertainment

◦ use of computer game leads to skills that later give kids advantages at school and work. Through extensive interviews with girls in their target age range, Purple Moon was able to create successful characters and game designs. However, the process was so time consuming and expensive that the company failed to achieve profitability fast enough to please its investors.

◦ Trying to be fashionable can result in products that are quickly perceived by kids as outdated. They also point out that "fun" is just as important to measure as usability, that measurements of fun should be shared with development teams and, moreover, that the product should grow with users over time and continue to be fun long after kids have learned to use it

GENRES OF TECHNOLOGY FOR KIDS

Educations

Needs analysis
- For learners
- For teachers

Select pedagogy

Select media/technology

Prototype
- Core application
- Supporting curricula
- Assessment strategies

Formative evaluation
- Usability
- Learning outcomes

Iterative design

Summative evaluation
- Usability
- Learning outcomes

As in any HCI research,

Educational technology designers use formative evaluation to informally understand what needs improvement in their learning environment, and guide the process of iterative design.

Formative evaluation must pay attention first to usability, and second to learning outcomes. If students cannot use the learning hardware or software, they certainly will not learn through its use. Once it is clear that usability has met a minimum threshold, designers then need to evaluate whether learning outcomes are being met. After formative evaluation and iterative design are complete, a final summative evaluation serves to document the effectiveness of the design and justify its use by learners and teachers. Summative evaluation must similarly pay attention to both usability and learning outcomes.

Genresof Educational Technology

In 1980, Taylor divided educational technology into three genres:

Computer as tutor

Computer as tool

Computer as tutee

As a Tutor

Often referred to as "drill and practice" or "computer-aided instruction" (CAI), this approach is grounded in behaviorism. Children are presented with information and then quizzed on their knowledge.

As a tool

The learner directs the learning process, rather than being directed by the computer. This approach is grounded in constructivism, which sees learning as an active process of constructing knowledge through experience

As a student

Typically, the learner uses construction kits to help reflect upon what he or she learned through the process of creation. This approach is grounded in constructivism and constructionism.

Summaries

To design for kids, we must have a model of what kids are and what we would like them to become.