ACCESSING THE LONG TAIL FOR LEARNING: CALL FOR AN ECOLOGICAL & DEVELOPMENTAL PERSPECTIVE

Brigid Barron
School of Education at Stanford, CA 94305
CSCL • Rhodes, Greece
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QUESTIONS

1. How are long tail niches for learning resources accessed?

2. What equity issues do we need to consider?

3. What are the implications for CSCL research & design?
Broader Research Context
Strong skills in English, mathematics, technology and science, as well as literature, history, and the arts will be essential for many; beyond this, candidates will have to be comfortable with ideas and abstractions, good at both analysis and synthesis, creative and innovative, self-disciplined and well organized, able to learn very quickly and work well as a member of a team and have the flexibility to adapt quickly to frequent changes in the labor market as the shifts in the economy become ever faster and more dramatic.”

NSF-commissioned NAE report (2004): “Assessing the capacity of the U.S. engineering research enterprise” (http://tinyurl.com/35u3ep)

WHAT’S NEEDED - 21ST CENTURY EXPERTISE

...Leadership in innovation is essential to U. S. prosperity and security. In a global, knowledge-driven economy, technological innovation, the transformation of new knowledge into products, processes, and services, is critical to competitiveness, long-term productivity growth, and the generation of wealth. U. S. leadership in technological innovation seems certain to be seriously eroded unless current trends are reversed.”

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Guest Editorial

Preparing People for Rapidly Changing Environments

JOHN BRANDSFORD
University of Washington

II. ARE WE HELPING PEOPLE BECOME ADAPTIVE?
While no term is perfect, the term **fluency** captures best for the committee connotations of the ability to reformulate knowledge, express oneself creatively and appropriately, and to produce and generate information (rather than simply comprehend it). It entails a process of lifelong learning in which individuals continually apply what they know to adapt to change and acquire more knowledge to be more effective at applying technology to their work and personal lives.
Broader Driving Questions

- What practices support the development of sustained engagement in computing based production activities?

- How do interests ebb and flow, evolve, and diversify?

- What goals for creation do we see and how are these intentions supported, recruited, taken up (or not)?
WORKING FRAMEWORK
Learning Ecology Framework

- Unit of analysis is person and multiple life spaces
- A learning ecology is dynamic
- Subject to interventions
- Activities, ideas are more or less boundary crossing
- Influences: Lewin, Bronfenbrenner, Cole, Engeström, Lave, Greeno, Rogoff, Saxe, Vygotsky)

Accessed set of contexts, comprised of configurations of activities, material resources, and relationships that are found in co-located physical or virtual spaces that provide opportunities for learning.

(Source: B. Barron, 2004; 2006)
BROADENING OUR EMPIRICAL SCOPE FOR INVESTIGATING LEARNING

1) From shorter to longer scales of time

2) From single to multiple settings

3) From a knowledge-centered focus to a knowledge + interest + meaning + affect + practices + learning relationships focus
STRATEGIES FOR RESEARCH

- Longitudinal designs, retrospective & prospective, design experiments and found settings

- Sampling of more and less intentionally designed ecologies that support production

- Sampling of communities that vary in technical immersion and knowledge network

- Fieldwork, case studies, quantitative comparisons
CASE IDENTIFICATION & INTERVIEWS

Experience Survey

High level of prior experience?

Learning Ecology Interview

Sustain project on their own time?

Case selection

Parent Interview

Artifact Based Interview
# Self Report Prior Experience

How often have you done the following 16 computer related activities?

- never
- once or twice
- 3 to 6 times
- more than 6 times

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Multimedia</td>
<td></td>
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<tr>
<td>Produced a publication</td>
<td></td>
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<tr>
<td>Created a website with program</td>
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<tr>
<td>Created website with HTML</td>
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<tr>
<td>Published a website</td>
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<tr>
<td>Made an animation</td>
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<tr>
<td>Made a digital movie</td>
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<tr>
<td>Used CAD to make a model</td>
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<tr>
<td>Built a robot</td>
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<tr>
<td>Made a database</td>
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<tr>
<td>Created a game</td>
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<tr>
<td>Created music</td>
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<tr>
<td>Did a simulation</td>
<td></td>
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<tr>
<td>Created a piece of art</td>
<td></td>
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<tr>
<td>Started discussion group</td>
<td></td>
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<tr>
<td>Written programming code</td>
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Web hosting business, Chat-bot business: ●●● online programming courses, books, robotics club ●●● 7 years of activity

Robotics, Grow with me kit, consultant; Science Fair design project ●●● online course, job with company, robotics club ●●● 8 years

Robotics, web design work, DVD business ●●● Summer camp, school courses, online course, church ●●● 5 years of activity

Playing Halo; spaceship animations using Flash, digital art ●●● 2 courses ●●● 6 years of activity

Photoshop art, games, movies, scripts●●●webdesign class●●● 5 years of activity

Programming, music videos, short movies, blogs ●●● Web design, programming, video classes 1.5 years of activity

Robotics, digital art, blogs, video editing ●●● Web design class, programming class, girl-tech club ●●● 2 years of activity

Blog, learning C++, graphics design tool POV-Ray ●●● programming class, online learning community●●● 1 year of activity
CASE 1: LAYLA
• At the time of the interview, Layla was a 13 year old middle school student attending the seventh grade in a public school in California.

• She lives with her father an engineer, her mother in the legal field, and her younger brother.

• She shares the family computer located in the home office.
In grade 6 Layla joined the math team, as a result of dropping by her school’s math club.

Her mother helped her find an online community the “Art of problem solving.com)

Within this online site she got to know other members, started a blog, deepened her commitment to mathematics and developed an interest in programming.

She found a free tutorial on the Internet about C++ for an introduction

At school she enrolled in programming, industrial technology, and web design.

It’s made me more interested in math than before I went on the site, just everybody talking about and panicking about whether they qualified for the next contest, that made me want to, that made me feel excited with them and stuff.
Um, well it’s like not organized like school or anything is, and it depends on how lucky you are. Yeah, how much you learn depends on how lucky you are to be around when somebody’s talking about something you want to learn about. It’s not like a specific class on X topic. It’s like a lot of different topics, so you learn a wide range of stuff I guess.
INSIGHTS ILLUSTRATED BY LAYLA’S LEARNING STORY

1) Latent interest sparked by the casual exploration of a math club, formal testing led to her join the team.

2) An online community (identified with the help of her mother) deepened her exploration, commitment and identity as a mathematical competitor.

3) Informal interaction with the online community led to a new interest in computer programming, identification of a tutorial online, and eventually the pursuit of courses in school.

4) While she recognizes value in this online community she also notes the “luck” involved in learning through lurking.
CASE EXAMPLE 2: CALEB
Caleb was an 8th grader attending the same school as Layla.

- He was an only child, father a programmer – mother also in the tech business
- Multiple computers at home: “Do you want me to count?”
- He was considered an expert at school, at home, and was employed in a computing company
• At age 6 Caleb began building analog models with his father. Next they bought simple kits online like HyperPeppy and more complex kits from Robotix all designed to create artifacts with movable parts, motors, and sensors that responded to sound and contact.

• At age 9 they played with LEGO MindStorms—he used Internet resources to learn how to reprogram it.

• When Caleb developed more interest in making his own creations, his father taught him C and Basic programming languages and he took a course at a camp.

• At 11 he started a grow with me robotics kit to teach computing to his peers.

• He worked for the company of a neighbor ON technical teams.

• At 12 He helped mentor his school’s robotics team.

• Participates in SourceForge, an online community which claims to be the world’s largest development and download repository of open source code.

I get information from wherever I can. If it’s not from a book, then I go to the Internet. If it’s not on the Internet, I ask someone. If I can’t find someone to ask, then I…systematically go down the list until I’ve found what I need. Where it comes from is insignificant. For me.
INSIGHTS ILLUSTRATED BY CALEB’S LEARNING STORY

1) Interests in building analog and computational objects nurtured early and often by his father.

2) Although his father was a major learning partner his broader social learning network included teachers as school, and neighbors who were experts in computing. He read extensively online, magazine, and sometimes text books.

3) Because of this unique environment at home he quickly surpassed school/camp offerings of formal courses and felt he learned most from classes where he could explore his own directions.

4) In addition to becoming more expert through informal activities he was being positioned, socialized, and recognized as a contributor to innovation and had relatively sophisticated perspectives on computing field.
SUMMARY & CONCLUSIONS

- Both Layla and Caleb benefited from the long-tail of learning resources.

- However, their access to these resources were the result of the support of a network of learning partners looking out for the interests and well being of these learners, over time and setting.

- Their unique learning outcomes need to be understood as the result of the assembling and coordination of resources, learning relationships.

- Though these two learners seemed to develop an awareness of how to find resources when needed, the development of such resourcefulness can’t be assumed.
COMMON PATTERNS ARISING FROM OUR BROADER SET OF CASES --> CONJECTURES

1. Interest led learners to choose, create, and seek out learning opportunities.

2. Interest driven activities were likely to be boundary crossing, that is move across settings of home, school, work, community, and online.

3. As learning opportunities expanded they increasingly became connected to a sense of present and possible future selves.

4. Learning opportunities dynamically developed, for example expertise was often taken up by others which resulted in new learning opportunities.
NEXT STEPS FOR LONGTAIL LEARNING RESEARCH

- Equity issues, how does one become resourceful?

- Learning brokers, what can we learn about who they are, what they do, and how we can nurture more of them in informal and formal organizations.

- The CSCL community can contribute to the design of research based resources and mechanisms.
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THANK YOU

PAPERS ON REQUEST


  Youthlab@stanford.edu