How We Learn
(Technology Across the Lifespan)

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HWL Pop Quiz

Please Raise Your hand if you agree with the statement

- When people give a luncheon talk I really pay attention.
- When I'm learning, I pay partial attention, so I can be aware of other things coming up—my phone, mp3 player, Blackberry, other people, and so on.
- The way I currently use technology improves my learning and quality of life.
- My learning and quality of life are often compromised by technology.
- Technology sets me free.
- Technology enslaves me.

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HWL Interview

- In your view, what is learning?
- How do you learn?
- Think of something you recently learned and tell me how you learned it?
- How do you learn technology?
- Is there a general approach you take when you learn a specific technology?

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How We Learn

(Technology Across the Lifespan)

- 3 year+ Longitudinal Study
- SSHRC Funded $181k
- Canada Foundation for Innovation (CFI)funded $200k
- Five Graduate Students (Lauren Hall, Kedrick James, Dai Kojima, PJ Rusnak, Lana Trey)
- postdoc (Franc Feng)
- Six faculty members
- six cohorts of 6-10 participant subjects
  - Age group cohorts
  - intergenerational learning

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How We Learn
(Technology Across the Lifespan)

RESEARCH QUESTIONS

- How do pre-school (3-6 yrs) and adolescent (7-12 yrs) children learn to use or play with robotic and other electronic pets and toys?

- How do teens (13-18 yrs) learn to accommodate new digital devices into everyday routines of play, study and work?

- How do young adults (19-40 yrs) and middle years adults (41-65) learn to accommodate new technologies in work routines?

- How do older adults (66-85) learn to adopt new technologies into their health and entertainment regimens?

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How We Learn
(Technology Across the Lifespan)

Phases of research

- Phase I: concept & Review of research
- phase II: field-based ethnographic
  - Meta-learning
  - how we learn technology
- phase III: lab-based experimental
  - intergenerational learning
  - attention & properties of new technologies
- phase IV: design-based Research (DBR)

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How We Learn
(phase II : meta-learning)

Interview Questions (1 hour) (Phase II)

- **First Set (Introductory)**
  - What is learning?
  - How do you learn?
  - Can you think of something you recently learned and tell me how you learned it?
  - Can you give some examples of methods of learning that you have experienced?
  - What motivates or excites you to learn?
- **Second Set (Sources of Learning)**
- **Third Set (What & Where is Learning)**
- **Fourth Set (Tricks, Charms, Meta-Learning)**

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How We Learn

(phase II : meta-learning)

"Meg" is an 8 year-old Caucasian girl, attending grade 3 in Vancouver, BC.

"Daniel" is a 7 year-old Caucasian boy, attending grade 2 in Vancouver, BC.

[M] Meg
[D] Daniel
[I] Interviewer

I: What do you think that learning is? What does it mean to learn?
M: Going to boring school.
D: um (pause) Trying out new things.

I: So, how do you learn?
M: They teach you.
D: By thinking.

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How We Learn

(phase II : meta-learning)

I: Do you think that learning takes place outside of school?
M: Sometimes (pause) if you are learning to play basketball. You might play basketball at recess or something.
D: hmmm (pause) That's at school really.

I: What kinds of learning takes place that is not at school?
D: Learning to swim.
M: Learning how to (pause) make clothes, I guess.
D: Learning how to talk.

I: Meg, do you think that you can learn?
M: (confidently) Yes, everybody can learn.

I: Why do you think that everybody can learn?
M: Well, except animals, and lights, and computers and furniture.
D: And inanimate things.
M: Things that are alive.
D: Animals, amphibians and technology can't learn.
M: Animals can learn.
D: Well, only one type of animal can learn.
M: No, lots of animals. Lots of kinds.
D: Only one of them can learn math, ok.
M: Yeah, only one.

I: Which type of animal can learn math?
D: It's (pause) the kind of animal that knows how to use a computer, and sleeps in a bed, and sits on a couch and watches tv.
M: A dog.
D: That's not a dog.

How We Learn

(phase II : meta-learning)

I: Do you know of any tricks that can help you to learn?
D: Counting on your fingers for math.
M: One of our teachers (pause) at my old school, our principal, he was testing the teachers with really, really hard questions that they didn't teach the students, and so in front of the whole school, and then (pause) the teacher is like ok, no counting on your fingers or on your bum cheeks. I don't see how he could count like that though (laughs). Maybe just like (pause) one-two, one-two.

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How We Learn
(phase II : meta-learning)

"Clara" is a 22 year-old Chinese-Canadian female studying microbiology.

[C] Clara
[I] Interviewer

I: In your view what is learning?
C: It is learning about the world, getting information, improving yourself through whatever information you are getting.

I: How do you learn?
C: I learn best by doing hands-on stuff. By actually performing the task and practicing it. That's how I learn. I also learn best when I try to find out information for my own interest, not information where people just ask you to memorize. When I am actively seeking out the information, that is when I am learning the best.

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How We Learn
(phase II : meta-learning)

"Clara" is a 22 year-old Chinese-Canadian female studying microbiology.

[C] Clara
[I] Interviewer

I: Do you know of any tricks that people use for learning?
C: Yeah, like pneumonics.... Another girl was saying that, I'm not quite sure if she has research basis on this, but she is saying that, perhaps smelling something while you are studying and when you go to write a test and smelling the same smell might trigger this memory. So, the same type of situation you are put in will make you remember more. Or associate the situation to the previous situation and the information from that situation can then be applied to this.

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How We Learn

(phase II : meta-learning)

"Scott" is a 29 years old male from the East Coast of the US. He identifies himself as Caucasian. He has a professional bachelor's degree in Architecture and currently works as an intern architect at a firm in Vancouver.

[S] Scott
[I] Interviewer

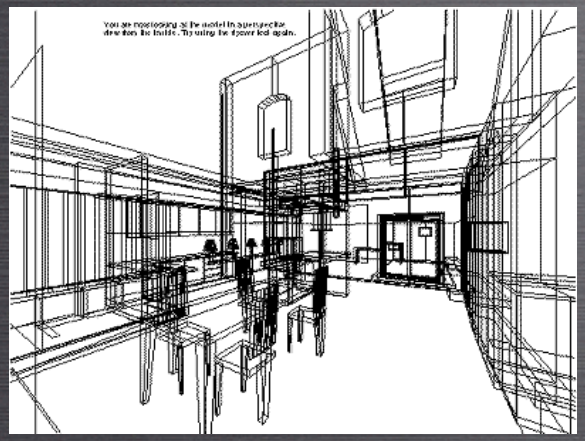
I: What motivates you or excites you to learn?

S: Um, if it has to do with something I'm naturally interested in, that's the single biggest motivator for me. Um, sometimes I know I have to learn things that I'm motivated to do so even though I'm not interested in. I'm motivated to do so because it's part of my job, and I know that there'll be negative consequences if I don't learn those things.

I: Can you tell me more about that?

S: I was gonna add that also the fear of being left behind, being the only one who doesn't know certain things. Yeah… can I tell you more?...Well, like, so at work using software, using a CAD software, there are sometimes lots of ways to do different things and you can save a lot of time if you learn certain ways to do certain things. And sometimes, by accident, you come across someone doing something with the CAD software, and they are doing it a faster and more effective way than you previously knew, and that sometimes happens at work. And I learn new things accidentally. But, for example, a lot of people are beginning to use 3D applications of CAD software that I'm unfamiliar with, and it seems like more and more people are learning them at work and using them recently, so I'm motivated to learn those, I think more because I'm afraid of (chuckle) being left behind. Partly I'm interested in learning those things, but I think the primary motivator is that I'll be the only one who doesn't know how to use them.

How We Learn
(phase II : meta-learning)



"Raymond" is a 33 years old Canadian male who identifies himself an East European descent. He has a professional bachelor's degree in Architecture and works as an intern architect at a firm in downtown Vancouver.

[R] Raymond
[I] Interviewer

I: Can you think of something you recently learned, and tell me how you learned it?

R: ... the other day there was this computer program used at work and there are functions on it that I didn't, that I never used before and never thought how to use, but on somebody else's computer we also use the same program in the project team. When that, um when he started having problems, I, we had to kinda learn about what this function was, and then kind of, I don't know, switch it or change it to suit the new computer on the project with which this guy was having problems.

I: Do you mind telling me what kind of program that is?

R: The program is VectorWorks..

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How We Learn
(phase II : meta-learning)

"Mila" is a 64 years old Russian immigrant to Canada.

[M] Mila
[I] Interviewer

I: Also, can you describe how you learn?

M: I find it useful when an English teacher describes a topic, then the teacher gives exercises for practicing and I with other students can try speaking new words. Another example, when I was learning to use computer, I, first, with a help of a teacher, wrote instructional steps of how to use computer. Then, with teacher guidance I followed those written instructions. Then, without a teacher I followed those written instructions. Finally, I practiced using computer without written help or a teacher. When learning computer, my success and my mistakes helped me. When learning English, my success helped me better, mistakes impeded in learning process. However, when I learn computer, my success and mistakes equally helped me, they created my experience.

How We Learn
(phase II : meta-learning)

Sophia is a 74 year old women who has lived in Canada for most of her life. She has several university undergraduate level degrees including a BFA degree from The Ontario College of Art. She has been an artist for most of her life.

[S] Sophia
[I] Interviewer

I: What is learning?

S: Let me see. Learning would be encountering new situations where you have no information or you have no skill, and suddenly having to reach for something that will be in line with what you are reaching to. Like the adage, “reach should recede your grasp or what is heaven for.” So caught in a sense a void of assets by which to understand which airplane to take or which direction to take. And then through chance, through accident, through whatever means, the person encounters a situation where they get information that becomes a source, so it’s a matter of stumbling upon it in some ways where it’s a given or packaged. And therefore is able to make judgments or make decisions or choices. Or maybe it’s the decision or choices out of which judgment might flow, if it comes to judgments.

How We Learn
(phase II : meta-learning)

Dexter is an 83 year old man who has lived in Canada for most of his life. He is a retired philosophy professor who has also taught at several high schools in Alberta. He is interested in music, film, literature, and photography.

[D] Dexter
[I] Interviewer

I: Would you say that learning requires a conscious acquisition of skill or knowledge? Is it a necessity for something to be learned it must become conscious?

D: ... I was just thinking of trying to apply the questions of learning, consciousness and so on. With regard to some of my experience with a camera and one that I have in mind for example, one of my all time favorite photographs was from photographing in the night, the fireworks exhibition, and this was Sweden's night. I merely was taking night photographs of this and one of the outcomes was one of my all time favorite photographs from an aesthetic point of view of interest. So one might ask well, someone might look at my photograph and ask me, well how did you do that? There are all sorts of answers one might give: did I use editing with a Photosuite, what did I do to capture this, or did I edit it in some way.

How We Learn
(Technology Across the Lifespan)

Key Findings from the Review of Literature

•To ask the question 'how do we learn'? is to ask the question 'how do we learn ***about***, ***through*** and ***for*** technology across the lifespan'? However, technological change seems too culturally specific and fierce— too intense— to conclude that learning is developmental.

Table 1. Taxonomy of Technological Literacy (Adapted from Todd, 1991)

Levels	Types of Knowledge	Action
Technological Perception	Knowing What	Attention
Technological Expression	Knowing What and That	Expression
Technological Capability	Knowing What, That and How	Application
Technological Ingenuity	Knowing What, That, How, When and Why	Invention
Technological Sensibility	Knowing What, That, How, When, Why and Why not	Judgment

Petrina, S., Feng, F. & Kim, J. (2008). Researching cognition and technology: How we learn across the lifespan. *International Journal of Technology and Design Education*. *18*(2), 1-22.

How We Learn
(Technology Across the Lifespan)

Key Findings from the Review of Literature

- By asking the question 'how do we learn technology across the lifespan'? we connect researchers across a broad range of disciplines. With this question, research into children and technology is reconciled with research into gerontechnology. The question 'How do we become technologically literate'? becomes 'How do children, adolescents, teens, adults and older adults learn technology'?

•Young children readily identify tangible objects as technology and while they tend to commonly associate technology with computers, they also recognize that buildings, machines and vehicles are technology. Conceptions of technology grow more sophisticated with the number of examples of technology that children express through, or communicate with, images, text and words. Different ideas about technology (e.g., bus, computer, house, tool) are evidence of sophistication.

•We can safely assume that the perception of adolescents and teens is already tuned to technological processes and products, and through its everyday use, a basic language of design and technology is expressed. If prior to any formal school experiences, students considered technology to be 'computers and electrical stuff' or basically things, in middle school 'it's not just computers… it's designing and making stuff'.

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How We Learn
(Technology Across the Lifespan)

Key Findings from the Review of Literature

•Learning at work is contradictory, increasing demands on employees for both expression and capability, and occupying time both on and off the job. Facing the digital transformation of the printing industry, one employee commented: 'The faster we learn, the better we learn, the better our chances are with the company. Because we are afraid to be left behind in the dust' (Lewis, 1997, p. 20).

•Older adults connect the process of learning about and through technology with a healthy mind and body— with youth— active aging and the use it or lose syndrome They are not merely interested in learning about digital technologies inasmuch as they are interested in learning about a wide range of assistive and health technologies. Their orientation to learning and knowledge is less about information than it is about wisdom; less about technological expression and capability than about sensibility.

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How We Learn
(Technology Across the Lifespan)

Key Questions for Us

- What does it mean to learn and be literate in a new age of technology?
- What counts for adequate expression, capability or sensibility in this new age?
- What counts for wisdom with regards to technology?
- What makes for a healthy relationship with our environment or with technology?
- How do we age (gracefully and with dignity) in this new age?

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Six Trends For Us

1. Rise of the Learning Sciences over the past fifteen years
2. From instruction to the "Process of Learning" and Meta-Learning
3. From User-Centered Design to Learning-Centered Design
4. From Educational Technology to Learning Technology
5. From Technology Education to STEM and TIDE to How We Learn (Technology Across the Lifespan)
6. From the curriculum of technological literacy to how we become technologically literate across the lifespan

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Thank You Very Much!

The Study of Technology
is a Profoundly Rewarding Endeavor.