The Internet of Education: What role for Education Research?

Richard Noss
London Knowledge Lab | Institute of Education
University of London
What do you think of western civilisation?
What do you think of western civilisation?

I think it would be a good idea!
What do you think of western civilisation?

I think it would be a good idea!

What do you think of technology in education?
Seymour Papert’s contribution
The purpose of this essay is to present a grander vision of an educational system in which technology is used not in the form of machines for processing children but as something the child himself will earn to manipulate, to extend, to apply to projects, thereby gaining a greater and more articulate mastery of the world, a sense of the power of applied knowledge and a self-confidently realistic image of himself as an intellectual agent.
Programming

Lisp
Logo
Imagine
NetLogo
Scratch…
• constructionism
• people learn best by making things and sharing them
• people learn best by making things and sharing them
• people learn well if they care about what they’re learning
• people learn best by making things and sharing them
• people learn well if they care about what they’re learning
• let’s not only make new ways to learn, let’s make new things for learning
• people learn best by making things and sharing them
[Kahn] takes a dim view of the constructionist idea that students won’t really understand math unless they discover each principle on their own. “Isaac Newton would not have invented calculus had he not had textbooks on algebra.”
• [Kahn] takes a dim view of the constructionist idea that students won’t really understand math unless they discover each principle on their own. “Isaac Newton would not have invented calculus had he not had textbooks on algebra.”

• Bill Gates is even more scathing: “It’s bullshit,” he says. “If you can’t do multiplication, then tell me, what is your contribution to society going to be?”
technology
technology

- as an informational medium
technology

- as an informational medium
- as a constructional medium
technology

- as an informational medium
- as a constructional medium
- ICT (ugh)
• people learn well if they care about what they’re learning
the knowledge that powers the world is less and less visible
systems are read-only
• let’s not only make new ways to learn, let’s make new things for learning
CXXXVII \times IV
CXXXVII × IV

build new representations for existing knowledge
education must **NOT** be read-only
“We were seeing things that were 25-standard deviation moves, **several days in a row**” said GS’s chief financial officer, 2007.
The expected waiting time for this event, 25 s.d., is $6 \times 10^{124}$ life of the universe
The expected waiting time for this event, 25 s.d., is $6 \times 10^{124}$ life of the universe

3 days in a row!
‘new trends’

• MOOCs ++, higher education policies, computer human interaction, machine learning, user analytics, automatic assessment, visualization
Description
This is the best integer practice app or program I have found in 34 years of teaching math. – Tim Seiber, Math Teacher

palawere Web Site  MathBoard Support  ...More

What's New in Version 1.5
- Added landscape support.
- Added support for left handed students.

iPad Screenshots

Customer Ratings
Current Version:
**** 16 Ratings
All Versions:
**** 195 Ratings

More iPad Apps by palawere

View In iTunes
$4.99
Category: Education
Updated: Jan 31, 2011
Current Version: 1.5
Size: 3.9 MB
Languages: English, Dutch, French, German, Japanese, Portuguese
Seller: Paul Schmitt
Copyright ©2010-11 palassoftware Inc. All rights reserved.
Rated 4+
Requirements: Compatible with iPad. Requires iOS 3.2 or later
TECHNOLOGY ENHANCED LEARNING RESEARCH PROGRAMME (2007-13)

tel.ac.uk
1 Connect

Exploit the power of personal devices to enhance learning.
2 Share

Catch the wave of social networking to share ideas and learn together.
7 Engage

Go beyond the keyboard and mouse to learn through movement and gesture.
10 Know

Employ tools to help learners make sense of the information overload.
8 Streamline

Enhance teachers’ productivity with new tools for designing teaching and learning.
"Learning Designer puts teachers in the driving seat. It’s a power tool for them just like computer-aided design is for architects. We want teachers to be able to play with lesson planning, to be creative. And we want to capture their pedagogy, to give them the chance to share their good ideas."

Professor Diana Laurillard, director of Learning Designer project.
9 Include

Empower the digitally and socially excluded to learn with technology.
Echoes has a massive impact on children with autism. It enables them to communicate and succeed without any barriers or feeling constrained by everyday teaching. They are free to explore, learn and develop by themselves, which is absolutely fascinating to see.

Ian Lowe, Headteacher, Topcliffe Primary School
11 Compute

Understand how computers think, to help learners shape the world around them.
some ideas are unlearnable, because of the way they are represented
Let us consider a Taylor expansion of $\psi(v^*)$ around $v'$. Thanks to (23), we get

$$\psi(v^*) = \psi(v') + \gamma a(|x - y|)\nabla \psi(v') \cdot (q \cdot n)n + \frac{1}{2} \gamma^2 a(|x - y|)^2 \sum_{i,j} \frac{\partial^2 \psi(v')}{\partial v'_i \partial v'_j} (q \cdot n)^2 n_i n_j + \ldots$$  \hspace{1cm} (24)$$

If the interactions are nearly elastic, so that $\gamma << 1$, we can truncate the expansion (24) after the first-order term. Inserting (24) into (21) gives

$$\langle \psi, \tilde{Q}_P(f, f) \rangle \approx \frac{1}{\epsilon} \int_{\mathbb{R}^3} \int_{\mathbb{R}^3} \int_{\mathbb{R}^3} B(|x - y|)(\psi(v') - \psi(v) + \gamma \nabla \psi(v') \cdot a(|x - y|)(q \cdot n)n) f(x, v)f(y, w) dv \, dw \, dy$$
$$= \langle \psi, \mathcal{D}_P(f, f) \rangle + \gamma \langle \psi, \mathcal{I}(f, f) \rangle.$$  \hspace{1cm} (25)$$

It is a simple matter to recognize that in (25) $\mathcal{D}_P(f, f)$ is a Povzner collision operator of the type (5), since the post-interaction velocity $v'$ in (25) is obtained from the pre-interaction velocities $(v, w)$ through the elastic interaction (21).
2 CHALLENGES

1. building learning technologies
2 CHALLENGES

1. building learning technologies

2. building learnable curricula
learning the learnable