Educational machines and how they work AU Research Webinar Series

Jon Dron, 4th June 2020



Technology Enhanced Knowledge Research Institute (TEKRI)





How could this be used for learning and teaching?

The stick becomes a technology when we add methods (and maybe other stuff)

The same is true of all technologies.

Stupid question: does the use of screws in classrooms improve learning?

Similarly stupid question: does the use of computers in classrooms improve learning?

Equally stupid question: does the use of <insert preferred teaching method here> in classrooms improve learning?

Technology: The ways we organize stuff to do stuff

More formally, an orchestration of phenomena to our use (W.Brian Arthur)

The product of the state of the



Any stuff.



X

123

hulududud







A noun and a verb

- I am using writing to write something written
 - Painters paint paintings
 - Production lines produce productions
 - **Teaching methods teach**

All technologies are assemblies



Almost all technologies are assemblies of *other* technologies

Pedagogies (methods of teaching) are technologies too

(and always parts of other assemblies)



Tell me and I forget, teach me and I may remember,

involve me and I learn. Franklin

> Criticize the work, not the student

The compliment sandwich



Concrete experience

Active experimentation



Abstract conceptualization

Reflective observation

Kolb/Lewin

and faculty

among students

- 3. Encourage active learning
- 4. Give prompt feedback
- 5. Emphasize time on task

learning

Chickering and Gamson

Machines in our minds

Don't punish or reward Kohn

- 1. Gaining attention
- 2. Informing participants of objectives
 - 3. Stimulating recall of prior learning
 - 4. Presenting the content
 - 5. Providing learning guidance
 - 6. Eliciting performance
 - 7. Providing feedback
 - 8. Assessing performance
 - 9. Enhancing retention and transfer Gagne

Tell 'em what you are going to tell 'em, tell 'em, tell 'em what you told 'em

1. Encourage contact between students

2. Develop reciprocity and cooperation

6. Communicate high expectations

7. Respect diverse talents and ways of



Learning technology

/'lərniNG//tek'näləjē/

noun and verb

of its assembly

A technology which includes one or more pedagogies as part

We don't just use technologies.

We participate in them.



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We are active orchestrators of phenomena



 (\mathbf{I})

Hard participation



Our participation is predetermined







technologies are complete. We can use them correctly



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Softness is an absence.

We can use soft technologies well

Nearly all technologies are assemblies of soft and hard.



Image by Jules Feiffer, from The Phantom Tollbooth, by Norton Juster

depend upon your point of view.

It's the assembly that matters.



You can add methods/tools to hard technologies to make them softer



Richard Dean Anderson as MacGyver

You can add constraints/rules to soft technologies to make them harder



1

Harder pedagogies

1894

- "I believe it is not possible for
- common popular instruction to
- advance a step, so long as
- formulas of instruction are not
- found which make the
- teacher...merely the mechanical
- tool of a method."

https://openlibrary.org/books/OL7244777M/How_Gertrude_teaches_her_children



2010

Script for Day: 053 TITLE: Reading and enjoying literature/ words with "b" TEXT: The Bath LECTURE: Assemble students on the rug or reading area. . . . Give students a warning about the dangers of hot water. . . . Say, "Listen very" quietly as I read the story." . . . Say, "Think of other pictures that make the same sound as the sound bath begins with."

Schwartz, B. (2015). Why We Work. Simon & Schuster/ TED.



Softer pedagogies



https://flic.kr/p/Er4hEx

https://flic.kr/p/iRBaxm



All pedagogies are at least a bit soft (to the teacher)

Designated teachers are not the only teachers

But...



We don't just *participate* in learning technologies.



We co-participate.

Not just designated teachers...

Textbook authors

Graphic designers

Institutional regulators

Application developers

Tech support staff

Curriculum designers

Learning designers

Editors

Course/program boards

Administrators

Other students

above all, the learners themselves









Learning is not entailed by teaching methods

Learning can at best be enabled by teaching methods

Kauffman, S. A. (2019). A World Beyond Physics: The Emergence and Evolution of Life. Oxford University Press.



'Bad' teaching works better (on average) than 'good' teaching

De Bruyckere, P., Kirschner, P. A., & Hulshof, C. D. (2015). Urban myths about learning and education. Academic Press. Hattie, J. (2013). Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement. Taylor & Francis.

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No teacher at all - not (necessarily) a problem

https://flic.kr/p/7GFSFA

The two sigma problem

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Home My home		The Student Success Centre is here for you.
Site pages	Welcome to COMP 266	How We Can Help
My profile	welcome to COMP 200	Using the Request System
 Current course COMP266 R3 	Computer Science 266: Introduction to Web Programming is designed to teach beginners how to program for the Web in HTMI	Make a Request
 Participants Activities 	and JavaScript.	AU Resources for Students
General Orientation	Before starting, read the Student Manual. It contains general information you need to complete an AU course successfully. If this is user first dispense. Linearity everyon do the Macdie Ociontation	Latest news 🗆 🗉
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 CSS Site Styling Script Use and Augmentation 	If you have any questions, please contact our Student Success Centre.	29 Sep, 16:02 fstweb Mobile Device Battery Performance Survey
 Writing JavaScript Using Libraries Using External Data Sources Course 	Course News and Announcements	15 Dec, 11:13 jodymc FST Student Success Centre Older topics
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 Acknowledgment My courses 	AU's social learning network. You will need to log	The Landing is where all the
Administration 🔲 🕻	COMP 266 group on the landing.	the course and where you should post reflections, seek
Course administration Users AU Course Links Reports	Upload your final portfolio files here.	and give help, explore the FAQs, find and share useful bookmarks, and engage with others on the course.
Grades	Academic Expert) is Mushtaq Ahmad.	Help – c
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My profile settings		CONF 200 Synabus
Site administration	Orientation	Library Help Centre SCIS Virtual Help Desk
	How to complete COMP 266 successfully.	Using APA
	Expected duration: around 5 hours	Using Moodle
	Unit 0: Orientation	News from outside 🗉 🖬
	Vinit 0 Self-test 5 open	Front Page – Ajaxian Scaling up CSS
	Site design	Mobile Proxies: A New Era Dawns
	Everything you do in the rest of the course is based (1)	Here comes Traversty traversing the DOM
		Failed with code: A feed

No significant difference (on average)



Being-taught habits (AKA learning styles)



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Reductive educational research "Everything works" (Hattie, 2013)

Equally true:

"Nothing works" (Dron, today)

Education is technology Technology is not applied science

Reductive educational research shows that this hard machine worked as intended in this hard assembly



Towards smarter research agendas

How to be a teacher

How to teach (generative, not summative)

Generative research methods

https://appreciativeinguiry.champlain.edu/

https://www.annmurraybrown.com/post/2019/01/21/outcomes-harvesting-a-different-type-of-evaluation-method

- e.g.
- **Appreciative inquiry**
- Outcome harvesting
- **Design-based/action/participative research**

Being a teacher Passion (for the subject, for teaching) **Compassion for learners Reflection and observation**



Thank you

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🧊 @jondron



https://jondron.ca/

Stay healthy!