Building, Making, Thinking: Robots that can help us learn

Dr Joanne Blannin
Course Leader | Master of Teaching
Senior Lecturer in Digital Transformations
Monash University
jo.blannin@monash.edu
Global monitoring of school closures caused by COVID-19

Visualize evolution over time.

31/07/2021

31,453,440 affected learners
1.8% of total enrolled learners
8 country-wide closures

©UNESCO. UN Disclaimers

Note: Figures correspond to number of learners enrolled at pre-primary, primary, lower-secondary, and upper-secondary levels of education [ISCED levels 0 to 3], as well as at tertiary education levels [ISCED levels 5 to 8]. Enrolment figures based on latest UNESCO Institute for Statistics data. See methodological note.
Covid-19 impact: Ed-Tech boom may create more opportunities for women

Teamlease Services alone has seen ed-tech companies post more than 20,000 jobs on the portal in the last three months

COVID-19 reveals need for more strategic approach to technology in education

by Kris Isles, Annabelle Taggart, Kieran Bayles and Sue Noble

Remote business will open up new, unexpected use cases for wearables and mixed realities

The unprecedented working environment created by the pandemic has propelled technologies like augmented reality (AR) forward beyond proofs of concept, opening up new, perhaps less obvious, cases and demonstrating the potential of wearables in driving collaboration amongst remote teams. Smart glasses provide a vehicle for interactive remote communication through document retrieval, workflow instructions and real-time data capture – bringing people face-to-face.

COVID-19 and education: how Australian schools are responding and what happens next

by David Sacks, Kieran Bayles, Annabelle Taggart and Sue Noble

The COVID-19 pandemic has disrupted almost every element of our lives, and the education of our children has been no exception.

How COVID-19 is Shaping Tech Use. What That Means When Schools Reopen

by Kevin Pichette — June 05, 2020

How COVID-19 made edtech a must

Digital learning has a long history, but take-up in schools and colleges has been erratic; the coronavirus may have changed all that.

The Covid-19 Crisis Is A Boost To Educational Technology Companies

LESSONS FROM

Mayra Rodriguez Vallaorees Senior Contributor

Banking & Insurance

With many COVID-19 cases and co-operate to mitigate the effects of the pandemic and maybe even “build back better”.

To support countries in this effort, the Harvard Global Education Innovation Initiative, HundrED, the OECD Directorate for Education and Skills and the World Bank Group Education Global Practice are combining their expertise to provide the countries with information and resources from around the world on the education response to the crisis.

How countries are using edtech (including online learning, radio, television, texting) to support access to remote learning during the COVID-19 pandemic
Schooling in lockdown isn't home schooling - but we can learn from the real thing.

Learning From Home arrangements are now finalised for Week 1.

- Playing games
- Playing outside with a ball or a bike
- Helping around the house
- Playing a game for fun on a screen
- Baking a cake
- Taking some quiet time out
- Listening and telling stories
- Having a conversation
- Singing and dancing
- Playing with your pet
“...the pandemic has recalibrated how teachers divide their time between teaching, engaging with students, and administrative tasks.”
The rise of the robot: Robotics in the modern classroom

Constructivist Digital Literacy
Learning Constructivism

Learning is an active, contextualized process of constructing knowledge based on personal experiences and social environment.

Constructivists like Jean-Jacques Piaget realized that a student’s background, perceptions, and perspective affect his learning in that they are foundations to build upon. Vygotsky argued that we learn and develop through interactions, with language playing a key role.

**Background**
- Environment
- Experience

**Scaffolding**
- Build on prior knowledge
- Allow guided independence

**Social**
- Seek assistance
- Learning is social

**MKO**
- Support
- Guide

**ZPD**
- Challenges
- Push boundaries

**History**
- Piaget
- Vygotsky
- **Methods:**
  - Lecture
  - Drill and Practice
  - Rote learning
  - Multiple choice tests

**Behaviorism**
Learner is passive: learns via external processes i.e. positive reinforcement

**Cognitivism**
Learning goes beyond external: is an internal process - short & long term memory

- **Methods:**
  - Lecture
  - Visual tools: mind maps, charts etc to facilitate memorization for learning
  - Multiple choice & essay assessment

**Constructivism**
Learner builds on personal experience [internal], active & social in the learning process

**Connectivism**
Learner is self-directed learning via nodes [content source, people, groups] within network

- **Methods:**
  - Self-directed quest for content
  - Sharing of content, sources
  - Spontaneous learning groups
  - Creates knowledge collaboratively
What is social constructivism?

"Every function in the child's cultural development appears twice: first, on the social level and, later on, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts."

- Lev Vygotsky

WWW.NAMTBLOG.COM

Zone of Proximal Development
"The Sweet Spot"

The Zone of Proximal Development: Things the child can do with a bit of help (scaffolding), such as when prompted with leading questions, or watching an example setter. This is the space where learning and growth occur.

Things the child can do all on their own.

Things the child just can't do yet, regardless of scaffolding. For instance, advanced mathematics for a five year old.
Constructivist Tools...

Robots

VR

AR

How might these devices be used in a constructivist classroom?
Robots
What about this robot?
The students are able to interact with the robots more on a level that they're feeling comfortable with.
Connect to real-world objects

https://scratch.mit.edu/projects/496202274
What SciFi thinks we will face...
Where science is at the moment...
Note the advertising language on this...

The Perfect Companion Robot to Ease your Life
Created to become the most advanced home companion and assistant robot possible to help and entertain anyone that needs him.

SMART
Buddy learns fast and is very knowable which will help you in your daily tasks.

UPGRADABLE
Thanks to his platform providing new skills & apps, Buddy keeps up with You.

EMOTIONAL
Buddy has a friendly and caring personality that will make you feel good.

MOBILE
Always at the right place at the right time, Buddy navigates and performs tasks in the house.

http://www.bluefrogrobotics.com/robot/
Tell me, I’ll forget
Show me, I’ll remember
Involve me, I’ll understand
Showing mechanisms in 3D is extremely helpful in understanding how a system functions. Image credit: eonreality.
The VR/AR market expected to grow to a $15.9 billion industry by 2020

Perhaps the most utopian application of this technology will be seen in terms of bridging cultures and fostering understanding among students.

Virtual Reality isn’t the real world but instead a simulation that draws the user into the virtual reality.

Augmented Reality is parts of the real world being overlapped so that you are able to use parts of both unlike MR which is mixed reality rather than an overlap.

Mixed Reality uses the technology of the digital world to enable it to coincide with the real world.
Virtual Reality is **not** a future tool, but is already in use in a range of fields:

- Gaming
- Virtual museums
- Virtual theme parks
- Theatre - immersive performances
- History - visit places, ‘visit’ up close, participate in historic events (WW1, Australian settlement, Mabo land rights declaration)
- Military - parachuting, flight simulation, Battle simulation, boot camp, medic training
- Real estate - house tours
- Design - tour architects’ designs, test ideas, explore full size models
- Surgery - virtual practice, interaction with patients, robotic surgery, diagnoses,
- Universities - recruit students with virtual tours
- Emergency management - drone footage and explore inaccessible spaces
- Artists: collaborate, remote creation, large scale installation art pieces
- Fashion - virtual models, 3D views of designs
- Start-ups - explore new products, design, advertising
- Business - remote workers benefit from virtual interactions with colleagues in VR (virtual meetings)
- Sport - bring audience on to the running track or into the pool, design shoes, coach skills, diagnose issues, personal training with a virtual trainer
- Shopping - Combine at-home Internet shopping with visiting items in store (also, soon you’ll be able to ‘touch’ fabrics, hold up items and talk to virtual staff (consider doing this at Bunnings or Toys R Us!)
- Instructional videos - rehearse your repair with an expert before performing it on your own.
- Building - viability checking, simulated construction, testing of build plan (to increase efficiency)
- Computer programming - virtual setting to physically move between algorithms and programs to test code. Next is “post-symbolic” coding that uses drawing as a method of writing program, these can then be manipulated in a VR environment to speed up coding and programming.
- Environment - promote positive environmental practices by visiting locations before/after human impact
- Virtual reality music (played on VR instruments), VR books (walking through the pages) and VR art (view art pieces alongside the artist, in the location that inspired the art)
- MIT - collaborative learning environments, work with other students within the virtual space
Potential:

- Immersive - ‘go’ somewhere else to learn in context
- Engage emotions in learning
- Enhance learning for all students
- Personalise interactions with content
- Bring the real-world into the classroom
- Learn by doing
- Practice before acting (social interactions, science experiments, writing, art)
- Stop smartphone distractions (phones are checked 11 times per lesson)
- Reduce other distractions, improve focus (?)
- Language learning - immersive learning
- Visualisations in the classroom - visit, interact, respond and ‘feel’ new places, ideas or concepts. E.g. sit and listen to Socrates, dive into the Mariana Trench, watch a geologic event
## Consequences for the classroom

There are many consequences for teaching and the classroom if you adhere to constructivist principles. The following chart from the Teaching and Learning Resources wiki compares traditional and constructivist classrooms across several components.

<table>
<thead>
<tr>
<th>Traditional Classroom</th>
<th>Constructivist Classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum begins with the parts of the whole. Emphasizes</td>
<td>Curriculum emphasizes big concepts, beginning with the whole and expanding to include the parts.</td>
</tr>
<tr>
<td>basic skills.</td>
<td></td>
</tr>
<tr>
<td>Strict adherence to fixed curriculum is highly valued.</td>
<td>Pursuit of student questions and interests is valued.</td>
</tr>
<tr>
<td>Materials are primarily textbooks and workbooks.</td>
<td>Materials include primary sources of material and manipulative materials.</td>
</tr>
<tr>
<td>Learning is based on repetition.</td>
<td>Learning is interactive, building on what the student already knows.</td>
</tr>
<tr>
<td>Teachers disseminate information to students. Students are</td>
<td>Teachers have a dialogue with students, helping students construct their own knowledge.</td>
</tr>
<tr>
<td>recipients of knowledge.</td>
<td></td>
</tr>
<tr>
<td>Teacher's role is directive, rooted in authority.</td>
<td>Teacher's role is interactive, rooted in negotiation.</td>
</tr>
<tr>
<td>Assessment is through testing and correct answers.</td>
<td>Assessment includes student works, observations and points of view, as well as tests. Process is as important as product.</td>
</tr>
<tr>
<td>Knowledge is seen as inert.</td>
<td>Knowledge is seen as dynamic, ever changing with our experiences.</td>
</tr>
<tr>
<td>Students work primarily alone.</td>
<td>Students work primarily in groups.</td>
</tr>
</tbody>
</table>

Robots? AR? VR?
Importantly, don’t panic, we won’t be replaced by this guy - any time soon!
How long will it take AI to simulate learning and human intelligence?

Source: Future Progress in Artificial Intelligence: A Survey of Expert Opinion by Vincent C. Müller a,b & Nick Bostrom

How long will it take Ai to simulate learning and human intelligence graph
“Knowledge that was accessible only through formal processes can now be approached concretely”

(Papert, 1986, p. 21)
What do you think?

Dr Joanne Blannin
Course Leader | Master of Teaching
Senior Lecturer in Digital Transformations
Monash University
jo.blannin@monash.edu