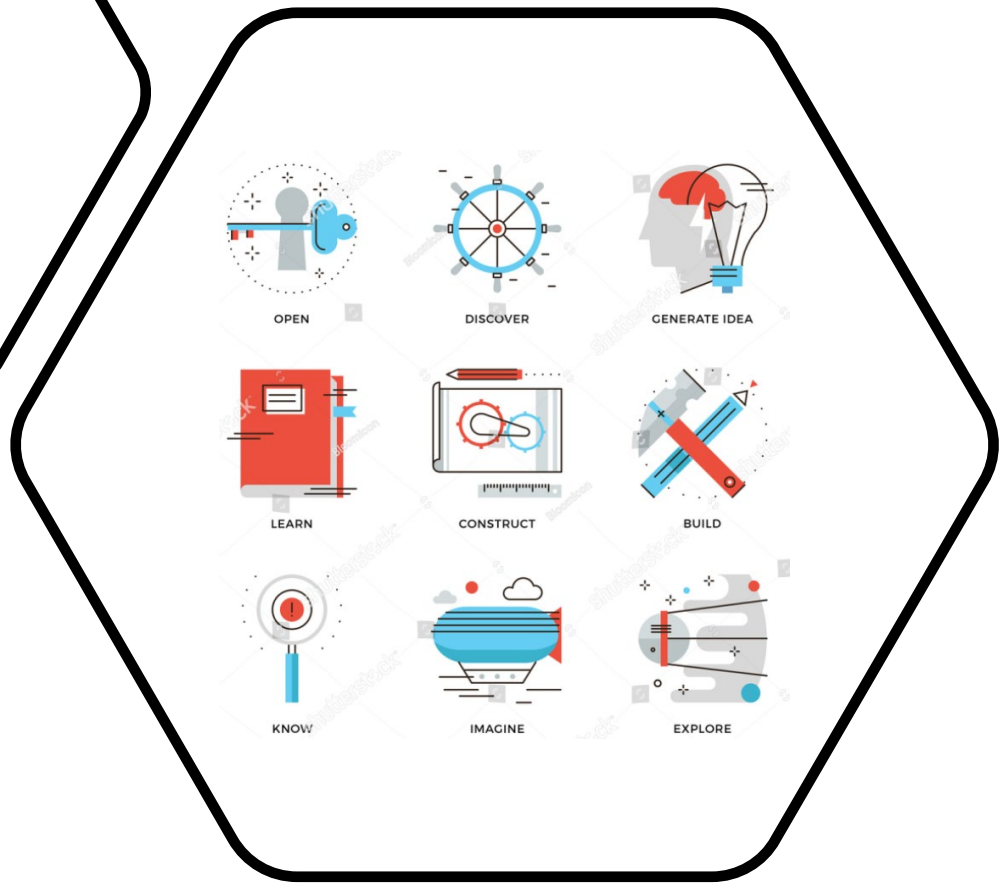
Leverage learning pedagogy and innovation to solve real-world challenges.

INNOVATION CENTRE

Nilanjana Saxena and Zach Chew

Ver 1



What is learning?

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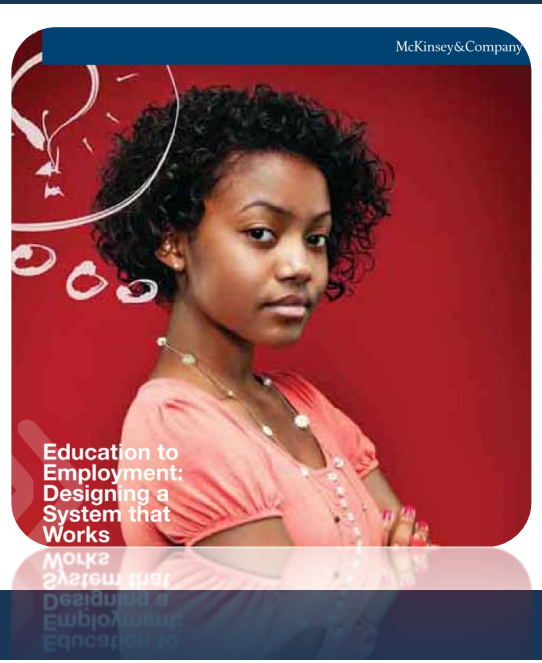
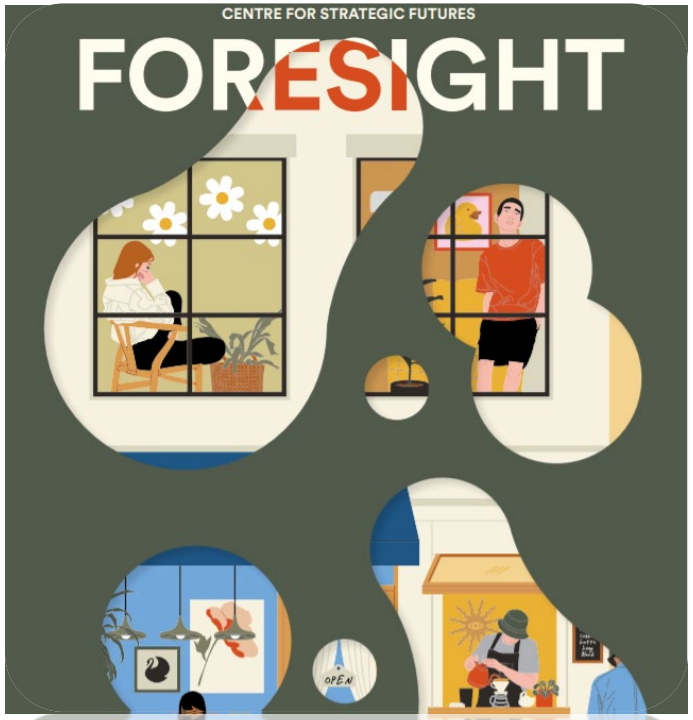
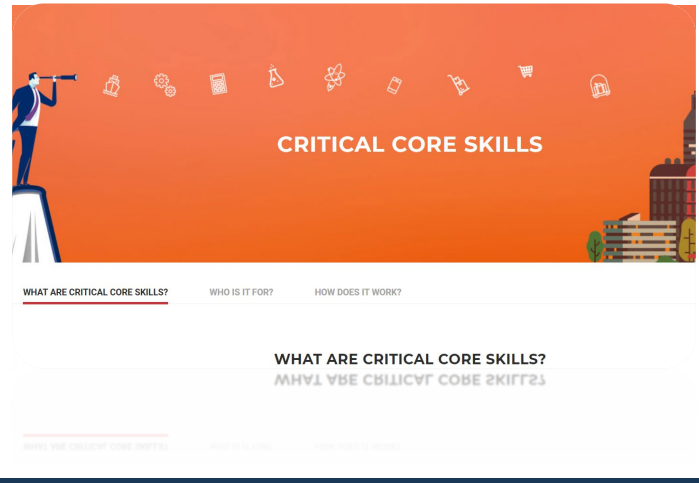
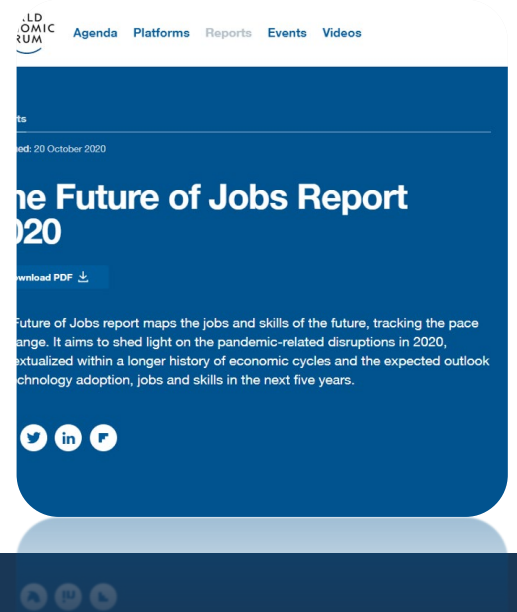

McKinsey&Company
Education to Employment: Designing a System that Works


CENTRE FOR STRATEGIC FUTURES
FORESIGHT
OPEN


CRITICAL CORE SKILLS
WHAT ARE CRITICAL CORE SKILLS?
WHO IS IT FOR?
HOW DOES IT WORK?
WHAT ARE CRITICAL CORE SKILLS?


WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD
Global Challenge Insight Report
The Future of Jobs
Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution
January 2016


Agenda
Platforms
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20 October 2020
Future of Jobs Report
020
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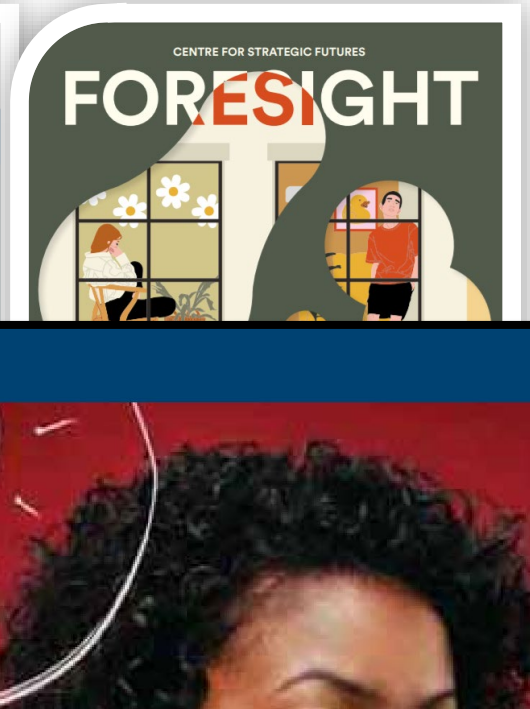
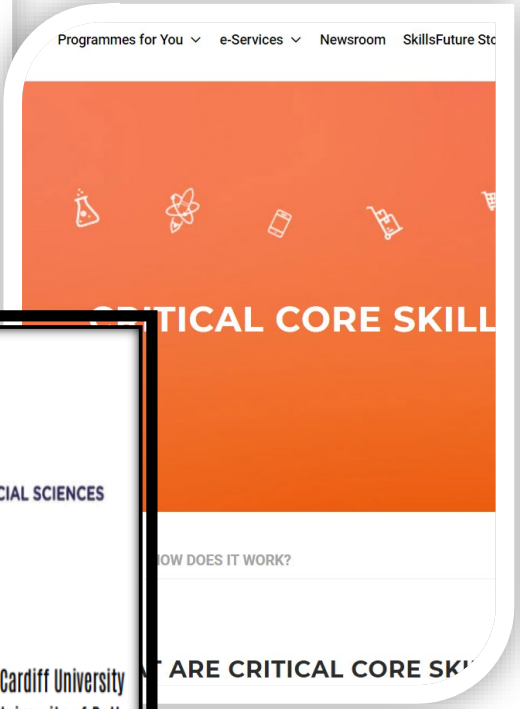
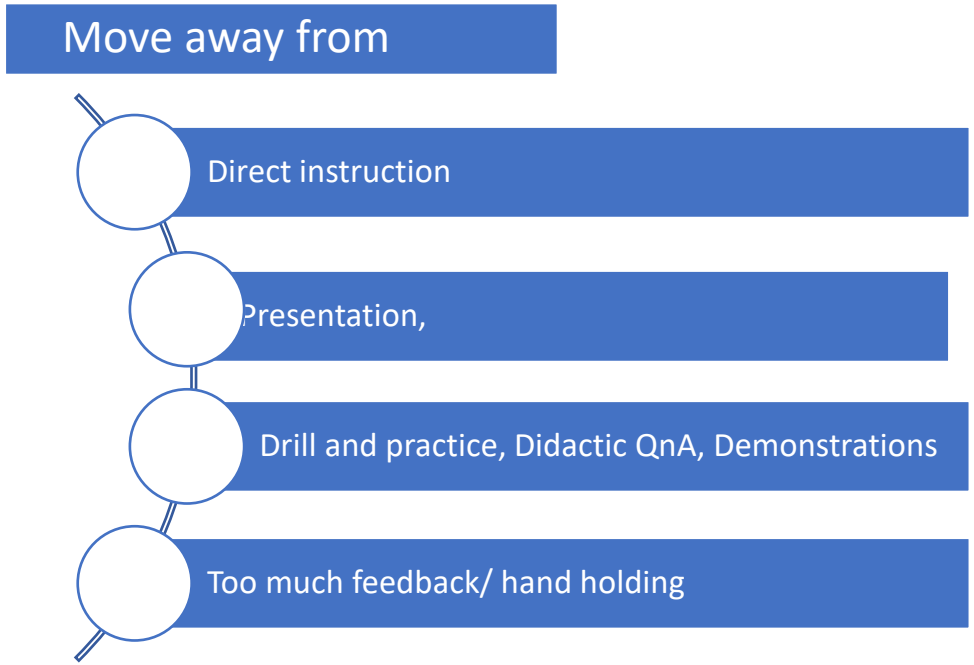
Future of Jobs report maps the jobs and skills of the future, tracking the pace
ange. It aims to shed light on the pandemic-related disruptions in 2020,
xtualized within a longer history of economic cycles and the expected outlook
chnology adoption, jobs and skills in the next five years.

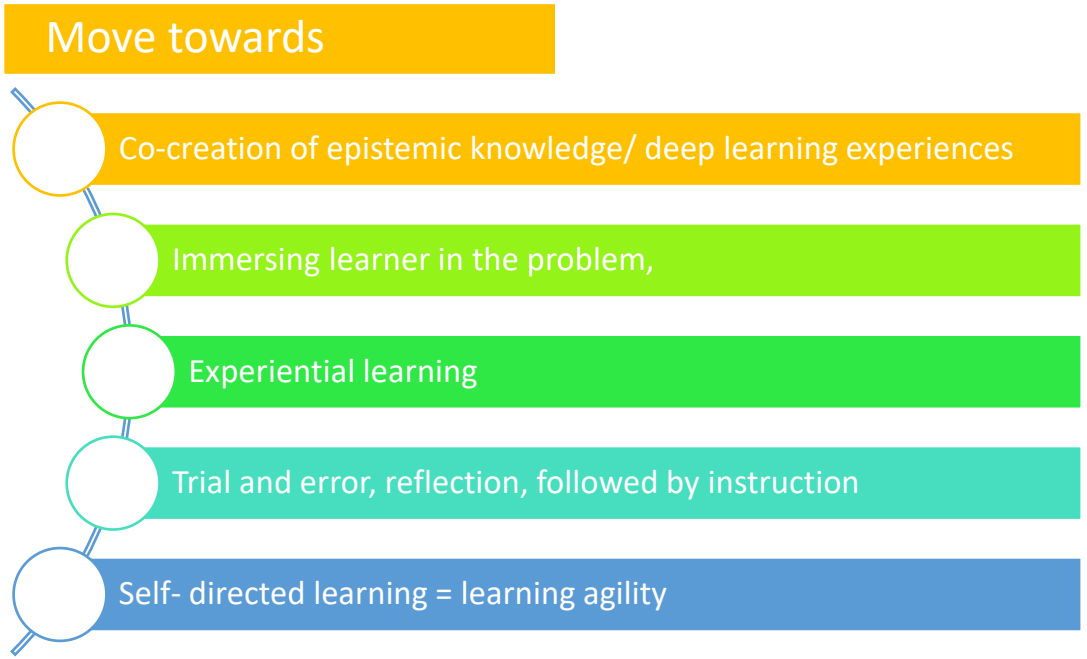




Can teaching & learning help address the evolving workforce needs better?

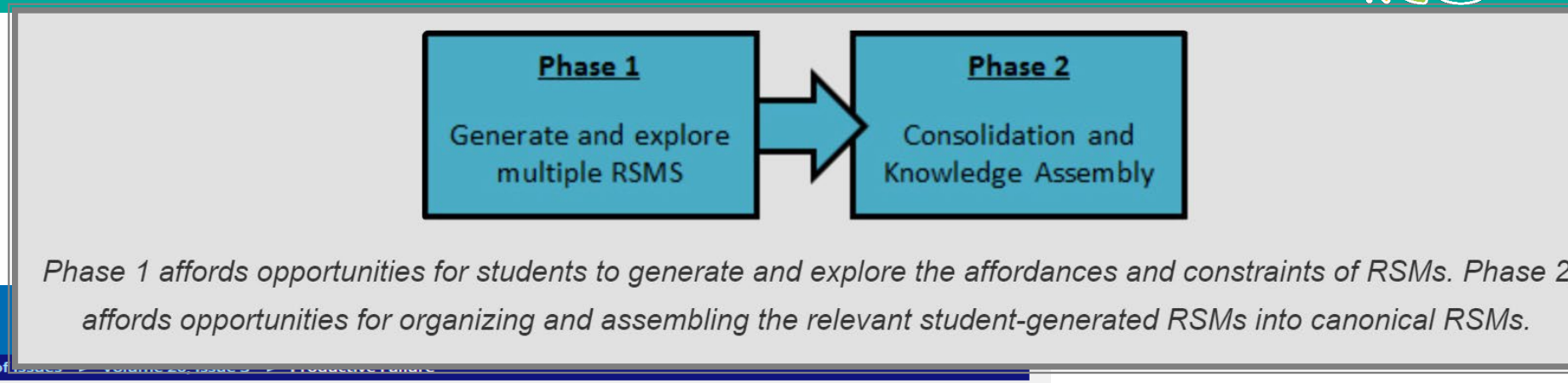
expert-dominated ways → expert enabled learning designs





Deeper Learning, as defined by William and Flora Hewlette Foundation quoted in the New Media Consortium (NMC) Higher Education Horizon 2017 Report, is "the mastery of content that engages students in critical thinking, problem-solving, collaboration and self-direct

How can Deeper Learning experiences be created using Existing and Emerging Technology?



Phase 1 affords opportunities for students to generate and explore the affordances and constraints of RSMs. Phase 2 affords opportunities for organizing and assembling the relevant student-generated RSMs into canonical RSMs.

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Productive Failure

Manu Kapur
Pages 379-424 | Published online: 07 Jul 2008
Download citation | https://doi.org/10.1080/07370000802212669

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Abstract

This study demonstrates an existence proof for *productive failure*: engaging students in solving complex, ill-structured problems without the provision of support structures can be a productive exercise in failure. In a computer-supported collaborative learning setting, eleventh-grade science students were randomly assigned to one of two conditions to solve problems in Newtonian

In this article

FAILURE AND STRUCTURE

STRUCTURE AND CSCL

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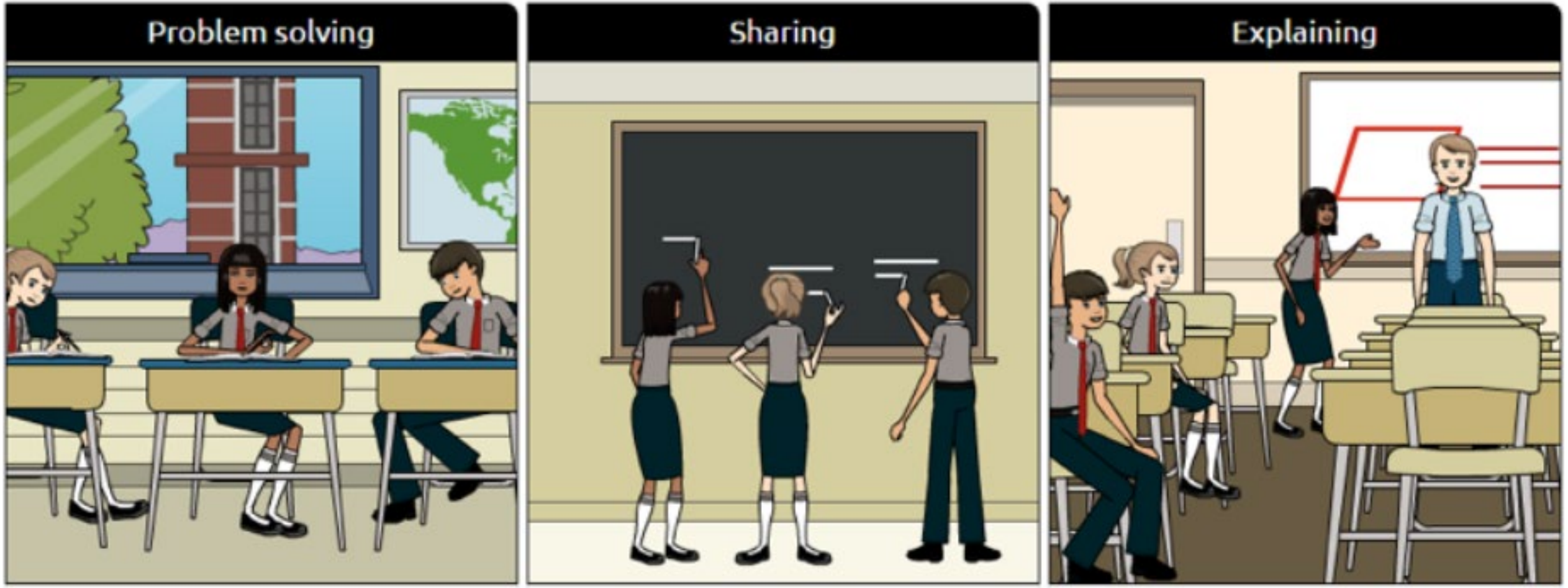
Designing for Productive Failure ›

https://www.jstor.org/stable/27739887



Mind the hand holding, stretch your students, lead the consolidation

Reference: https://singteach.nie.edu.sg/2021/04/26/productive-failure/

PubMed.gov

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Randomized Controlled Trial > Nurse Educ Today. 2021 Jun;101:104871.

doi: 10.1016/j.nedt.2021.104871. Epub 2021 Mar 17.

Measuring the impact of productive failure nursing students' learning in healthcare A quasi-experimental study

Evelyn Palominos [1], Tracy Levett-Jones [2], Tamara Power [2], Nadir Roberto Martinez-Maldonado [3]

Affiliations + expand

PMID: 33773221 DOI: 10.1016/j.nedt.2021.104871

Abstract

Background: Previous research suggests that making errors in a non-threatening si environment can facilitate learning. Productive failure, which combines problem-solving followed by instruction, enables students to learn from making mistakes. This teaching app. demonstrated improved learning outcomes such as explanatory knowledge and transfer of knowledge compared to a direct instruction approach where students receive instruction prior to problem-solving tasks. However, no previous studies have examined the impact of productive failure on nursing students' learning in manikin-based simulation.

Objective: To measure the impact of productive failure on nursing students' declarative knowledge, explanatory knowledge, and transfer of knowledge compared to a direct instruction approach in a paediatric closed head injury simulation.

Methods: Second year undergraduate nursing students (n = 349) from one Australian university were

Productive Failure in Higher education and Doctorate programs

SpringerLink

Published: 14 May 2019

Productive failure as an instructional approach to ɔmote future learning

nhof, Nicole N. Woods, Pascal W. M. Van Gerven & Maria Mylopoulos

h Sciences Education 24, 739–749 (2019) | Cite this article

Citations | 15 Altmetric | Metrics

' approach that requires learners to struggle as they roblems before, rather than after, receiving direct ept. Studies demonstrate that productive failure prepares g of new, related knowledge. Our study explored the effectiveness of an instructional intervention in health professions education with uisition and application of a novel concept, and (b) learners' preparation for g of new, related content. Forty year-one students enrolled in the Doctor of y program at the University of Toronto were randomly assigned to a productive e (i.e. attempt to generate solutions before receiving instruction) or direct instruction nly learning condition. After a practice phase, participants completed a series of tests designed to measure knowledge acquisition, knowledge application, and preparation for future learning (new learning is required for successful problem solving). As expected, no difference in performance was seen between participants on the acquisition and application tests. However, participants in the productive failure condition outperformed those in the

PF across Disciplines: Selected Research and Application

1. **PF in Mathematics.** Kapur (2011) paper investigates 'lecture and practice', PF and 'Facilitated Problem Solving' instructional designs on the unit of rate and speed for 7th grade mathematics students. Findings suggest that learners in PF created diverse representations and methods whilst solving the complex math sums and significantly outperformed counterparts in post-tests on both well-structured as well as higher-order application problems.

2. Learning about climate change as a complex system (Jacobson et.al., 2017). The paper highlights how complex ideas and difficult science concepts can be taught using PF as a learning design. The 9th grade learners solved challenges using agent-based models to learn about complex systems and its causal relations in climate change. PF students scored higher in near and far transfer of knowledge, compared to learners that experienced direct and explicit instructions regarding these concepts. *Jacobson, M. J., Markauskaite, L., Portolese, A., Kapur, M., Lai, P. K., & Roberts, G. (2017). Designs for learning about climate change as a complex system. Learning and instruction, 52, 1-14.*

3. **Learning through collaborative virtual worlds**. PF can be imbued with elements of play. This presentation illustrates the use of 3D virtual worlds for scientific inquiry and learning, as an instructional anchor. Engaging learners in complex problems with less symmetrical and explicit direct instructions coupled with Role playing proved engaging and had a positive impact on attitudes to science (Newstead, & Jacobson, 2012).

4. **DIY PF boosting performance in a large undergraduate biology course.** This paper highlights the potential of PF approach when learning basic biology and science procedures and processes, over being explicitly taught the same. The paper highlights that low-performing students improved significantly (Chowrira., Smith, Dubois, & Roll, 2019).

5. **PF in a market ready EdTech product: Pallas Advanced Learning System (Pallas).** Pallas is a research-based Education Technology startup from Sydney, Australia. Pallas provides virtual science kits (VSK) using immersive technology, tools like NetLogo, which enable visualizations for advanced learning systems for STEM subjects.

Saxena Ms., N. (2020). Working 'Failure' into your Learning Design. The Emerging Learning Design Journal, 7(1), 2. https://digitalcommons.montclair.edu/cgi/viewcontent.cgi?article=1033&context=eldj

Learning through collaborative virtual worlds.
Pallas Virtual Learning Kits - Overview 2017https://www.youtube.com/watch?v=A8DKQ9JfKvs

Working FAILURE into your Learning Design

1. Safe space for exploration
2. A challenging yet not frustrating problem/ investigation
3. Toggle between the designer, facilitator as well as learner mindset
4. Challenge for first timers
5. Role of the facilitator and the designer
6. AE’s domain expertise and fluency with different teaching and learning approaches
7. AE’s ability to manage ‘confusion, challenge and mindset shift’ for first time learners.
8. Learner and learning group dynamics.
9. Ability to toggle between learner, facilitator and guide perspective is key
10. Fidelity to PF principles and how


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'FAILURE'
FOR L&D
SUCCESS
WEBINAR
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Manu Kapur
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Thank you

You can reach me at
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Nilanjana Saxena
Mom | Learning strategist | Thought leader | Pedagogue

A National and Sectoral Imperative

Refreshing the Innovative Learning Initiative: iN.LEARN 2.0

iN.LEARN 2.0 focuses on four key areas:

i. increasing the uptake of online and blended learning by individuals;

ii. amplifying enterprises' adoption of innovative learning technology;

iii. developing effective remote assessment and proctoring solutions for individual and enterprise-led training; and

iv. developing effective placement solutions that tighten the industry-training nexus.

Access

Efficacy

Lifelong

Progress

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We are your partner in innovation

LEARNING TRANSFORMATION THROUGH VALUE CREATION

Meet Demand

Identify and reach out to high potential industry sectors

1. *Industry 4.0*
2. *Care Economy*
3. *Green Economy*
4. *Digital Economy*

Offer Value

Leverage Innovation Centre's knowledge and expertise

1. *Advisory services on TAE market gaps and needs.*
2. *Integration of pedagogical / andragogical practices with LearnTech*
3. *Building IC knowledge base through action research*

innovLogue

innovBite

innovDev

Create Value

Provide a common platform for collaboration and learning innovation translation

innovJam

Innovation Sandbox

innovPlus

innovSpur

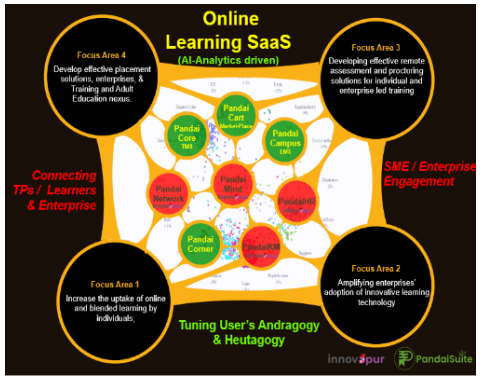
Garageworks

Deliver Value

Increase the rate and adoption of innovative training approaches and practices *(iN.LEARN 2.0)*

Facilitating Innovations

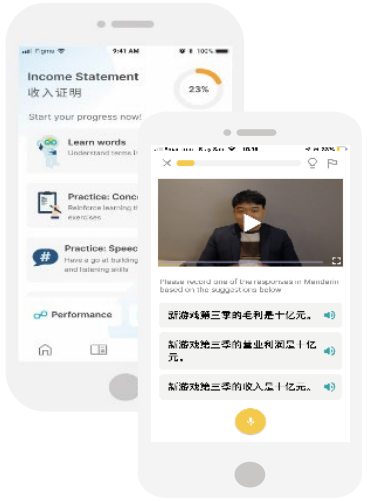
Global Training Service - Playware Studios
Developed a prototype that engages migrant workers in a controlled setting to learn "safe working" at hazardous environments, and to enable trainers to massively scale their training efficiency.



COGNOTIV
ADVANCING INTELLIGENTLY

A Diversified Learning Ecological System
An Online Learning, Adoption, Assessment & Placement Platform, characterized by its patent-pending andragogy & heutagogy.

Bluente

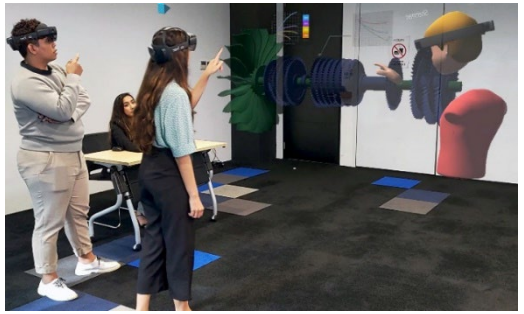


Language Learning In Professional Fields
Comprising an AI-based learning package, BluEx learning platform and Biz-specific speech recognition engine. … to deliver active learning with high efficacy.

BCA Academy tapping on Serl.io AMRAS

Easy, no-code authoring using a WYSIWYG (gaze-and-drop) interface.

Local or remote collaboration sessions. Internet not required for local sessions.



Efficient session facilitation with built-in Win 10/11 session management tool.

The Solution For BCA Academy

AMRAS prototype with BCAA through IAL's InnovPlus program.

- **AMRAS** is a no-code platform for any subject matter expert to create and deploy Mixed Reality content.
- **MRx** is a modified version of **AMRAS** currently released in the Microsoft Store.

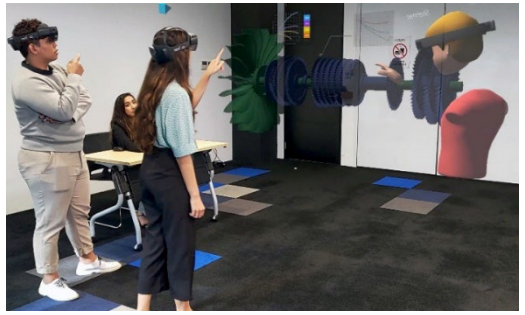
Available in the Microsoft Store

Watch Video: https://www.youtube.com/watch?v=7CLboMIh1wk

MRx FEATURES

Easy, no-code authoring using a WYSIWYG (gaze-and-drop) interface.

Local or remote collaboration sessions. Internet not required for local sessions.



Efficient session facilitation with built-in Win 10/11 session management tool.

"A very powerful solution indeed! This is fantastic."

"I find using MRx quite easy and user friendly."

Dr.Suresh Paranjothy
Senior Consultant Anaesthetist
National University Health System

Institute of Technical Education

Crescent Girls' School

IBM

Building and Construction Authority

NUHS
National University Health System

Boston Scientific

Prairie View A&M University

HCC
Houston Community College

BCA Academy Use Cases

AMRAS is used primarily in training and learning at BCAA:

- Overcome constrains in equipment, lab or personnel availability to conduct interactive simulation training/learning anywhere
- Scalable. From MEP Lab to Lift Systems training/learning.
- Easy. Both students and instructors were able to create and deploy content.

MRx FOR WORKPLACE SAFTEY

MRx / AMRAS can be used for training, guidance or visualization. The following are some examples:

- Heads-up safety checklist.
- Hazard location and awareness.
- Proper tool/equipment operation or handling procedure.
- Safety lock-out/tag out procedure training.

IN.LEARN2.0

innovJam → innovPlus → innovSpur

	Incubator		Accelerator	Regulatory Sandbox
Description	Pilot test interesting ideas that have the potential to solve enterprises' learning challenges	Develops promising ideas into minimum viable products (MVPs)	Develops successful MVPs into minimum marketable products (MMPs)	Helps innovators surmount regulatory obstacles to access course fee funding or SkillsFuture Credit
Target	Ground-Up initiative, Learners and Practitioners	Singapore-registered organisations, excluding Government Agencies and Statutory Boards	Learn Tech enterprises	Training Providers, CET
Funding Support	**S$5,000** to testbed solution ideas	Up to **S$200,000** per project, for a year	Up to **S$500,000** per project, for up to 01 year to further develop a prototype to MMP	If approved, CET courses using these innovative solutions could continue to be eligible for SSG course fee funding for up to two years.

Thank you

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zach_chew@ial.edu.sg