How the Failure of e-Learning during the Covid-19 Lockdown Could Have Been Avoided Through Enhanced Learning Design Alignment

Professor Emeritus Tom Reeves
The University of Georgia, USA
March 2020
• Within a month, the entire genome of coronavirus were sorted, identified and posted online.

• Two weeks later, designs were already being keyed into machines to create a Covid-19 vaccine.

• By December 2020, Moderna and Pfizer-BioNTech mRNA vaccines were approved.
Randomized Controlled Trials

- Distance Learning Isn’t Working.
- Not Good for Learning.
- Remote Learning Fails the Test
$700B: That’s How Much It Will Cost to Fix Pandemic Learning Loss


https://doi.org/10.3102/0013189X221125764
The science on remote schooling is now clear. Here’s who it hurt most.

Remote learning during the pandemic?
1. Failure to conduct research that actually influences practice

2. Failure to align critical learning design dimensions

3. Failure to make e-learning as authentic and active as possible
Too Much Research on Things

- Virtual Reality
- iPads and Tablets
- Mobile Learning
- Online Learning
- 3D Printing
- Games and Simulations
- Wearable Technology
- Smart Phones
- Machine Learning
- Immersive Learning

Too Little Research on Problems

- Failure to engage learners
- Ineffective teaching
- Inadequate higher order learning
- Poor learner motivation
- Little preparation for real world performance
- Lack of intellectual curiosity
- Undeveloped creativity
- Weak communication skills
- Insufficient time-on-task
Some say RCTs are necessary to improve online learning!

Robert E. Slavin
• Is there a control group?
• Are the control and experimental groups assigned randomly?
• If a matched study, are the groups extremely similar?
• Is the sample size large enough?
• Are the results statistically significant?
Charles Desforges

“The status of research deemed educational would have to be judged, first in terms of its disciplined quality and secondly in terms of its impact. Poor discipline is no discipline. And excellent research without impact is not educational.”
Educational design research is not defined by its methods, but by its twofold goals.

1. Robust program, product, or policy to solve a real problem
2. Usable knowledge/theory, such as design principles
Educational Design Research:

- In close collaboration with practitioners, define an important pedagogical outcome and create a prototype learning environment informed by theory and practice.
- Emphasize content and pedagogy rather than technology alone.
- Give special attention to supporting human interactions.
- Test, refine, and retest learning environments until outcome is reached.
- Refine theory simultaneously.


• 231 students randomly assigned to either a digital tablet version (119 students) or a paper version (112 students)
• 800-word leadership article
• Treatment time less than ten minutes
• Assessment with 10 multiple-choice items to measure recall accuracy and two short essay questions to measure comprehension

No Significant Differences
Learning objectives

content

Instructional design

Learner tasks

Teacher roles

Technology roles

Assessment

Low order, discrete

High order, robust

One right answer

Multiple perspectives

Lecture

Experiential

Academic

Authentic

Instructor

Mentor/facilitator

Tutorials/videos

Simulation & Communication

Discrete knowledge

Mental models

Alignment is essential!
Stop video when policy violated.

TEST & REFINE....

Analysis

Design

Evaluation

Reflection

Maturing intervention

Theoretical understanding

Exploration

Construction
Educational Design Research

**IMPACT**

on real world problems!
Educational design research enables a better balance between rigor and relevance that is socially responsible.
The Problem: Vaccine Quality Management

Nepal: Delivering Covid-19 Vaccines by Porter
“Pharmaceutical Cold Chain Management on Wheels”
How to fit a bus into a computer screen?
Alignment in e-learning is essential!

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Content</th>
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</thead>
<tbody>
<tr>
<td>Low order, discrete</td>
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Instructional Design

<table>
<thead>
<tr>
<th>Learner Tasks</th>
<th>Teacher Roles</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>Academic</td>
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<tr>
<td>Experiential</td>
<td>Authentic</td>
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Technology Roles

<table>
<thead>
<tr>
<th>Technology Roles</th>
<th>Assessment</th>
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</thead>
<tbody>
<tr>
<td>Tutorials/videos</td>
<td>Mental models</td>
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<tr>
<td>Simulation &amp; Communication</td>
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Knowledge dimensions

<table>
<thead>
<tr>
<th>Knowledge dimensions</th>
<th>Cognitive process dimensions</th>
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<tbody>
<tr>
<td>Remembering</td>
<td>Understanding</td>
</tr>
<tr>
<td></td>
<td>Applying</td>
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<tr>
<td></td>
<td>Analyzing</td>
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<tr>
<td></td>
<td>Evaluating</td>
</tr>
<tr>
<td></td>
<td>Creating</td>
</tr>
<tr>
<td>Factual knowledge</td>
<td>1 2 2</td>
</tr>
<tr>
<td>Conceptual knowledge</td>
<td>1 1 2 2</td>
</tr>
<tr>
<td>Procedural knowledge</td>
<td>2 2 3 4</td>
</tr>
<tr>
<td>Metacognitive knowledge</td>
<td>1 2 3</td>
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</table>
e-Pharmaceutical Cold Chain Management Course

Nature of content

One correct answer
Multiple perspectives

Instructional design

Lecture method
Experiential learning

Thermodynamics / Kevin O'Connell
Redundant controls / Jim Vesper

Last mile / Umit Kartoglu
e-Pharmaceutical Cold Chain Management Course

Academic

Learner tasks

Authentic
e-Pharmaceutical Cold Chain Management Course

Instructor roles

Mentor/ facilitator

Tutorials/video

Simulation & Communication

Technology roles

Michelle ARNOT
Abuja, Nigeria

Chathura EDIRISURIYA
Colombo, Sri Lanka

Tatsuhiko TSUKAKOSHI
Pohnpei, Micronesia
Alignment was the key to our success.

- Learning objectives: Low order, discrete, High order, robust
- Content: One right answer, multiple perspectives
- Instructional design: Lecture, Experiential
- Learner tasks: Academic, Authentic
- Teacher roles: Instructor, Mentor/facilitator
- Technology roles: Tutorials/videos, Simulation & Communication
- Assessment: Discrete knowledge, Mental models
Educational Design Research Team

Jim Vesper, Jan Herrington, Tom Reeves
E-Learning Design Team in Antalya, Turkey
Authentic contexts
Authentic tasks
Expert performances
Multiple roles and perspectives
Collaborative construction of knowledge
Reflection
Articulation
Coaching and scaffolding
Authentic assessment
Authentic learning design principles
**Authentic context and tasks**

- Taking on a realistic role
  - Vaccine stores manager
  - Deciding if a vaccine has been affected by freezing or not

- Doing a real-life task
  - Which vaccines should be used first?
Access to expert performances

Thermodynamics / Kevin O'Donnell

Last mile / Umit Kartoglu

Improving access / Umit Kartoglu

Redundant controls / Jim Vesper

Multiple roles and perspectives

Quality assurance manager
Pharmacist
Logistics manager
GDP inspector
Doctor
Consultant
Cold store manager
Collaborative construction of knowledge

Michelle ARNOT
Abuja, Nigeria
GMT +1 hr

Chathura EDIRISURIYA
Colombo, Sri Lanka
GMT +5:30 hrs

Tatsuhiko TSUKAKOSHI
Pohnpei, Micronesia
GMT +11 hrs

Reflection

DIARY
Coaching and scaffolding

Online learning environment
**Authentic assessment**

- Individual or Group reports on authentic tasks
- Participation in Discussion Forum
- Peer-review Commenting on other reports
- Flipgrid videos
- Articulation
- Learning Diaries
  What did I learn and what will I carry to my work?
- Scavenger Hunt blog postings on given circumstances

**Final Assessment**

**Assignment:** Providing consulting services to the Albanian Institute of Public Health
Design Principle 1: Rather than perfectly duplicate, replicate where possible and innovate where necessary.
Design Principle 2: The collaboration that is essential to instantiating authentic tasks-based learning strategies online is a new experience for most learners and must be carefully nurtured.

Design Principle 3: The fidelity of the simulated experiential learning environment does not have to be high as long as it enables learners to suspend disbelief and feel that what they are experiencing is real.

The videos – the facilities tour – you almost feel like walking with the camera. This is something that makes the course so lively.
Extensio et Progressio

e-Pharmaceutical Cold Chain Management Course
http://www.epela.net/epela_web/index.php

Dr. Ümit Kartoglu
World Health Organization
How can we prepare for the next pandemic?

Enhancing e-learning requires:
- Alignment of course design dimensions
- Active learning through authentic tasks
- Socially responsible educational design research
Don’t waste their education. Go authentic, keep it aligned and conduct Educational Design Research!

https://kartoglu.ch
Thank you!

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• www.evaluateitnow.com