Team-based learning ("TBL") for 21st Century Skills
Beyond Higher Education

December 2016
Agenda and objectives

At the end of this session you should be able to:

1. **Identify** who I am and why I am here

2. **Define** 21\textsuperscript{st} century skills and TBL

3. **Describe** how TBL has been applied outside of schools
I am a Team-based learning...

Educator
Adjunct Professor
- **Airplanes:** Aeronautical Science for Management
- **Airlines:** Airline Management
- **Airports:** Airport Administration and Finance

Entrepreneur
Commercial Founder and Executive Chairman
Entrepreneur-in-Residence

Conferences and faculty workshops (globally)
After we sold Skywest to Virgin in 2013, I shifted to education to address developing talent.
The need: students not ready to work

## Future skills – World Economic Forum

<table>
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<th>Top 10 skills required in 2020*</th>
<th>Lecture</th>
<th>TBL</th>
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21st century skills

- Less content and more soft skills
- Content obsolete in zero to three years, but soft skills will endure
- Opportunity to teach content and soft skills simultaneously
Team-Based learning ("TBL") a specific type of blended learning in Higher Education

**Before class**

1. Learn with pre-work on your own

2. Quiz (forced recall)

3. Team Quiz (peer learning; practice with feedback)

4. Clarify Doubts (explain by peers; just-in-time teaching)

5. Team Cases (apply to solve problems)

**In class:**

- Closed book
- Open
**Methodology to customize TBL and other techniques outside of high education**

**Core TBL**

1. Set objectives
2. Content delivery
3. Individual test
4. Team test and debrief
5. Applied team cases
6. Simulation
7. Follow up/practice

**Illustrative optimized learning**

- InteLearn™ is a patent pending methodology and supporting technologies that apply cognitive science to optimize learning
- Developed at Duke-NUS Medical School in Singapore

**Cognitive science based learning principles**

- Orient
- Set goals
- Motivate
- Prime
- Streamline
- Interleave
- Space
- Feedback
- Collaborate
- Adapt
- Contextualize
- Apply

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Blended learning solutions

Software-as-a-Service (SaaS)
- Cloud-based software for blended learning and Team-Based learning (“TBL”)

Train-the-trainer Workshops
- Workshops to train others in TBL
- Academics and corporates

Turnkey Solutions
- Fully organized content, software and delivery
  - Corporate: 1st vertical in healthcare
  - Consumer: 1st vertical in job search skills
Turnkey Solutions: Corporate

Three-day corporate training workshop with **zero lectures**

Pilot workshop Top 10 pharma player
N=60 corporate employees from Asia

**100% learner recommendation**

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>IRAT</th>
<th>TRAT</th>
<th>Final Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRAT</td>
<td>74</td>
<td>96</td>
<td>93</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Confidence</th>
<th>Pre-Meeting</th>
<th>Post Posting</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRAT</td>
<td>2.8</td>
<td>3.4</td>
</tr>
</tbody>
</table>

- Three top ten pharm companies
- Internal employee training
- External stakeholder training

Exclusive licensee of Duke-NUS optimized learning methods

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Turnkey Solutions: Consumer

Five-day boot camp: Career Strategy, Pitching, Resumes, Networking and Interviewing

5stepCareers

5-day Bootcamp in Shanghai
N=16

Career skills confidence

100% learner recommendation

Before
After

27%
92%

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Turnkey Solutions: Common themes

- **Use of technology**
  - Distribute pre-work
  - Real-time analytics to improve face-to-face class
  - Evaluation

- **Face-to-face**
  - TBL active learning (IRAT, TRAT, Clarifications and Applications)
  - Simulations
  - Use the pre-work and efficiency of TBL to make time for simulations
Do the lower order more efficiently to make time for higher order and value

Theory / lower order

Content delivery
Individual test
Team test and debrief

Practice / higher order

Applied team cases
Simulation

Many traditional learning environments (lecture + test)
Implementation

- Start with the end in mind (backward design)
- Simulate reality as close as possible
- Practice with feedback (grading rubrics)
- Team feedback (learn by critically evaluating others)
- Lots of work to dial-in learning objectives
Role of technology

- Ideally push as much to online as possible
- But need to test / evaluate what the learning outcome / ROI implication is (A/B testing)
- Multi-modality model (blended F2F to innovate; pure online to scale)
- Could consider online TBL
  - Asynchronous
  - Synchronous
Dare to be great

- Can you learn how to play the piano by watching a video?

- Can you learn how to land an airplane with only online instruction?
Dare to be great

https://www.youtube.com/watch?v=jJT_CACIZqs

Would a non-pilot, with no previous instruction or flight training, be able to take off, fly and land a private plane, based only on experience from a desktop flight simulator?

13:00 short final
13:39 finished
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Blog:  www.intedashboard.org
Tech vertical:  www.intedashboard.com
Corporate healthcare vertical:  www.medniva.com
Consumer career skills vertical:  www.5stepcareers.com
Appendix
Arteries to Ailerons
Applying team based learning methods from Duke-NUS Medical School to flip the classroom for active and relevant learning at Embry-Riddle Aeronautical University Asia

Brian O’Dwyer
Adjunct Professor, Embry-Riddle Aeronautical University Asia
Founder and Executive Chairman, CognaLearn
Former Entrepreneur-in-Residence, Duke-NUS Medical School

16 November 2016
Reminders

1. **Slides**: Now available on my blog
   
   www.intedashboard.org

2. **Cheat sheet**: Available on chairs or blog

3. **Feedback form**: Please complete

4. **Mentorship offer**: Details at the end
To achieve this *landing* objective...
...pilots need to know:
Too high or too low
Too fast or too slow

To meet *learning* objectives
Teachers also need to know
- too high / too low
- too fast / too slow
Agenda and objectives

After this presentation you should be able to:

1. **Describe** who I am and why I am here
2. **Define** Team-based learning ("TBL")
3. **Identify** what TBL can do for students, teachers and administrators
4. **Explain** how to implement TBL
5. **Experience** TBL as a student
I am a Team-based learning...

**Educator**

Adjunct Professor

- **Airplanes:** Aeronautical Science for Management
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- **Airports:** Airport Administration and Finance

**Entrepreneur**

Commercial Founder and Executive Chairman

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**Enthusiast**

Conferences and faculty workshops (globally)
After we sold Skywest to Virgin in 2013, I shifted to education to address developing talent.
Why I am here:
Are students ready to work?

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<tr>
<th>Group</th>
<th>Ready to Work</th>
<th>Not Ready to Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business leaders</td>
<td>Yes, 11%</td>
<td>No, 89%</td>
</tr>
<tr>
<td>Students</td>
<td>Yes, 21%</td>
<td>No, 79%</td>
</tr>
<tr>
<td>Chief academic officers</td>
<td>No, 4%</td>
<td>Yes, 96%</td>
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Saw this first hand reviewing thousands of resumes and interviewing hundreds as a hiring decision maker
The problem – lectures don’t work...

Retention 1st 10 mins: 70%
Retention last 10 mins: 20%

In a one hour lecture
- 80% is forgotten
- <10 minutes retained
…particularly ineffective for **millennials** who want:

- Social and collaborative learning
- Teachers as mentors and guides
- Immediate feedback
- Learning to be interesting
- Real and relevant work
The what is clear...

1. Who and Why

Active learning

Technology in learning

Workforce readiness

Top 10 skills

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...how to do it gets hazy

Active learning

Which of the 80,000 apps to pick?

Workforce readiness

“If I don’t lecture, **what exactly do I do in class?”**

1. Who and Why
Define TBL: a specific type of “flipped classroom” or blended learning

Before class

1. Learn with pre-work on your own

In class: Closed book

2. Quiz (forced recall)

3. Team Quiz (peer learning; practice with feedback)

4. Clarify Doubts (explain by peers; just-in-time teaching)

In class: Open

5. Team Cases (apply to solve problems)
For students: 6 of 10 future skills

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For teachers: Evidence-based

Research in over 300 peer reviewed journals over 30 years in many disciplines

Nearly half of US medical schools now use TBL
For administrators: Resource efficient

Duke-NUS students were above the United States mean in half the time

How to TBL

- **Backward design:** Start with the end in mind
- **Pre-work:** Assign readings or send out lecture slides
- **Tests:** Can pull questions for existing question bank or exams
- **Applications:** Can use existing cases or real world problems
3. Group Readiness Assessment (IRA)

4. How to TBL

---

Module 3 – Aircraft Performance
Learning Objectives

After this module you should be able to:

- Calculate aircraft performance metrics:
  - Take-off and landing distances
  - Fuel consumption
  - Crosswind
  - Weight and balance
- Describe what factors affect aircraft performance such as altitude, temperature, weight, air pressure, head/tailwind, etc.
- Compare aircraft types on performance

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2. Individual Readiness Assurance Test (IRAT)

Students

• Quiz on website accessed from laptops, tablets or smartphones
• 75% new / 25% old questions
2. Individual Readiness Assurance Test (IRAT)

Professor

- Identify the weakest areas

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3. Team Readiness Assurance Test (TRAT)

Students

- Same questions as a team
- Immediate feedback
- Answer until **correct** (resilience)
3. Team Readiness Assurance Test (TRAT)

Professor

- What wrong choice were teams selecting?
4. Clarification

If I ask if anyone doesn’t understand I get this…
4. Clarification

…so ask the teams to identify questions to clarify

Questions / points requiring clarification

Team 1 (gunners)
None

Team 2 (confused)
#8 Density altitude

Then the gunners stand up and explain density altitude to the confused team
5. Applications – 4S

Which aircraft should Virgin fly on the Sydney to Canberra route?

A) ATR 72
   Turboprop

B) E170
   Regional Jet

Significant problem

Same problem

Specific choice

Simultaneous report
5. Applications – 4S

Simultaneous report

Question: Which aircraft should Virgin Australia operate on the Sydney-Canb

A) ATR72 Turboprop
B) E-170 Regional Jet
C) B737

1 2 3 4

None

Team 1 : A  Team 2 : A  Team 3 : A  Team 4 : B
1. Divide up into teams of five or less

2. www.intedashboard.com on any browser and click “Student Login”
   Login = password = talk##
   Number depends on your team
   “talk11” for team 1, member 1

3. Click on “Start IRAT” button
   (Individual readiness assurance test)

4. Begin to answer questions individually
TBL experience – TRAT

1. **ONLY ONE** person from team clicks on “Start TRAT”

2. Team members debate to come up with the right answer and submit

3. If correct (green check, go to next question)

4. If wrong (red X), re-debate until you get the right answer
Summary

1. I am a TBL Educator / Enthusiast / Entrepreneur focused on the employability gap created by inefficient lectures

2. TBL is a specific form of flipped classroom

3. TBL can:
   • For students: 6 of 10 future career skills
   • For teachers: evidence in >300 journals in 30 years; ~40% med schools
   • For administrators: same results in half the time

3. How to TBL

Pre-work

Solo test

Team test

Clarify

Closed book

Open book

Apply
Moving forward

Beyond higher education

- Corporates (Pharma/PUB)
- K-12 (Spectra)
- Test prep (GMAT and SAT)
- Career skills

Big data

- 50,000 data points per course!
Mentorship offer

• Offer to provide mentorship to anyone interested in trying to implement TBL

• Higher education, K-12 or corporate

• Before 31 December 2016

• Can try one module as a review
Contacts, questions and learning more

Contacts
Brian O’Dwyer
odwyerb@erau.edu
brian@cognalearn.com
https://sg.linkedin.com/in/brianodwyer

Thank you!
Any questions or comments?

Learning more
- Download this presentation from my blog: www.intedashboard.org
- Embry-Riddle faculty bio: http://asia.erau.edu/profiles/brian-odwyer
- Duke-NUS video: https://www.youtube.com/watch?v=BlVPLYGdBLg
- Team-based Learning Collaborative: http://www.teambasedlearning.org

Future pilots!

Any questions or comments?
TBL for corporates

Corporate

Pilot workshop Top 10 pharma player
N=60 corporate employees from Asia

Knowledge

Confidence

IRAT | TRAT | Final Exam
---|---|---
74 | 96 | 93

Pre-Meeting | Post Posting
---|---
2.8 | 3.4

+26% | +21%

3 day corporate training workshop with zero lectures
TBL for career skills

Strategy, Pitching, Resumes, Networking and Interviewing

5-step Careers

Career skills confidence

5-day Bootcamp in Shanghai
N=16

92%

27%

Before

After

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On-time performance (OTP)

On-time performance

If you quiz them, they will come

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Test scores

IRAT and TRAT scores

IRAT μ = 77%
TRAT μ = 95%

Final exam μ = 97%
Mid-term μ = 90%

Team scores ~20 points higher than individual and gains are sustained in midterm and final
Student feedback – survey

Recommend

TBL: 4.9/5.0
Campus Mean: 3.8

30% better vs Campus (1.1σ)

Active learning

TBL: 4.9/5.0
Campus Mean: 4.2

17% better vs Campus (1.0σ)

Scale: 5.0 = Definitely, 4.0 = Very Probably, 3 = Possibly, 2 = Probably Note and 1 = Very Probably Not

Scale: 5.0 = Strongly Agree, 4.0 = Agree, 3 = Neutral, 2 = Disagree and 1 = Strongly Disagree