

Training the next generation in aviation with technology enabled team-based learning

Brian O'Dwyer

Embry-Riddle Aeronautical University Asia (Singapore Campus), Adjunct Faculty

CognaLearn, Executive Chairman and Commercial Founder

Duke-National University of Singapore Medical, Former Entrepreneur-in-Residence

AviAsian Conference

Singapore Aviation Academy

Singapore

5 September 2018



Acknowledgements

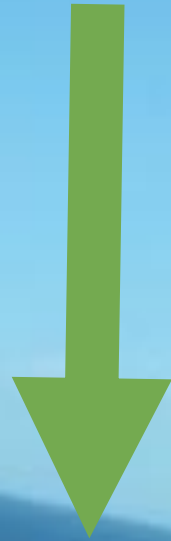
- The presenter is the Commercial Founder of and has a financial interest in CognaLearn. CognaLearn is the company that developed InteDashBoard™ www.intedashboard.com, which is TBL software developed in collaboration with Duke-US Medical School; InteDashBoard™ is one of the technology tools described in this presentation.

Objectives

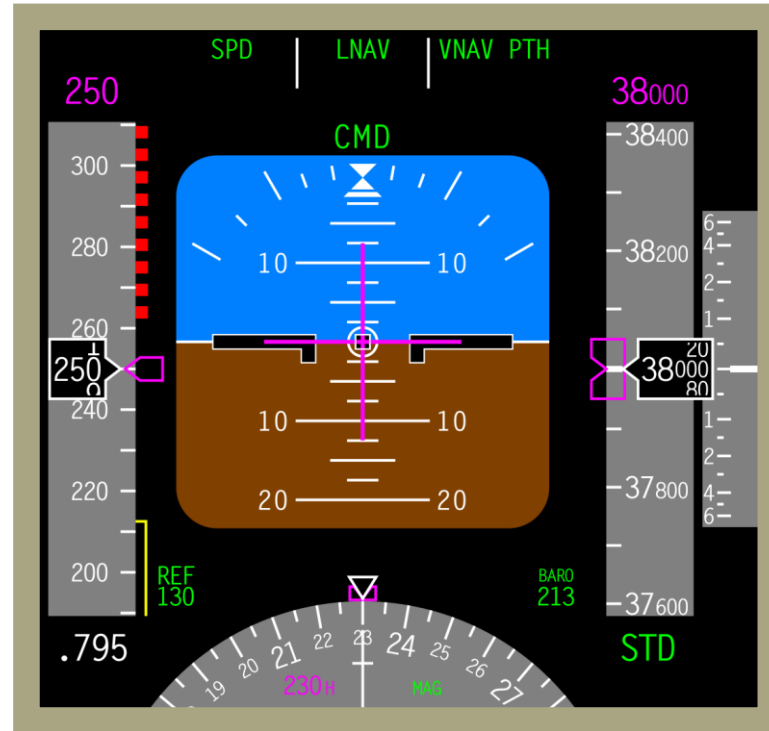
After this session participants should be able to:

- 1. Define:** team-based learning (“TBL”)
- 2. Explain:** benefits and considerations of TBL
- 3. Describe:** the backwards design approach to TBL

Landing objective



Too fast?
Too slow?



Too high?
Too low?

Team-based learning...

Educator

EMBRY-RIDDLE
Aeronautical University

Entrepreneur



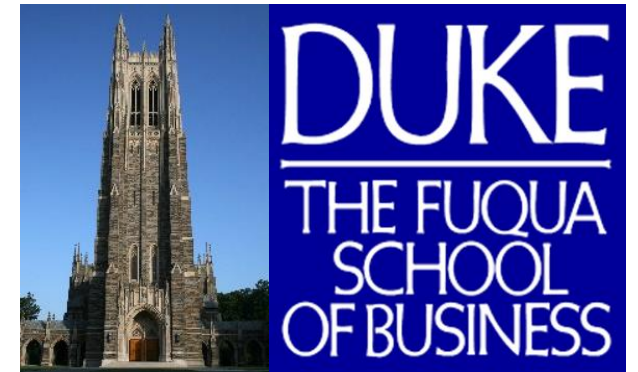
Speaker



Parent



My path



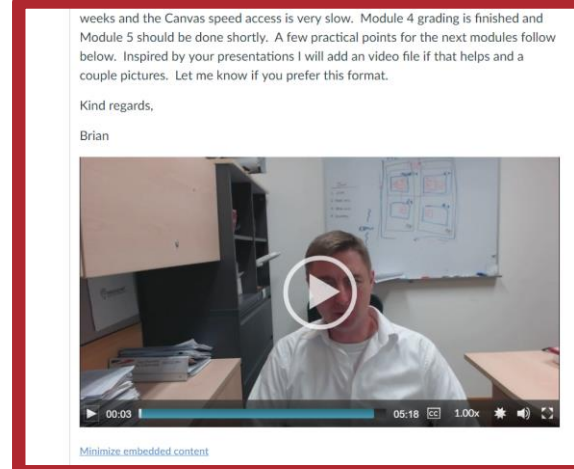
Problem: employability gap

Learning 1.0



Laurentius de Voltolina, School of Bologna 14th century.

Learning 2.0



Problem

BBC Sign in News Sport Weather Shop Earth Travel Me

NEWS

Home Video World Asia UK **Business** Tech Science Stories Entertainment & Arts

Business Market Data Global Trade Companies Entrepreneurship Technology of Business

Boeing says Asia needs 240,000 pilots over next two decades

By Leisha Santorelli
BBC Business reporter

© 28 August 2018 [Share](#)



Solution: team-based learning (“TBL”)

In class: theory

In class: apply



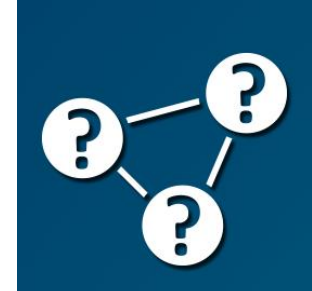
1. Pre-work



2. Quiz



3. Team
quiz



4. Clarify
doubts



5. Team
applications

Also 360° teammate evaluation

TBL in practice

Originated in 1970s
by Larry Michaelsen
in Marketing

Used by 100s of
universities globally

Many fields

- Health sciences (~50% of US medical schools)
- Business
- Computer science
- Engineering
- Social sciences
- Law



Emerging K-12, government, employability and corporate



1. Pre-work

Module 3 – Aircraft Performance Learning Objectives

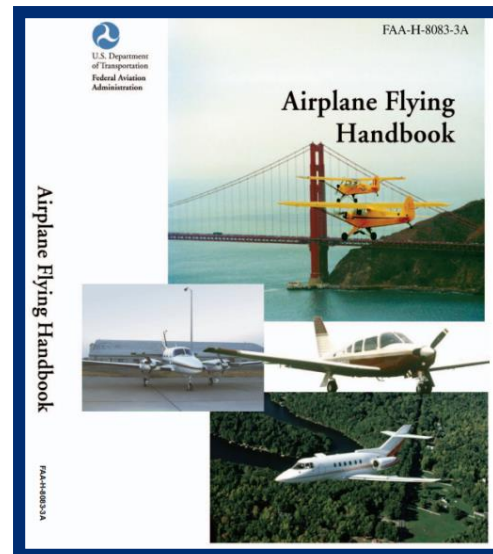
After this module you should be able to:

- 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

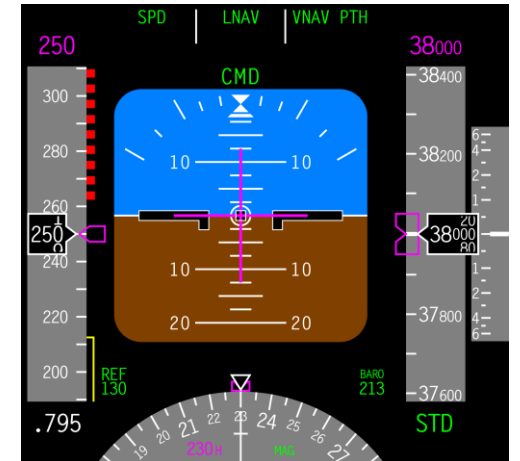
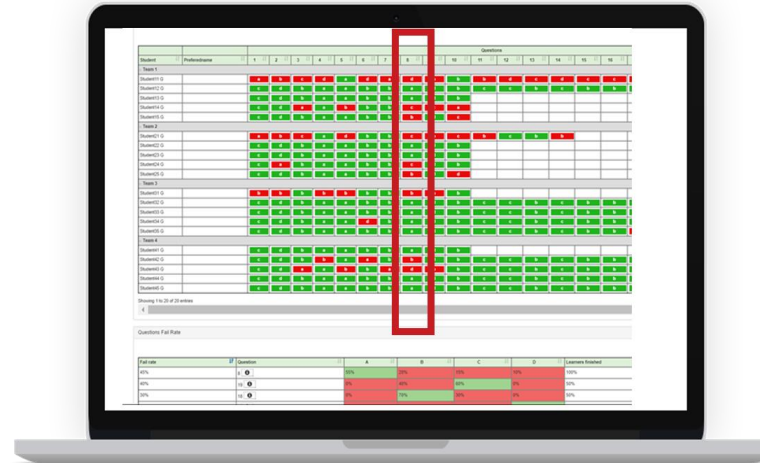
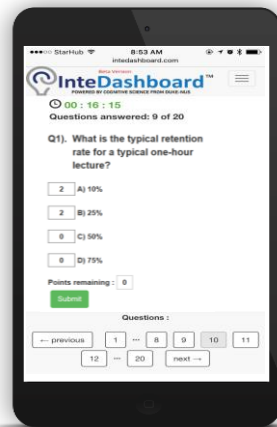
EMBRY-RIDDLE
Aeronautical University

Articles to Allerton: Applying team based learning methods from Duke-NUS Medical School of Singapore to flip the classroom for active and relevant learning at Embry-Riddle Aeronautical University Asia
© Copyright Brian O'Dwyer. Not to be reproduced or disseminated without permission.

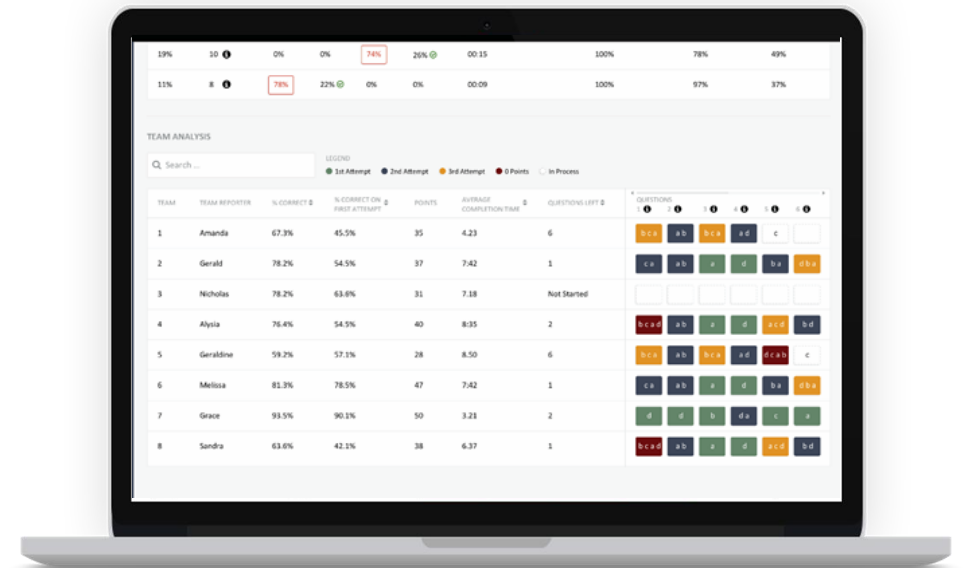
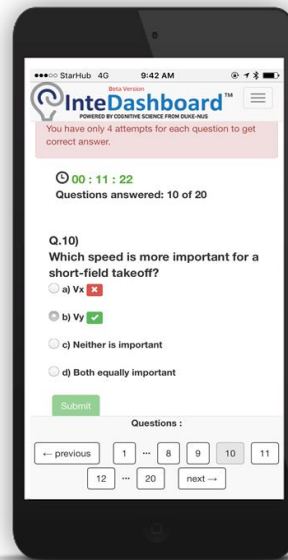
17



2. Individual Readiness Assurance Test (“IRAT”)



3. Team Readiness Assurance Test (“TRAT”) with immediate feedback



4. Clarifications



5. Applications

Significant problem

Same problem

Specific choice

Simultaneous report

Canberra

Sydney



After class appeals

- Students have an opportunity to provide a written “appeal” of any question
- Appeals help faculty to improve questions
- Appeals help students by requiring them to review material at a deeper level

After class: peer evaluation


- Team members “grade” each other on their performance as team members
 - Mitigates “free rider” problem
 - Learn by evaluating performance

Quantitative Analysis

To complete this section, you must distribute the given number of points among your teammates. ✕

Teammate	Score
Team member 1	<input type="text" value="9"/>
Team member 2	<input type="text" value="11"/>
Points Remaining : <input type="text" value="0"/>	

Divide 20 points among your two teammates



Qualitative Analysis

To complete this section, you must answer all the questions marked with an asterisk. ✕

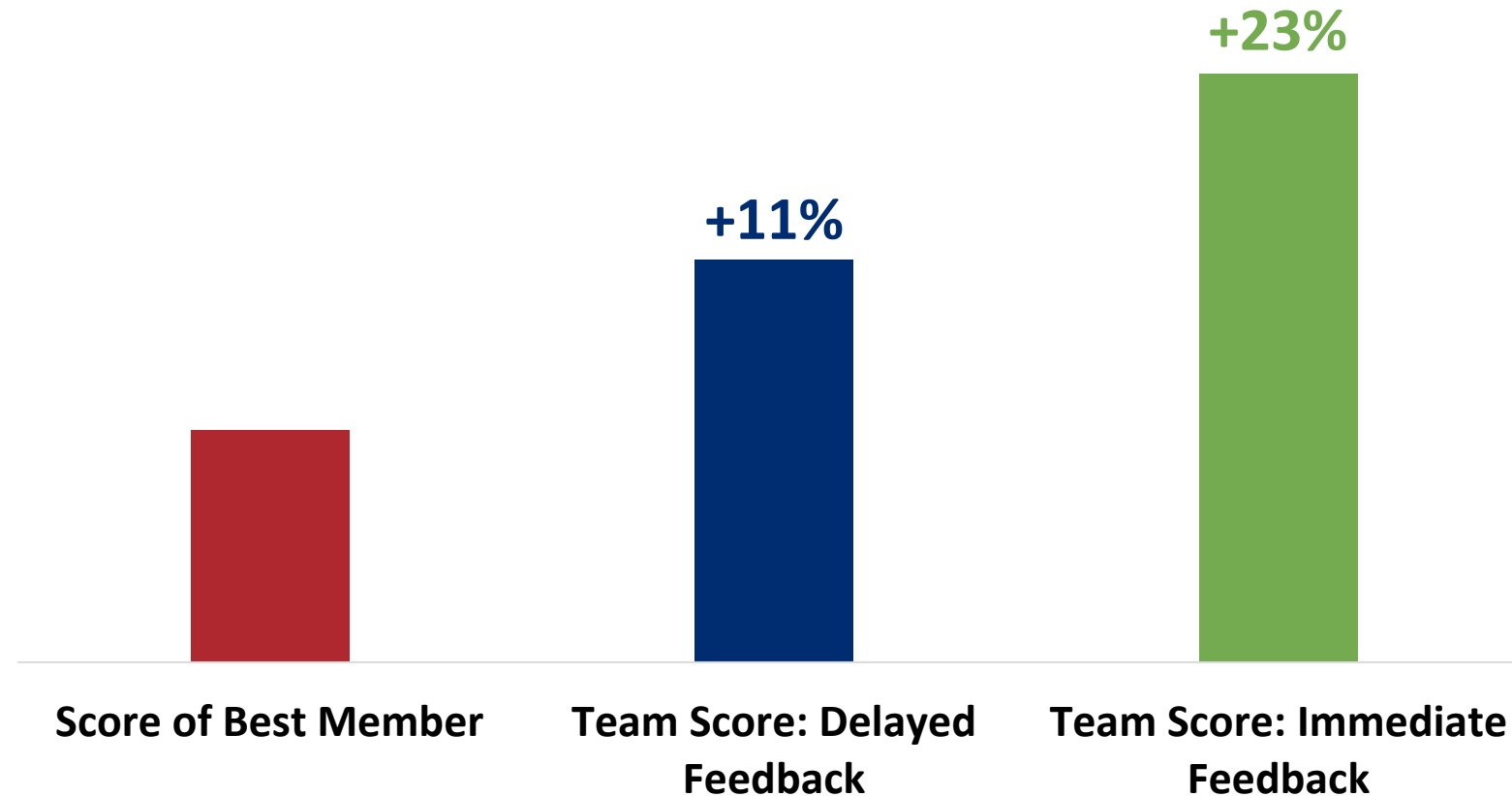
demo1#2 Generic

What did your teammate do well and should continue doing?

What you could your teammate do differently to become a better teammate?

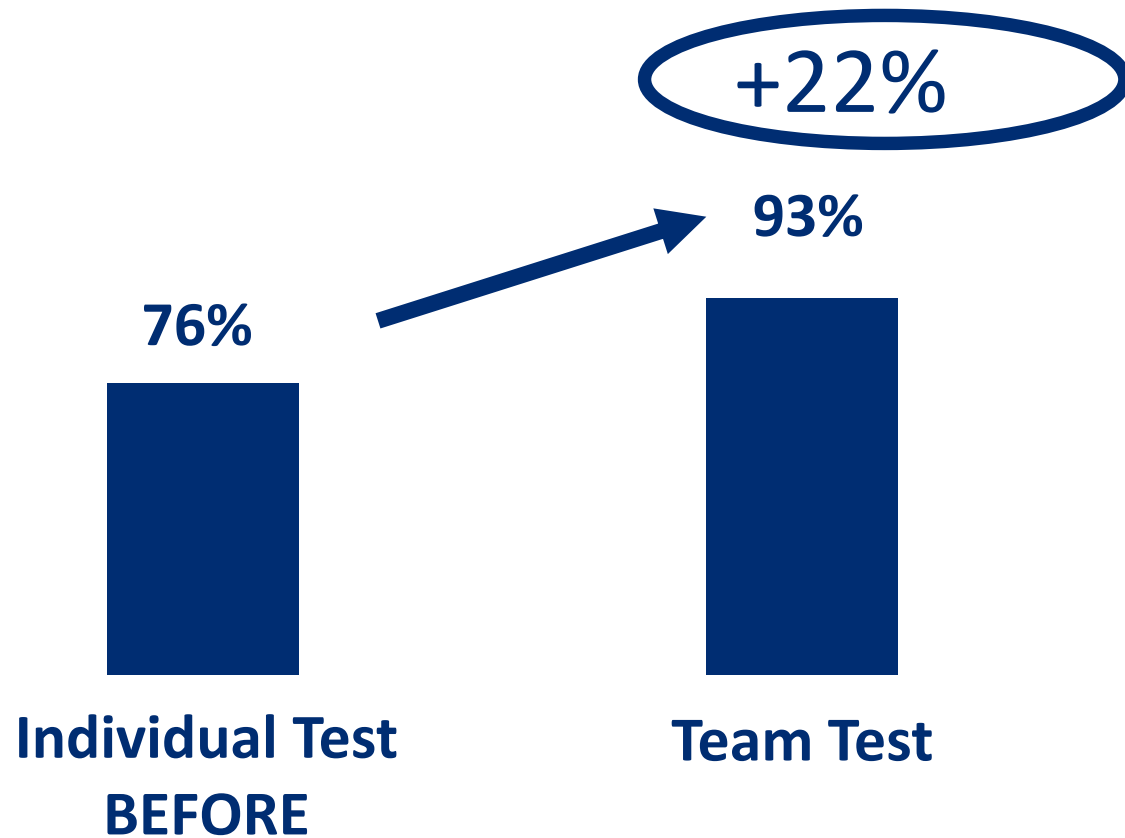
Individual versus team: Michaelsen

In a study of over 1,500 TEAMS...

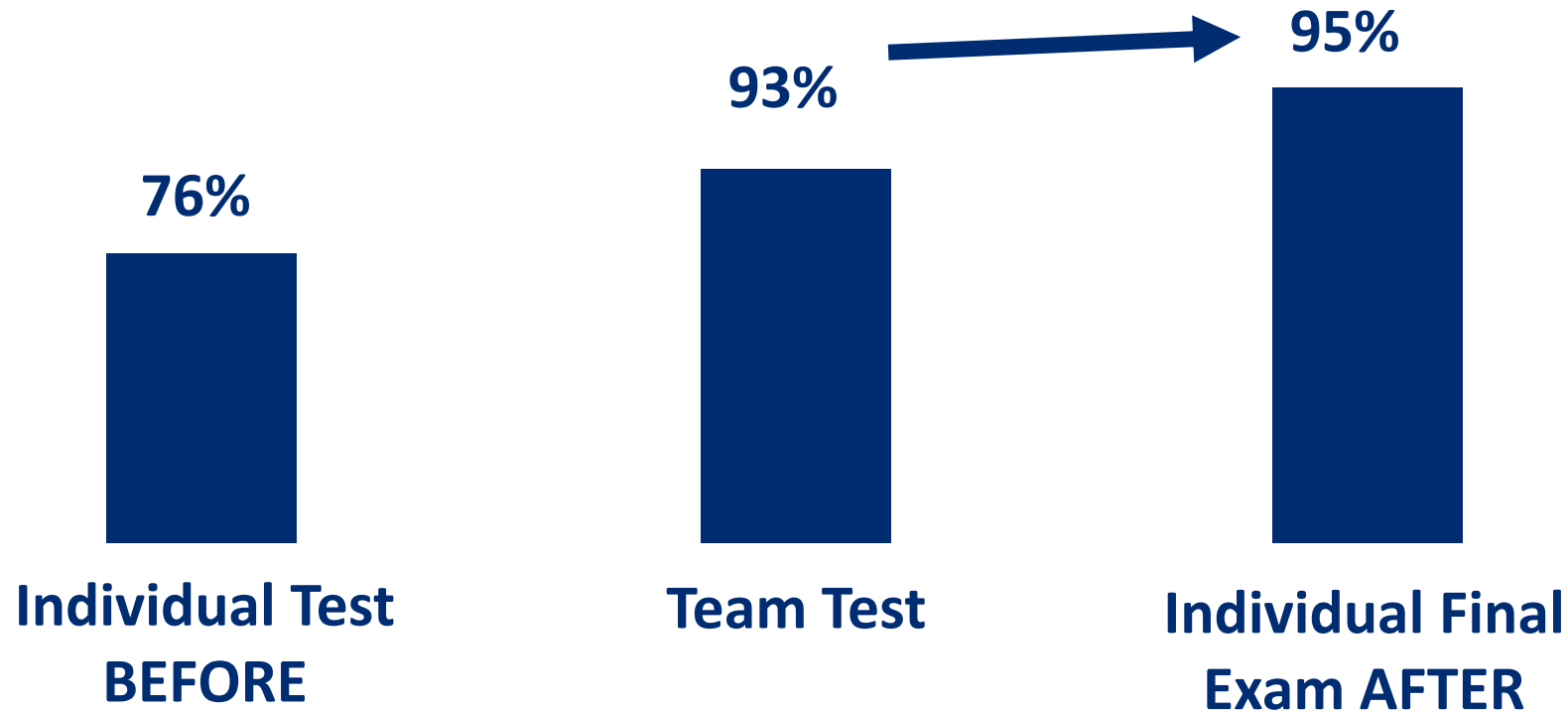


Source: Larry Michaelsen, David Ross Boyd Professor Emeritus of Management at the University of Oklahoma, Founder of TBL. Personal communication.

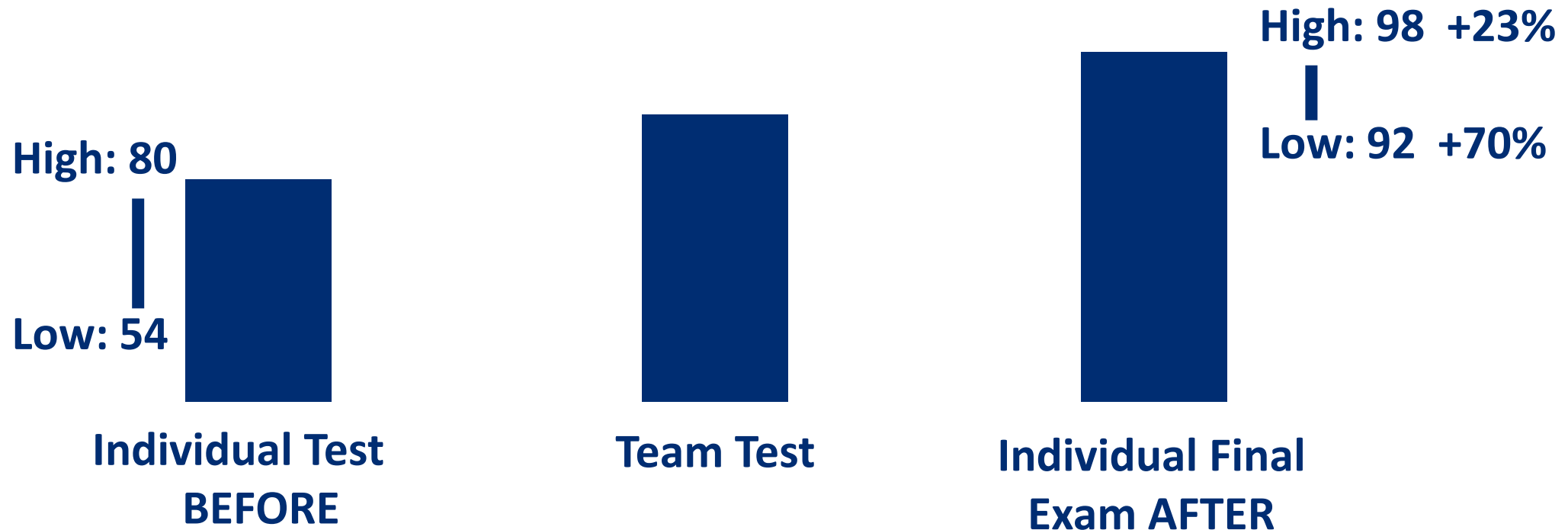
My class: teams outperform individuals



My class: individuals retain team gains



My class: high-low range narrows



World Economic Forum future skills

Top 10 skills required in 2020	<u>Lecture</u>	<u>TBL</u>
1. Complex Problem Solving		✓
2. Critical Thinking		✓
3. Creativity		
4. People Management		✓
5. Coordinating with Others		✓
6. Emotional Intelligence		
7. Judgement and Decision Making		✓
8. Service Orientation		
9. Negotiation		✓
10. Cognitive Flexibility		

World Economic Forum Future of Jobs
Report-<http://reports.weforum.org/future-of-jobs-2016/shareable-infographics/>

TBL supported by research

The screenshot shows the ERIC database search results for the query 'team-based learning'. The search results are displayed in a list format, showing the title of the article, the author(s), the journal name, and the year. Each result includes a 'Peer reviewed' icon and a 'Direct link' button. The search results are filtered to show only peer-reviewed articles. The search results are as follows:

Publication Date	Count
In 2016	24
Since 2015	75
Since 2012 (last 5 years)	169
Since 2007 (last 10 years)	277
Since 1997 (last 20 years)	351

Descriptor	Count
Teamwork	177
Cooperative Learning	129
Teaching Methods	122
Foreign Countries	105
Student Attitudes	72
Higher Education	54
Instructional Effectiveness	53
Undergraduate Students	47
College Students	44
Case Studies	41

Source	Count
Anatomical Sciences Education	15
New Directions for Teaching...	11
Journal on Excellence in ...	9
Journal of Management...	8
Advances in Physiology ...	7
Decision Sciences Journal of...	6
Advances in Engineering...	5
Journal of College Teaching & ...	5
Journal of Continuing...	5
Journal of Information...	5

Collection **Thesaurus** [Notes](#) [FAQ](#) [Contact Us](#)

team-based learning [Advanced Search Tips](#)

Peer reviewed only Full text available on ERIC

Showing 1 to 15 of 361 results [Save](#) | [Export](#)

Teaching Research to MSW Students: Effectiveness of the Team-Based Learning Pedagogy
Macke, Caroline; Tapp, Karen – Journal of Teaching in Social Work, 2012
Social work students often have been labeled as research-reluctant. Consequently, it is important to identify effective teaching strategies. One innovative strategy is team-based learning. The effectiveness of team-based learning has not yet been evaluated with a social work research class. As a result, the current study compared the effectiveness...
Descriptors: Instructional Effectiveness, Self Efficacy, Social Work, Teaching Methods

Team-Based Learning
Michaelsen, Larry K.; Sweet, Michael – New Directions for Teaching and Learning, 2011
Team-based learning (TBL), when properly implemented, includes many, if not all, of the common elements of evidence-based best practices. To explain this, a brief overview of TBL is presented. The authors examine the relationship between the best practices of evidence-based teaching and the principles that constitute team-based learning. (Contains...
Descriptors: Teaching Methods, Teamwork, Cooperative Learning, Critical Thinking

Creation of Exercises for Team-Based Learning in Business
Timmerman, John E.; Morris, R. Franklin, Jr. – International Journal of Teaching and Learning in Higher Education, 2015
Team-based learning (TBL) is an approach that builds on both the case method and problem-based learning and has been widely adopted in the sciences and healthcare disciplines. In recent years business disciplines have also discovered the value of this approach. One of the key characteristics of the team-based learning approach consists of...
Descriptors: Teamwork, Business Administration Education, Teaching Methods, Instructional Effectiveness

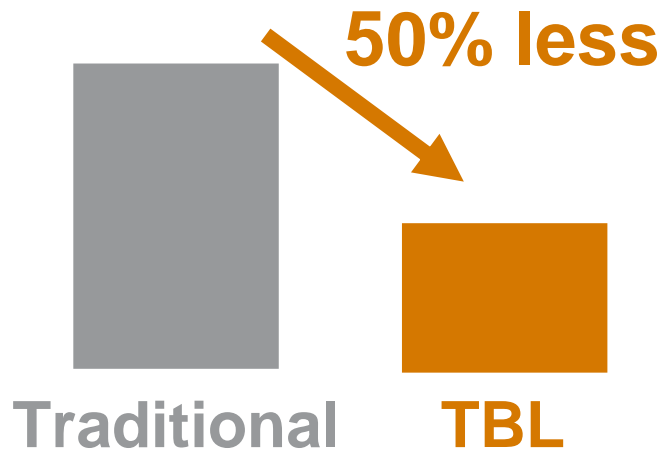
Social Work Students' Perceptions of Team-Based Learning
Macke, Caroline; Taylor, Jessica Averitt; Taylor, James E.; Tapp, Karen; Canfield, James – Journal of Teaching in Social Work, 2015
This study sought to examine social work students' perceptions of Team-Based Learning (N = 154). Aside from looking at overall student perceptions, comparative analyses examined differences in perceptions between BSW and MSW students, and between Caucasian students and students of color. Findings for the overall sample revealed favorable...
Descriptors: Social Work, Student Attitudes, Teamwork, Cooperative Learning

300+ journal articles

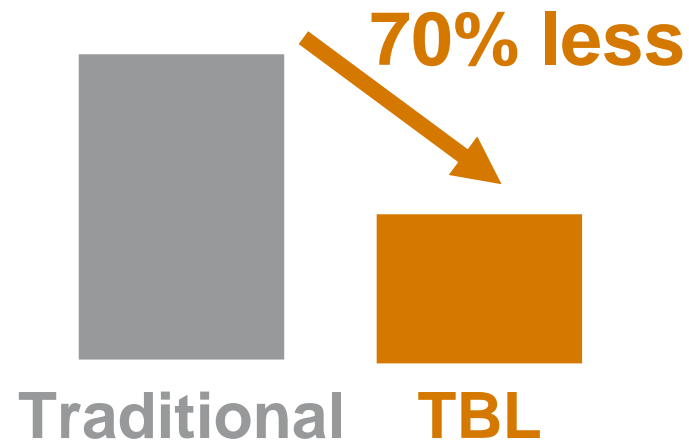
Curriculum and resource savings



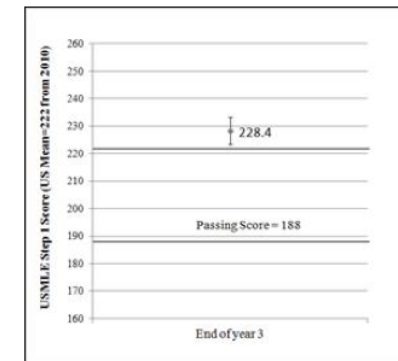
Classroom time



Faculty time



Better exam scores



Kamei RK, Cook S, Puthuchery J, Starmer CF. Medical Science Educator. 22: 2012.

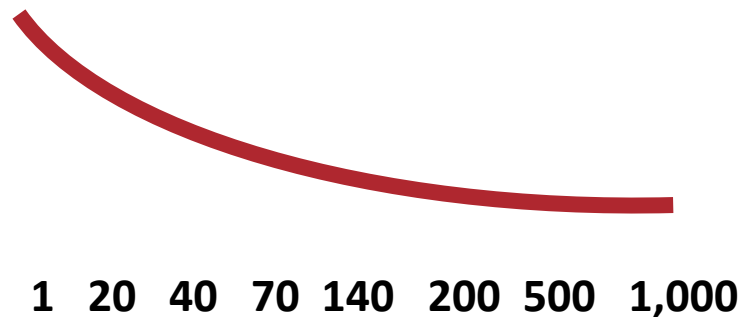
Note: Classroom and faculty time are unpublished estimates. Exam scores versus US national average published as cited..

Effectiveness in large classes

Traditional class

Outcomes decline as class size increases

Outcomes

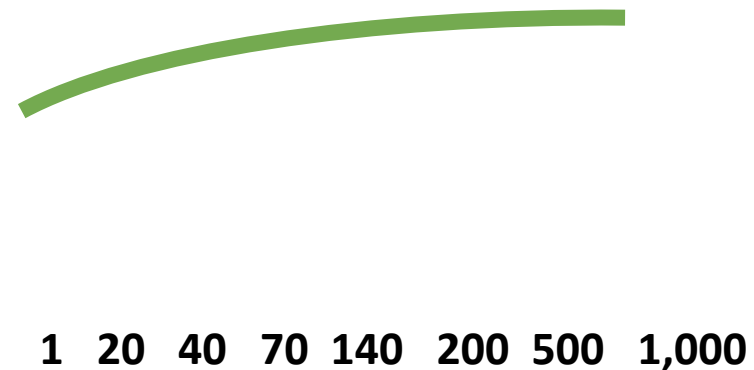


Number of students

TBL class

Outcomes rise and maintain better as class size increases

Outcomes



Number of students

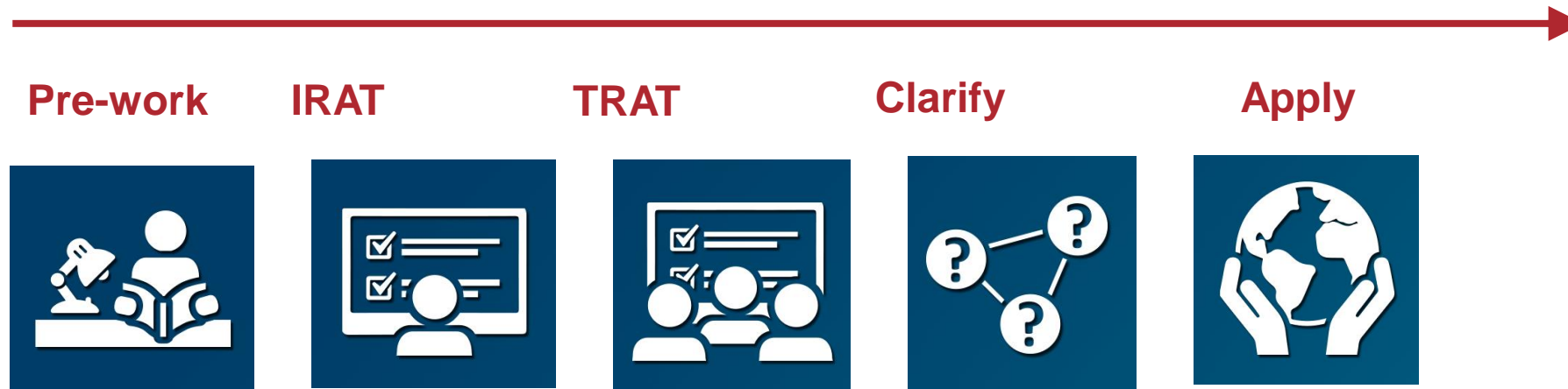
Illustrative

Considerations

- Design of TBL course materials (pre-work, questions and cases)
- Change management for educators and learners
- Administrative process to implement

Backwards design

TBL Class Flow



Backwards Design



Team formation

- Always instructor created
- Assembled to create a diverse team
- Same teams for the entire term
- Sizes:
 - Typically 5-7 in face-to-face
 - Online smaller usually 3 or 4

Schedule examples

3-hour (1x per week)

Readiness Phase (75 min)

- IRAT (20 MCQ) 25 min
- TRAT (20 MCQ) 25 min
- Clarify doubts 25 min

[Break]

Application Phase (75 min)

- Application cases 3-6x (5-15 min each)

1-hour (3x per week)

Monday

- IRAT (10 MCQ) 15 min
- TRAT (10 MCQ) 15 min
- Clarify doubts 30 min

Wednesday

- Cases ~3x (5-15 min each)

Friday

- Cases ~3x (5-15 min each)

Summary

- **Team-based learning (“TBL”):**
specific type of blended learning
- Positive impact on scores and alignment future skills
- Change management to implement

Learn more

Brian O’Dwyer

odwyerb@erau.edu

**Team-Based Learning
Collaborative**

www.teambasedlearning.org

TBL software

www.intedashboard.com