Team Based Learning in a Mechanical Engineering undergraduate programme

Victor Geh
Steve Cayzer
Goals of this talk

• If you are new to Team Based Learning (TBL)
  • To motivate you to talk to me, find out more and maybe give it a try

• If you are a TBL expert
  • To motivate you to provide help and guidance particularly on peer evaluation

• Anyone else
  • To motivate you to engage - all comments welcome!
Picture of Tutorial showing
- lack of peer engagement
- patchy attendance
Team-based Learning (TBL)

- TBL is a teaching strategy that brings the benefits of small group teaching into a large group setting.
- Students are given the responsibility for their own learning and are held accountable to their team.

**i. Pre-class preparation**
- Lecture(s)
- Pre-reading

**ii. Readiness Assurance Process (RAP)**
- Students take a Readiness Assurance Test (RAT) to establish basic concepts
- First attempt test individually (iRAT)
- Attempts same test as a team (tRAT)

**iii. Team Application Activities**
- Teams use newly learnt concepts to solve increasingly difficult application exercises
The TBL Process

1. Pre-class Preparation
   - Lectures
   - Screencasts
   - Pre-class reading
   - E-learning resources

2. Readiness Assurance Process
   - iRAT: Individual MCQs
   - tRAT: Team Discussion of MCQs answers revealed by scratchcards
   - Tutor Instructions
   - Appeals

3. Application Activities
   - Teams use concepts learnt in RAP to solve challenging problems
   - Team debate and discussion
   - Problems build towards exam style questions
### The TBL Process

#### Pre-class Preparation
- Lectures
- Screencasts
- Pre-class reading
- E-learning resources

#### Readiness Assurance Process
- iRAT: Individual MCQs
- tRAT: Team Discussion of MCQs answers revealed by scratchcards

#### Application Activities
- Teams use concepts learnt in RAP to solve challenging problems
- Team debate and discussion
- Problems build towards exam style questions
iRAT: Individual MCQs

tRAT: Team Discussion of MCQs answers revealed by scratchcards

Tutor Instruction

Appeals
Individual Test

Team takes same Test
Readiness Assurance Test Scores

- iRAT Avg
- iRAT Max
- tRAT
Picture of students engaged in iRAT/tRAT
Teams use concepts learnt in RAP to solve challenging problems.

Team debate and discussion.

Problems build towards exam style questions.
Picture of students engaged in Application Activity
Methodology (Timeline)

Stage 1

TBL 1 (RAT) → TBL 2 (App) → TBL 3 (App)

Feedback 1

Stage 2

TBL 4 (RAT) → TBL 5 (App)

Feedback 2

(7 weeks)
What went well?

- The Readiness Assurance Test (RAT)
- Peer learning at a large scale

“The quiz in TBL 1 was really useful”.

“Things learned are more memorable than standard tutorials”.

![Test Score Chart]

- Average Individual: 7.44
- Highest individual of each team: 8.88
- Team Score: 9.34
What went well?

• The Readiness Assurance Test (RAT)
• Peer learning at a large scale

“Encouraged learning together; useful to hear how other people worked through a problem; I find it easier to ask for help from friends than lecturers and helpers, so this session meant I could learn more”.

- 31, 43%: “Learning from other people’s ideas”
- 16, 22%: “Flowcharts are a good revision technique”
- 9, 12%: “Meeting new people”
- 17, 23%: “Useful quiz”
What did not go so well?

- Flowchart in TBL 2 and TBL 3
- Groups did not develop into high-performing learning teams

“Need to be more general so that what we do is more applicable than just to attempt one specific question.”

“Variation needed.”

Not time efficient enough to keep up with how many questions we should have done... by this point....

The amount of material covered was:

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<tr>
<th>Answer</th>
<th>No. Responses</th>
<th>Relative %</th>
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<tr>
<td>&quot;Just right&quot;</td>
<td>23</td>
<td>27%</td>
</tr>
<tr>
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<td>7</td>
<td>8%</td>
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<tr>
<td>&quot;Too little&quot;</td>
<td>56</td>
<td>65%</td>
</tr>
<tr>
<td>TBL 1 (RAT)</td>
<td>TBL 2 (App)</td>
<td>TBL 3 (App)</td>
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<td>99</td>
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(7 weeks)
Self Assessment

Four Essential Elements of TBL

1. Strategically formed permanent teams with a wide range of skillset
2. The Readiness Assurance Process (e.g. Pre-reading, iRAT, tRAT, feedback)
3. Effective group assignments that develop student’s critical thinking skills
4. Holding students accountable to their work and providing frequent feedback
Conclusion

The Easy part

• iRAT/tRAT worked!
• Scaling up of learning

The Hard Part

• Designing Application Activities
• Building High Performing Teams (peer evaluation)

TBL does not play well with ‘traditional’ tutorial schedule/mindset