Medical Education Journal Club

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## Disclosure Information

**Activity Directors / Planners / Reviewers / Faculty**

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Disclosure / Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carla S. Lupi, MD</td>
<td>Activity Director/Planner/Speaker</td>
<td>Dr. Lupi reports no relevant financial relationships.</td>
</tr>
<tr>
<td>Vivian Obeso, MD</td>
<td>Planner/ Speaker</td>
<td>Dr. Obeso reports no relevant financial relationships.</td>
</tr>
<tr>
<td>Christian Castro</td>
<td>Planner</td>
<td>Mr. Castro reports no relevant financial relationships.</td>
</tr>
<tr>
<td>Melissa Ward-Peterson, MPH</td>
<td>Planner</td>
<td>Ms. Ward-Peterson reports no relevant financial relationships.</td>
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</tbody>
</table>
Learning Objectives

• Be able to list the search results for one medical education database consulted in the design of a course or teaching session.

• Conduct a critical appraisal of an article in the medical education research.

• Identify the applicability of research results to one's own course or teaching session.
Medical Education Journal Club

• Establish a forum for faculty to share and discuss recent literature in medical education

• Use best evidence in medical education literature to evaluate and advance current practices in our educational program

• Establish a culture that promotes curricular innovation and change in an evidence-based manner

• Stimulate educational scholarship
Today’s Objectives

• Review the elements of TBL
• Review the elements of appraising a systematic review by appraising one
• Appreciate (if you don’t already) the BEME series
• Summarize the evidence on TBL in HPE
• Consider the implications for HW FIUCOM
Background

Brief description of TBL
TBL at a glance

BEFORE CLASS
- Absolutely essential, vital!!

DURING CLASS
- iRAT
- gRAT
- Appeal Process
  - Instructor’s review and clarification of questions
- GAE
  - Instructor wrap-up

Peer Assessment
TBL at a glance

BEFORE CLASS

Absolutely essential, vital!!

DURING CLASS

iRAT

gRAT

Real Process

Social Learning & Peer Monitoring of Team Functioning

clarification of questions

GAE

Instructor’s review and clarification of questions

Instructor wrap-up

Saves contact time for application!

ALL WITH JUST ONE TEACHER!

INDIVIDUAL ACCOUNTABILITY
JITT: Addressing the RAT Qs
The Goal of Application Exercises:
Students engaging with Students
Small Group Learning

Why don’t they ever listen to me?

I’m not doing anything for this class until the final.

But I would really like to learn this stuff..

Just let me answer it so we can get out of here!
Systematic Reviews & Appraising Today’s Article

Types of review studies
The BEME series!
Framework for Appraisal of SR
Types of Reviews

Reviews
(narrative/literature/traditional)

Systematic reviews

Meta-analysis
The Best Evidence in Medical Education (BEME) Series of Systematic Reviews from AMEE/Medical Teacher

**SEPTEMBER 2013**
*Doctor Role Modelling in Medical Education*

**OCTOBER 2013**
*Impact of an Intercalated BSc on Medical Student Performance and Careers*

**NOVEMBER 2013**
*A review of the literature regarding the effectiveness of interventions to promote successful adoption of Electronic Health Records in healthcare professionals*

**DECEMBER 2013**
*The effectiveness of team-based learning on learning outcomes in health professions education: A Best Evidence in Medical Education Systematic Review*

- Methodology based on Cochrane principles available at: [www.bemecollaboration.org](http://www.bemecollaboration.org)
- Different than AMEE Guides=practical reviews
The effectiveness of team-based learning on learning outcomes in health professions education: BEME Guide No. 30

MIM FATMI, LISA HARTLING, TRACEY HILLIER, SANDRA CAMPBELL & ANNA E. OSWALD
University of Alberta, Edmonton, Canada

Abstract

**Background**: Team-Based Learning (TBL) is a student-centred active learning method, requiring less faculty time than other active learning methods. While TBL may have pedagogical value, individual studies present inconsistent findings. The aim of this systematic review was to assess the effectiveness of TBL on improving learning outcomes in health professions education.

**Methods**: A peer-reviewed systematic review protocol was registered with the Best Evidence in Medical Education (BEME) organization. After comprehensive literature searching, title and full-text review were completed by two independent reviewers. Included studies assessed TBL and a valid comparator in health professions. Included studies were assessed for methodological quality by two independent reviewers. Studies were categorised by outcomes using the Kirkpatrick framework.

**Results**: Of 330 screened titles, 14 were included. Seven studies reported significant increase in knowledge scores for the TBL group, four reported no difference and three showed improvement but did not comment on statistical significance. Only one study reported significant improvement in learner reaction for the TBL group while another study reported a significant difference favouring the comparator.

**Conclusions**: Despite improvement in knowledge scores, there was mixed learner reaction. This may reflect the increased demands on learners in this student-centred teaching strategy, although further study is needed.
Critical Appraisal of a Systematic Review with Fs
In comparison to other forms of education instruction.... “Is TBL effective in improving learning outcomes in health professions education?”

**Population:** Health Professions Students

**Intervention:** TBL

**Comparator:** Lectures, workshops, small-group learning (SGL), case-based discussions (CBD), clinical exposure, & blended learning

**Outcomes:**

- **Evaluation of Results:**
  - What happens to patient populations as a result of what they’ve learned?

- **Evaluation of Behavior:**
  - What do students do with what they’ve learned? What do they intend to do?

- **Evaluation of Learning:**
  - What do students know now (short term)? What do they retain & remember (long term)?

- **Evaluation of Reaction:**
  - How do students feel about their learning experience? About their instructor?
**FRAME**

In comparison to other forms of education instruction…. “Is TBL effective in improving learning outcomes in health professions education?”

**FETCH**

- Databases searched:
  - 5 health-related databases
  - 6 general databases
- Detailed search term list and strategy for each type of database
- Cited reference search
- Search for unpublished, recently published, or ongoing studies

**FILTER 1**

Screening & Selection:
- Titles and abstracts screened by 2 reviewers
- Detailed inclusion/exclusion criteria used to eliminate irrelevant studies
- Full-text review then conducted

**FILTER 2**

Assessment of Methodological Quality by 2 independent reviewers:
- Cochrane Risk of Bias tool used for controlled trials
- Newcastle-Ottawa Scale used for cohort studies
BELIEVABLE ENOUGH TO LOOK AT THE RESULTS?
What did the reviewers learn?
336 studies identified –

> 14 studies included > 6 UME

- 1 RCT
- 1 NRCT
- 1 retrospective cohort study
- 3 non-concurrent cohort studies
Framing&Filtering2

RCTs and NRCTs (3 studies) all at “high risk” of bias

no reporting of allocation concealment-3
non-randomized assignment-2
no blinding of participants-3
no or unreported blinding of outcome assessors and/or data analysts-3
Framing & Filtering

Cohort studies: all 5 UME studies “fair”

retention/completeness of f/u – 4
representativeness of exposed cohort-2
Summary Findings Across HPE
Learning (see table 5)

• Knowledge as assessed via MCQ, mixed between no difference and favoring TBL, with weight toward latter

• Comparator did not matter overall, but only RCT found no difference between TBL and CBGD
Student Reaction (see table 5)

• 7 studies reporting
• Comparator did not matter
<table>
<thead>
<tr>
<th>Study Type</th>
<th>ID</th>
<th>Course</th>
<th>Summary of Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT: 83 M2s</td>
<td>Koles et al. 2005 Wright State</td>
<td>Pathology</td>
<td>No significant differences in exam scores were found between TBL session Qs and <strong>CBGD</strong> Qs.</td>
</tr>
<tr>
<td></td>
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<td></td>
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</tr>
<tr>
<td>NRCT: 167 M2s</td>
<td>Willett et al. 2011 NJSMD</td>
<td>Pathophys Endo/rheu m module 6 sessions</td>
<td>Significant difference between the exam scores of TBL and <strong>SGL</strong> groups favoring TBL (81.7% vs. 79.7%, p=0.04). After adjusting for performance on non-TBL modules (prior coursework), no significant difference was reported.</td>
</tr>
<tr>
<td>Assignment by last name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRCT: 112 M3s</td>
<td>Thomas 2011: Hopkins</td>
<td>Ambulator medicine modules</td>
<td>Significant difference favoring TBL over <strong>SGL</strong> of 4% in first three modules and then 12% in second three modules.</td>
</tr>
<tr>
<td>Retrospectiv Cohort: 178 M2s</td>
<td>Koles et al. 2010 Wright State</td>
<td>Pathology within OSMs</td>
<td>TBL-related Qs answered correctly on average 5.9% more often than than TBL-unrelated Qs (<strong>mixed learning</strong>). Within the lowest academic quartile, TBL-related Qs were answered correctly more often than in the highest academic quartile (7.9% vs. 3.8%, p=0.001).</td>
</tr>
<tr>
<td>Study Type</td>
<td>Name/Year</td>
<td>Course</td>
<td>Summary of Findings</td>
</tr>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Non-concurrent Cohort</td>
<td>Levine et al. 2004</td>
<td>Psychiatry Clerkship M3s</td>
<td>Significant increase in NBME psychiatry subject exam scores between the TBL cohort and <strong>lecture cohort</strong> (72.9% vs. 69.6%, p&lt;0.05).</td>
</tr>
<tr>
<td></td>
<td>173 lecture 133 TBL</td>
<td></td>
<td>No difference in average scores between groups. Significant decrease in number of exam failures after the implementation of TBL compared to the <strong>lecture</strong> group (1 vs. 6, p&lt;0.001).</td>
</tr>
<tr>
<td></td>
<td>Nieder et al. 2005</td>
<td>Anatomy M1s</td>
<td>Student performance on exams improved significantly in the module in which TBL was implemented compared to the <strong>lecture</strong> groups one and two years prior (75% vs. 58% and 47%, respectively, p=0.03).</td>
</tr>
<tr>
<td></td>
<td>N=95 M1s TBL N=276 M1s no TB</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zgheib et al. 2010</td>
<td>Pharm 2 sessions only M2s</td>
<td></td>
</tr>
</tbody>
</table>
8 GOLD & 8 GREEN TEAMS

8 ACTIVE LEARNING MODULES in PATHOLOGY: ADVANCE ASSIGNMENT LECTURE + READING

10 QUESTION RAT. GREEN TEAMS ASSIGNED to ONE MODE, GOLD to OTHER

8 TEAMS in CBGD
CBGD: 2 or 3 CASES in GROUPs of 13-20 w/ 1 FACULTY

8 TEAMS in TBL
TBL APPLICATION EXERCISES for 40
TAKE GRAT

CROSSOVER TO OTHER METHOD FOR OTHER MODULES

ALL STUDENTS TAKE EOC EXAMS=
PATH Qs RELATED TO ACTIVE LEARNING + Qs

Table 3

Comparison of the Performance of 178 Second-Year Medical Students on Pathology-Based Exam Questions (PBQs), Boonshoft School of Medicine, 2003–2005*  

<table>
<thead>
<tr>
<th>Group of PBQs</th>
<th>No. of questions</th>
<th>DI: Mean (SD)</th>
<th>Score Mean % (SD)</th>
<th>Range %</th>
<th>P value†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All CCEs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR</td>
<td>243</td>
<td>0.20 (0.12)</td>
<td>83.6 (6.1)</td>
<td>64.0–96.1</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>TU</td>
<td>462</td>
<td>0.22 (0.13)</td>
<td>77.7 (6.9)</td>
<td>59.7–91.3</td>
<td></td>
</tr>
<tr>
<td><strong>Term 1 CCEs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR</td>
<td>127</td>
<td>0.20 (0.12)</td>
<td>82.3 (7.3)</td>
<td>59.7–98.5</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>TU</td>
<td>267</td>
<td>0.22 (0.14)</td>
<td>77.5 (7.2)</td>
<td>60.0–93.6</td>
<td></td>
</tr>
<tr>
<td><strong>Term 2 CCEs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR</td>
<td>116</td>
<td>0.20 (0.13)</td>
<td>85.0 (7.0)</td>
<td>51.9–100.0</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>TU</td>
<td>195</td>
<td>0.22 (0.13)</td>
<td>78.0 (7.7)</td>
<td>57.3–96.2</td>
<td></td>
</tr>
</tbody>
</table>

* CCE indicates comprehensive course examination; DI, discrimination index; TR, TBL-related PBQ; TU, TBL-unrelated PBQ.
† The P value compares TR versus TU scores.
Table 4

Performance of Second-Year Medical Students in the Highest Academic Quartile (n = 45) Versus Those in the Lowest Academic Quartile (n = 45) on Pathology-Based Examination Questions (PBQs), Boonshoft School of Medicine, 2003–2005*

<table>
<thead>
<tr>
<th>Academic quartile and group of PBQ</th>
<th>Score on all exams</th>
<th>Difference in scores†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean % (SD)</td>
<td>Range %</td>
</tr>
<tr>
<td><strong>Highest quartile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR</td>
<td>89.3 (4.0)</td>
<td>80.6 to 96.1</td>
</tr>
<tr>
<td>TU</td>
<td>85.5 (3.2)</td>
<td>78.8 to 91.3</td>
</tr>
<tr>
<td><strong>Lowest quartile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR</td>
<td><strong>77.5 (5.8)</strong></td>
<td>64.0 to 86.8</td>
</tr>
<tr>
<td>TU</td>
<td>69.6 (4.5)</td>
<td>59.7 to 77.5</td>
</tr>
</tbody>
</table>

* TBL, team-based learning; TR, TBL-related PBQ; TU, TBL-unrelated PBQ.
† TR versus TU scores.
‡ P = .001 for two-way ANOVA interaction comparing the difference in mean scores on TR and TU questions for highest- versus lowest-quartile students.

Fewer Failures: Nieder et al, 2005

Fig. 1. Overall class performance in the Human Structure course in years 1999–2002. ‘Initial failures’ are those students achieving <60% average on major exams. ‘Remediations’ includes those students achieving an average ≥60% but <70%. ‘Remediation resulting in failure’ includes remediating students still not achieving 70% after the remediation retests. ‘Total failures’ are the sum of initial failures and failures after remediation. N = number of students in each class.
Hmmmm.....

• Why validity of even MCQs, especially when the primary outcome, is seldom reported...., much less cognitive level of MCQ; and why are Ns missing?
• Why students aren’t more enthusiastic....
• Can you really hold interventions assessing pedagogy to a standard of blinding students?
• The how and why of the elements of TBL
• How can research on TBL be designed to look at higher level Kirkpatrick outcomes?
• The faculty factor....& why TBL didn’t trump lecture....
Evaluation of Results

What happens to patient populations as a result of what they’ve learned?

Evaluation of Behavior

What do students do with what they’ve learned? What do they intend to do?

Evaluation of Learning

What do students know now (short term)? What do they retain & remember (long term)?

Evaluation of Reaction

How do students feel about their learning experience? About their instructor?
Questions, comments, and what about us?
Please complete the CME survey to receive credit for attendance.
• Two clerkship studies: Levine (3 point NBME performance) vs. lecture
• Thomas and bowen (Jhopkins) vs. sgl
<table>
<thead>
<tr>
<th>Non clerkship</th>
<th>Path/c bgd</th>
<th>No sig diff overall, better long term in lowerst quartile – LOOK UP</th>
<th>peer?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koles 2005 RCT 83 m2s</td>
<td>Retro/mixd</td>
<td>5.9% overall for TBL, lowest quartile data</td>
<td></td>
</tr>
<tr>
<td>Nieder 2005 NCClecture</td>
<td>No change av exam scores; reduced failure rate</td>
<td>Lectures used to deliver some</td>
<td></td>
</tr>
<tr>
<td>Zgheib</td>
<td></td>
<td>Used in only two sessions</td>
<td></td>
</tr>
<tr>
<td>Thomas&amp;B 2011</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levine 2004</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Design: RCTs & NRCTs

- **RCT**: Assignment is randomized
- **RCTs** are experimental designs

- **NRCT**: Assignment is NOT randomized
- **NRCTs** are quasi-experimental designs

**FIGURE 7-1.** Schematic Representation of Experimental Study Implementation
Study Design: Cohort Studies

Cohort studies are observational.
## Findings: UME

<table>
<thead>
<tr>
<th>Comparator</th>
<th>Name/Year</th>
<th>Course</th>
<th>Summary of Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Lecture</td>
<td>Levine et al. 2004</td>
<td>Psychiatry</td>
<td>Significant increase in NBME psychiatry subject exam scores between the TBL cohort and lecture cohort (72.9% vs. 69.6%, p&lt;0.05).</td>
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<tr>
<td></td>
<td>Nieder et al. 2005</td>
<td>Anatomy</td>
<td>No difference in average scores; less variation in scores. There was a significant decrease in the number of exam failures after the implementation of TBL compared to the lecture group (1 vs. 6, p&lt;0.001).</td>
</tr>
<tr>
<td>Blended Learning</td>
<td>Koles et al. 2010</td>
<td>Pathology</td>
<td>TBL-related questions were answered correctly an average of 5.9% more often than TBL-unrelated questions. Within the lowest academic quartile, TBL-related questions were answered correctly more often than in the highest academic quartile (7.9% vs. 3.8%, p=0.001).</td>
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