Research in Team-Based Learning

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Unique Characteristics of Health Professions Education

Typical Higher Education Classroom Setting	Typical Health Professions Education Setting (includes undergraduate, graduate, and continuing medical education)
Courses taught by one or few instructors	Courses taught by large, loosely aligned groups of faculty
Large (>40 hours) amount of contact hours with students	Contact hours often limited and significantly less than 40 hours
Courses are graded	Graduate medical education (GME) and continuing medical education (CME) settings often do not assign grades
Learners have their time protected to attend class	Learners often have competing responsibilities that include patient care, scheduling conflicts, etc.
Teacher has time protected for planning and implementing a course	Teachers often have to balance 'donated' teaching time with funded mandates, such as clinical work and research
Course instructor often has a large degree of control over the grading structure of the course	Medical schools often have mandated grading structures that dictate the number and timing of tests and the grade distributions that must ensue.
Course sizes often < 100 learners	Course sizes often > 100 learners

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Overview of TBL Research in Health Sciences Education

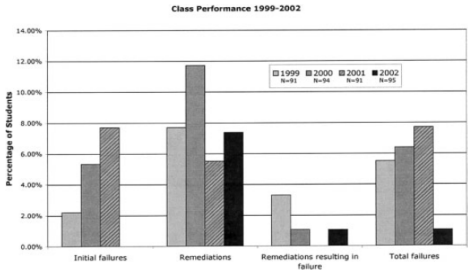
- Scope of Published Reports
- Knowledge-Based Outcomes
- Classroom Engagement
- Learner Attitudes

Scope of Published Reports

- MedEdPORTAL: physiology, pharmacology, genetics, immunology, nutrition, neurology, endocrinology, psychiatry, hematology, pulmonary medicine, cardiology, gynecology, geriatrics, and interprofessional education
- Peer-Reviewed Literature: anatomy, microbiology, pharmacology, research ethics, embryology, medical ethics, pathology, endocrinology, cultural competency, cardiology, psychiatry, substance abuse screening, evidence-based medicine, nursing
- Countries: U.S.A., Korea, India, Croatia, Germany

Knowledge-Based Outcomes

Gross Anatomy Performance



Nieder et al; Clinical Anatomy 2005;18:56-63

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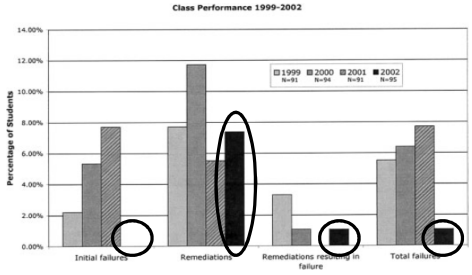

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Gross Anatomy Performance

Analysis of Student Performance (Percent Score and Standard Deviation)

Year	*N*	Unit 1	Unit 2	Unit 3	NBME[a]
2002	169	73 (9.6)	75 (7.5)	71 (8.3)	70 (7.0)
2003	173	70 (7.7)	73 (9.6)	77 (6.9)	64 (8.6)
2004	168	77 (8.7)	81 (8.9)	80 (8.8)	70 (7.3)
2005	178	81 (9.2)	88 (8.1)	85 (7.3)	72 (7.0)
2006	176	84 (8.6)	87 (9.3)	86 (6.5)	78 (6.9)
Group grades[b]					
2005		97	98	97	
2006		100	99	97	

Vasan et al; Anatomical Sciences Education 2008;1:3-9

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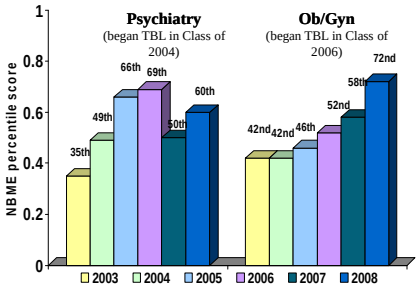
Comparison of Psychiatry and Ob/Gyn Clerkship Performance



Levine et al, Teaching and Learning in Medicine 2004;16:270-275,
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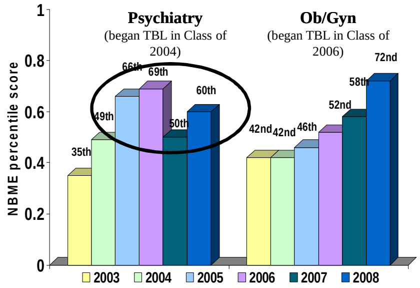

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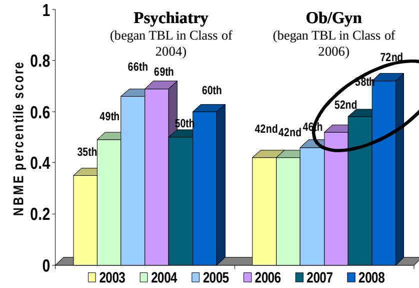

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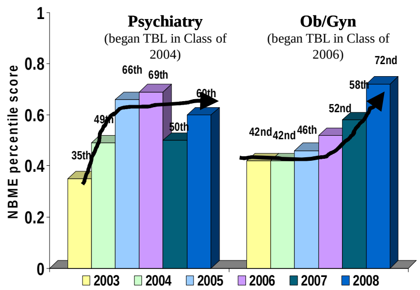

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Pathology Performance: Lecture vs. TBL

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*

Academic quartile and group of PBQ	Score on all exams		Difference in scores†	
	Mean % (SD)	Range %	Mean % (SD)	Range %
Highest quartile				
TR	89.3 (4.0)	80.6 to 96.1	3.8 (5.4)‡	−7.7 to 13.3
TU	85.5 (3.2)	78.8 to 91.3		
Lowest quartile				
TR	77.5 (5.8)	64.0 to 86.8	7.9 (6.0)‡	−5.1 to 20.6
TU	69.6 (4.5)	59.7 to 77.5		

* 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.

Koles et al; Academic Medicine 2010; epub ahead of print

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Classroom Engagement

Pharmacology Engagement

Table 3. *Student Evaluation of the Small Group Participation Experience in the Endocrine Pharmacology Educational Unit.*

Using the paradigm of *strongly agree, moderately agree, moderately disagree, strongly disagree,* and *don't know,* students were asked to indicate the extent to which they agreed with the following eight statements. Questions 9 and 10 in the questionnaire employed a different strategy.

1. Inclusion of small group participation increased the extent of my usual classroom involvement.
2. Inclusion of small group participation enhanced the educational value of my usual classroom involvement.
3. Inclusion of small group participation improved insight into educational material that was presented in classroom sessions.
4. Inclusion of small group participation motivated my preparation prior to attending class.
5. The educational value of small group participation was worth the time that could have been otherwise available to the lecture.
6. Participation in the group presentation at the end of the unit extended my basic knowledge of endocrine pharmacology.
7. Involvement in the group presentation process at the end of the unit was a valuable learning experience in group participation.
8. The cases and questions in the lecture effectively focused small group participation.

Question No.	Strongly Agree	Moderately Agree	Moderately Disagree	Strongly Disagree	Don't Know
1	6	3	0	0	0
2	6	3	0	0	0
3	7	1	0	0	1
4	6	3	0	0	0
5	6	3	0	0	0
6	7	0	0	0	0
7	9	0	0	0	0
8	5	4	0	0	0

Dunaway, Teaching and Learning in Medicine 2005;17:56-62

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Learner Patterns of Engagement

Table 2. *Proportions of Observed Learner Engagement Behavior[a] by Type*

Instructional Method	Class Level	Learner-to-Learners[b] Learner Observed is: Speaking	Learner-to-Learners[b] Learner Observed is: Listening	Learner-to-Instructor Learner Observed is: Speaking	Learner-to-Instructor Learner Observed is: Listening	Self-Engaged[c]	Total Observed Behaviors
Lecture	1st-year medical	22 (10%)	4 (2%)	2 (1%)	94 (45%)	90 (42%)	212
	Physician assistant	24 (5%)	6 (1%)	4 (1%)	272 (64%)	122 (29%)	428
	Total	56 (9%)		372 (58%)		212 (33%)	640
PBL	1st-year medical	37 (13%)	166 (57%)	1 (0%)	36 (12%)	54 (18%)	294
	2nd-year medical	11 (16%)	55 (76%)	0 (0%)	4 (5%)	2 (3%)	72
	Total	269 (74%)		41 (11%)		56 (15%)	366
Team learning	1st-year medical	97 (24%)	95 (25%)	0 (0%)	114 (29%)	86 (22%)	392
	Physician assistant	145 (27%)	144 (27%)	7 (1%)	71 (13%)	177 (32%)	544
	Total	481 (51%)		192 (21%)		263 (28%)	936

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Observed and Perceived Engagement

Table II. Patterns of interactions by learners

	Didactic group	Active group
Interacting with instructor	84%	57%
Interacting with student(s)	16%	43%

*$p < 0.001$, chi square analysis.

Table III. Learners' perceptions of the teaching process*

Scale	Didactic session mean score	Active session mean score	P value (student's t-test)
Engagement*	3.6	4.0	0.001
Value of the Session*	4.3	3.9	0.03
Met Objectives	6.1	9.5	0.004

*Higher numbers indicate more favorable responses (i.e., more actively engaged and higher perceived value of the session). The 'met objectives' scale is reverse scored; higher numbers indicate lower perceptions that the session met its objectives.

Haidet et al, Advances in Health Sciences Education 2004;9:15-27

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STROBE results (observed)

Perceived value

Perceived engagement

Haidet et al, Advances in Health Sciences Education 2004;9:15-27

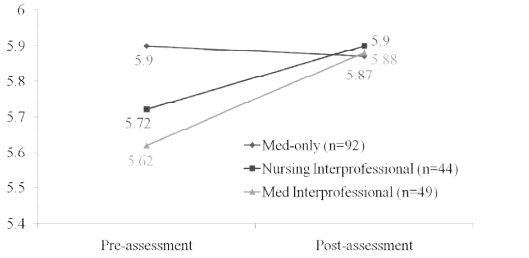
Learner Attitudes

Qualitative Comments

- "I just felt like you wanted to be a team player, so you wanted to be there to help your team out when they were answering the questions and give your input. And you wanted to try to read the night before to help your team"
- "...a lot of times students were kind of learning the stuff, you know, from scratch and because of their levels of understanding are able to explain it to other students in a way that students can understand because they are kind of at the same level..."
- "I think it was during the case study when we were deliberating between 2 different options and I realized that much of our decisions are different because we all come from different backgrounds, have different experiences, and this leads to us all having different perspectives which is beneficial to making a decision but hard to reconcile."
- "I thought working in a group was the most beneficial aspect of my learning experience in today's session. When I didn't know a certain answer I could ask my team member to explain it. For example, I had some questions understanding what a balancing measure was and one of my team mates was able to explain it to me because he had a better understanding of it. Now I know how to explain it. If we had not been working together as a team I would still not know how to explain it."

Hunt et al, Teaching and Learning in Medicine 2003;15:131-139,
Haidet et al, 2010; unpublished data

"Value of Teams" Scores*



*p = 0.02 for interaction between time period and group

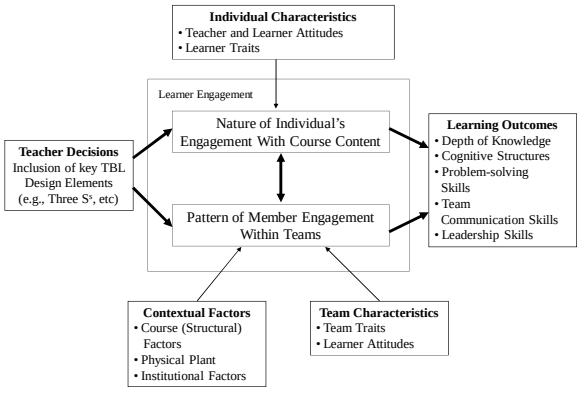
Haidet et al, 2010: unpublished data

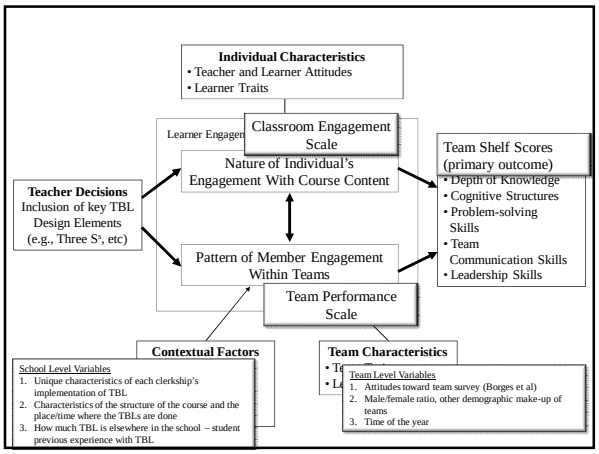
Other Lines of Inquiry

- Patterns of Peer Review Levine et al 2007
- Barriers and Facilitators to Dissemination
  Searle et al 2003, Thompson et al 2007
- Team Performance Measurement Thompson et al 2009, Levine et al (ongoing NBME project)
- Dynamics of Facilitation Sweet et al ongoing, multiple others?

Measurement Tools

- STROBE O'Malley et al, Evaluation and the Health Professions 2003;26:86-103
- Classroom Engagement O'Malley et al, Evaluation and the Health Professions 2003;26:86-103
- Value of Teams Levine et al, Teaching and Learning in Medicine 2004;16:270-275
- Team Performance Scale Thompson et al, Academic Medicine 2009;84(10 Suppl):S124-S127





Some Conclusions

- TBL leads to greater knowledge gains, possibly through effects on the bottom of the curve
- TBL leads to high learner engagement with content, and balanced engagement with other learners
- TBL can foster changes in attitudes, such as the degree to which learners value working in teams
- Learners don't always immediately recognize the value of TBL
- Learners speak each others' language more easily than the teacher does