

# The Effectiveness of Team Based Learning on Learning Outcomes in Health Professions Education: A Best Evidence for Medical Education (BEME) Systematic Review



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## background

- There is a growing interest in active learning strategies in health professions education due to the belief that active learning may enhance knowledge retention.
- Team based learning (TBL) is an active learning method grounded in student-centred learning, requiring less faculty time and fewer resources than other active learning methods.
- First developed by Larry Michaelsen in a business curriculum, TBL is characterised with three main phases:
  - (1) advanced preparation by students
  - (2) individual and group readiness assessment
  - (3) application exercises, including discussion and analysis with the entire class (Koles et al., 2010).
- While TBL may have real 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 in order to provide curriculum planners with more direction in their decision-making with regard to TBL implementation.

## characteristics

- This is the first systematic review that we are aware of that examines the effects of TBL in health professions education.
- The inclusion criteria required studies to comply with a definition of TBL verified with two experts in the field and use a valid comparator.
- The 14 studies assessed at least 3,535 participants (exact numbers are not known as 3 studies did not report the number of control group participants).
- Among the included studies were 13 undergraduate and 1 graduate study. The studies assessed students in medicine, pharmacy, dentistry, and nursing programs.
- Kirkpatrick's framework of learning outcomes was used to categorise each trial (Kirkpatrick, 2006). All 14 trials assessed changes in knowledge, and 7 studies assessed changes in learner reaction.

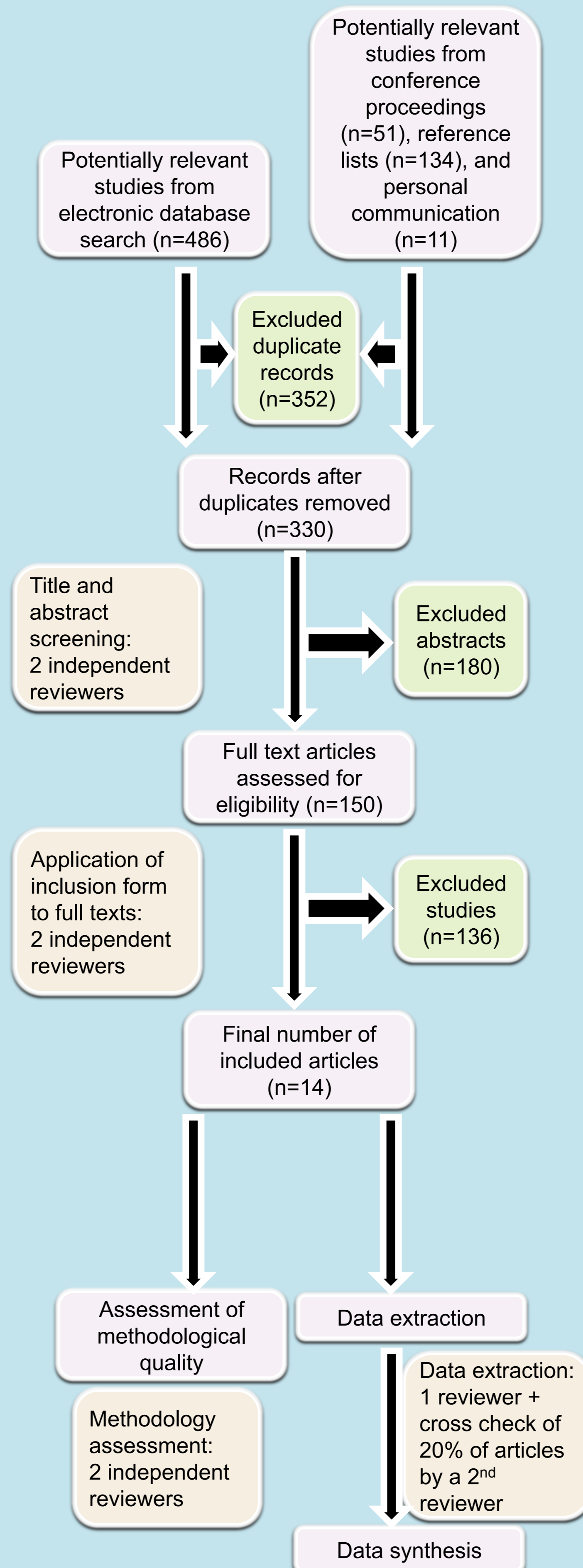
### References

Kirkpatrick, D. L., & Kirkpatrick, J. D. (2006). *Evaluating training programs: The four levels* (3rd ed.). San Francisco, CA: Berrett-Koehler.  
Koles, P. G., Stolfi, A., Borges, N. J., Nelson, S., & Parmelee, D. X. (2010). The impact of team-based learning on medical students' academic performance. *Academic Medicine*, 85(11), 1739-1745.

### Funded by:

The Faculty Education Advisory Committee,  
University of Alberta

## flow of studies



## quality assessment

Type of study	#	Common sources of bias in included studies
Randomized controlled trials	1	1/1: allocation concealment/blinding were incomplete
Non-randomized controlled trials	2	1/2: inadequate comparability of control 2/2: allocation concealment/blinding were incomplete
Concurrent cohort studies	4	4/4: inadequate comparability of control 3/4: not truly representative of the average health professions student
Non-concurrent cohort studies	7	6/7: inadequate comparability of control 3/7: incomplete participant follow-up

## results

### Knowledge Outcomes:

- all 14 studies assessed knowledge outcomes
- 7 of 14 studies reported a statistically significant increase ( $p < 0.05$ ) in the knowledge scores for the TBL group
- 4 studies reported no statistically significant difference between knowledge scores of the TBL and non-TBL group
- 2 of these 4 studies found a significant difference in subgroup analyses, but could not report a significant difference between TBL and comparator groups overall
- 3 studies did not report a p-value and did not comment on significance, despite a clear trend in reported knowledge scores favouring TBL

### Learner Reaction Outcomes:

- 7 of 14 studies looked at reaction scores
- Only 1 study reported significant improvement ( $p < 0.05$ ) favouring the TBL group
- Another study reported significant student preference the TBL comparator
- 3 studies reported non-significant differences
- 2 studies did not report p-values

## discussion

- This review presents predominantly positive and neutral effects of TBL on knowledge scores.
- Learner reaction scores were mixed but presented a largely negative trend; however, none of the included studies used a recurrent TBL curriculum, making it difficult to determine if students get accustomed to TBL and react more positively over time.
- The major limitations of this review are due to the methodological quality of studies; most were cohort designs and had limited reporting with respect to statistical results.
- However, the trend in findings from the cohort studies corresponded to those of trial designs, and therefore likely to do not skew the results.

## conclusion

- Team based learning may improve knowledge scores but yields predominantly negative learner reaction; the authors hypothesize that this may be due to increased student workload.
- While a causal relationship cannot be inferred from these studies, this review shows that TBL may be associated with increased knowledge scores in health based education across disciplines and settings.
- More trial-based studies are needed in TBL research; more thorough reporting and statistical analysis is required in future studies.