

***Thriving Interdependence and Independence:
Teamwork and Self-Directed Learning as Nurtured by Team-Based Learning
(TBL)?***

Li Yuen Wah, Baruch Consulting, Hong Kong

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Abstract

Team-based learning (TBL) has been in prevalent use by higher education, and particularly professional education, with its proven success in student learning in content and application, as well as nurturing teamwork and attitudinal development. I initiated a pilot to introduce TBL sessions into part of a course on research methods for my part-time MBA students in the Mainland China. The pilot had been conducted consecutively with cohorts of students for two academic years, with measurements of students' attitudes towards teamwork and self-directed learning before and after the TBL sessions, among others. Students of the pilot cohorts, comparing with the non-pilot cohorts in the past, revealed more positive course evaluation (+4.0%), and exhibited higher participation (+10.8%), and better academic performance (+3.8%). The paired-samples of the pilot cohorts (n = 44) showed general improvements on attitudes toward teamwork (+1.6%-+1.8%) and self-directed learning (+.2%) after the TBL sessions, with statistical significance identified on particular attitudinal attributes, including *confidence in group vs. individuals to arrive at better decisions*, *confidence in resolving conflicts effectively among team members*, and *liking of learning*. The extent of attitudinal changes toward teamwork was also found in association with students' evaluation of the TBL experiences in general, and the teamwork experiences involved in the sessions in particular. In sum, the pilot found that the TBL approach not only enhanced students' engagement in learning and academic performance, but also nurtured attitudinal changes, especially in teamwork by the teamwork experiences involved in the TBL sessions, in favor of the 21st century competence.

Keywords: team-based learning, teamwork, self-directed learning, 21st century skills, business education, MBA, teaching research methods, scholarship of teaching and learning

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Introduction

This paper features the insights of a two-year pilot adopting the instructional strategy of team-based learning (TBL) (Michaelsen, Knight & Fink, 2002) in a graduate course on research methods. The course is a core course offered for part-time MBA students in the Mainland China by a local university in Hong Kong. The TBL approach was found, among others, conducive to positive attitudinal changes of students in teamwork and self-directed learning. These qualities have been sought after, as among the 21st century competency (or skills), by the higher education institutions and business schools in particular, and yet remaining a shortfall in the workforce.

The talent gap to be filled

The 21st century is characterized as intense transformation as allowed and driven by new technologies, and the face pace in which those changes take place in pervasive human life domains (Salas-Pilco, 2013). Education (and any institution alike) is challenged for what is to prepare their students (people) for, as well as what is to prepare for their students (people). This is how the 21st century competency framework came about, probably taken up firstly by UNESCO as early as 1996 with the attempt to define the kind of competencies that would be needed in the coming century. Among major frameworks, the Assessment of and Teaching of the 21st Century Skills (ATCS) as developed by Binkely and colleagues (Binkely, Erstad, Herman, Raizen, Ripley & Rumble, 2012) with the sponsorship of Cisco, Intel, and Microsoft, set out ten competences in four categories (see Figure 1).

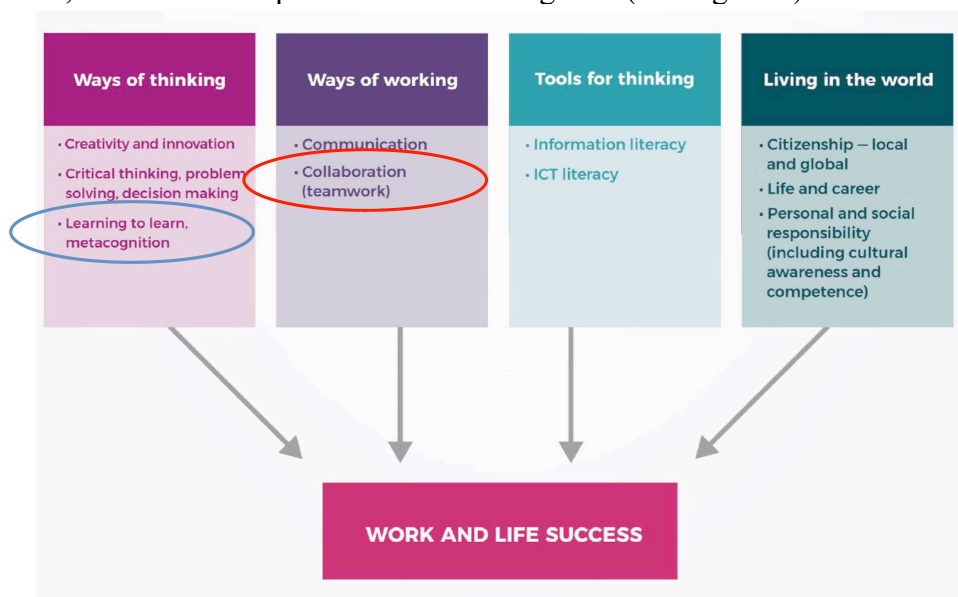


Figure 1: The 21st Century skills adapted from Binkely et al. (2012)

In particular, *collaboration (teamwork)* come under the category of “ways of working”, and *learning to learn (metacognition)* under the category of “ways of thinking” are pertinent to the focus of this research. These two competencies are also among the graduate attributes set out, namely *teamwork* and *learning*, by a local university in Hong Kong - one that I used to teach and where the pilot was conducted - since 2008. Obviously, the 21st century competences are not of something new, but expected to grow in importance as the century goes (Salas-Pilco, 2013).

In Association of American Colleges and Universities' latest survey (Hart Research Associates, 2018), both business executives and hiring managers rated employee attributes such as *being able to work in teams*, *able to work (and learn) independently*, and *self-motivated* as very important skills (or competencies), and yet found significant gaps in college graduates' preparedness (as wide as a range of 35-46 points in importance vs. preparedness). This presents ample challenges, as well as opportunities, for higher education institutions to evolve and innovate from what they may have done justice (and injustice) to fulfil the needs so far. As far as business schools are concerned, critiques for over a decade have called for instructional innovation over the dominantly used approaches such as lecture and case study, to better promote the transfer of knowledge and skills to the managerial practice (Dierdorff, Nayden, Jain & Jain, 2013). Competencies such as teamwork and self-direction in learning are right appealing for one's skills and attitudes (and even dispositions) vis-à-vis knowledge, to come to play.

Team-Based Learning (TBL) and its promises

The pilot reported in this paper refers to the adoption of TBL as an instruction strategy, used in combination with case method. What is TBL? How does it work to improve student learning, and in teamwork and self-direction in learning in particular? TBL is an instructional approach that “uses small groups extensively but sets up a particular sequence of activities that transforms groups into teams and then use the extraordinary capabilities of teams to accomplish a high level of content and application learning” (Fink, 2003, p. 132). The typical learning activities include in order: (1) pre-class reading around given content knowledge to be completed by individual students, (2) in-class readiness assurance exercises on the content knowledge (usually in the form of multiple-choice questions) conducted firstly for individuals (i.e., iRAT) and then teams of 4-7 concurrently (i.e., tRAT), followed by feedback or clarifications (e.g., mini-lecture) on questions arisen from the exercises, and (3) most importantly, in-class application activities relevant to the content knowledge. In-class activities may span from two to five hours in total, depending on the scope of the content knowledge and its application, with the application activities taking up the largest portion of time (see Figure 2). Apart from activities of a typical cycle, it is also advisable to have peer assessment system in place to incentivize individual contributions and effective teamwork along, and address the concern of equity as common in group work (Michaelsen, Peterson & Sweet, 2009).

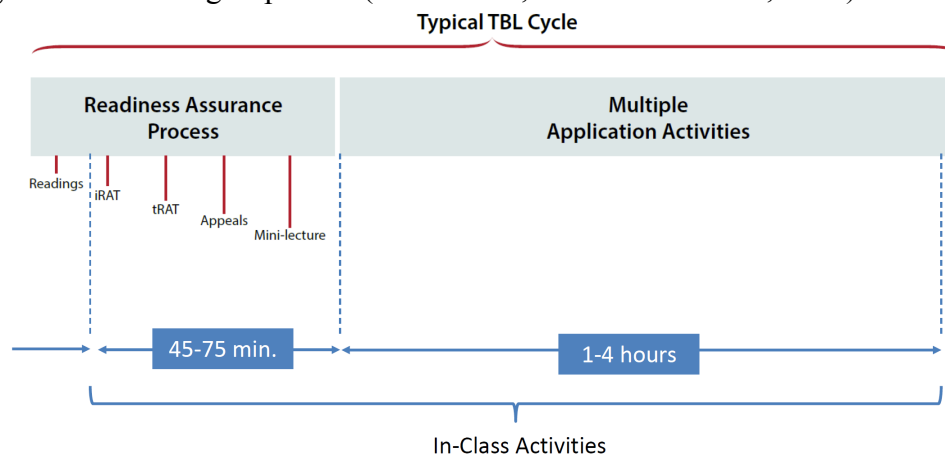


Figure 2: Typical learning activities in TBL (Sibley, 2019; Michaelsen & Sweet, 2008)

TBL strategy is considered particularly effective for learning involving a substantial body of knowledge and problem solving that calls for application of the knowledge (Swanson, McCulley, Osman, Lewis & Solis, 2017). Courses where factual materials are essential and definite answers (e.g., right or wrong) cannot be easily determined are believed to be most benefited by TBL (Michaselsen et al., 2002). It is no wonder why TBL strategy is so prevailing in professional training (e.g., for nurses and medical practitioners). Like problem-based learning (PBL), TBL is characterized as constructivist where learner-centered, problem-solving orientated, learning with dialogue and from each other (c.f. peer instruction), and reflective practices are emphasized (Hrynychak & Batty, 2012). The learning activities involved in TBL sessions are also expected to hit at the depth of Dale's cone of learning that brings about the strongest degree of retention (Herreid, Buskist & Groccia, 2011). TBL is also considered advantageous over *pure* PBL approach (incl. case method), for its lowered risk of cognitive overload on learners, and relatively more economic and scalable use of teaching resources, in general (Dolmans, Michaelsen, Merriënboer & Vleuten, 2015; Vogeltanz-Holm, Olson, Borg & Hill, 2014).

Considerable evidences for the impact of TBL have been received and accumulated along with its practice over the past decades. It has brought about benefits to learners, not limited to knowledge acquisition and academic performance, but also their participation, self-efficacy and interests, and team performance, as well as transfer of learning to the workplace (Haidet, Kubitz & McCormack, 2014; Swanson et al., 2017). For its proven success, TBL is prevalently used in higher education, and professional schools in particular (e.g., medical schools), by over a hundred schools all over the world as at early 2013 (Haidet et al., 2014).

The pilot case in point

For both the promises of TBL as mentioned above, and my personal connection with Prof. Michaelsen – who used to be my teacher in Organization Behavior – and hence my first-hand experience of TBL with him, I had attempted to try out TBL in a course on research methods for my students. This is a 3-credit core course of the MBA programme, used to run in three parts, with the first (about 3 sessions) and the last (about 3 sessions) parts on problem diagnosis and research proposal respectively using interrupted long cases for instruction, whereas the second part (about 3 sessions) on research methodologies using a few short cases for discussion. I started the pilot with TBL for the second part of the course, since the academic year of 2017. Specifically, two cycles of TBL were run for the content on research methodologies for each cohort, from pre-class readings through in-class readiness assurance exercises with clarification to in-class multiple application activities with short cases. Peer assessment however was not put in place in the pilot, after solicited and considered the students' views and concerns. The post-TBL stage is defined up to the end of the academic year of 2019, involving 4 cohorts and a total of 187 students who had completed the course (i.e., $N_{post} = 187$). For comparison, the pre-TBL stage is taken from the beginning of the academic year of 2016, involving 3 cohorts and a total of 96 students who had completed the course (i.e., $N_{pre} = 96$). All those students were studying part-time in the Mainland China, working in role of middle management and above in varied industries, with work experience of 10-12 years on average.

It was hypothesized in this research that students' attitudes toward teamwork and self-direction in learning would be improved, along with their academic performance, as a result of the course adopting the TBL strategy. Students' attitudes toward teamwork were measured by the instruments of Value of Teams Survey (Espey, 2010; 9 items; $\alpha = .830$) and Self-Efficacy for Teamwork adapted from De la Torre-Ruiz, Ferron-Vilchez and Ortiz-de-Mandojana (2014; 4 items; $\alpha = .872$), whereas students' self-direction in learning measured by the Scale for Self-Directed Learning (Cheng, Kuo, Lin & Lee-Hsieh, 2010; 20 items; $\alpha = .938$). Students of the pre- and post-TBL stages were compared in terms of their course evaluation and academic performance, as independent samples. On the other hand, students of the post-TBL stage were compared in terms of their attitudes toward teamwork and self-direction in learning as revealed at the beginning of the course (i.e., pre-test) and after the second part of the course where TBL was used was completed (i.e., post-test), as paired samples ($n_{\text{paired}} = 44$). Student feedback to the TBL experiences was also collected with the scale adapted from Vasan, DeFouw and Compton's (2009) (15 items; $\alpha = .951$) in two dimensions – teamwork (7 items; $\alpha = .901$) and process (8 items; $\alpha = .950$) - as part of the post-test measurement.

Conclusion

Students showed a more positive course evaluation in general (+ 4.0%) upon the use of TBL since the academic year of 2017. By comparing the pre and post-TBL cohorts, academic performance of the course showed improvement in overall terms (+ 3.8% ; $F(1, 281) = 8.058, p = .005$), as well as by assignments – individual (+ 3.1%) and group (+ .9%) – and most pronouncedly in participation (+ 10.8%) (see Figure 3).

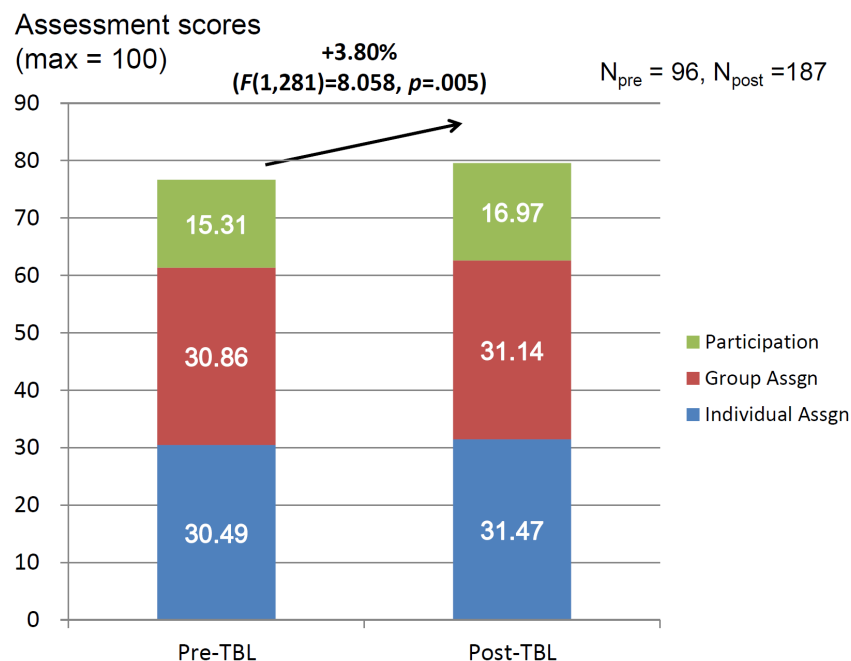


Figure 3: Comparison of academic performances of pre- and post-TBL cohorts

The post-TBL students also found the approach beneficial to their learning, along with other instructional strategies (e.g., instructor teaching and case method). They highly appreciated the learning experiences that TBL brought about with the

teamwork as well as its process, as evidenced by an average rating of above 4.4 (out of 5) received on all items of the TBL experiences (Vasan et al., 2009) (see Figure 4).

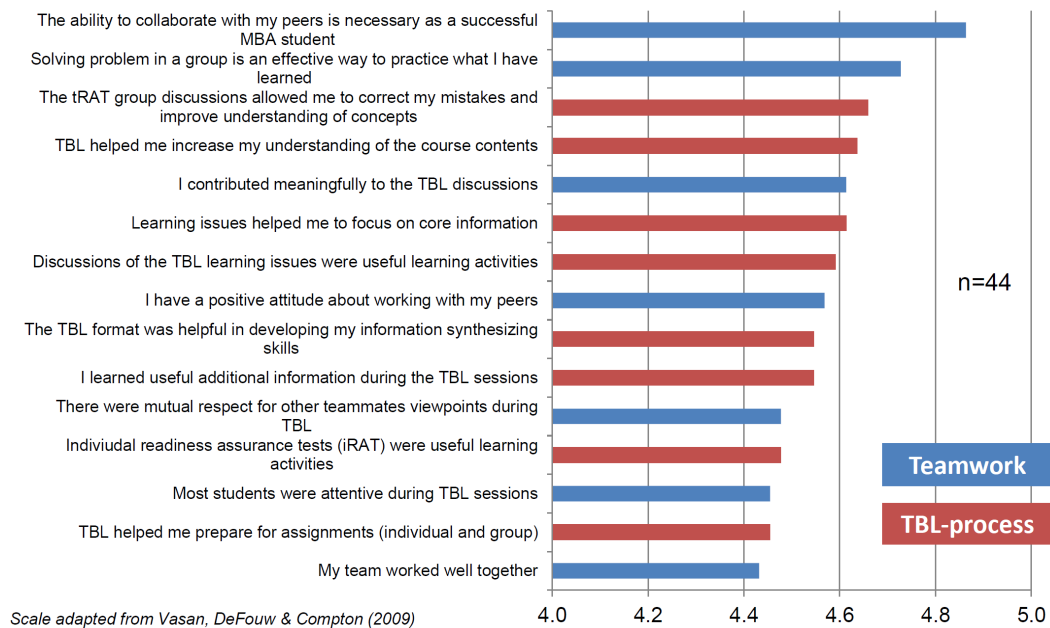


Figure 4: Students' evaluation of TBL experiences

Students' attitude towards teamwork showed some signs of improvement after the TBL sessions, as measured by Value of Teams Survey (+1.61%) and the scale of Self-Efficacy for Teamwork (+1.79%), and so did their self-direction in learning as informed by the Self-directed Learning scale (+.24%) (see Figure 5).

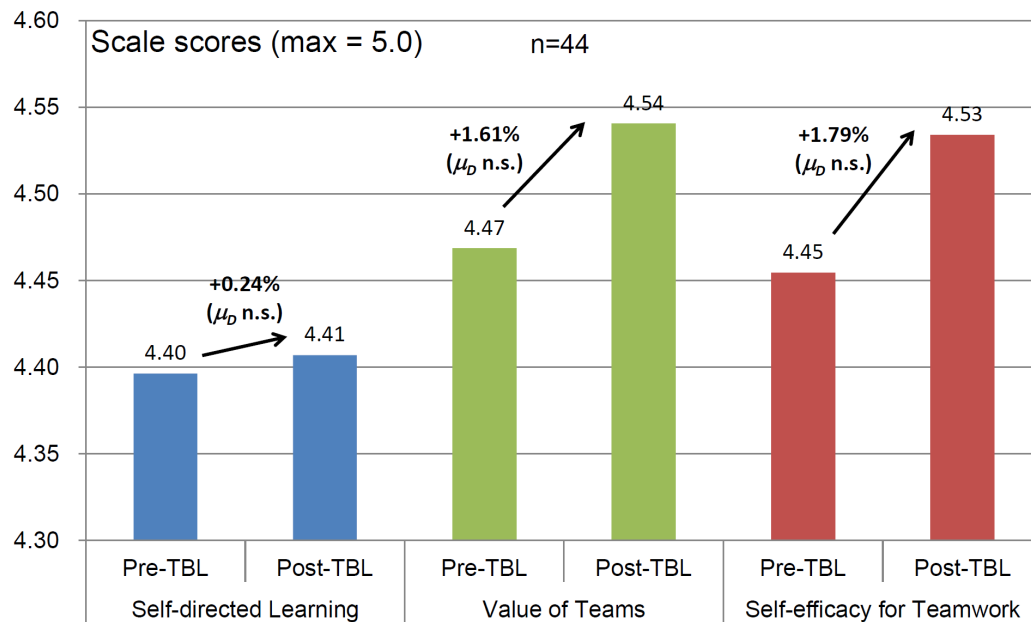


Figure 5: Comparison of students' self-direction in learning and teamwork-related attitudes before and after TBL sessions

Though improvements at the scale level did not reach the desired level of statistical significance (i.e., $p \leq .1$), significant (statistically) improvements were detected on individual items that worth attention. These include: -

- Students after the TBL sessions had grown in belief about group over individual decisions. By comparing students' post-test and pre-test responses to Value of Teams Survey, they showed higher level of agreement to the statement that "group decisions are often better than individual decision" (Paired $t(43) = 1.673$; $p = .05073$, one tailed);
- Students had become more confident in resolving conflicts among team members. Their responses to the Self-Efficacy for Teamwork scale indicated that, after the TBL sessions, they felt more strongly being "able to resolve conflicts between individuals effectively" (Paired $t(43) = 1.666$; $p = .05149$, one tailed);
- Students after the TBL sessions had increase in motivation to learn. They asserted agreement more strongly to the statement that "regardless of the results or effectiveness of my learning, I still like learning" (Paired $t(42) = 2.496$; $p = .0083$, one tailed), as revealed by their responses to the Self-Directed Learning scale after the TBL sessions.

Furthermore, positive TBL experiences, particularly teamwork experiences, were found conducive to greater improvement on students' Value of Teams. This was informed by the significant (statistically) correlations detected between evaluation of TBL experiences and changes in Value of Teams – as a whole and on its constituent items – as shown below: -

- Better (or worse) TBL teamwork experiences were found in association with greater (or reduced) improvement on Value of Teams ($r = .344$, $p = .022$). The strength of association was particularly strong for the assertion that "I have a positive attitude about working with my peers" ($r = .396$, $p = .008$), among TBL teamwork experiences.
- Better (or worse) overall TBL experiences - teamwork and process – is likely to reinforce (or weaken) the fostered belief about group learning where "solving problem in a group is an effective way to practice what I have learned" ($r = .365$, $p = .015$) as captured in Value of Teams Survey. Significant correlations were identified with the entire teamwork dimension ($r = .395$, $p = .008$), and most of its constituent items including *holding positive attitude about working with peers* ($r = .441$, $p = .003$), *other students' attentiveness* ($r = .384$, $p = .010$), *being able to contribute personally* ($r = .369$, $p = .014$), and *mutual respect* ($r = .299$, $p = .049$), as well as *being helpful for assignment preparation* ($r = .340$, $p = .024$) and *group discussions being useful learning activities* ($r = .334$, $p = .027$) of the process dimension.

In sum, the pilot showed that adoption of TBL in the course brought about significant learning experiences to students, which not only enhanced their participation in learning and academic performance, but also resulted in attitudinal changes especially in teamwork that are conducive to the 21st Century competence. The result offered evidences for early success of the pilot of using TBL in the course, supporting further application of the approach in the course as well as possible extension to other courses.

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Contact email: consult.baruch@gmail.com