

## Understanding the antecedents of knowledge sharing behaviour and its relationship to team effectiveness and individual learning

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Due to the competitive and rapidly changing nature of the external business environment, university students must acquire the ability to cooperate, share knowledge, and enhance team effectiveness and learning in the workplaces of the future. Consequently, the design of business courses in higher education merits further discussion. Based on the notions of team-based learning and flipped classrooms, we proposed a business course model that consisted of three main phases: before-class, in-class, and after-class online course activities. After implementing the course models in two business courses at two public universities in Taiwan, a survey based on social learning and social exchange theories was distributed. The data collected from 218 undergraduate business students were analysed. The findings reveal that value in team members' contributions is positively associated with team trust and each has a significant impact on knowledge sharing and team effectiveness. Knowledge sharing played a key role in this learning context and was a significant mediator between perceptions of value in team members' contributions and team effectiveness, as well as between team trust and team effectiveness. In addition, team effectiveness was a benefit to individual learning in these classes.

### *Implications for practice or policy:*

- Business schools are in a position to innovate and create opportunities to deliver quality education. Educators should consider the necessity of creating a team-based learning environment and build university students' competency relevant to workplaces via flipped classroom approach.
- In team-based learning, team members' perceived contributions and team trust are two essential antecedents for educators to pay attention to for improving the quality of students' knowledge sharing process and consequences in team effectiveness and perceived individual learning.

*Keywords:* team-based learning; perceived team members' contributions; team trust; knowledge sharing; team effectiveness; perceived individual learning

## Introduction

As the business environment continuously changes, curriculum designers of business education must recognise emerging needs and incorporate course content that best aligns with industry expectations for potential graduates who can meet the challenges (Gonzalez, Quesada, Mueller, & Mueller, 2011). There is an opportunity for business schools to transform the current teaching and learning to integrate and connect with real business practices that emphasise the importance of group communication and teamwork (Khan, 2015). In order to pursue such educational intent, business educators must customise instructional design by assessing learners' needs as well as market requirements in order to prepare students to work collaboratively in the workplace (Jackson, 2005; Plewa, Galán-Muros, & Davey, 2015). Traditional lecture-based classes allow instructors to present large amounts of valuable information to learners who are placed in a passive role of listening (Carpenter, 2006; Machemer & Crawford, 2007). However, traditional lecture-based delivery of course content has its pedagogical limitations, and active learning and the interpersonal fit between learners and instructors have become critical factors that trigger more effective learning (Exeter et al., 2010; Long & Coldren, 2006).

This situation has inspired the practitioners of higher education to enact powerful changes in curriculum

and to reform course design by integrating technology that has flipped the passive learning classroom environment (Al-Zahrani, 2015; Davies, Dean, & Ball, 2013; Dyson, Vickers, Turtle, Cowan, & Tassone, 2015). An important characteristic of the flipped approach is the expectation that students will take the initiative to study course-related materials before class (McCallum, Schultz, Sellke, & Spartz, 2015), while actual class time is designed with activities and tasks that promote students' application of targeted knowledge, abilities, and skills (Albert & Beatty, 2014; Gilboy, Heinerichs, & Pazzaglia, 2015). In this study, many of the in-class activities and tasks were organised according to group-based formats in order to foster collaboration, knowledge sharing, and learning processes and outcomes (Findlay-Thompson & Mombourquette, 2014). Via flipped learning, students increase their awareness of technology as a communication tool that can help them to collaborate during task-based teamwork, to undertake interactive knowledge inquiry, and to exchange ideas (Mitchell, Skinner, & White, 2010; Rutherford, Parks, Cavazos, & White, 2012).

Given that the application of team-based flipped learning in business education is still rare, this study focused on exploring how flipped classrooms can be integrated into the business curriculum and how this type of flipped approach promotes students' teamwork and learning.

## Literature review

### TBL in business education

The competitive and fast-changing characteristics of today's external business environment require more negotiation and collaborative work in many decision-making processes (Tymon, 2013). Accordingly, business courses in higher education are experiencing a growing need to investigate course modules that promote both specific knowledge and skill learning such as the soft skills of communication, collaboration, innovation, and entrepreneurship, for students (Al-Atabi & DeBoer, 2014; Ivanov, Shaidullina, Drovnikov, Yakovlev, & Masalimova, 2014). The adoption of team-based learning (TBL) provides students with various scenarios and opportunities to strengthen their readiness for the future in an increasingly complicated world (Chad, 2012; Lightner, Bober, & Willi, 2007; Mutch, 1998). Grounded in contextual situations, TBL encourages students to use interactions and connections with other team members to exchange ideas and reach a consensus (Baldwin, Bedell, & Johnson, 1997; Letassy, Fugate, Medina, Stroup, & Britton, 2008). TBL cultivates a logical thinking trajectory and promotes active learning by simulating the types of problems students will encounter in the workplace in the future (Kesner, Larson, & Dias, 2017).

While applying knowledge and skills to meaningful tasks within a team-based context, students are required to inquire, think at high levels, and solve problems via the development of self-directed abilities and problem-solving skills (Parmelee & Michaelsen, 2010; Rassuli & Manzer, 2005). The interconnectedness derived from this team-based process impacts students in terms of their level of commitment building, intimacy, trust, and learning outcomes (McLoughlin & Luca, 2002; Michaelsen & Sweet, 2008; Paul & Mukhopadhyay, 2005). TBL emphasises beneficial functioning, intricate bonding, and mutual support (Clark, Nguyen, Bray, & Levine, 2008). Typically, the operation of forming a team is based upon the diversity of learner characteristics, which remains intact throughout and ensures that no friendship-based groupings or pre-existing social networks are adopted (Burgess, McGregor, & Mellis, 2014). TBL encourages discussions and the exchange of perspectives. Team members also benefit from an understanding of, and feedback from, assigned tasks, the performance of tasks, and the quality of interpersonal relationships (Zellmer-Bruhn & Gibson, 2006). Students transition from passive learners to active learners via the process of collaboration and reflection. They take responsibility for a significant amount of their own subject area and for establishing targeted competencies (Felder & Brent, 1996; Rasiah, 2014).

### Flipped classroom and TBL course design

The flipped classroom provides a model that frees class time from lecture and revolutionises the way millennial students receive information (Roehl, Reddy, & Shannon, 2013). It has attracted attention in higher education through its leveraging of different technologies and providing various opportunities for active learning in class (Abeysekera & Dawson, 2015; McLaughlin et al., 2014; Roach, 2014). By transforming the format of traditional transmissive teaching, flipped classroom approaches incorporate before-, during- and after-class tasks, that encourage students to share their knowledge and to provide

reciprocal constructive feedback (Wallace, Walker, Braseby, & Sweet, 2014). In the flipped classroom model, students are required to preview course reading or to watch video material before attending a class (Prashar, 2015). During class time, the instructor introduces more sophisticated work that promotes students' assimilation of knowledge as well as collaborative learning through strategies that include role-playing, discussion, debates, and problem solving. After-class activities may consist of various types of assignments such as practicing individual exercise, reading deeper about the course topic, and cooperation in group projects that integrate in-class teaching and learning (Hwang, Lai, & Wang, 2015).

By devoting class time to the implementation of various learning activities, flipped classrooms transform the traditional practice of lectures (DeLozier & Rhodes, 2017). Flipped classrooms also incorporate the use of technology in and out of the classroom that allows students to access course materials without the constraints of location and time (Kim, Kim, Khera, & Getman, 2014). The TBL format places few limitations on the delivery and acquisition of primary course materials, which allows class time to be dedicated to investigating higher levels of application-based activities. Accordingly, flipped-classroom TBL (FC-TBL) not only encourages small groups and classroom activities that facilitate active learning, but also motivates students to utilise classroom time to solve problems while cultivating necessary professional knowledge, abilities, and skills (Della Ratta, 2015; Huang & Lin, 2017). FC-TBL enables a student to embark on an individual thinking trajectory and gain a deeper understanding of the content as primary knowledge acquisition takes place before class (Jakobsen & Knetemann, 2017). FC-TBL is an effective instructional strategy that allows teaching to be tailored to students' needs and creates space for student discussion, risk-taking, and knowledge sharing with peers while developing expertise (Balan, Clark, & Restall, 2015).

### Perceived value of team members' contributions

According to social learning theory (Bandura, 1986), variables such as the individuals' cognition and behaviour are often influenced and shaped by the context of social networking. The FC-TBL course design encourages students to learn and interact with other teammates via both in-class and online activities that deepen their learning experience by promoting active learning through teamwork (Gomez, Wu, & Passerini, 2010). Working in teams requires members to build a sophisticated network of relationships on the projects they are assigned and allows those who are more capable in particular areas to delicate their strengths and expertise accordingly. For instance, some members could have insights into different areas that will allow them to contribute with ease to the task at hand. More conscientious team members are more likely expend greater effort to help the team meet deadlines (Loughry, Ohland, & DeWayne Moore, 2007). In this FC-TBL context, team members observe other teammates' work attitudes and behaviours, and by example they teach one another how to work more efficiently.

Effective teams consist of team members who are equipped with the necessary knowledge, skills, and abilities and are committed to support each other to accomplish their group goals (Lurey & Raisinghani, 2001). With a collection of individuals who are collaborative and inter-reliant in their tasks, team effectiveness can be understood as the capacity of the team to accomplish their shared goals based on predetermined responsibilities and identified outcomes. (Marks, Mathieu, & Zaccaro, 2001). In addition to individual accountability for his or her own work, members must have mutual accountability to one another for a team to operate effectively (Wang, Yang, and Wu, 2006). On the other hand, team effectiveness can be decreased by *social loafing*: a tendency to exert less effort when working in a group than when working individually (Latané, Williams, & Harkins, 1979). Thus, in the FC-TBL environment, students have greater opportunities to observe, feel, and discover the value in other team members' contributions and performance. Then, as social learning suggests, they might be more willing to contribute their effort to teamwork when they perceive value in the behavior of others, which leads to a higher level of team effectiveness. Thus, we have the following hypotheses.

H1: Perceived team members' valuable contributions are positively associated with team effectiveness.

Some researchers emphasise that the internal team environment is related to team effectiveness (Daspit, Tillman, Boyd, & Mckee, 2013). Cohen and Bailey (1997) noted that attributes such as cooperation and communication among team members have a positive influence on team effectiveness. Janz, Colquitt, and Noe (1997) stated that sharing information and providing assistance are essential to team effectiveness. Based on social exchange theory (Blau, 1964), individuals who receive support from the organisation or

team are more likely to provide feedback and contribute to the organisation and team in return (Eisenberger, Armeli, Rexwinkel, Lynch, & Rhoades, 2001). Accordingly, FC-TBL course design may have the potential to foster knowledge sharing within a social context. Thus, we postulate that when students perceive other team members' valuable contributions, such as sharing knowledge and information with other team members, they are more likely to share within the team for their mutual benefit.

H2: Perceived team members' valuable contributions are positively associated with knowledge sharing.

Knowledge is viewed as a means of effective action, which is acquired through learning. Knowledge sharing is the interaction between knowledge providers and receivers. The purpose of knowledge sharing is to help others learn (Senge, 1997). Therefore knowledge sharing is also described as a flow activity (Nissen, 2005), which is an exchange of explicit or tacit knowledge from one party to another (Hall, 2003). Researchers have found that knowledge sharing in teams is critical for team effectiveness since team members have greater interdependence (Powell, Piccoli, & Ives, 2004). In addition, through collaborative learning, team members learn better problem-solving abilities (Nelson & Coopriider, 1996; Wellins, Byham, & Dixon, 1994). Hence, we hypothesise that the interaction and transmittance of knowledge and resources within teams benefits team effectiveness (Hansen, 1999; Pangil & Chan, 2014; Tsai & Ghosal, 1998).

H3: Knowledge sharing is positively associated with team effectiveness.

The perceptions of value in team members' contributions positively influences team operation and performance in two ways (Lindsley, Brass, & Thomas, 1995; Lester, Meglino, & Korsgaard, 2002). First, an individual team member's stronger level of devotion to the team may also motivate others to actively participate in team activities (Krackhardt & Stern, 1988), which leads to a level of knowledge and information exchange that becomes an important team resource or asset (Burt, 1992). Second, when someone is willing to share resources and information, they make themselves more accessible to other team members, which leads to the creation of closer collegial relationships which promote knowledge sharing and transfer (Krackhardt & Stern, 1988). This in turn promotes knowledge sharing and transfer (Dhanaraj, Lyles, Steensma, & Tihanyi, 2004), and it leads to more positive benefits such as team effectiveness. Researchers have found that individual contributions can promote team development and reduce social loafing. Good teamwork can have a positive impact on the overall learning experience (Michaelsen, Fink, & Knight, 2002). Therefore, we further hypothesise that knowledge sharing can play a mediating role between the perception of value in team members' contributions and team effectiveness.

H4: Knowledge sharing mediates the relationship between perceived team members' valuable contributions and team effectiveness.

Trust generally involves concepts such as honesty, trust-worthiness, reliability, responsibility, and purity of motives (Colquitt, Scott, & LePine, 2007), while team trust refers to the extent to which team members believe each other or rely on the actions of other teammates (Chang & Cheng, 2013). According to Blau's (1964) perspective on social exchange theory, individuals who perceive support and trust from their teammates will feel an obligation to pay it back. Consequently, perceived positive thinking within the team may lead to positive interactions, which can lead to better teamwork and to a greater level of effectiveness (Al-Kurdi, El-Haddadeh, & Eldabi, 2018). Evidence from relevant studies has found that individuals develop an interdependent relationship with the organisation or team. Such interdependencies can generate a high-quality relationship among teammates, and help the organisation or team reach its goals (Daspit, et al., 2013; Eisenberger et al., 2001). Thus, in the FC- TBL classroom, if team members experience trust in the team, they should have a better relationship, and the team should run more efficiently and effectively. Further, it is also predictable that a good relationship among team members will a positive impact on knowledge sharing (Nelson & Coopriider, 1996). Thus, we formulated the following two hypotheses.

H5: Team trust is positively associated with team effectiveness.

H6: Team trust is positively associated with knowledge sharing.

Sharing knowledge and resources within teams contributes to team effectiveness. Knowledge sharing in teams is critical for team effectiveness since team members rely on each other (Powell et al., 2004). Consequently, as social exchange theory has noted, individuals who perceive support from their teams will experience an obligation to repay the team. Thus, it is likely that students who perceive positive social

support in this internal team environment will be more likely to engage in knowledge sharing activities (Daspit, et al., 2013), which leads to team effectiveness.

H7: Knowledge sharing mediates the relationship between team trust and team effectiveness.

It is meaningful to assess team members' perceptions of the value of the contributions from other team members since people are likely to make contributions to their teams based on what they perceive about other team members' supportive behaviour and contributions (Daspit, et al., 2013). Social exchange theory suggests, interpersonal interactions can create a sense of interdependence among team members (Blau, 1964), and such an interdependent relationship can generate a high-quality relationship (Cropanzano & Mitchell, 2005), and enhance cohesion in teams (Daspit, et al., 2013). In this context, students were asked whether they perceive teammates' contributions as valuable, useful, and worthy of their study time investment. This should correlate with the overall level of trust among team members.

H8: Perceived team members' valuable contributions will be correlated with team trust.

When team members have a stronger team orientation, people are clearer about their roles and jobs in teams (Isabella & Waddock, 1994), and learners have higher levels of perceived individual learning from the collaborative contribution (Gomez et al., 2010).

H9: Team effectiveness is positively associated with perceived individual learning.

Based on the nine proposed hypotheses, a research framework is presented in Figure 1.

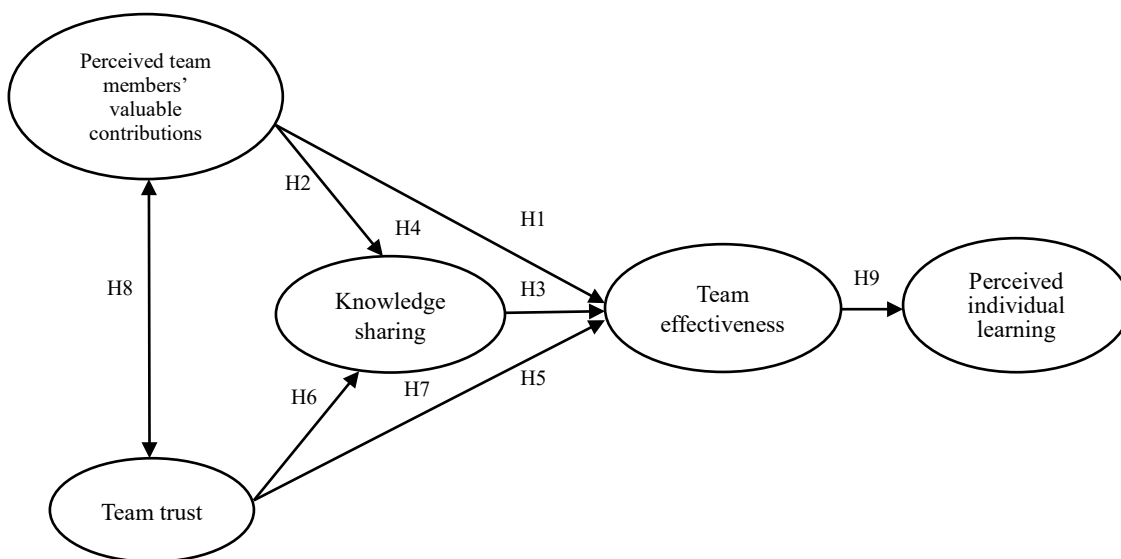


Figure 1. The hypothesised model

## Methods

The study received the ethical approval from the Research Ethics Office of National Taiwan University. The participants gave informed consent to participate in this study.

## Research context and participants

The research context of the study is the FC-TBL, which is an instructional design focused on the philosophy of a constructivist paradigm that encourages students to take an active role and contribute to developing their own knowledge and information seeking process (Jonassen & Land, 2012). We replicated the framework of Huang and Lin (2017) in the design of FC-TBL regarding the pre-, during-, and after-class tasks. Students were required to take the initiative in previewing the assigned course materials before classes, which included watching videos and reading textbook-related materials. During the classes, the

instructors provided opportunities to engage in various in-class activities and participate in online Facebook discussions and assignments among peer learners.

The blended approach of FC-TBL in business courses serves as a potential model to leverage technology, increase teacher-student and student-student interactions and engagement, and provide greater opportunities to achieve a higher level of learning. The participants consisted of 262 business-major undergraduate students at two national universities in an urban area of northern Taiwan. These two universities aim to cultivate quality and innovation in the business education of their students. All of the participants took the undergraduate business courses based on the FC-TBL learning models organised by our research team in two semesters. A total of 240 surveys were returned, and 218 of them were valid for further data analysis. The response rate was 83.20%. The data were analysed using SPSS 19 and AMOS 22 software programs.

## Measures

Our survey had five dimensions: (1) perceived team members' valuable contributions, (2) team trust, (3) knowledge sharing, (4) team effectiveness, and (5) perceived individual learning, consisting of 29 items in total. All items were translated from English to Chinese. The questionnaire was checked by two content and language experts to avoid translation and linguistic errors. In order to reduce the effect of common method variance, some variables were rated via a 5-point scale and some were rated through use of a 7-point scale (1= *strongly disagree* to 7= *strongly agree*; 1= *strongly disagree* to 5= *strongly agree*).

### Perceived team members' valuable contributions

This construct was assessed using three items from a validated survey on asynchronous online communications (Wu & Hiltz, 2004). This construct was rated on 5-point Likert scale. A sample item is "Most classmates' comments are very valuable." The Cronbach's  $\alpha$  was 0.77, which indicates high internal consistency for the set of items.

### Team trust

Team trust generally refers to the trust relationships among members. The construct was assessed using the modified scale developed by Wang, Yang, and Wu (2006). The scale has five items and it was also rated on a 5-point Likert scale. A sample item is "Classmates trust other members' levels of competency and help each other in the team. The Cronbach's  $\alpha$  was 0.87.

### Knowledge sharing

Knowledge sharing involves the interaction and knowledge sharing behavior among team members. The construct was assessed by the eight items derived from Nelson and Coopriders' (1996) and Senge's (1997) studies. A sample item is "Team members often share their knowledge and experience with others voluntarily and proactively." This construct was rated on a 5-point Likert scale as well. The original Cronbach's  $\alpha$  was 0.87.

### Team effectiveness

The scale of team effectiveness was rated based on two studies (Lurey & Raisinghani, 2001; Wang, Yang, & Wu, 2006). Team effectiveness was rated on a 5-point Likert scale and had two sub-dimensions: performance and quality of work life. One item concerned budget limitations in teamwork, which is not applicable to this research context, so we eliminated the item after performing exploratory factor analysis to test whether the scale contained the two dimensions of the original one. The result of total explained variance was 58.21%, and it had only one dimension for the scale. Later, based on confirmatory factor analysis, one more item with lower factor loadings was eliminated, so we used 6 items to assess team effectiveness. The original Cronbach's  $\alpha$  was 0.86.

### Perceived individual learning

This construct was assessed by the six items adopted from prior studies in an asynchronous computer-supported learning network context (Gomez et al., 2010). This construct was rated on a 7-point Likert scale. A sample item is "The learning quality of course materials was improved by the team activities." The original Cronbach's  $\alpha$  was .92.

### Confirmatory factory analysis

Research in the field of business data analysis (Hair, Black, Babin, & Anderson, 2010; Hooper, Coughlan, & Mullen, 2008), suggest standardised factor loadings should be at least .50. because these represent the characteristics of the dimensions in each construct and help determine the reliability in our questionnaire scale. After performing the confirmatory factor analysis, we deleted some items in three of the constructs: team trust, knowledge sharing, and perceived individual learning. Overall, we had 24 items in our final questionnaire. In addition, we conducted a Harman's1-factor test to determine whether there was a serious common method variance problem in the post-hoc testing. The results showed that the first principal component in the total variance explained sheet was 18.70%, lower than 50%. This suggested no serious common method variance problem.

## Results

### Inter-correlations of variables

Table 1 shows the means, standard deviations, the square root of average variance extracted (AVE), and the correlations for all variables in this study. Except for the Pearson's correlation of knowledge sharing and team effectiveness ( $r = .74, p < .001$ ), other correlation coefficients returned medium or lower levels of correlations. Perceived team members' valuable contribution was positively related to team trust ( $r = .37, p < .001$ ), knowledge sharing ( $r = .47, p < .001$ ), team effectiveness ( $r = .45, p < .001$ ), and perceived individual learning ( $r = .64, p < .001$ ). Both team effectiveness and perceived individual learning were significantly related to knowledge sharing ( $r = .74, p < .001$ ;  $r = .57, p < .001$ , respectively), and team effectiveness was positively related to perceived individual learning ( $r = .50, p < .001$ ). According to Hair et al. (2010), the estimated intercorrelations among most of the constructs in this study were less than the AVE square roots for each construct, and this evidence provided support for the discriminant validity of the scales.

Table 1  
Means, standard deviations, validity, and correlations of variables

Variables	Mean	SD	1	2	3	4	5	6
1. Gender	.27	.45						
2. Perceived team members' valuable contributions	3.77	.57	.05	(.77)				
3. Team trust	4.02	.66	.03	.37***	(.80)			
4. Knowledge sharing	3.92	.55	-.01	.47***	.65***	(.73)		
5. Team effectiveness	3.91	.56	.04	.45***	.63***	.74***	(.73)	
6. Perceived individual learning	4.93	.89	.12	.64***	.40***	.57***	.50***	(.85)

Note. The parentheses in the correlation matrix represents the square root of AVE. \*\*\* $p < .001$ ;  $N = 218$

### Reliability and validity

Table 2 shows that both Cronbach's alpha and composite reliability (CR) of each construct exceed the .70 threshold value, so the internal consistency reliability is acceptable (Bagozzi & Yi, 1989; Fornell & Larcker, 1981). In addition, the AVE from all constructs ranged from .54 to .72 and exceeded the .50 threshold value (Bagozzi & Yi, 1989; Fornell & Larcker, 1981), so convergent validity was achieved for all constructs.

Table 2  
Coefficients for the 5-factor measurement model

Variable	No. of items	Underlying items	Cronbach's $\alpha$	Standardised factor loadings	CR	AVE
Perceived team members' valuable contributions	3	PTMVC14	.77	.88	.80	.59
		PTMVC15		.92		
		PTMVC16		.40		
Team trust	4	TT58	.87	.81	.87	.63
		TT59		.90		
		TT60		.79		
		TT62		.67		
Knowledge sharing	6	KS20	.87	.61	.87	.54
		KS23		.73		
		KS24		.77		
		KS25		.79		
		KS26		.73		
		KS27		.75		
Team effectiveness	6	TE28	.86	.51	.87	.54
		TE30		.70		
		TE31		.84		
		TE32		.78		
		TE33		.83		
		TE34		.71		
Perceived individual learning	5	PIL1	.92	.90	.93	.72
		PIL2		.86		
		PIL3		.90		
		PIL4		.91		
		PIL5		.91		
		PIL6		.65		

Note.  $N = 218$ . AVE ( $> .50$ ); CR ( $> .70$ )

### Model-data fit

We also performed confirmatory factor analysis for each of the latent variables and the 5-factor SEM model, as measured by the 24 indicators. Table 3 provides the satisfactory model fit indices and evidence of discriminant validity, which decreases the potential influence of common methods variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Podsakoff & Organ, 1986). The 5-factor model used in this study indicated the different characteristics and concepts of five constructs in the measurement model.

Table 3  
Summary of fit indices

Variables	Fit Indices							CR
	$\chi^2$	df	$\chi^2/df$	RMSEA	CFI	TLI	IFI	
1. Perceived team members' valuable contributions	-	-	-	-	-	-	-	.80
2. Team trust	4.37	2	2.19	.07	.99	.98	.99	.87
3. Knowledge sharing	17.55	9	1.95	.07	.99	.98	.99	.87
4. Team effectiveness	22.04	9	2.45	.08	.98	.96	.98	.87
5. Perceived individual learning	18.07	5	3.61	.11	.99	.97	.99	.93
6. Five-factors model	513.04	245	2.09	.07	.92	.91	.92	-

Note.  $N = 218$

### Structural model

According to our analyses, the results of the direct effects of perceived team members' valuable contributions (standardised direct effect = .43,  $p < .001$ ) and team trust (standardised direct effect = .67,  $p < .001$ ) on team effectiveness were statistically significant. Hence, hypotheses 1 and 5 were supported. In addition, the results of the direct effects of perceived team members' valuable contributions and team trust



on knowledge sharing (standardised direct effect = .47,  $p < .001$ ; standardised direct effect = .74,  $p < .001$ , respectively), and the subsequent direct effects of knowledge sharing on team effectiveness (standardised direct effect = .76,  $p < .001$ ) were all statistically significant. Consequently, hypotheses 2, 3, and 6 are supported.

In addition, the direct effect of team effectiveness on perceived individual learning (standardised direct effect = .60,  $p < .001$ ) is significant. Therefore, hypothesis 9 is supported. An explanation of hypothesis 8 can be illustrated by the positive correlation between perceived team members' valuable contributions and team trust (standardised direct effect = .35,  $p < .001$ ). It means that students perceived more valuable contributions from other team members, which would reinforce trust among team members. Further, the impact of affective perceptions regarding other team members' contributions and trust apparently influenced further behaviours and actions in teams.

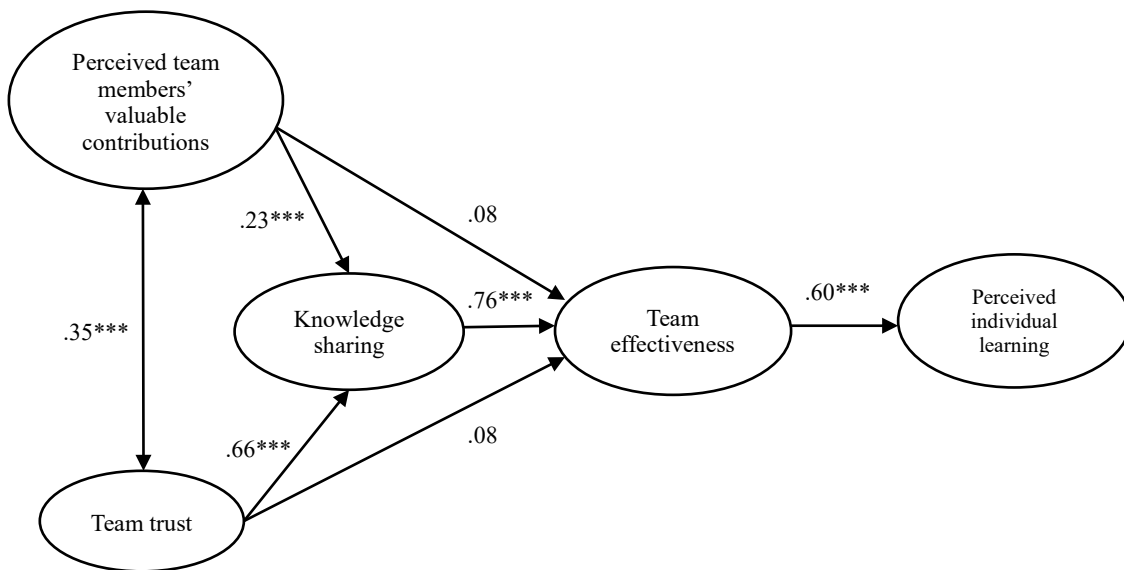


Figure 2. Structural equation modeling of the hypothesised model  
 Note. \*\*\* $p < .001$ ;  $N = 218$

In order to investigate the indirect effects of dependent variables through the mediator of knowledge sharing, we conducted bias-corrected bootstrapping and percentile bootstrapping at a 95% confidence interval with 5,000 bootstrap samples (Taylor, MacKinnon, & Tein, 2008). Further, we followed the suggestions of Preacher and Hayes (2008) and calculated the confidence interval of the lower and upper bounds to determine whether zero is included in the specific interval, which was used to determine the significance of the indirect effect. As shown in Table 4, the results of the bootstrapping test confirmed the existence of a positive and significant intervening effect for knowledge sharing between perceived team members' valuable contributions and team effectiveness (standardised direct effect = .29,  $p < .001$ ). A similar intervening effect that knowledge sharing exerted between team trust and team effectiveness was revealed in Table 5, which indicated full mediation in this model. The Z scores of the direct effects in the products of the coefficients both (.64 and .74) fell under the 1.96 threshold value. The direct effects were obviously insignificant. Based on the above statements, full mediations occurred in this study, and hypotheses 4 and 7 are supported.

Table 4

*The mediating effect of knowledge sharing between perceived team members' valuable contributions and team effectiveness*

	Point estimation	Product of coefficients		Bootstrapping			
				Bias-corrected 95% CI		Percentile 95% CI	
				Lower	Upper	Lower	Upper
		SE	Z				
Indirect effect	0.287	0.073	3.932	0.163	0.458	0.155	0.441
Direct effect	0.035	0.055	0.636	-0.069	0.151	-0.068	0.151
Total effect	0.322	0.087	3.701	0.167	0.51	0.165	0.506

Note. Bootstrapping sample of estimation is 5,000

Table 5

*The mediating effect of knowledge sharing on team trust and team effectiveness*

	Point estimation	Product of coefficients		Bootstrapping			
				Bias-corrected 95% CI		Percentile 95% CI	
				Lower	Upper	Lower	Upper
		SE	Z				
Indirect effect	0.421	0.091	4.626	0.28	0.659	0.266	0.622
Direct effect	0.065	0.088	0.739	-0.116	0.238	-0.103	0.248
Total effect	0.486	0.095	5.116	0.315	0.687	0.318	0.693

Note. Bootstrapping sample of estimation is 5,000

## Discussion

The results of this study reveal that our research framework had a good data-model fit and the nine hypotheses are all supported. In general, evidence shows that the course design inclusion of three phases was suitable for business course delivery and student learning in the business professions. Further, the FC-TBL course design gave students greater opportunities to interact, communicate with teammates, and create a learning communities. More specifically, in the FC-TBL classroom, the construct of perceived team members' valuable contributions greatly impacted students' knowledge sharing (H2) and team effectiveness (H1). In contrast, team trust also had positive impacts on knowledge sharing (H6) and on team effectiveness (H5). Knowledge sharing was associated with team effectiveness (H3). H4 posits that knowledge sharing plays a mediating role between perceived team members' valuable contributions and team effectiveness. H7 posits that the mediating role of knowledge sharing makes a significant contribution to team trust and team effectiveness. Perceived team members' valuable contribution was positively associated with team trust (H8). Last, team effectiveness was positively related to individual learning (H9).

In this study, the combination of flipped classrooms and team-based learning proved to be a successful model for business courses. Through the implementation of FC-TBL, participating students shared knowledge and collaborated in teams and the empirical data revealed that the business students' individual learning was effectively increased. Our results generally agree with those of previous studies conducted in flipped classrooms (Abeysekera & Dawson, 2015; McLaughlin et al., 2014; Roach, 2014). Flipped classrooms not only utilise various instructional strategies and technology to transform the teaching environment, but also provide learners with opportunities for active learning in class. In addition, our findings resonated with previous research outcomes on TBL in terms of its pedagogical characteristics and corresponding advantages (Balan, Clark, & Restall, 2015; Baldwin, Bedell, & Johnson, 1997; Berge, 1997; Burgess, McGregor, & Mellis, 2014; Campbell & Stasser, 2006; Chad, 2012; Chang & Cheng, 2013; Daspit, Tillman, Boyd, & McKee, 2013; Della Ratta, 2015; Gomez et al., 2010; Jakobsen & Knetemann, 2017; Huang & Lin, 2017; Rasiah, 2014; Wu & Hiltz, 2004). Computer-mediated or blended TBL can be viewed as an effective teaching method to enhance students' learning experience and performance.

## Conclusions and implications

We examined several important variables regarding students' teamwork and learning in a research context based on the notions of social exchange theory (Blau, 1964) as well as social learning theory (Bandura,

1986. The findings show that the dynamic interactions and interdependent relationships formed among the team members are essential in team-based work. As indicated, perceived team members' valuable contributions and team trust are responsible for team members' knowledge sharing. Through the processes of knowledge exchange and sharing, team effectiveness and individual learning is subsequently achieved. In addition, the findings indicated that knowledge sharing is critical in a FC-TBL classroom. The results from the students' interactions and achievement in this FC-TBL classroom resonated with the two theories that were applied as the students learned, worked, interacted, and collaborated as a team. For instance, individuals were more willing to share knowledge when they perceived value in the contributions from their teammates.

This study showed that in a FC-TBL classroom where high interdependence is needed for the completion of a performance collaborative, when team trust is built, team members are more likely to assist and cooperate with one another through their communication of ideas and exchanges of knowledge. With the open sharing of knowledge among team members, a team operates better, generates productive outcomes, and achieves improved performance due to the collective contribution. Compared with the lecture-only classrooms, learners in a FC-TBL classroom learn better when they work well in teams and develop targeted competencies and skills by participating in different tasks and consequently increase their own competitive advantage. In brief, these findings are consistent with previous studies (Buvik & Tvedt, 2017; Chang & Cheng, 2013; Wang et al., 2006) and are valuable and insightful for instructors to consider when conducting FC-TBL.

Thus, FC-TBL instructors must construct an open and trusting environment that promotes their learning motivation and encourages members to take initiatives when participating. Instructors can help students organise their communities, establish their rapport, find common language and vision, and discuss the potential benefits and barriers that must be overcome for knowledge sharing processes. When an individual is confident of their team members' support of the group's work, he or she is far more likely to communicate openly, exchange ideas, and share knowledge. Also, by engaging in participative problem solving and decision-making processes, team members are more likely to reciprocate as they contribute their expertise and insights to one another. When each member is willing to share useful information and knowledge towards targeted tasks, the team can achieve their goals in a more effective and meaningful way due to mutual influence and cohesiveness. The dynamic processes of conversations and collaborations before-, during- and after- class can deepen each individual learner's understanding of the content through self-directed learning and practical application.

### **Limitations and future directions**

We experimented with FC-TBL in support of undergraduate business courses and examined the relationship among relevant factors. Nevertheless, a number of limitations remain. First, the research framework was conducted at two universities in one subject area. Future studies are encouraged to apply and expand this research framework in different course settings. Second, quantitative data were collected for research analysis, so different qualitative research paradigms can be adopted to explore additional information and findings regarding similar instructional designs and topics. Third, the research design was performed in a self-reported fashion, although CMV problem was not a serious problem. Future studies could use a proactive experiment design to examine the effect of FC-TBL in different temporal stages or the difference between FC-TBL and traditional teaching methods. Furthermore, researchers could apply longitudinal or multi-level study to eliminate any variance error generated from data collection. Qualitative data, such as interviews or field documents, could be integrated to develop a better understanding of the research problems and corroborate the results from quantitative data.

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