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STUDENTS’ ENGAGEMENT IN COLLABORATIVE LEARNING GROUP SUPPORTED BY COMMUNICATION TOOLS: AN EMPIRICAL STUDY

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Abstract

Collaborative learning group in higher education is increasingly supported by communication tools, but there are still some problems regarding engagement. We examined students’ engagement in collaborative learning groups with the help of communication tool—Slack. Students’ motivation to engage in teamwork can be promoted through the openness of team members’ effort on Slack. Moreover, free-rider and sucker effect can also be relieved. Teamwork engagement can prompt students’ learning and work satisfaction. We proposed a research model and corresponding hypotheses. Surveys were issued online to graduate students at different time of our course. SmartPLS 3.0 was used to analyze data and test structure equations. We came to conclusions lastly as follows: mutual trust, social influence and reward valence are positively related to teamwork engagement, and teamwork engagement is positively related to personal success (i.e. learning and work satisfaction). However, the moderation role of task complexity between teamwork engagement and personal success is not supported. Theoretical and practical contributions are discussed. Research limitations and future research directions are also presented.

Keywords: Student Engagement, Collaborative learning, Social Influence, Communication Tools.
1 INTRODUCTION

Many research indicated that teaching effect can be greatly improved through collaborative learning (Garfield, 1993; Gregory & Thorley, 2013). For example, researchers found that collaborative learning can enhance students’ critical thinking significantly (Gokhale, 1995) and promote communication, problem solving skills and relationship among students (Ferreri & O’Connor, 2013). With the development of Internet and communication tools, various IT means are applied in teaching. Many universities have set up E-learning platforms, on which students have an access to various kinds of course resources and discussing board.

However, there are still some issues in group learning hindering students’ engagement. The problem mainly manifests as two forms: firstly for some students, they don’t want to make a contribution and just want to rely on other group members to finish the task, which is called free-riding effect. It is the tendency for individuals to expend less effort when working collectively than when working individually (Hall & Buzwell, 2012). Secondly some active students may feel unfairly exploited by free-riders and may give up making efforts because of sucker effect (Hüttier & Diehl, 2011).

More generally, the problem lies in that there are no proper ways to supervise and quantify students’ engagement. To address this problem, we consider applying communication tools to improve the visibility of students’ efforts and engagement. We assumed that students may have to enhance personal engagement because of other members’ engagement. We have taught a graduate course for 8 weeks. This course introduced new business models driven by big data and aimed at developing students’ analysis, innovation and problem solving skills. 183 postgraduate students were divided into ten teams and every team had four small groups. Students were required to use Slack, a communication platform, to collaborate. This study intends to explore the role of teamwork engagement in the context of learning group supported by communication tools. Surveys were issued for two times and SmartPLS was used to analyze data.

Based on Social Capital Theory, it is noted that mutual trust plays an important role in the formation of students’ motivation for engaging in group learning. Besides, it is also believed that motivation is effected by two aspects (Wächter, Lungu, Liu, Willingham, & Ashe, 2009): one is the benefits if he/she engages, and the other is the loss if he/she doesn’t engage. We argued that reward valence is the bonus when students engage in group learning. As for the loss, we proposed social influence from the perspective of reasoned behavior, which means one has to do something due to the influence of people who are important for him/her. If he/she doesn’t do something, he/she may lose others’ trust and be alienated. As the benefits of engaging in teamwork, personal success, including learning and work satisfaction, can be met. In addition, we have taken environment factors into consideration. Whether task complexity plays a moderating role between teamwork engagement and personal success has also been examined.

The rest of the paper is organized as follows. We begin with the theoretical foundations, reviewing prior work on the teamwork engagement, mutual trust, social influence, reward valence and personal success. This is followed by a discussion of the research model and seven research hypotheses. Then, results of empirical tests of the model will be presented. Finally, the paper concludes with a discussion of the theoretical and practical implications of our findings.

2 LITERATURE REVIEW

2.1 Teamwork Engagement

Engagement is an important concept in assessing the quality of a class. Many teaching methods and factors influencing students’ engagement in course have been explored for a long time (Fallon, Walsh,
In this paper, we defined teamwork engagement as students’ active participation on Slack, including uploading documents, sharing useful links, proposing new ideas and so on.

However, creating successful learning group is not simply a matter of putting students together. Students can’t automatically become more involved, thoughtful, skilled, or responsible when working together (Feichtner & Davis, 1984). An effective learning group should be adapted to the unique students, curriculum, and context. Besides, free-rider and sucker effect brought about by group cooperation also do harm to overall performance. Therefore, this paper provides a potential solution to this problem from three different aspects of student motivation, including mutual trust, social influence and reward valence.

2.2 Mutual Trust

Trust reflects a willingness to be in a position of vulnerability based on the positive expectation toward another party’s future behaviour (Gefen et al., 2003). Mutual trust is the basis of the cooperation among people. A great deal of research have examined how trust affects team performance (De Jong & Elfring, 2010; Ennen, Stark, & Lassiter, 2015). For example, Swift et.al (2013) posited that trust had a positive influence on knowledge sharing and organization learning. Trust building contains two processes, including the formation of cognitive trust and affective trust (Zahedi & Song, 2008). Cognitive trust focuses on one’s capability and resources and thereby cognitive trust is more easily established between people who are not familiar with each other. While affective trust emphasizes social identification and one’s personality. Therefore close friends are apt to create affective trust.

Our course was taught in the first semester for first-year graduate students. Students were not so familiar with each other. We believed that students tended to construct cognitive trust in cooperation. In this paper, mutual trust refers to a sense of belief in other team members when they collaborating together. As a part of motivation, mutual trust played a crucial role in stimulating students’ engagement in teamwork. If members trust each other, they will be willing to engage in teamwork.

2.3 Social Influence

Social influence refers to a trend of one’s behaviour being affected by people around him/her, even he/she does not detect (Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008). Related research revealed that people having something in common are more likely to be influenced (Young, 2009). In group cooperation, group climate is a remarkable factor of knowledge sharing (Xue, Bradley, & Liang, 2011). That is to say, if most of group members engage in teamwork actively, the rest will also involve themselves in teamwork because of others’ influence.

But in traditional group learning setting, efforts from active members cannot always be seen by do-little members. Hence, social influence helps little in overall teamwork. Thanks to the development of Internet and technology, many IT-supported tools have been applied in education to improve teaching efficiency (Clarke & Minocha, 2009; Falloon, 2015). Cooperative tools make it open to all team members and supervisor. In our class, students were required to use Slack to cooperate and coordinate. Moreover, we announced that team communication and cooperation was an important component of final grades. Consequently, students may be more engaged in teamwork. Specifically, students were afraid of being alienated and getting a bad grade if they do little teamwork. Thereby, social influence can also be comprehended as potential loss if people don’t do something.

2.4 Reward Valence

According to Expectancy Theory, reward valence is the degree of one’s goals satisfied when he obtains the rewards. For instance, a man will ask himself whether his personal goals can be satisfied if he gets the reward when making a decision. Reward valence is captured by individual’s perception of
the importance of gaining rewards (Eklöf, 2010). Many research have shown that reward can stimulate one’s motivation to make an effort (Sun, Wang, Yin, & Zhang, 2015). Further, reward can be classified into two types: economic reward and social reward (Zhang, Ordonez de Pablos, & Zhang, 2012). Economic reward focuses on money or material reward, while social reward underlines social respect and bonus within relationships. There were no economic incentives in this class and scores play a similar role as economics bonus. So scores can be treated as a kind of economic reward. Meanwhile, social rewards, such as respect and praise form members, are also important parts of reward valence.

2.5 Personal Success

Besides group performance, personal success of group members is also an important part to assess teamwork quality (Hoegl & Gemuenden, 2001). Future cooperation and personal growth of members should also be taken into consideration. A successful team should work in a way that can increase members’ motivation to engage in future cooperation. Specifically, personal success comprises learning and work satisfaction, which are two basic elements for future collaboration. Learning refers to what a person has learned from cooperation, such as techniques, problem-solving capability and so on. Work satisfaction is one’s overall satisfaction with other group members and tasks completion. Group members’ acquisition of new skills and work satisfaction increase the likelihood of future cooperation. In this paper, we take personal success as a benefit of group members’ teamwork engagement. Moreover, this relation may be affected by environment factors, such as task complexity.

3 MODEL DEVELOPMENT AND HYPOTHESES

Based on literature review, the conceptual research model is proposed in Figure 1.

![Research Model](image)

**Figure 1.** Research Model.

3.1 Mutual Trust and Teamwork Engagement

Mutual trust is a social concept, covering form person-to-person trust to organization-to-organization trust (Zaheer, McEvily, & Perrone, 1998). It is believed that trust is the basis of interpersonal relationship and people tend to believe a man’s behaviour and words if they trust him (Hanham & McCormick, 2009). A mass of research have shown that people are more likely to share knowledge if they are in a trustworthy atmosphere (Levin & Cross, 2004; Yuan, Zhang, Chen, Vogel, & Chu, 2009).

In our class, students were not very familiar with each other. But they knew what capabilities their group members have and based on this cognitive trust they could assign tasks well. For example, Mary
and Tom are in one group, and Mary knows Tom is good at programming. When their group needs programming, Mary will recommend Tom to take this responsibility and trust Tom can finish this task well. As for Tom, after perceiving other members’ trust, he will be more confident and will fully engage himself in teamwork. In other words, group members’ teamwork engagement will be high when they have mutual trust. Hence, we proposed hypothesis as follow:

H1: Mutual trust is positively related to teamwork engagement.

3.2 Social Influence and Teamwork Engagement

Social influence can be defined as the degree of one’s behaviour being affected by people around him. It is a direct response to overt social forces (Cialdini & Goldstein, 2004). One’s decision to do or not to do something is usually influenced by the behaviours of people who are important to him (Cialdini et al., 2006). But the premise is that others’ behaviours and choices can be seen and perceived. If you can’t see or perceive what others have done, your behaviour may not be influenced.

In this course, students used Slack to communicate, coordinate tasks and upload documents. All these were recorded by Slack and could be seen by all team members and the teacher. Under this circumstance, students’ engagement is visible and can be evaluated. Teamwork engagement manifested as frequent communication with others, organizing tasks, sharing materials, proposing new ideas and so on. The power of social influence lies in promoting students’ engagement from others’ silent effect, rather than directly telling him to be engaged in teamwork. Consequently, we propose:

H2: Social engagement is positively related to teamwork engagement.

3.3 Reward Valence and Teamwork Engagement

Reward valence is an important factor for one’s motivation to do something. It is often viewed as a stimuli for one’s behaviour. Many research have investigated the relationship between reward and motivation form the perspective of expectancy-valence theory (Erez & Isen, 2002; Kominis & Emmanuel, 2007). People usually look forward to what they will gain if they do something. In turn, this expectation will stimulate a man’s motivation to engage in something. Reward valence includes monetary or material incentives, as well as internal reward, such as social respect and self-affirmation.

In our class, final score was a kind of material reward and respect from other members could be seen as internal reward. Both kinds of reward can satisfy personal goals to a certain extent. So we propose:

H3: Reward valence is positively related to teamwork engagement.

3.4 Teamwork Engagement and Personal Success

Students’ engagement can still exert a series of positive effects. Different from previous research, we focus on personal success, rather than team performance. Because team performance focuses on the whole performance, neglecting individuals’ gain. On the contrary, personal success, including learning and work satisfaction, is consistent with the goal of caring for every student’s gain and growth.

We posit that students’ teamwork engagement will help them achieve personal success. Learning emphasizes personal cognitive gain, such as the use of software, knowing new knowledge, learning new methods. While work satisfaction pays attention to perceived satisfaction with other team members and attitude to future cooperation. Therefore, we propose:

H4: Teamwork engagement is positively related to personal success-learning.

H5: Teamwork engagement is positively related to personal success-work satisfaction.
3.5 Task Complexity

Many research suggested that relationships were supported under certain environmental conditions (Mangos & Steele-Johnson, 2001). In addition to what we have discussed above, we also considered the moderating role of environment factors (i.e. task complexity). Because when tasks are complex, even students engaged themselves in teamwork, they may not achieve personal success. When task complexity is low, students are more likely to realize personal success. Hence, we propose that:

H6: Task complexity moderates the relationship between teamwork engagement and personal success-learning such that increased task complexity weakens the positive effect of teamwork engagement on personal success-learning.

H7: Task complexity moderates the relationship between teamwork engagement and personal success-work satisfaction such that increased task complexity weakens the positive effect of teamwork engagement on personal success-work satisfaction.

4 RESEARCH DESIGN

4.1 Measures

The scale of each construct was from prior studies to adapt to this research. Each item was measured using a 7-point Likert scale (i.e. 1=strongly disagree, 7=strongly agree). Measures for mutual trust are form the research of De Jong et.al (2010). Scales of social influence are based on a study of Davis et.al (2015). Reward valence is from a research by Sanchez et.al (2000). Teamwork engagement is based on Rich’s research (Rich, Lepine, & Crawford, 2010). Measures for personal success, consisting of learning and work satisfaction, are from a study of Hoegl et al (2001). Measures for task complexity are modified (Seijts, Latham, Tasa, & Latham, 2004; Taylor, 1981; Yeo & Neal, 2004).

These items were firstly translated into Chinese by a researcher. After that, another researcher translated them back into English to avoid common bias and ensure consistency. Both researchers knew well about this course and had expertise in mutual translation between English and Chinese. When the instrument was developed, we conducted a pilot survey among 10 students who have attended this course. According to response from these students, we then made some revision.

4.2 Data Collection

Our course was taught to first-year graduate students for 8 weeks in Tianjin University. There were 181 students, including 60 males and 121 females. Notably, there were 9 international students in our class and surveys in English were prepared for them. Students were divided into ten teams and each team had four groups. There were 17 to 18 students in each team. We assigned ten different topics related to course themes, such as crowdsourcing, smart restaurant et al. Each team was required to collect materials, analyze and give a case report. All teams and groups were asked to use Slack, an effective collaboration platform, to communicate and coordinate online. It allows each team constructing their channels for different groups. The general channel is open for everyone in this team. Each group could also create a private channel for internal group communication. All teams’ communication and coordination records were asked to be delivered at the end of this course, which could be viewed as team cooperation performance. Final score was made up with three parts, namely presentations, team cooperation performance and final report. Four groups in one team had different divisions of work and team target was reached through cooperation among groups.

We had two online surveys collected at different time during these 8 weeks. The first survey was conducted at the fourth week, examining mutual trust, social influence and reward valence of team members. As time went on, further group cooperation arose in teams. Consequently, the second survey
was at the eighth week, mainly investigating teamwork engagement, personal success and task complexity of team members.

Data was analysed by PLS. Reasons for choosing PLS are presented: 1) one of our research goals is to identify key driver constructs. According to Hair et al (2011), PLS is a proper selection; 2) PLS works well with small-to-medium-sized samples (Chin, 2010).

5 RESULTS

5.1 Measurement Model

Firstly, convergent validity is measured by Quality Criteria, as Table 1 shows. All average variance extracted (AVE) exceeds 0.5 and Composite Reliability (CR) exceeds 0.7; thus, the scale has a good convergent validity. In addition, All Cronbach’s Alpha (Cα) are between 0.6 and 0.7, suggesting a good reliability.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Abb.</th>
<th>AVE</th>
<th>CR</th>
<th>Cα</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutual Trust</td>
<td>MT</td>
<td>0.679</td>
<td>0.914</td>
<td>0.881</td>
</tr>
<tr>
<td>Social Influence</td>
<td>SI</td>
<td>0.776</td>
<td>0.912</td>
<td>0.856</td>
</tr>
<tr>
<td>Reward Valence</td>
<td>RV</td>
<td>0.752</td>
<td>0.858</td>
<td>0.687</td>
</tr>
<tr>
<td>Teamwork Engagement</td>
<td>TE</td>
<td>0.600</td>
<td>0.962</td>
<td>0.958</td>
</tr>
<tr>
<td>Learning</td>
<td>LE</td>
<td>0.675</td>
<td>0.912</td>
<td>0.880</td>
</tr>
<tr>
<td>Work Satisfaction</td>
<td>WS</td>
<td>0.731</td>
<td>0.890</td>
<td>0.820</td>
</tr>
<tr>
<td>Task Complexity</td>
<td>TC</td>
<td>0.681</td>
<td>0.801</td>
<td>0.727</td>
</tr>
</tbody>
</table>

Table 1. Quality Criteria

Discriminant validity was measured by Fornell-Larcker Criterion (FLC) and Cross Loadings (CL). These two criteria can reflect differences of interpretation ability and the ability of other significant variables to construct latent variables to their corresponding significant variables. The results in Table 2 shows discriminant validity of our model. For each factor, the square root of AVE (figures in bold) is larger than its correlation coefficients with other factors. This suggests a good discriminant validity (Fornell & Larcker, 1981). As for cross loadings, we deleted some items whose outer loadings were low, such as RV3, TC1.

<table>
<thead>
<tr>
<th>Items</th>
<th>LE</th>
<th>MT</th>
<th>RV</th>
<th>SI</th>
<th>TC</th>
<th>TE</th>
<th>WS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LE</td>
<td>0.822</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MT</td>
<td>0.388</td>
<td>0.824</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RV</td>
<td>0.223</td>
<td>0.303</td>
<td>0.867</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>0.291</td>
<td>0.631</td>
<td>0.373</td>
<td>0.881</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TC</td>
<td>0.152</td>
<td>0.190</td>
<td>0.125</td>
<td>0.234</td>
<td>0.825</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TE</td>
<td>0.422</td>
<td>0.686</td>
<td>0.360</td>
<td>0.557</td>
<td>0.146</td>
<td>0.775</td>
<td></td>
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<tr>
<td>WS</td>
<td>0.796</td>
<td>0.387</td>
<td>0.221</td>
<td>0.294</td>
<td>0.211</td>
<td>0.377</td>
<td>0.855</td>
</tr>
</tbody>
</table>

Table 2. Fornell-Larcker criterion

5.2 Structural Model

The second step of SEM analysis is structural model analysis. The significance of each path coefficient was calculated by bootstrapping with 5000 samples with the replacement method. Results are shown in Table 3.
Hypotheses | Relationship | Original Sample | P-value | Result
---|---|---|---|---
H1+ | MT->TE | 0.540 | 0.000*** | Support
H2+ | SI->TE | 0.166 | 0.023* | Support
H3+ | RV->TE | 0.134 | 0.043* | Support
H4+ | TE->LE | 0.404 | 0.000*** | Support
H5+ | TE->WS | 0.347 | 0.000*** | Support
H6- | TC->LE | 0.106 | 0.287 | Not Support
H7- | TC->WS | 0.178 | 0.100 | Not Support

Table 3. Path Coefficient and Significance
*=p<.05; **=p<.01; ***=p<.001

6 DISCUSSION

We have examined the role of teamwork engagement in learning groups supported by collaborative tools. Firstly, results showed that students were willing to engage themselves in teamwork when they perceived mutual trust in their teams. This trust manifested as belief in some capabilities of other members or belief in one’s personality, such as honesty. Secondly, results indicated that social influence of other team members and teacher had positive effect on teamwork engagement. This is mainly because of the openness and visibility of online collaboration, team members did not want to be accused of free riders and they hoped to give a good impression to the instructor. Thirdly, results showed that reward valence had positive effect on teamwork engagement. Reward valence emphasized internal motivation over external stimulation. Lastly, teamwork engagement had a positive effect on personal success. This means that teamwork engagement could promote one’s learning capability through learning new knowledge and techniques, as well as one’s work satisfaction through interpersonal coordination and collaboration.

The tests of moderation effects of task complexity between teamwork engagement and personal success were not supported. When task is complex, students may learn something new and build close cooperation among team members. When task isn’t very complex, students may learn how to finish an easy task more efficiently and easy tasks might promote team confidence and cooperation.

This research has many theoretical and practical implications. Firstly, in theory, we combine social capital theory and reasoned action to develop a research model. Meanwhile, teamwork engagement also has critical effect on team and personal performance. Different from previous research, we choose personal success, including learning and work satisfaction, to measure students’ gain and growth. Secondly, in practice, how to promote students’ engagement in learning groups is a crucial problem. We take social influence into account under the online group cooperation context. It suggests that students are more likely to be influenced by other team members when others’ effort is visible. Words and documents uploaded on Slack can be seen by every member, as well as teacher. This provides teachers a way to know the contributions of each member in a learning group. Under this circumstance, score is not just related to team performance, it is also dependent on one’s effort on Slack. It is more scientific and comprehensive to evaluate a student’s performance in group learning.

Some limitations exist in this paper. Firstly, students’ personal success (learning and work satisfaction) is a perceived conception and it cannot stand for the true level of learning and growth. Future study can use other ways to measure students’ development and performance. Secondly, although the method of PLS provides a good way to study SEM, the loss of the sample data caused by the component extraction causes a problem with accuracy in the parameters’ estimation. Thus, a more accurate study with a bigger sample should be conducted in future study.
References


