

Role-Play in Computer-Supported Collaborative Learning-An Explorative Study

Yu-Chen HSU^a & Yen-Lin CHIU^{b*}

^a*School of Public Administration, Sichuan University, China*

^b*Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology, Taiwan*

*E-mail: erin0825@ms58.hinet.net

Abstract: The role-play has been regarded as an important function which may facilitate effective computer-supported collaborative learning (CSCL). In this paper, we explored undergraduates' experiences in undertaking team-based task in CSCL environment. The main purpose of this study was to examine the impacts of role-play on CSCL. 90 participants grouped into 18 teams were surveyed. For the team-based analysis level, the results indicated that roles of team members in CSCL teams have relations with their appraisal for CSCL. This finding suggested that teachers and students should be aware of the roles played in CSCL environment and govern the roles to stimulate effective online collaborative learning.

Keywords: collaborative learning, CSCL, performance, role-play, satisfaction

1. Introduction

Nowadays collaboration has been extremely concerned and adopted in learning activities. Collaborative learning is regarded as students' interaction while they are making efforts to solve problems and accomplish tasks together in learning process (Dewiyanti et al., 2007). In recent years computer supported collaborative learning (CSCL) is viewed as a good way to facilitate knowledge acquisition and to improve learning in online environments (Noroozi et al., 2013; Wecker et al., 2014).

However, it was indicated that putting students together does not necessarily result in effective outcomes of collaborative learning (Weinberger et al. 2005). On the one hand, it was pointed out that assigning roles to students in collaborative learning process has positive effects on learning outcomes (De Wever et al., 2008). Roles can be defined as learners' responsibilities which may guide individual behavior and govern group interaction to achieve group's goal (Strijbos & De Laat, 2010). The role concept has attracted increasing attention and become a promising construct for facilitating CSCL (Strijbos & De Laat, 2010; Pozzi, 2011). However, the impact of role-play on CSCL is still an emerging topic which has not been completely studied. This study aimed to explore team members' roles in CSCL teams and its impacts on team members' appraisal for CSCL.

2. Methods

2.1 Participants

All participants were undergraduates of Sichuan University in China. The average age of them was 21.52 with a range from 20 to 24. The ratios of gender type were almost equal. Most of the participants majored in public administration and public policy. They were grouped into 18 teams to collaboratively accomplish a team-based task which was part of their assignments related to their study topic. The number of team members ranged from 3 to 7 with an average of 5 members. The roles they played while undertaking team-based task in CSCL environment were conductor (16.7%), information provider (15.6%), active actor (54.4) and general actor (13.3%).

Table 1: Participants' demographics.

Demographics		
Variables	Frequency	%
Gender		
Female	48	53.3
Male	42	46.7
Major		
Public administration and Public Policy	34	37.8
Land Resource and Real Estate Management	9	10.0
Social Security and Insurance	13	14.4
Philosophy	3	3.3
Secretary and Archive Science	9	10.0
Information management technology	15	16.7
Information Resource Management	7	7.8
Country level of hometown		
Level 1	5	5.6
Level 2	17	18.9
Level 3	23	25.6
Village	45	50.0
Role in CSCL team		
Conductor	15	16.7
Information provider	14	15.6
Active actor	49	54.4
General actor	12	13.3

2.2 Instruments

In addition to the demographic variables, a self-report instrument for appraising participants' experiences of CSCL including attitude toward CSCL, satisfaction with CSCL method and satisfaction with CSCL outcome were evaluated. Moreover, the Internet Self-efficacy Scale was also utilized and measured.

2.3 Analysis Procedure

The descriptive statistics were analyzed to explore the demographics of the participants. The exploratory factor analysis was conducted to validate the instruments including CSCL experience survey and Internet self-efficacy scale. Finally, the hypotheses were tested by executing t-test and regression analysis.

3. Results

3.1 Results of exploratory factor analysis

For evaluating the validation of instruments the exploratory factor analyses were conducted. The Kaiser-Meyer-Olkin (KMO) measure and the Bartlett's test of sphericity were examined to determine whether the sample was appropriate for executing the EFA.

For the Internet Self-Efficacy Scale (ISES), it was reported that the KMO measure had a value of 0.89 with a significant Bartlett's test (chi-square = 624.30, $p < 0.001$) showing the EFA was appropriate. As a result, the items were grouped into 2 factors, namely Basic Internet Self-Efficacy (BISE) and Advanced Internet Self-Efficacy (AISE). The Cronbach's alpha for two factors were 0.77 and 0.85, suggesting that two factors had high reliability. Both BISE and AISE contained 5 items and the total variance explained reached 74.17%, implying the ISES was appropriate for assessing the participant's Internet-based self-efficacy. With respect to the CSCL experience, the EFA results revealed

that the KMO measure (0.84) and Bartlett's test (chi-square = 116.25, $p < 0.001$) were well examined. 65.87 % of total variances were explained by two factors namely overall appraisal for method (3 items) and overall appraisal for outcome (3 items) with alpha values of 0.69 and 0.68, respectively.

3.2 Comparisons of gender difference

Table 1 shows the differences between genders. It reveals that males have higher frequency in computer usage and Internet usage than females does. However, there are no differences of appraisal for CSCL method and appraisal for CSCL outcome between males and females.

Table 1: Differences between genders.

Variables	Male		Female		<i>t</i> -test	<i>p</i> value
	Mean	S.D.	Mean	S.D.		
age	21.71	0.97	21.35	0.86	-1.86	0.066
computer usage (hr/week)	35.83	25.23	23.00	12.81	-3.06**	0.003
Internet usage (hr/week)	28.93	25.05	16.79	11.52	-2.98**	0.004
Satisfaction with performance	3.36	1.12	2.92	1.22	-1.78	0.079
Satisfaction with communication	4.40	0.66	4.10	0.83	-1.88	0.064
Attitude toward CSCL	3.71	0.83	3.48	0.92	-1.26	0.211
Attitude toward cooperation	4.90	0.45	4.85	0.54	-0.46	0.649
Satisfaction with cooperation	4.76	0.69	4.66	1.03	-0.54	0.588
Attitude toward online discussion	4.24	0.98	4.07	1.01	-0.78	0.440
Basic Internet self-efficacy	5.64	0.46	5.59	0.48	0.47	0.643
Advanced Internet self-efficacy	5.51	0.72	5.02	0.99	2.64*	0.010
Overall appraisal for CSCL method	4.33	0.56	4.21	0.69	-0.84	0.406
Overall appraisal for CSCL outcome	4.17	0.58	3.89	0.87	-1.78	0.079

Note: * $p < 0.05$; ** $p < 0.01$

3.3 Correlations among variables for individuals

As shown in table 2, males have higher computer usage and Internet usage than females; however, males possess higher Advanced Internet self-efficacy than their counterparts. Moreover, it reveals that computer usage has positive relations with attitude toward CSCL, suggesting that raising learners' computer usage may increase their positive attitude toward CSCL.

3.4 Correlations among variables for CSCL teams

Table 3 shows the correlations among variables for team level. It should be noted that all variables were calculated for team level; for instance, the roles (conductor, information provider, active actor and general actor) were counted as ratios in a CSCL team.

As revealed in table 3, CSCL teams have higher satisfaction with communication while they have higher ratio of information provider ($r = 0.57$, $p < 0.05$), suggesting that arrange more information provider in a CSCL team may increase team members' satisfaction with their communication. However, the teams reveal negative attitude toward CSCL ($r = -0.51$, $p < 0.05$) if the CSCL teams have more general actors in their team; moreover, the teams with higher ratio of general actor tend to possess lower satisfaction with communication ($r = -0.50$, $p < 0.05$), online discussion ($r = -0.48$, $p < 0.05$) as well as overall appraisal for CSCL outcome ($r = -0.50$, $p < 0.05$). Moreover, the teams have more positive attitude toward CSCL ($r = 0.49$, $p < 0.05$), online communication ($r = 0.71$, $p < 0.01$) and appraisal for CSCL method ($r = 0.62$, $p < 0.01$) while these teams have higher average computer usage. Finally, it is indicated that Basic Internet self-efficacy has positive relationships between attitude toward CSCL ($r = 0.47$, $p < 0.05$) and online discussion ($r = 0.54$, $p < 0.05$), showing that improving teams' basic Internet self-efficacy may increase their attitude toward CSCL.

Table 2: Correlations among variables for individuals.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Gender (male: 1; female: 0)	-----												
2. Age	0.19												
3. Computer usage (hr/week)	0.31**	0.12											
4. Internet usage (hr/week)	0.31**	0.14	0.94***										
5. Satisfaction with performance	0.19	0.18	0.09	0.06									
6. Satisfaction with communication	0.20	-0.04	0.05	0.04	0.48***								
7. Attitude toward CSCL	0.13	-0.04	0.22*	0.20	0.44***	0.51***							
8. Attitude toward cooperation	0.05	-0.19	-0.11	-0.16	0.24*	0.38**	0.35**						
9. Satisfaction with cooperation	0.06	-0.05	-0.18	-0.20	0.38***	0.47***	0.35***	0.49***					
10. Attitude toward online discussion	0.09	-0.16	0.12	0.03	0.33**	0.37***	0.58***	0.32**	0.20				
11. Overall appraisal for CSCL method ^{#1}	0.10	-0.07	0.19	0.14	0.39**	0.56***	0.86***	0.61***	0.48***	0.86***			
12. Overall appraisal for CSCL outcome ^{#2}	0.19	0.07	0.00	-0.03	0.84***	0.79***	0.55***	0.45***	0.75***	0.38***	0.58***		
13. Basic Internet self-efficacy	0.09	-0.21*	-0.00	-0.02	0.08	0.08	0.16	0.20	0.18	0.14	0.13	0.14	
14. Advanced Internet self-efficacy	0.26*	-0.15	0.12	0.11	0.11	0.14	0.17	0.18	0.10	0.04	0.05	0.14	0.77***

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

^{#1} Overall appraisal for CSCL method = (attitude toward CSCL + attitude toward cooperation + attitude toward online discussion)/3

^{#2} Overall appraisal for CSCL outcome = (Satisfaction with performance+ Satisfaction with communication+ Satisfaction with cooperation)/3

Table3: Correlations among variables for CSCL teams

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Gender (male: 1; female: 0)	----																
2. Age	0.28																
3. Conductor ^{#1}	0.14	0.13															
4. Information provider ^{#2}	0.16	-0.15	-0.11														
5. Active actor ^{#3}	-0.11	-0.04	-0.17	-0.67 ^{**}													
6. General actor ^{#4}	-0.14	0.04	-0.32	0.02	-0.59 [*]												
7. Computer usage (hr/week)	0.13	0.04	-0.17	0.47 [*]	-0.38	0.16											
8. Internet usage (hr/week)	0.21	0.07	-0.27	0.47 [*]	-0.21	0.00	0.94 ^{***}										
9. Satisfaction with performance	0.39	-0.07	0.00	0.24	0.06	-0.37	0.26	0.28									
10. Satisfaction with communication	0.45	-0.17	0.15	0.57 [*]	-0.14	-0.50 [*]	0.24	0.31	0.73 ^{**}								
11. Attitude toward CSCL	0.40	-0.34	0.04	0.33	0.11	-0.51 [*]	0.49 [*]	0.55 [*]	0.55 [*]	0.71 ^{**}							
12. Attitude toward cooperation	0.08	-0.42	0.03	0.21	0.09	-0.37	0.27	0.20	0.41	0.51 [*]	0.70 ^{**}						
13. Satisfaction with cooperation	0.22	-0.36	-0.19	0.26	0.25	-0.48 [*]	-0.10	0.01	0.43	0.57 [*]	0.54 [*]	0.55 [*]					
14. Attitude toward online discussion	0.38	-0.22	0.08	0.38	-0.18	-0.20	0.71 ^{**}	0.70 ^{**}	0.58 [*]	0.65 ^{**}	0.79 ^{**}	0.40	0.18				
15. Basic Internet self-efficacy	0.04	-0.61 ^{**}	-0.19	-0.02	0.16	-0.09	0.07	0.07	0.30	0.36	0.54 [*]	0.46	0.31	0.47 [*]			
16. Advanced Internet self-efficacy	0.13	-0.68 ^{**}	-0.12	0.18	-0.17	0.13	0.10	0.05	0.29	0.42	0.46	0.43	0.28	0.45	0.91 ^{***}		
17. Overall appraisal for CSCL method	0.38	-0.27	0.08	0.31	0.01	-0.39	0.62 ^{**}	0.62 ^{**}	0.47 [*]	0.63 ^{**}	0.93 ^{**}	0.65 ^{**}	0.39	0.90 ^{***}	-0.47	-0.38	
18. Overall appraisal for CSCL outcome	0.43	-0.19	-0.01	0.39	0.06	-0.50 [*]	0.20	0.27	0.92 ^{***}	0.89 ^{***}	0.70 ^{**}	0.55 [*]	0.70 ^{**}	0.59 [*]	-0.38	-0.38	0.58 [*]

Note: ^{*} $p < 0.05$; ^{**} $p < 0.01$; ^{***} $p < 0.001$ ^{#1} Ratio of conductor in CSCL team; ^{#2} Ratio of information provider in CSCL team; ^{#3} Ratio of active actor in CSCL team; ^{#4} Ratio of general actor in CSCL team

4. Conclusions

This study indicated that team members' roles in a CSCL team have relations with their appraisal for CSCL. This finding suggested that teachers and students should be aware of the roles played in CSCL environment and govern the roles to stimulate effective online collaborative learning.

.

Acknowledgements

This study was supported by the Ministry of Science and Technology, Taiwan, under grant number MOST 103-2511-S-011 -008 -MY3.

References

- De Wever, B., Van Keer, H., Schellens, T., & Valcke, M. (2009). Structuring asynchronous discussion groups: the impact of role assignment and self-assessment on students' levels of knowledge construction through social negotiation. *Journal of Computer Assisted Learning*, 25, 177-188.
- Dewiyanti, S., Brand-Gruwel, S., Jochems, W., Broers, N. J. (2007). Students' experiences with collaborative learning in asynchronous computer-supported collaborative learning environments. *Computers in Human Behavior*, 23, 496-514.
- Noroozi, O., Teasley, S.D., Biemans, H. J. A., Weinberger, A., & Mulder, M. (2013). Facilitating learning in multidisciplinary groups with transactive CSCL scripts. *International Journal of Computer-supported Collaborative Learning*, 8(2), 189-223.
- Pozzi, F. (2011). The impact of scripted roles on online collaborative learning processes. *Computer-Supported Collaborative Learning*, 6, 471-484.
- Strijbos, J. W., & De Laat, M. F. (2010). Developing the role concept for computer-supported collaborative learning: An explorative synthesis. *Computers in Human Behavior*, 26, 495-505.
- Wecker, C., & Fischer, F. (2014). Where is the evidence? A meta-analysis on the role of argumentation for the acquisition of domain-specific knowledge in computer-supported collaborative learning. *Computers & Education*, 75, 218-228.
- Weinberger A., Reiserer M., Ertl B., Fischer F., & Mandl H.(2005). Facilitating collaborative knowledge construction in computer-mediated learning environments with cooperation scripts. In R. Bromme, F.W. Hesse, & H. Spada (Eds), *Barriers and Biases in Computer-Mediated Knowledge Communication* (pp. 15-38). Kluwer, Boston.