S. L. Wong et al. (Eds.) (2010). Proceedings of the 18th International Conference on Computers in Education. Putrajaya, Malaysia: Asia-Pacific Society for Computers in Education.

Exploration Study on Group Work with Interactive Whiteboard and Computer Feedback System for Primary Students

Tsung-Ho LIANG[a*], Shu-Chuan TU[b], Ya-Kuei HUANG[b], Yen-Ning SU[a], Yueh-Min HUANG[a]

[a] *Department of Engineer*ing *Science, National Cheng Kung University, Tainan, Taiwan*

[b] *Graduate Institute of Technology Development and Communication, National University of Tainan, Tainan, Taiwan.*

protnmike@gmail.com,

Abstract: This paper presents a case study of one teacher and 28 first-grade primary students utilizing the interactive whiteboard (IWB) and computer feedback system (CFS) to improve the group works in their language learning activities. The classroom observation and a content analysis method were conducted for investigating the teaching and learning interactions, and total 72 instructional events were considered to be the data in the coding procedure. The results indicated that 44.44% of instructional events embraced students' learning interest, active participation, and peer cooperation behaviors, which reveal the students were very engaged in the cooperative group works. Consequently, the IWB plus CFS improved the teaching and learning interactions, especially on whole-class discussion and cooperative group work, in which student's concept was constructed by those efficient dialogic interactions among teacher and students.

Keywords: group work, interaction, interactive whiteboard, computer feedback system

Introduction

In traditional whole-class discussion activities, the interactions usually focus on a few students those were clear thinking and expeditious decision-making. The other students are often lack of interest in this kind of whole-class discussion due to their slow responses, which may lead to a lack of learning interactions between teacher and students [1].

In order to increase the interaction between teacher and students, Newhouse [3] emphasized the importance of adaptive interactive design that stimulates the interactions among teacher and students in activities. Hence, the purpose of this study is to investigate whether the interactive technologies support teaching and learning interaction design could improve the group work efficiency in a primary school.

The application of interactive technology in group work

The classroom feedback system (CFS; [1]) is a computer-mediated feedback system that could improve the interaction problem of the teacher is limited to interact with several students in one time. It enabled the one-way, two-way, even multi-way interaction to carry out seamlessly among teacher and students. A number of studies aimed at different demands to develop various CFSs, e.g., *Classtalk*, *ActivClass*, *Dyknow*, *WiTEC*, and *Classroom Presenter*. The main purpose of these CFSs is to support the interaction between teacher and students. With the CFS supporting, teachers can deeply realize the student's concept developments and problems. These systems promote students participating in discussions, and the peer cooperation becomes more engaged in-group discussion. Thus, this study utilized the interactive technologies including an IWB and a CFS to improve the group interaction between teacher and students.

Case study

This paper conducted a case study to examine the teaching and learning interactions from classroom observation in an interactive-based learning environment. The teacher who participated in this study has four years of IWB instructional experience in teaching. The 28 students who participated in study are primary first-grade students; they have a half year of IWB experience in learning, and are able to utilize the IWB in tasks.

990501
The teacher opened the file and explained a sentence structure, and then proceeded with a whole-class discussion. Some students were oral presented their ideas.

IST1	IST2	IST3	TSL1	TSL2	TSL3	ISL1	ISL2	ISL3	SIL1	SIL2	SIL3
1	0	0	1	1	1	0	1	0	1	1	0

IST	TSL	ISL	SIL
=IST1+IST2+IST3 =1+0+0=1 (pattern 100, in scale 1)	= TSL1+TSL2+TSL 3 =1+1+1=3 (pattern 111, in scale 3)	=ISL1+ISL2+ISL3 =0+1+0=1 (pattern 010, in scale 0)	=SIL1+SIL2+SIL3 =1+1+0=2 (pattern 110, in scale 2)

Figure 1 Analysis of an instructional event.

This study utilized a digital camcorder to record the teacher instructing a Mandarin subject for two lessons (about 80 minutes of video material was collected). Afterwards, this study adopted one minute as the analytic unit for one instructional event. Meanwhile, we asked the teacher to give a brief description of every instructional event (as shown in the upper part of Figure 1) and eliminated those (e.g. working on assignments, class management) which were not classified as the instructional events. The total instructional events (n=72) were then used as data to conduct the coding procedure in this study.

In the coding procedure, this study adopted an interaction factor category which defines four IWB supported teaching and learning interaction factors: IWB Supported Teaching (IST), IWB Supported Learning (ISL), Teacher Supported Learning (TSL), and Student Interactive Learning (SIL). This category was developed based on a review of the literature, and every interaction factor is subdivided into three subcategories. Afterwards, the expert teachers separately reviewed and coded the behavior attributes of 12 subcategories between *appearance* (1) and *disappearance* (0) for each instructional event. The reliability of coding results is .89, and then if the coding results had any disagreement, the expert teachers would discuss the event and achieve consensus on it.

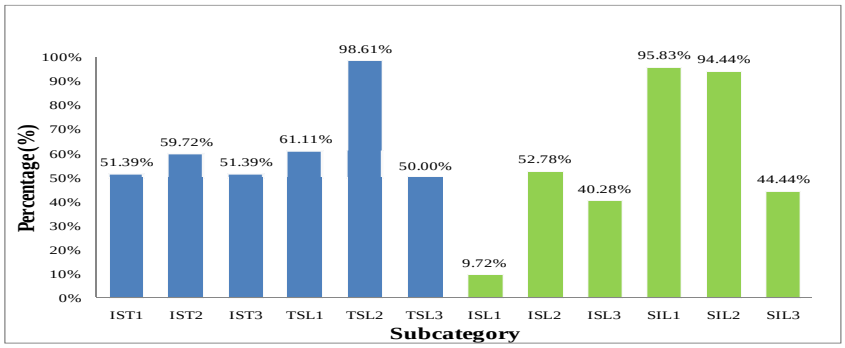

Figure 2 Results of the instructional event analysis of the 12 subcategories.

Results

Figure 2 presents the percentage of the instructional event analysis results of 12 subcategories, the blue bars represent teaching behaviors, and the green ones represent

learning behaviors. Table 1 presents the results of the subcategory patterns in a joint distribution of interaction scales in four interaction factors.

Table 1 The descriptive statistics of the results of the instructional events analysis in a joint distribution of scales and factors.

Interaction scales	Subcategory patterns				Interaction factors				Scale marginal
	***1	***2	***3		IST	TSL	ISL	SIL	
0	0	0	0		29	0	34	3	
				Count	29	0	34	3	66
				Column %	40.28%	0.00%	47.22%	4.17%	22.92%
				Row %	43.94%	0.00%	51.52%	4.55%	100.00%
1	1	0	0		0	1	0	1	
	0	1	0		6	28	9	0	
	0	0	1		0	0	0	0	
				Count	6	29	9	1	45
				Column %	8.33%	40.28%	12.50%	1.39%	15.63%
				Row %	13.33%	64.44%	20.00%	2.22%	100.00%
2	1	1	0		0	7	0	36	
	1	0	1		0	0	0	0	
	0	1	1		0	0	22	0	
				Count	0	7	22	36	65
				Column %	0.00%	9.72%	30.56%	50.00%	22.57%
				Row %	0.00%	10.77%	33.85%	55.38%	100.00%
3	1	1	1		37	36	7	32	
				Count	37	36	7	32	112
				Column %	51.39%	50.00%	9.72%	44.44%	38.89%
				Row %	33.04%	32.14%	6.25%	28.57%	100.00%
Factor marginal				Count	72	72	72	72	288
				Column %	100.00%	100.00%	100.00%	100.00%	100.00%
				Row %	25.00%	25.00%	25.00%	25.00%	100.00%

Note. The first column represents the interaction scale set (0, 1, 2, and 3) of this study. The second column represents the results of the subcategory coded composition, with item ***1 representing IST1/TSL1/ISL1/SIL1. For example, the composition of the 000 pattern means ***1+***2+***3=0+0+0=0 was classified to scale 0; the 010 pattern means ***1+***2+***3=0+1+0=1 was classified to scale 1. The other columns represent the coded results' calculation with regard to the four interaction factors.

Conclusion

This study explored the primary students' group works in terms of the usage of IWB and CFS. We conducted a case study and analyzed the instruction events by a content analysis method. The results found the IWB plus CFS improved the teaching and learning interactions, especially on whole-class discussion (teacher-student) and cooperative group work (student-student). While these activities were seamlessly proceeding, student's concept is simultaneously constructed by efficient dialogic interactions between a teacher and students. Just as the suggestions of Dhindsa and Emran [2] that the technology itself has little bearing on the learning of students. In this study, we concluded that the teacher is still a key to construct an environment enabling students' active, cooperative and responsible learning. In the manner, the concept development can occur through the learners' observation, response and interaction process, enhancing the knowledge construction. Thus, the ultimate goal of the ICT supported interactive learning is that teachers and students can indulge themselves with reciprocal interactions in all activities through the technology.

Acknowledgements

This work was supported in part by the National Science Council (NSC), Taiwan, ROC, under Contract No. NSC 97-2511-S-006-001-MY3, NSC 98-2631-S-024-001 and NSC 99-2631-S-006 -001.

References

[1] Anderson, R. J., Anderson, R., Vandegrift, T., Wolfman, S., & Yasuhara, K. (2003). *Promoting interaction in large classes with computer-mediated feedback.* Paper presented at the Proceedings of CSCL 2003.

[2] Dhindsa, H. S., & Emran, S. H. (2006). *Use of the interactive whiteboard in constructivist teaching for higher student achievement.* Paper presented at the Proceedings of the Second Annual Conference for Middle East Teachers of Science, Mathematics and Computing., Abu Dhabi.

[3] Newhouse, C. P. (2002). *The Impact of ICT on Learning and Teaching*. Retrieved June 29, 2006, from http://www.det.wa.edu.au/education/cmis/eval/downloads/pd/impactreview.pdf