

# Student Conflicts in a Jigsaw-type Technology Classroom for Collaborative Knowledge Construction

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**Abstract:** Jigsaw-typed collaborative classroom is a kind of real time learning in a digital classroom. While the traditional role of a teacher, he/she is being changed into an organizer; students will not be a passive listener, but an active learner. A teacher plays a role of coordinator, while the students are the main actors. Jigsaw, which can be considered as a piece-by-piece learning method without technology-support, was adopted in this experiment. In this research, it is supposed to observe the learning status between learners and to examine how the interaction can affect knowledge construction. Eventually, after the experiment, it describes and analyzes the conflict between group members that can whether to be one of the effects of collaborative knowledge construction in a discussion.

**Keywords:** conflict, jigsaw, collaborative knowledge construction, collaborative learning

## Introduction

In CSCL community, group learning is one of the discussion issues. A large majority of researchers want to find “what is the proof of learning?” Under collaboration, what do they construct? How do they construct? And what do they learn? Researchers are eager to understand the interaction and learning effectiveness between group members, or how the progress of knowledge is built (Beers et al, 2004). CSCL is popular as compared to the cooperative learning in the past. Diggelen & Overdijk (2007) claimed that the trend, which should be accomplished by the computer media, should focus on the connection between students who are in different time or different place.

Diggelen & Overdijk (2007) thought that online collaborative learning would limit the understanding of possibility in computer-supported learning. They insisted that learning happened in the classroom. Students were face-to-face collaboration and they should sit next to the others. Computer should be used to support collaborative learning but not using collaborative learning to support computer technology.

We noticed that the students always distribute and separate their tasks in a tradition classroom. This may not be the best way in learning, as every student has only learnt his or her assigned parts in a project, but not the whole. The goal of learning is changed into task-oriented, but it should be learning-oriented. According to the ideas of Diggelen & Overdijk (2007) that using technology in a face-to-face and collaborative way in learning, this research is supposed to use a real time collaborative editing tool to support Jigsaw-type collaborative learning and to find how the conflicts happen between students can affect collaborative knowledge construction.

## 1. Collaborative Knowledge Construction (CKC)

CKC was one of the most important concepts that CSCL researchers concern. Researchers cared the interaction between learners, how to stay along with sharing ideas, and to solve problems, in order to learning knowledge. A lot of CKC researchers paid attention on the cognitive side to explore group learning. Stahl (2000) built a model of collaborative knowledge building. He thought that the society composed of several different stages of social process, which was a relation of knowledge building in between personal and the society.

In order to monitor the status of learning, except for the discrimination after CKC, Beers et al (2004) said that the knowledge construction is being changed from the individual undelivered knowledge into new knowledge of group members. Weinberger (2003) also described 4 kinds of characteristics under the progress of collaboration. It raised a question: how to explore knowledge construction? Some researchers claimed that they discovered knowledge via discussion.

## 2. Jigsaw

This research supposed to describe a situation under Jigsaw-type technology environment. Jigsaw was originally an idea, which was proposed by Aronson (1971). After 26 years, Aronson & Patnoe (1997) said that Jigsaw was a face-to-face method, without the support of technology, and it emphasized on the interaction between group members. Gallardo et al. (2003) uses a group software tools to support Jigsaw-type collaborative learning. It is web-based, and it is used in the preparation and the learning activities. Teachers accomplished their learning plans and activities preparations via collaboration.

Johnson & Johnson (1992) had a similar research. It was called FCL (Fostering Community of Learners), which was used by instructional learning. This method was more innovative and was proved to enhance learning efficiency. We found that Jigsaw could be considered as a cooperative learning (Johnson & Johnson, 1992) or collaborative learning (Silverman, 1995). Gallardo (2003) thought that this activity could be explained by constructivism. New knowledge was built on the original knowledge. It described how knowledge was happened and internalized.

## 3. Conflicts

Tedesco (2000) claimed that conflicts happened under collaborative or cooperative situation. When there was not communications between learners, they could not work together. From the point of view of classroom learning, a lot of conflicts were always trying to be avoided (DeCecco & Richards, 1974). Usually, conflicts were considered as negative, miserable, and even though disagreement might appear between learners (Collins, 1970). But there are some researchers thought that conflicts could provide positive effects (Johnson, 1982).

Under group collaborations, conflicts could not be avoided and it happened when discussion arose (Easterbrook et al, 1992). Tedesco (2000) suggested two kinds of conflicts of metacognition: non tasked-related conflicts meant the role of a corresponding position in a society, and tasked-related conflicts could be divided into brief, contextual, and metacognitive conflicts (Tedesco & Self, 1998).

## System and Design

### 1. Design

In this research, we adopted the idea of sharing documents in a Jigsaw-type classroom. For the system selection, we decided CoWord for our experiment. CoWord is based on Microsoft Word, but it extends from standalone to multi-user editing simultaneously. In this experiment, 9 graduate students were divided into 3 groups by applying Jigsaw activities in 3 hours. We supposed to observe the learning status of a learner in the class, and we focused on the discussion of abortion in which we concentrated on discussing 3 different countries and 3 different ways. It's divided into 5 stages:

#### *a. Introduction to the activity*

In the beginning, 9 students sit together in front of the teacher. First, the teacher gave a story to every student. When they get the basic idea of the story, we narrowed down the concept on the abortion.

#### *b. Jigsaw: original group*

Then, the students are assigned randomly into 3 groups, which consist of 3 students. The class was going to work on the Jigsaw model. Every group received different news that related to the topic from 3 different countries. During the process, they worked collaboratively and sharing the ideas using CoWord.

#### *c. Jigsaw: expert group*

Next, every student in every group would receive different expert knowledge, which consisted of validity, moral, and medical. Every student who received legalistic expert knowledge would bring their computers and to form a group called legalistic expert group, and so on. Every group based on the information and search for additional knowledge using Internet, and then they used CoWord to finish the document together.

#### *d. Jigsaw: back to the original group*

By using the documents finished in expert group, every student returned to the original group and taught their group members that they learnt in the previous session.

#### *e. Group Report*

Finally, every group had to present their work to the others. When 3 groups had finished their presentations, they had to fill in the questionnaire and the activities ended.

## Result and Analysis

During the experiment, it was rather smooth as the students were familiar with Microsoft Word. The experiment was analyzed by using recordings (digital video cameras, voice records, and computer motion), and the notes taken by the researchers.

### 1. Conflict of personal recognition

The conflicts are divided into two kinds of situation: the conflict of personal recognition, and the conflict between group interactions. Conflict of personal recognition happens while it had discussion in progress, showing a significant difference with personal experiences. In Table 1, conflict of personal recognition happened in Stage b.

From Table 1, there were differences between USER02's pre-knowledge and the given information. When USER02 explained the discussion topics and read the information, USER02 recognized that pre-self reading supported the abortion. But, after reading the materials, she recognized that the religion did not support abortion. There was a contradiction with her personal knowledge and the knowledge in the experiment. Although the goal of this situation was to clarify the facts that the religion did not support abortion, it might trigger the other's attention.

Table 1: Situation #1

Discussion	(Discussing the validity of abortion in Taiwan) USER02: What are the 3 different levels of abortion? ... I suddenly recognize that the religion holds a different idea. USER03: Yes, religion does not support abortion. USER02: It seems that religion does not support abortion.
Kind	Conflict of personal recognition

## 2. Conflict between group interactions

The second situation is to describe the conflict happened between group interactions. As shown in Table 2, a conflict is described as it happened between group interactions. It was caused by USER06. He thought that mothers had their rights to decide whether to do the abortion, and having their rights to control their babies' life. But USER05 made an objection to argue with USER06. Although there was no discussion after USER06 had agreed with USER05, this kind of conflict could stimulate group members' motivation.

Table 2: Situation #2

Discussion	USER06: Validity? Mothers have their rights to do abortion... USER05: Do mothers have their rights to do abortion? USER06: Abortion for their kids. USER05: I think it's easy to argue. There are some rules that parents cannot do the physical punishment to their kids. How do parents consider a physical punishment, much less a murder?
Kind	Conflict between group interactions

## Discussion and conclusion

Conflicts happened during a discussion is one of the ways to affect CKC. In this article, we analyzed and discussed two kinds of conflicts, and how it affects the knowledge construction via collaboration. Although there were only 2 situations listed in this article, we found totally 11 conflicts in the whole experiment. In conclusion, we summarize this research into 3 characteristics:

a. It was not easy to find the conflict of personal recognition, as there was 1 out of 11 conflicts belonged to personal conflict. In the experiment of 3 hours, the students seldom showed an obvious contradiction or hesitation between their pre-knowledge and the new knowledge. It was possible, as the discussion topic was an open question and the students were not coming from a psychology background, they were inclined to read the relevant knowledge, so that they seldom had a reflection regarding the given materials.

b. There are some relationships with the difficulty of topics and the frequency of

conflicts occurs. The design of the content affects the frequency of conflicts occurs. When the discussion topic is simple and debatable, students have more interest to discuss, so that conflict happens more frequently. But when the discussion topic is complicated and professional, conflicts did not happen so frequently.

c. Conflict appears to be one of the reasons that affects the discussion. For the 11 conflicts in this experiment, there are 7 conflicts, which may be one of the reasons that can both affect the motivation and enhance the knowledge construction.

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## References

- [1] Aronson, E. (1971). History of the Jigsaw Classroom. 2007 Retrived from The Jigsaw Classroom: <http://www.jigsaw.org/history.htm>
- [2] Aronson, E., & Patnoe, S. (1997). *The jigsaw classroom: Building cooperation in the classroom*. Longman. New York.
- [3] Beers, P. J., Boshuizen, H. P. A., & Kirschner, P. (2004). Computer support for knowledge construction in collaborative learning environments. In P. A. Kirschner (Chair), *Learning in innovative learning environments*. Symposium conducted at the AERA, San Diego, California, USA.
- [4] Collins, B. (1970). *Social psychology*. Reading, MA: Addison-Wesley
- [5] Dececco, J., & Richards, A. (1974). *Growing pains: Uses of school conflict*. New York: Aberdeen Press.
- [6] Diggelen, W. V., & Overdijk, M. (2007). Small-group Face-to-Face Discussions in the Classroom: A New Direction of CSCL Research. *CSCL*, (pp. 726-735).
- [7] Easterbrook, S.M., Beck, E.E., Goodlet, J.S., Plowman, L., Sharples, M. and Wood, C.C. (1992). A Survey of Empirical Studies of Conflict. In Easterbrook, S. (ed.): (1992) in *CSCW: Cooperation or Conflict?*, Computer-Supported Cooperative Work series, Diaper, D. and Sanger, C. (eds.) Springer-Verlag, (1992) 1-68
- [8] Gallardo, T., Guerrero, L.A., Collazos, C., Pino, J.A., & Ochoa, S. (2003). Supporting JIGSAW-type Collaborative Learning. *System Sciences*, (P. 8). Hawaii.
- [9] Johnson, F. (1982). *Joining together: Group theory and group D. W., & JOHNSON, skills* (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.
- [10] Johnson, D.W., & Johnson, R.T. (1992). Positive interdependence: Key to effective cooperation. In R. Hertz\_Lazarowitz & N Miller (Eds.). *Interacting in cooperative groups. The theoretical anatomy of group learning* (pp. 145-173). New York: Cambridge University Press.
- [11] Silverman, Barry G. (1995). Computer Supported Collaborative Learning (CSCL). *Computers Education*, Vol. 25 (3), 81-91.
- [12] Stahl, G. (2000). A Model of Collaborative Knowledge-Building. In B. Fishman & S. O'Connor-Divelbiss (Eds.), *Proceedings of the Fourth International Conference of the Learning Sciences* (pp. 70-77). Mahwah, NJ: Erlbaum.
- [13] Tedesco, P. and Self, J.A. (1998). Towards a computational model of meta-cognitive conflicts: a preliminary investigation. Technical Report 98/28, Computer Based Learning Unit, University of Leeds
- [14] Tedesco, P. and Self, J. A. (2000). "Using Meta-Cognitive Conflicts to Support Group Problem-Solving". In Gauthier, G., Frasson, C., and VanLehn, K. (eds.) *Proceedings of ITS'2000, Lecture Notes in Computer Science*, 1839, Springer Verlag, 232-241.
- [15] Weinberger, A. (2003). *Scripts for computer-supported collaborative learning. Effects of social and epistemic cooperation scripts on collaborative knowledge construction*. [Dissertation, Ludwig-Maximilians-Universität]. Verfügbar unter: [http://edoc.ub.uni-muenchen.de/archive/00001120/01/Weinberger\\_Armin.pdf](http://edoc.ub.uni-muenchen.de/archive/00001120/01/Weinberger_Armin.pdf).