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# Computer-Supported Collective English Writing Tasks for Learners with Different Cognitive Styles

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**Abstract**

Previous studies have shown that field independent (FI) learners dislike collaborative activities, while field dependent (FD) learners prefer to work with others. In addition, FI learners prefer an online learning environment, while FD learners feel disoriented in cyberspace. As research on computer-supported collaborative learning seldom investigates learners with different cognitive styles, it is worth examining how FI and FD learners perceive the learning experience when collaborative activities are implemented in an online learning environment. Thus, to fill the gap in the existing literature, 29 FI and 32 FD students at two universities participated in this study, and were requested to provide online peer feedback inside dyads and create a group e-book. Instruments included questionnaires and the Group Embedded Figure Test. The researchers used descriptive statistics, t-tests, and the constant analysis method to analyze the data. The results of the peer feedback activity showed that, for the FI students, the task of collaborating with four to five members to create a group e-book was more challenging than cooperating with just one group member. Even for FD students, using unfamiliar technological tools to interact with unfamiliar students could still be rather awkward, especially when the communication was asynchronous. Some pedagogical implications are provided to conclude this study.

## 1 Introduction

In the past few decades, the *process approach* has become common in both English as a Second Language (ESL) and English as a Foreign Language (EFL) writing classroom contexts. Proponents of the process approach (Emig, 1971; Zamel, 1983) indicated that students should write frequently and require clear feedback for their revisions. The role of the teacher in a process-oriented classroom is not to identify student surface level errors such as grammatical or spelling inaccuracies, but rather to patiently assist students to reflect on how to make revisions with regard to their ideas. However, when writing teachers put these theories into practice, they might encounter two challenges. First, the task of providing detailed feedback to individual students may be too demanding for the teacher, if they teach a large class. Second, students, especially those who have lower English proficiency, may feel frustrated when they need specific feedback in order to revise their linguistic errors on early drafts. To solve the teacher's dilemma for involving students in repetitious practices, peer feedback inside dyads or group members working together to produce a

joint writing piece has been widely implemented to provide alternative human readers. In fact, the mechanism of collective activities (a hypernym of cooperative and collaborative activities; see Mangenot & Nissen, 2006) is supported by both the theory of social constructivism and research evidence.

According to social development theory (Vygotsky, 1978), the interaction of lower-level learners (novices) with more competent partners (experts) could assist them in constructing linguistic knowledge and trigger learners' cognitive development. It is said that expert learners' dialogues help the novices notice and learn their partner peers' language skills and high-order thinking during the process of joint accomplishment of a task (see Shehadeh, 2011; Swain, 2010). Moreover, numerous empirical studies have shown the benefits of implementing peer feedback, such as expanding ideas from different perspectives, reducing the student's anxiety when compared to their writing alone, enhancing cognitive thinking among student writers, encouraging student-centered learning, raising learners' awareness of their own strengths and weaknesses, and improving writing quality (Chen & Cheng, 2008; Lai, 2010; Leki, 1990; Liu & Lin, 2007; Liu & Sadler, 2003; Nuwar, 2010; Paulus, 1999).

While both the theoretical perspective and studies have demonstrated the advantages of applying peer feedback, it is still not clear whether such a collective activity is appropriate for every learner. Previous studies have revealed several learner factors that affect learning outcomes in collaborative writing learning, such as learner cultural background (Carson & Nelson, 1994), learner level of proficiency (Amros, 1997), learner genders (Wang & Lee, 2012), and learner cognitive style preferences (Kuo, Hwang, Chen, & Chen, 2012).

Among these factors, learner cognitive style is a key potential factor for group success or failure in collaborative learning, because research has shown that cognitive styles influence the way individual students perceive the learning experience and how they interact with peers. According to Witkin and Goodenough (1977, 1981), field dependent (FD) cognitive style learners have better social and interpersonal skills, and prefer to work with others to achieve a common goal or rely on others when solving problems. In contrast, field independent (FI) cognitive style learners prefer to work alone, because FI learners are more self-confident and less capable of building interpersonal relationships. Therefore, FI learners may experience frustration when they work in conditions requiring collaboration. Furthermore, the literature suggests that web-based instruction appears to be more appealing to FI learners, because the hypermedia instructional environment provides more opportunities for learner exploration. In a computer-based learning situation, FI learners display stronger information-seeking behaviors, read more quickly through the screens, and are more actively engaged. In contrast, FD learners need assistance in a hypermedia environment due to the fact that they are less likely to establish a meaningful organization of ideas, when they access information (Handal & Herrington, 2013; Kuo et al., 2012; Oh & Lim, 2005).

Considering the fact that FI learners are more individualistic and that FD learners are more group-oriented, it seems reasonable to hypothesize that FD learners will be more interested in collaborative learning than FI learners. On the other hand, since FI learners are better at navigating and organizing information in an online environment than FD learners, a web-based learning environment may interest FI learners more. Hence, it is intriguing to explore how both FI learners and FD learners perceive the experience when the collaborative learning is implemented in cyberspace. Unfortunately, there has been relatively little research into the area. This study thus asks two research questions:

1. How do the FI and FD students perceive the experience of the peer feedback task during the first semester?
2. How do the FI and FD students perceive the experience of creating a group e-book during the second semester?

To help readers understand the theoretical foundation of the current study, the researchers review related literature in the following section. This will help provide an understanding of what has been done in earlier studies and how the present study could supplement the findings of these previous studies.

## 2 Literature review

### *2.1 FI and FD cognitive styles*

The term cognitive style refers to "information processing habits representing the learner's typical mode of perceiving, thinking, problem solving, and remembering" (Messick, 1984, p. 61). Among the various cognitive styles, FI and FD styles constitute two of the most frequently studied cognitive styles and have been recognized as being highly potential factors in second language acquisition (Brown, 2007; Darabad, 2013; Larsen-Freeman & Long, 1991; Reid, 1995).

According to Witkin, Moore, Goodenough, and Cox (1977), FI and FD learners differ in their analytical and differentiating ability. FI learners have better cognitive restructuring skills, and are more accurate and efficient when analyzing, organizing, encoding, and processing information. Since they are good at storing and retrieving information, they generally perform better in recall tests. In addition, they perform well in mathematics, science, engineering, and architecture. On the contrary, FD learners are less analytical and learn better when instructional materials are well organized and structured. Moreover, they have a smaller working memory capacity and require more explicit directions, feedback, and more external reinforcement when undertaking problem solving tasks. They perform better at courses in the humanities and social sciences.

Other differences between FI learners and FD learners lie in their personality and motivation. FI learners are more competitive, proactive, individualistic, and self-confident. They are intrinsically motivated and have self-designed goals. FI learners are less affected by other people's criticism and more influenced by their own motivation. In contrast, FD learners are more passive and extrinsically motivated. They like to work with others and are more influenced by the social environment. They prefer group projects and need more assistance from the educator (Handal & Herrington, 2013; Sealetsa & Moalosi, 2012).

### *2.2 Cognitive styles and L2 learning*

When people learn a language, they need to understand language items in context and then be able to extract them and use them in a new context. Since FI learners are skilled at separating the important content from a whole text, many studies on second/foreign language learning have suggested that being FI is a strong predictor of successful second language (L2) learning. Some research findings indeed show that FI learners had better L2 performance than FD learners (Chien, 2008; Hansen & Stansfield, 1981; Hoffman, 1997; Khodadady, 2012; Liao, 2007; Lieu, 1999; Parry, 1984). However, other studies did not find any significant difference in FI learners' and FD learners' L2 learning outcomes (Bialystok & Frohlich, 1978; Tucker, Hamayan, & Genesee, 1976; Wang, 2012).

Possibly, the nature of the language test is one of the mediating factors involved in the relationship between learner cognitive style and learner performance. As Reid (1995) pointed out, some language tests may favor either FI or FD learners. For example, the former perform better in multiple-choice and cloze tests that require analytic skills, while the latter perform better on essay and open-ended tests that require holistic skills. This view has been supported by the findings of some recent studies (Khodadady, 2012; Salmani-Nodoushan, 2007, 2009). The study by Salmani-Nodoushan (2009), for instance, indicated that FI learners could write good isolated sentences, but they were not able to use sentences to form a unified holistic composition; and that FD learners, on the other hand, were good at the overall content and organization, but failed to attend to sentence-level grammaticality.

### *2.3 Cognitive styles and computer-based learning*

Several studies investigating non-language learners (Ford & Chen, 2000; Luk, 1998; Weller, Repman, & Rooze, 1994) have noted that FI learners have more opportunities to succeed in a computer-based learning environment,t because they have better search strategies and strong prob-

lem solving skills. They know how to navigate and organize the abundant database of information on the Internet. Quite the opposite, FD learners may feel disoriented and overwhelmed by the abundance of online messages, because they lack the ability to structure information and recognize salient cues in a computer-based environment. When FD learners are in an online learning environment, they need more social interaction and guidance in utilizing the necessary resources.

Conversely, other studies involving non-language students on computer-based learning have found that there is no significant difference in FI and FD students' attitudes toward online learning and learning outcomes (Brenner, 1997; Fitzgerald & Semrau, 1997; Lu, Yu, & Liu, 2003; Oh & Lim, 2005). A study done by Oh and Lim (2005) examined the attitudes and learning outcomes of 104 students enrolled in various online courses at the University of Tennessee in relation to their cognitive styles. The study results indicated that students' cognitive style did not influence their attitudes and online learning achievements. Instead, students' previous online learning experience and computer competence had a more significant impact on their attitudes and performance in an online environment.

It is worth noting that the majority of the participants in previous studies on computer-based learning were learners from non-language classes, such as an Information and Library Management class (Ford & Chen, 2000), a Health Science class (Luk, 1998), and a Computer Literacy class (Weller et al., 1994). Studies involving learners from language classes and examining the relationship between cognitive styles and online language learning are still scant.

### *2.4 Cognitive styles and collaborative learning*

Research investigating the impact of student cognitive styles on collaborative learning, especially online collaborative writing, is also scarce. Most research on collaborative writing has compared the writing quality of individual writing and pair writing (Shehadeh, 2011; Storch & Wigglesworth, 2007), the effect of group interaction on writers' metalinguistic awareness and text quality (Kuiken & Vedder, 2002), the benefits of peer feedback (Zhu, 2001), the extent to which peer feedback is incorporated into students' subsequent revisions (Min, 2006), and the difficulties encountered by students when they were involved in the collaborative writing (Lee & Wang, 2013).

The study conducted by Kuo et al. (2012) is one of the few studies investigating the effect of online collaborative learning on FI and FD learners. They found that collaborative learning strategy is suitable for FD learners but not for FI learners. In their study, 88 fifth-grade Taiwanese students in social science classes were divided into three groups: one experiment group, and two control groups. The experiment group (N=29) accepted collaborative learning and web-based problem solving activities. Control group one (N=29) accepted individual learning and web-based problem solving activities. Control group two (N=30) accepted individual learning and teacher-centered direct instruction strategies. The students in the experimental group were divided into 3-member learning groups, each consisting of a high-achieving, a middle-achieving, and a low-achieving student. Results showed that FD learners in the experiment group had significantly better achievement than FD learners in control group one. Additionally, FI learners performed significantly better than FD learners in control group one. That is, FD students benefited greatly by collaborative learning intervention, while FI students learned better when they solved problems alone. The researchers speculated that the FD students in the experiment group could inspect what the FI students did during the problem-solving process; therefore, they were more confident and obtained better achievements.

As shown in previously reviewed studies, several issues deserve consideration. First, studies on the impact of cognitive styles on student learning outcomes are still conflicting and inconclusive, and further studies are needed. Second, relatively little attention has been devoted to exploring the link between learners' cognitive styles and their perceptions regarding online collaborative foreign language learning. Many questions concerning cognitive style and online foreign language learning still remain unanswered. Therefore, this current study attempted to identify the perceptions of learners with different cognitive styles. Finally, previous studies on collaborative learning seldom distinguished cooperative activities from collaborative activities. As Mangenot and Nissen (2006)

argued, in a cooperative environment, the activity is more structured and more controlled by the instructor, learner roles are assigned, and learners' social abilities are to be taught. In contrast, in a collaborative environment, students need to negotiate their roles with peers, and work together with the aim of producing a joint project. Although the collaborative task gives students the freedom to manage the progression of their work, it requires more student autonomy, and learners' social abilities are considered to be a prerequisite. In order to deepen our understanding of how FI and FD learners perceive cooperative and collaborative learning, this study requested learners to participate in both a cooperative peer feedback activity and the group e-book collaborative writing project.

## 3 Methodology

### *3.1 Participants*

Participating students comprised one intact freshmen class of English majors at National Kaohsiung University of Applied Sciences (KUAS, N=40) and one intact freshmen class of non-English majors at National Kaohsiung Marine University (NKMU, N=34). The researchers were the instructors of the two classes, and the students' individual consents were obtained before they participated in the study. Because of the geographical limitations, it was not convenient for the students from the two schools to have face-to-face communication, which therefore increased the opportunities for the participating students to exchange thoughts and opinions online. Recruiting students from different academic backgrounds allowed the researchers to see more diverse attitudes and perceptions of the project. The students were randomly assigned to 17 groups (of four to five members), but particular attention was paid to ensure that there were equivalent numbers of students from both schools in each group.

### *3.2 Instruments*

Instruments included two attitude questionnaires and the Group Embedded Figure Test (GEFT). The questionnaire for students' perceptions of online peer feedback in the first semester consisted of 20 five-point Likert scale-type questions, 2 multiple-choice questions, 5 open-ended questions, and 4 background information questions. The questionnaire for students' perceptions of the online group project in the second semester consisted of 15 five-point Likert scale-type questions, 2 multiple-choice questions, 7 open-ended questions, and 4 background information questions.

GEFT was used to identify student cognitive style as being either FI or FD (Witkin, Oltman, Raskin, & Karp, 1971). The GEFT contained three sections with 25 questions, in which a simple figure was embedded in a complex one (See example in Appendix A). Section one of GEFT is a practice session consisting of seven questions. Sections two and three contain nine questions each. Scoring is based on the number of simple figures correctly traced and may range from 0 to 18. FD learners experienced more difficulty finding the simple figures in the complex patterns, while FI learners could quickly and easily identify the simple figures (Witkin et al., 1977).

### *3.3 The online writing tasks*

During the first semester, students read four celebrity biographies as outside reading assignments from the researchers. Whenever they finished reading one celebrity biography, they had to submit a summary on this celebrity, based on the *structure guideline* provided by the researchers, to the school's e-learning website, located at http://elearning.nkmu.edu.tw. Then, each student gave feedback to their group members' writings based on the *peer feedback sheet* provided by the instructors. In summary, the participating students read four books, turned in four summaries, and conducted four online peer feedback tasks among dyads during the first semester.

During the second semester, each group was required to use the wiki forum to collaboratively create an online biography book of their own chosen celebrities. To complete this project, they

first discussed which celebrity should be selected as their project topic, collected related information about the celebrity, and then created an e-book to introduce the celebrity. All group discussion, writing, revising, and editing activities were conducted and stored on each group's wiki page. In order to encourage students' contributions to the group project, students in one group received the same score for their final group e-book.

### *3.4 Data collection and analysis*

In the first semester, student summaries of celebrity biographies were collected from the website. The researchers examined who had submitted all four book summaries and only these students were marked as active participants. Five students did not meet the requirement, and they were omitted. As a result, 43 KUAS students and 37 NKMU students were counted as the participating students in the first semester. In week 18, these students answered the questionnaire of the first semester.

In the second semester, the subjects needed to create a group celebrity biography on the wiki forum. They went through the process of brainstorming, discussing and exchanging opinions, writing, revising, and editing before they collaboratively completed the project. In week 17, each group gave an oral presentation of their work in class. In the last week, students answered the questionnaire for the second semester. However, some students who had actively participated in the first semester were absent, when the survey was conducted. As a result, 40 KUAS students and 34 NKUM students filled out the questionnaire for the second semester. In order to accurately compare student perceptions in the two semesters, these 74 students who had answered the two questionnaires were regarded as the subjects of the study.

Moreover, to identify student cognitive styles as FI or FD, the researchers asked students to take the GEFT. The mean scores of the 74 students ±0.5 SD scores were used as the cutoff score. As a result, FI students were those whose scores were 16–18, FD students were those whose scores were 0–13, and field neutral (FN) students were those whose scores were 14–15. Since this study investigated FI and FD students, FN students were not included among the participating students. Therefore, the subjects of this study were 29 FI students (14 males and 15 females) and 32 FD students (15 males and 17 females). Among the 29 FI students, 12 students were KUAS students (1 male and 11 females), and the other 17 students were NKMU students (13 males and 4 females). As for the 32 FD students, 20 students were KUAS students (8 males and 12 females), and 12 students came from NKMU (7 males and 5 females; see Tables 1 and 2).

After the researchers collected the data, they used descriptive statistics and an independent t-test to answer the two research questions.

**Table 1. Background information of the subjects**

| | | FI | | FD | |
|---|---|---|---|---|---|
| | | **N** | **%** | **N** | **%** |
| **School** | KUAS | 12 | 41.4 | 20 | 62.5 |
| | NKMU | 17 | 58.6 | 12 | 37.5 |
| | **Total** | 29 | 100 | 32 | 100 |
| **Gender** | Male | 14 | 48.3 | 15 | 46.9 |
| | Female | 15 | 51.7 | 17 | 53.1 |
| | **Total** | 29 | 100 | 32 | 100 |

**Table 2. Gender distribution of the subjects in each school**

| School | Gender | FI (N= 29) | | FD (N=32) | |
|---|---|---|---|---|---|
| | | N | % | N | % |
| KUAS | Male | 1 | 3.5 | 8 | 25.0 |
| (N=32) | Female | 11 | 37.9 | 12 | 37.5 |
| NKMU | Male | 13 | 44.8 | 7 | 21.9 |
| (N=29) | Female | 4 | 13.8 | 5 | 15.6 |

## 4 Results and discussion

### *4.1 FI/FD student perceptions of the peer feedback activity*

Table 3 reveals that FI students were more positive toward the peer feedback activity than FD students. Among the 20 items, the mean scores of FI students were higher than those of FD students for a total of 17 items (85%), which showed that FI students were more positive towards the cooperative learning than FD students.

FI/FD students' attitudes were significantly different in "I like to write and interact with other students" (item 1), "I could understand my group member corrections and responses" (item 4), and "I think the online collaborative writing is helpful to my English reading ability" (item 15). These results indicated that FI students were more interested in interacting with peers (item mean score 3.55 vs. 2.97), less able to comprehend their group member corrections and responses (4.07 vs. 4.56), and perceived that the peer feedback activity was more beneficial to their English reading skills than FD students (3.90 vs. 3.44). As previous research (Darabad, 2013; Handal & Herrington, 2013) suggested, an online learning environment is more likely to engage FI learners. Although FI learners tend to be socially detached in nature, due to the fact that they have better skills when navigating and organizing information in a hypermedia environment, they may feel more confident communicating with peers or giving feedback online. If this speculation is correct, then an online environment can help FI learners overcome their lack of social strategies.

**Table 3. Differences in FI/FD students' perceptions in the first semester**

| Question | FI/ FD | N | Mean | Std. Dev. | t | p |
|---|---|---|---|---|---|---|
| 1. I like to write and interact with other students online. | FI | 29 | 3.55 | .50 | 3.18 | 0.002** |
| | FD | 32 | 2.97 | .86 | | |
| 2. I like to read my group member assignments online. | FI | 29 | 3.59 | .68 | 1.45 | 0.151 |
| | FD | 32 | 3.28 | .92 | | |
| 3. I like my group members to correct and respond to my assignments online. | FI | 29 | 3.34 | .67 | 0.00 | 0.995 |
| | FD | 32 | 3.34 | .74 | | |
| 4. I can understand my group member corrections and responses to my assignments. | FI | 29 | 4.07 | 1.13 | -2.14 | 0.036* |
| | FD | 32 | 4.56 | .61 | | |
| 5. I think the corrections that my group members have made in my assignments are correct. | FI | 29 | 3.66 | .67 | 0.32 | 0.747 |
| | FD | 32 | 3.59 | .79 | | |
| 6. I like to respond to my group member assignments online. | FI | 29 | 3.31 | .66 | -0.14 | 0.882 |
| | FD | 32 | 3.34 | 1.03 | | |
| 7. I benefit greatly from my group member corrections and responses to my assignments. | FI | 29 | 3.21 | .67 | 0.75 | 0.452 |
| | FD | 32 | 3.06 | .80 | | |
| 8. I benefit greatly from my responses to my group member assignments online. | FI | 29 | 3.66 | .67 | 1.96 | 0.055 |
| | FD | 32 | 3.31 | .69 | | |
| 9. I am diligent in writing the summaries for the assigned books. | FI | 29 | 3.90 | .48 | 1.59 | 0.117 |
| | FD | 32 | 3.63 | .79 | | |
| 10. I am diligent in responding to my group member summaries. | FI | 29 | 3.62 | .77 | 0.12 | 0.902 |
| | FD | 32 | 3.59 | .91 | | |
| 11. My group members are diligent in responding to my summaries. | FI | 29 | 3.45 | .78 | 1.24 | 0.218 |
| | FD | 32 | 3.16 | 1.01 | | |
| 12. I think the online collaborative writing is helpful to my English **vocabulary** ability**.** | FI | 29 | 3.52 | .73 | 0.78 | 0.439 |
| | FD | 32 | 3.34 | .97 | | |
| 13. I think the online collaborative writing is helpful to my English **grammar** ability**.** | FI | 29 | 3.55 | .73 | 0.93 | 0.354 |
| | FD | 32 | 3.34 | .97 | | |
| 14. I think the online collaborative writing is helpful to my English **organization** ability**.** | FI | 29 | 3.86 | .63 | 1.65 | 0.103 |
| | FD | 32 | 3.56 | .75 | | |
| 15. I think the online collaborative writing is helpful to my English **reading** ability**.** | FI | 29 | 3.90 | .55 | 2.21 | 0.031* |
| | FD | 32 | 3.44 | .98 | | |
| 16. I think the online collaborative writing is helpful to my English **writing** ability**.** | FI | 29 | 3.83 | .60 | 0.80 | 0.423 |
| | FD | 32 | 3.69 | .73 | | |
| 17. I think the online collaborative writing is helpful to my English **creative thinking** ability**.** | FI | 29 | 3.55 | .68 | 1.13 | 0.263 |
| | FD | 32 | 3.34 | .74 | | |
| 18. I think the summary guideline offered by teachers is helpful. | FI | 29 | 3.93 | .65 | 1.39 | 0.170 |
| | FD | 32 | 3.66 | .86 | | |
| 19. I think the assigned books are interesting. | FI | 29 | 3.62 | .82 | 0.12 | 0.902 |
| | FD | 32 | 3.59 | .87 | | |
| 20. All in all, I like the activity of the online collaborative English writing learning this semester. | FI | 29 | 3.38 | .82 | 1.65 | 0.104 |
| | FD | 32 | 3.03 | .82 | | |

* $p<0.05$ ** $p<0.01$

### *4.2 FI/FD student perceptions of the group e-book project*

Students' responses to item 15, "All in all, I like the activity of the online collaborative English writing learning this semester," showed that both FI and FD students held negative attitudes towards the group e-book project, and the FI students' attitudes were even more negative than those of the FD students, which was very different from the situation in the first semester. Compared to their attitudes in the first semester, the FI students' favorable disposition toward collaborative learning was significantly lower in the second semester (item mean score 3.38 vs. 2.34). By looking at the other items, we can see that FI students disliked writing and interacting with other students online in the second semester. They became less diligent in contributing their ideas on the

group project than FD students (2.90 vs. 3.06), and they also held more negative attitudes toward their group members' contribution than FD students (2.66 vs. 2.97; see Table 4).

A benefit, however, of the group project to FI students was that the group e-book project helped them develop higher-order thinking in the process of writing and revision. The only significant difference ($p<0.01$) between FI and FD students was found in item 13, "I think the online collaborative writing is helpful to my creative thinking ability." Therefore, FI students perceived that there were more cognitive benefits to be obtained from the creation of an e-book than FD students.

**Table 4. Differences in FI/FD students' perceptions in the second semester**

| Question | FI/ FD | N | Mean | Std. Dev. | t | p |
|---|---|---|---|---|---|---|
| 1. I like to write and interact with other students online. | FI | 29 | 2.76 | .78 | 1.46 | 0.149 |
| | FD | 32 | 2.47 | .76 | | |
| 2. I can understand my group member assignments online. | FI | 29 | 4.00 | .80 | -0.68 | 0.493 |
| | FD | 32 | 4.13 | .60 | | |
| 3. I think my group members' English assignments are grammatically accurate. | FI | 29 | 3.34 | .76 | 0.16 | 0.868 |
| | FD | 32 | 3.31 | .73 | | |
| 4. I was diligent in contributing my ideas on the group project. | FI | 29 | 2.90 | .81 | -0.76 | 0.449 |
| | FD | 32 | 3.06 | .87 | | |
| 5. My group members were diligent in contributing their ideas on the group project. | FI | 29 | 2.66 | 1.14 | -1.12 | 0.264 |
| | FD | 32 | 2.97 | 1.03 | | |
| 6. I benefited greatly from the online collaborative biography project. | FI | 29 | 3.03 | .73 | 0.64 | 0.523 |
| | FD | 32 | 2.91 | .81 | | |
| 7. I think the online collaborative writing is helpful to my English **learning interests**. | FI | 29 | 2.93 | .92 | -0.17 | 0.864 |
| | FD | 32 | 2.97 | .78 | | |
| 8. I think the online collaborative writing is helpful to my **interpersonal communications**. | FI | 29 | 2.86 | .83 | 0.41 | 0.683 |
| | FD | 32 | 2.78 | .70 | | |
| 9. I think the online collaborative writing is helpful to my English **vocabulary** ability | FI | 29 | 3.52 | .68 | 0.88 | 0.380 |
| | FD | 32 | 3.34 | .82 | | |
| 10. I think the online collaborative writing is helpful to my English **grammar** ability. | FI | 29 | 3.38 | .72 | 0.50 | 0.613 |
| | FD | 32 | 3.28 | .77 | | |
| 11. I think the online collaborative writing is helpful to my English **organization** ability. | FI | 29 | 3.59 | .68 | 1.27 | 0.206 |
| | FD | 32 | 3.34 | .78 | | |
| 12. I think the online collaborative writing is helpful to my English **reading** ability. | FI | 29 | 3.66 | .61 | 0.90 | 0.371 |
| | FD | 32 | 3.50 | .71 | | |
| 13. I think the online collaborative writing is helpful to my **creative thinking** ability. | FI | 29 | 3.62 | .49 | 3.23 | 0.002** |
| | FD | 32 | 3.03 | .86 | | |
| 14. I think the online biography made by my group is interesting. | FI | 29 | 2.90 | .72 | 0.28 | 0.777 |
| | FD | 32 | 2.84 | .72 | | |
| 15. All in all, I like the activity of the online collaborative English writing learning this semester. | FI | 29 | 2.34 | .76 | -0.15 | 0.877 |
| | FD | 32 | 2.38 | .75 | | |

** $p<0.01$

### *4.3 FI/FD student responses to the open-ended questions*

Student perceptions could also be found by coding their answers to the open-ended questions. Table 5 reports students' answers to the question, "My motive for continuing to participate in this collaborative project is …" FI students' answers (N=27) were as follows: getting a good score on the course (10, 37%), fulfilling a student's obligation (8, 30%), reading more celebrity biographies (4, 15%), not disappointing my teacher (2, 7%), working with others (2, 7%), and practicing English (1, 4%). As for the FD students' (N=27) answers to this question, the responses were as follows: getting a good score on the course (20, 74%), working with others (4, 15%), practicing English (2, 7%), and reading more celebrity biographies (1, 4%). Most FD students tended to have

extrinsic types of motivation such as getting good grades, while FI students had not only extrinsic but also intrinsic motivations such as fulfilling a student's obligation. As Yin-Ying (all student names cited throughout the article are pseudonyms), an FI student, said, "I believe it's a student's duty to complete the assignment. Although the project was supposed to be teamwork and my group members were lazy, I would still try my best to finish the group project." This finding indicates that FI students seemed to be the more autonomous language learners who took responsibility for the entirety of their learning situation. Therefore, this result echoes the finding of Witkin et al. (1977) that FI students are intrinsically motivated, have self-designed goals, and tend to solve problems independently.

**Table 5. Students' motives for their participation**

| FI/FD | My motive for continuing to participate in this collaborative project is… | N | % |
|---|---|---|---|
| FI (N=27) | 1. Getting a good score on the course. | 10 | 37 |
| | 2. Fulfilling a student's obligation. | 8 | 30 |
| | 3. Being fond of reading celebrity biographies. | 4 | 15 |
| | 4. Not to disappoint my teacher. | 2 | 7 |
| | 5. Working with others. | 2 | 7 |
| | 6. Practicing English. | 1 | 4 |
| FD (N=27) | 1. Getting a good score on the course. | 20 | 74 |
| | 2. Working with others. | 4 | 15 |
| | 3. Practicing English. | 2 | 7 |
| | 4. Being fond of reading celebrity biographies. | 1 | 4 |

Next, student responses to the question, "The biggest gain from this project is …" showed that FD responses were similar to those of FI students (see Table 6). For example, they felt that this project helped them to know more about some celebrities, and improve their English. The difference between FI and FD students was that although no FI students mentioned the benefit of collaborating with peers, this collaborative experience has helped FI students to self-reflect on the importance of each individual member's involvement leading to the success of a group project. For instance, one FI student, Cha-Yun, said, "This project taught me that I should turn in the assignments on time and I should not be a troublemaker in a team."

**Table 6. Students' biggest gain from the project**

| FI/FD | The biggest gain from this project is… | N | % |
|---|---|---|---|
| FI (N=24) | 1. Getting to know some celebrities. | 13 | 54 |
| | 2. Improving my English. | 9 | 38 |
| | 3. Becoming acquainted with new friends. | 1 | 4 |
| | 4. Self-reflection. | 1 | 4 |
| FD (N=26) | 1. Getting to know some celebrities. | 11 | 42 |
| | 2. Improving my English. | 10 | 38 |
| | 3. Becoming acquainted with new friends and collaborating with others. | 5 | 19 |

Table 7 points out the students' perceptions of the biggest frustration/failure with the project. Infrequent communication and discussions among group members were the principal cause of FI students' disappointment. In addition, the difficulties encountered in requesting that their group members share the task were another source of negative feelings among FI students. As Pi-Yi, an FI student, pointed out, "We were in different locations and were not familiar with each other. It is really hard for me to request that a distant stranger do something." This finding shows that FI persons were less skilled in terms of interpersonal relationships, which agrees with Witkin and Goodenough's (1977, 1981) studies on the characteristics of the FI/FD cognitive styles. On the other hand, the main frustration of FD students was caused by their own problems such as being lazy, poor in English ability, or lacking motivation. For example, Yu-Ting confessed, "I thought

NKMU students were much more diligent than us (KUAS students) although their English abilities were worse than ours. I felt great shame at having been so lazy, which made the project unsuccessful." In comparing FI and FD students' perceptions, when the communication among team members was scarce, FI students were more annoyed than FD students. As for FD students, they were more concerned about whether the communication was synchronous. It seemed that if synchronous communication had been possible, FD students might have felt less discouraged, and FI students' dissatisfaction with the lack of group discussion could have been alleviated because synchronous communication might have increased the frequency of group discussion.

**Table 7. Causes of student frustration with the project**

| FI/FD | The biggest frustration/failure with this project is… | N | % |
|---|---|---|---|
| FI (N=19) | 1. Infrequent communication and discussion among group members. | 9 | 47 |
| | 2. My poor English ability. | 4 | 21 |
| | 3. My group members' poor English ability. | 2 | 11 |
| | 4. The wiki tool. | 2 | 11 |
| | 5. Being unable to communicate with others synchronously. | 1 | 5 |
| | 6. The difficulty faced in requesting that the group members share the task. | 1 | 5 |
| FD (N=16) | 1. My own problems such as being lazy, having poor English ability, or lacking motivation. | 7 | 44 |
| | 2. Being unable to communicate with others synchronously. | 5 | 31 |
| | 3. My group members' poor English ability. | 2 | 13 |
| | 4. The wiki tool. | 1 | 6 |
| | 5. Infrequent cooperation among group members. | 1 | 6 |

Indeed, as Table 8 reveals, the passive participation of FI students was greatly influenced by the infrequent involvement of their group members, while FD students' inactive participation was due to the asynchronous online group discussion. Pei-Yuan, an FD student, said, "I don't like online assignments. Although writing using a computer is convenient, I was easily distracted while I was online. Eventually, I didn't finish the homework on time, and sometimes I even forgot when I should turn in the homework or what I was supposed to do for the group project." This finding supports Oh and Lim's (2005) observations about the difficulties that FD learners encounter in an online learning environment. Since FD learners often become disoriented and miss information when they are online, online learning might be rather difficult for them.

**Table 8. Students' reasons for their passive participation**

| FI/FD | The reason why I did not take part in the project is… | N | % |
|---|---|---|---|
| FI (N=20) | 1. My group members were not diligent in the work. | 10 | 50 |
| | 2. The lack of time. | 3 | 15 |
| | 3. The inconvenience of asynchronous discussion with others online. | 3 | 15 |
| | 4. I was not interested in the project. | 2 | 10 |
| | 5. I was not familiar with the wiki tool. | 2 | 10 |
| FD (N=22) | 1. The inconvenience of asynchronous discussion with others online. | 7 | 32 |
| | 2. The lack of time. | 6 | 27 |
| | 3. The difficulties faced in completing the online assignment. | 4 | 18 |
| | 4. I was not interested in the project. | 2 | 9 |
| | 5. My group members were not diligent in the work. | 2 | 9 |
| | 6. My laziness. | 1 | 5 |

According to the students' responses to the question "I want to tell teachers that …", FI students' messages to teachers consisted mostly of compliments and one direct complaint. In contrast, none of the FD students directly complained. Before they put forward some complaints or suggestions, they offered some compliments first (see Table 9). For example, Cho-Tsu said, "The purpose of this activity is good, but I think online writing is very inconvenient. If the project could

have been written on paper instead of on a computer, I would have liked it more." Another FD student, Don-Sun wrote, "Thank you, teacher, for designing this course. I believe it would have been better if we had collaborated with our own classmates or if the students from the two schools had had the chance to meet in person. However, I still highly appreciate what you have done for us…." Similarly, Yi-Shan said, "I think the idea of collaborating with peers is great, but I do not like to work with peers from another school." Through these messages, we found that FD students were more sensitive and careful not to offend teachers. When they had to express some negative comments, they would use an indirect mode or mix compliments with criticisms, which sounded less harsh to others. This finding suggested again that FD persons had better social skills than FI persons.

**Table 9. Student messages to teachers**

| FI/FD | I want to say to teachers "…" | N | % |
|---|---|---|---|
| FI (N=17) | 1. (a compliment) Thank you. | 10 | 59 |
| | 2. (a compliment) You are great/nice/hardworking. | 6 | 35 |
| | 3. (a complaint) It's very tiring to turn in weekly assignments! | 1 | 6 |
| FD (N=13) | 1. (a compliment) You are creative/patient/great/nice/hardworking. | 6 | 46 |
| | 2. (a compliment) Thank you. | 4 | 31 |
| | 3. (a compliment + a complaint/suggestion) This course was great but if…, it would have been even better | 3 | 23 |

## 5 Conclusion

This study attempts to explore FI and FD students' perceptions of online peer feedback (a co-operative activity) and the online group e-book project (a collaborative activity). The results indicate that both the FI and FD students held positive attitudes toward the peer feedback activity. Interestingly, FI students liked writing and interacting with other students among dyads in cyperspace significantly more than FD students, which was different from previous studies showing that FI students preferred to work alone (Witkin & Goodenough, 1981; Kuo et al., 2012). However, both FI and FD students exhibited negative attitudes toward the group e-book project. The collaborative learning experience turned out to be a huge disappointment to the majority of the students, especially to the FI students, who were more irritated by the lack of group autonomy, such as infrequent communication and discussions among group members. Not knowing how to request group members to share the tasks, some FI students chose to finish the project by themselves, while other FI students were discouraged from further contributing to the group work. Therefore, when a collective activity requires learners to work among dyads in cyberspace, FIs may manage to complete the task. Nevertheless, working with a group of people to produce a joint product may be very challenging for FIs, especially when their team members lack the diligence to finish the project on time.

As for FD students, although they are skilled in communicating with people, they would be reluctant to join group discussions, when they are not familiar with other group members. Furthermore, they prefer face-to-face communication instead of online communication. In particular, as FD learners are not used to the online communication tool, they find it difficult to collaborate. The use of asynchronous technological tools further increases the difficulty of working with others.

Several pedagogical implications may be gained from this study. First, to make collective activities successful, teachers must monitor student participation. Individual student indolence will cause the whole group to feel frustrated. For FI students, especially those who have not had any prior practice in group learning, working with lazy peers will end in disappointment. Since most current online writing platforms record students' posting entries, teachers could use the history archives to trace the students' contribution, and to supervise student participation. Involving an online teaching assistant (TA) would also add to this activity, because the TA could observe the interaction modes between students and instantly help to resolve any disagreement among group

members. Second, teachers should use a more user-friendly online writing platform, such as Facebook and Twitter, which could allow synchronous communication (Godwin-Jones, 2010). Clear explanations and educational training on how to use these synchronous social networking tools prior to the online writing tasks will be vital, especially for FD learners. Third, teachers should try to provide sufficient writing assistance, such as systematic writing instruction, an on-site writing conference, and even editing help during the drafting stage. Thus, FD learners would feel less intimidated by the independent assignments they are required to complete. They would have more confidence as well as the capability to complete the complicated writing tasks.

It should be noted that this study has examined only the factor of student cognitive styles in online collaborative learning. Other variables such as gender, learners' majors, or school location may intervene in the effect of students' cognitive styles on their perceptions of the collaborative learning. Future studies could examine the roles of other variables and their influence on online collaborative learning.

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## Appendix A

### *Example of GEFT*

GROUP
EMBEDDED
FIGURES TEST

By Philip K. Oltman, Evelyn Raskin, & Herman A. Witkin

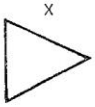
Class _____ No. _____

Name _____ Sex _____

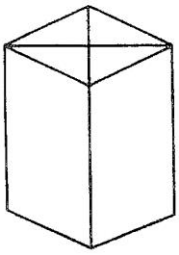
INSTRUCTIONS: This is a test of your ability to find a simple form when it is hidden within a complex pattern.

Here is a simple form which we have labeled "X":

X

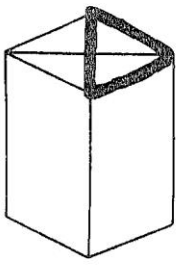


This simple form, named "X", is hidden within the more complex figure below:



Try to find the simple form in the complex figure and trace it *in pencil* directly over the lines of the complex figure. It is the SAME SIZE, in the SAME PROPORTIONS, and FACES IN THE SAME DIRECTION within the complex figure as when it appeared alone.

This is the correct solution, with the simple form traced over the lines of the complex figure:



Note that the top right-hand triangle is the correct one; the top left-hand triangle is similar, but faces in the opposite direction and is therefore *not* correct.