

Exploring the Relationship Between Constructivist Learning Environments and Chinese University Students' English Productive Abilities

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Abstract

Productive abilities play an important role in English-as-a-second/foreign-language (ESL/EFL) learning. Yet, the relationship between the productive abilities of ESL/EFL learners and learning environments is still under-researched. The principal objective of this research was to explore the predictive effect of learning environments on university EFL students' productive abilities. A total of 1,499 students from a national key comprehensive university in China were recruited. Perceived learning environments were assessed from a constructivist perspective using the Inventory for Student's Perceived Learning Environments (ISPLE), while productive abilities were measured based on the English Productive Abilities Scale (EPAS). Findings indicated that two environmental dimensions (i.e., student-student cooperation and student autonomy) had significant effects on students' English productive abilities. The pedagogical implications for university English teaching are discussed.

Keywords: constructivist learning environments, English productive abilities, Chinese university students

1. Introduction

One primary goal of foreign language teaching is to develop students' ability to express and communicate meaning in the target language accurately and appropriately. Productive abilities, the abilities to speak and/or to write in the target language, are important for English-as-a-second/foreign-language (ESL/EFL) learners. However, in the context of Chinese ESL/EFL teaching and learning, previous research has consistently pointed out that such goal is unmet where learners' productive abilities are relatively weak (He & Wang, 2021; Zhang, Guo, Wu, & Zhang, 2017). Even if the learners have rich lexical resources and well mastered grammatical rules, they often feel stretched to communicate in English either in spoken or written form.

Abundant studies have been conducted on Chinese university English learners' speaking and/or writing abilities from the perspectives of instruction (e.g., Cui, Gai, & Zhang, 2019; Lu, Liao, & Xu, 2021; Yang & Feng, 2022; Zhang, 2014) and assessment (e.g., Li & Sui, 2022; Jin & Jie, 2020; Ma & Wang, 2021). In addition, some researchers investigated the factors influencing university English learners' speaking and/or writing abilities (e.g., Gao & Wen, 2017; Gu, Xu, & Wang, 2021; Guo, 2018). Although it has been widely accepted that learning environments play an important role in foreign language learning (Qin & Dai, 2015; Ren, 2018; Xia & Xu, 2018), there is a paucity of research on the influence of constructivist learning environments on Chinese university language learners' productive abilities. It is necessary to identify characteristics of learning environments that can contribute to the development of students' language productive abilities.

This study aimed to explore the relationship between learning environments from the constructivist perspective and the productive abilities of EFL learners. Participants were 1,000-odd Chinese university EFL learners and the quantitative method was employed using established inventories to measure students' perceived English productive abilities and constructivist learning environments.

1.1 English Productive Abilities

English productive abilities refer to the ability to produce information in English in either spoken or written form, which consists of English speaking ability and English writing ability (Liu & Han, 2018). English learners in

China have been taught how to articulate comprehensible sounds, accumulate words and phrases, and understand grammatical rules which contribute to their linguistic competence. However, linguistic competence is not sufficient for communicating competently in another language (Nunan, 2001). Chinese university English learners' productive abilities are relatively weak due to the fact that many primary and middle schools lack qualified teachers who are capable of cultivating students' productive abilities, and that students lack opportunities to communicate in spoken or written form. In addition, many universities do not offer oral English courses or English writing courses for students to choose from. Research on enhancing ESL/EFL learners' productive abilities has been conventionally focusing on teaching models (e.g., Wang, Zhao, & Yang, 2018; Yang & Feng, 2022) and learning tasks (e.g., Tao & Wang, 2019; Xing, 2020). However, the role of learning environments in building and sustaining productive abilities has received relatively little attention.

1.2 Constructivist Learning Environments

Learning environments are generally defined as "the social, psychological and pedagogical contexts in which learning occurs and which affect student achievement and attitudes" (Fraser, 1998, p. 3). Research on learning environments originates from Kurt Lewin's early thought. Lewin (1936) puts forward a classical formula concerning humans and the environment, i.e., $B=F(P, E)$, where human behavior (B) is interpreted as the result of the interaction between humans (P) and the environment (E). Research on learning environments from the perspective of learners' perception was initiated by Herbert Walberg and Rudolf Moos in the mid-20th century. In order to explore the relationship between individual learners' satisfaction with classroom climate and learning, Walberg and Anderson (1968) developed the learning environment scale (LEI). Later, Trickett and Moos (1973) developed the classroom environment scale (CES). Previous research has shown that students' perception of learning environments can largely explain the differences in learning results, and students' perception of learning environment can explain the differences in learning results more strongly than demographic variables (e.g., Dorman, 2001; Fraser, 1994).

Constructivism, which emerged in the 1980s, emphasizes the main role of learners, holding that learners are not passively receiving external stimuli, and that learning does not simply mean the acquisition and accumulation of knowledge. On the contrary, knowledge is actively constructed by learners (Alt, 2018; Brooks & Brooks, 1999). Learners connect new knowledge with their previously acquired knowledge and understand new knowledge based on their own knowledge (Lyons & Gijbels, 2008). In addition, constructivist learning theory also pays attention to the relationship between learners and learning environments. It holds that learning is a meaning construction process realized through interpersonal collaborative activities with the help of others against certain social and cultural backgrounds (Dai & Liu, 2004). A constructivist learning environment refers to the environment in which learners can cooperate and support each other using various tools and information resources to achieve learning goals and solve problems (Wilson, 1995). Fan and Zhang (2014) summarize four educational principles of constructivist learning environments, namely constructivist learning, student autonomy, interaction and cooperation, clear goals, and curriculum coherence. They propose that, instead of teaching students to memorize information, teachers should show students how to construct knowledge by teaching and provide students with opportunities to experience the process of knowledge construction.

1.3 Relationship Between Constructivist Learning Environments and English Productive Abilities

Constructivist learning theory has received extensive attention since it was introduced into the field of foreign language teaching and research in China in the 1990s, bringing about a great impact on this field of study. Chinese university English teachers have actively explored teaching models under the guidance of constructivist learning, such as project-based learning with technology (Gu & Fang, 2003), the thematic language teaching model (Hu, 2004), the "three-stages" teaching model (Zhao & Zhan, 2006), students-as-instructors teaching model (Sun, 2008), research-oriented approach (Feng, 2009), PBL teaching (Chen, 2013) and content-based flipped classroom teaching (Xu, 2017). The successful implementations of these teaching models show that constructivist learning is conducive to students' English learning. However, there is a paucity of research concerning the effects of the constructivist learning environments on students' productive abilities. Less is known about what specific dimensions of the constructivist learning environments contribute to productive abilities.

1.4 The Current Study

To fill in the aforementioned research gap at least partially, this research examined the relationship between Chinese university English learners' perception of a constructivist learning environment and their English productive abilities. As an important supplement to the relevant EFL learning theories, the current study sought answers to the following two questions: Do constructive learning environments contribute to Chinese university

students' productive abilities? What specific dimensions of the constructivist learning environment contribute to Chinese university students' productive abilities?

2. Method

2.1 Participants

A total of 1,499 students from a national key comprehensive university in Southwest China participated in the research. The pilot study involved 181 students. Among the 1318 participants in the main study, 73.1% were female while 26.9% were male, 78.6% were in their second year while 21.4% were in their fourth year, 49.1% were majoring in English while 50.9% were majoring in other subjects, including philosophy, economics, pedagogy, Chinese literature, history, science, engineering, agriculture, and management. Informed consent was obtained from all the participants who were informed of the research purpose and their right to withdraw from the study at any time.

2.2 Measures

The participants were asked to indicate how accurately each statement in the questionnaire described their perceived learning environments and their English productive abilities on a 7-point Likert scale, where "1" represented "extremely inaccurate" and "7" "extremely accurate". Demographic information (i.e., age, gender, hometown, and major) was collected. Psychometric properties of the inventories utilized in the research were examined both in the pilot study and the main study. In the pilot study, exploratory factor analysis (EFA) and estimates of internal consistency were conducted. In the main study, the data collected were divided randomly and evenly into two groups. Group A data (n=659) were used for EFA, whereas Group B data (n=659) were used for confirmatory factor analysis (CFA) via Amos 21.0. In addition, estimates of internal consistency were also calculated in the main study. Estimates of internal consistency and confirmatory factor analysis were conducted. Correlations were conducted to examine the relationships between the perceived learning environments and English productive abilities. Multiple regressions were conducted to predict English productive abilities from learning environments with demographic factors (i.e., gender, grade, major, and hometown) being controlled.

2.2.1 Inventory of Students' Perceived Learning Environment

The Inventory of Students' Perceived Learning Environment (ISPLE) is a 32-item inventory developed by Fan and Zhang (2014) for assessing students' perceptions of eight dimensions of constructivist learning environments: (1) constructivist-oriented teaching; (2) clear goals and coherence of curricula; (3) student autonomy; (4) assessments and assignments; (5) teacher-student interaction; (6) student-student cooperation; (7) peer morale and identities; and (8) learning facilities. Each dimension of the inventory consists of 4 items (e.g., for student-student cooperation, "We always have opportunities to work together with others on learning"; for student autonomy, "We are given some choices over how we go about learning"). In studies assessing students' perception of the learning environment (Chen, Fan, & Jury, 2017; Fan & Zhang, 2014; Li, 2015), this inventory demonstrated good reliability and validity.

2.2.2 English Productive Abilities Scale

The English Productive Abilities Scale (EPAS) was developed based on the Speaking Self-assessment Scale and the Writing Self-assessment Scale from China's Standards of English Language Ability (SCE). SCE "defines the English ability of Chinese English learners and users, describes the features of their English ability at each level, and provides a reference for English learning and teaching" (Liu, 2019, p. 7). Zhou (2021) validated the SCE-based self-assessment scales, indicating that the scales could reliably distinguish students' English proficiency levels. The present EPAS consists of two dimensions: (1) speaking ability (4 items, e.g., "I can express my ideas clearly on social issues in English"); and (2) writing ability (5 items, e.g., "I can use rhetorical devices to make my writing more effective").

3. Results

3.1 Preliminary Data Analysis

3.1.1 Psychometric Properties of the Inventory of Students' Perceived Learning Environment

In the pilot study, after executing EFA using the Principal Components Analysis (PCA) via varimax rotation, the four items of learning facilities were deleted. The Cronbach's alpha coefficients of the remaining seven scales of ISPLE were .83 (assessments and assignments), .80 (teacher-student interaction), .79 (student-student cooperation), .79 (constructivist-oriented teaching), .77 (student autonomy), .74 (clear goals and coherence of curricula), .73 (peer morale and identities).

In the main study, the alpha coefficients of the revised 7-scale ISPLE ranged from .77 (student autonomy) to .88

(student-student cooperation). However, should Item 3 in the scale for clear goals and coherence of curricula and Item 11 in the scale for student autonomy be deleted, the alpha coefficients of these two scales would raise from .82 and .77 to .84 and .78 respectively. For EFA, The PCA with varimax rotation was performed with the number of factors extracted a priori set to be seven. The KMO value reached .92 while Bartlett's test of sphericity was significant ($df=325$; $p<.001$), indicating that the data set was suitable for factor analysis. Approximately 72.57% of the variance in learning environments was explained by this factor structure. All the 28 items loaded on where they were theoretically expected. CFA was conducted on Group B data, whose results indicated that model fit indices were basically in the acceptable range, $\chi^2/df=2.50$, GFI=.92, AFFI=.90, CFI=.96, RMR=.08, RMSEA=.05.

3.1.2 Psychometric Properties of the English Productive Abilities Scale

In the pilot study, an EFA using PCA via varimax rotation was performed to extract two factors. Although three items cross-loaded on both factors, indicating that these items should be deleted or reworded. The Cronbach's alpha coefficients of the two scales of EPAS were .90 (speaking ability), and .91 (writing ability).

Given the small number of items, the cross-load items were reworded prior to the main study, e.g. "I can briefly analyze literary criticism and explain the artistic effect of literary works in English orally" was reworded as "I can make a brief analysis of literary works in English orally."

In the main study, the alpha coefficients of the revised EPAS were .91 (speaking ability) and .90 (writing ability). For EFA, The PCA with varimax rotation was performed to extract two factors. The KMO value reached .93 while Bartlett's test of sphericity was significant ($df=36$; $p<.001$), indicating that the data set was suitable for factor analysis. Approximately 74.68% of the variance in English productive abilities was explained by this factor structure. However, three items of writing ability cross-loaded on both factors. Results of EFA conducted when deleting Item 9 showed that Item 5 still cross-loaded on both factors. Deleting Item 5, the KMO value was .92 while Bartlett's test of sphericity was significant ($df=28$; $p<.001$), indicating that the data set was still suitable for factor analysis. Approximately 77.01% of the variance in English productive abilities was explained by this factor structure. All the remaining seven items loaded on factors as theoretically expected. CFA was conducted on the Group B data, whose results indicated that model fit indices were basically in the acceptable range, $\chi^2/df=4.70$, GFI=.98, AFFI=.94, CFI=.99, RMR=.04, RMSEA=.08.

3.1.3 Intercorrelations Among Learning Environment and English Productive Ability Dimensions

Table 1 reports the intercorrelations among perceived CLE and the EPA dimensions. As can be seen, the seven CLE dimensions were found to be significantly and positively correlated with reading ability and writing ability (all $ps<.001$), with correlation coefficients ranging from .14 to .38. The seven CLE dimensions were positively correlated with one another, with correlation coefficients ranging from .32 to .59 (all $ps<.001$).

Table 1. Intercorrelations among learning environment and English productive ability dimensions

Dimension	1	2	3	4	5	6	7	8	9
1. clear goals and coherence of curricula	1								
2. constructivist-oriented teaching	.59***	1							
3. student autonomy	.42***	.55***	1						
4. teacher-student interaction	.51***	.51***	.45***	1					
5. peer morale and identities	.36***	.41***	.36***	.37***	1				
6. student-student cooperation	.37***	.48***	.44***	.42***	.55***	1			
7. assessments and assignments	.33***	.44***	.32***	.41***	.37***	.40***	1		
8. speaking ability	.22***	.26***	.29***	.19***	.29***	.33***	.16***	1	
9. writing ability	.16***	.21***	.25***	.16***	.27***	.28***	.14***	.75***	1

Note. * $p<.05$, ** $p<.01$, *** $p<.001$.

3.2 The Role of CLC Dimensions in Chinese University Students' English Productive Abilities

Demographic variables (i.e., gender, grade, major, and hometown) were put under control in multiple regressions of English productive abilities on learning environments. Results from multiple regressions showed that three of seven dimensions of the learning environment uniquely contributed to Chinese university students' English productive abilities in a statistical sense (Table 2). The amount of variance in English productive abilities that was explained by learning environments ranged from 9% (writing ability) to 12% (speaking ability). Specifically, two dimensions of the constructivist learning environments statistically predicted the speaking ability, i.e.,

student-student cooperation ($\beta=.23, p<.001$) and student autonomy ($\beta=.14, p<.001$). Meanwhile, three dimensions of the learning environment statistically predicted the writing ability, where student-student cooperation ($\beta=.18, p<.001$) and student autonomy ($\beta=.13, p<.001$) were the two major contributors.

Table 2. Predicting English productive abilities from the constructivist learning environment ($n=1,318$)

	speaking ability	writing ability
R ² total	.35	.30
R ² gender, grade, major, and hometown	.23	.21
R ² learning environment	.12	.09
<i>F</i>	62.96***	50.54***
<i>df</i>	11,1306	11,1306
β clear goals and coherence of curricula		
β constructivist-oriented teaching		
β student autonomy	.14***	.13***
β teacher-student interaction		
β peer morale and identities		.07*
β student-student cooperation	.23***	.18***
β assessments and assignments		

Note. * $p<.05$, ** $p<.01$, *** $p<.001$.

4. Discussion

Results of the present research indicated that all the seven dimensions of constructivist learning environments significantly correlated with Chinese university students' English productive abilities positively. This finding echoes previous findings (Jia & Zheng, 2004) that environment was the key factor that affected college students' oral English proficiency. Results also indicated that the two powerful predictors of the English productive abilities of University English learners were student-student cooperation and learner autonomy.

First, student-student cooperation has the most prominent predictive power for English productive ability. This finding confirms the claim that collaborative learning is an effective approach to enhancing students' English-speaking ability (Zhang, 2014). This suggests that providing students with opportunities to communicate and work with other students has a beneficial effect on students' English speaking and writing abilities. Two possible reasons may explain this finding. First, cooperation-encouraging learning environments provide students with more opportunities for language output. Second, cooperative learning can reduce foreign language learning anxiety (Wu & Gu, 2011; Wu & He, 2014). Foreign language learning anxiety is an important factor affecting foreign language learning (Guo & Xu, 2014), which is found to negatively predict foreign language achievement (Li & Liu, 2013; Shi & Liu, 2006). The relaxed and pleasant learning atmosphere in participating in cooperative learning can alleviate students' anxiety and pressure. Language anxiety has a negative influence on students' perception of their communicative competence and confidence in English use, and then negatively affects students' willingness to communicate in English (Hashimoto, 2002, see also Zhang, Yang, & Chen, 2021). Thus, creating a learning environment which encourages student-student cooperation can reduce students' anxiety and other negative emotions (e.g., suspicion or hostility), while boosting cooperation and mutual trust might lead to the establishment of rapport and reciprocity.

In addition, learner autonomy is also found to be a powerful predictor of university language learners' speaking ability and writing ability. This finding not only confirms the findings of Dincer, Yesilyurt, and Takkac (2012) that a learning environment supporting learner autonomy is significantly correlated with students' perceived oral English ability, but also verifies the view that promoting learners' autonomy is a key factor in accelerating the process of students' second language output from input (Yang, 2003). Moreover, Ouyang and Xie (2009) conducted a one-year experimental study on the autonomous English learning model, finding that the students of the experimental class adopting this model significantly improved their scores on both the English final examination and the spoken English test, and their scores on these two examinations were significantly higher than those of the control group. These findings suggest that paying attention to students' ideas and suggestions on teaching and giving students the opportunities to choose their own learning methods and participate in course design are more conducive to the improvement of students' language productive ability. In addition, Xia and Xu (2018) found that the English majors who perceived a higher level of autonomy, exhibited a lower level of negative emotions, i.e., anxiety, guilt, helplessness, and boredom. Students' second language oral performance

was found to be positively correlated with the positive emotion of self-confidence, and negatively correlated with the negative emotion of anxiety (Pyun, Kim, Cho, & Lee, 2014). Therefore, creating a constructivist learning environment that advocates learners' autonomy helps to improve learners' positive emotions, enabling them to carry out language learning with a more positive attitude and achieve better results. However, there are still deficiencies in the cultivation of learner autonomy in English teaching in China. The survey conducted by Liu and Xu (2018) found that although university English teachers unanimously approved of the advantages of implementing autonomous language learning and clearly understood the definition of learner autonomy, they did not know how to increase learner autonomy in their teaching practice.

Autonomous Learning and cooperative learning are not contradictory. On the contrary, they have a high degree of commonality and complementarity (Lin, Feng, & Luo, 2011; Zhang, 2017). As Dam (1995) notes, learner autonomy is not only the ability and willingness of an individual to act independently but also the ability and willingness of an individual with social responsibility to cooperate with others. "Ideally, the active body and all the senses, as well as social collaborative structures, are involved in the creation of learning experiences" (van Lier, 2008, p. 54). Xu (2012) also advocates critical cooperative autonomous learning among foreign language learners. Therefore, university English teachers should understand the relationship between autonomy and cooperation and combine them organically in teaching.

5. Conclusions

Two major conclusions can be drawn. First, Chinese university students' English productive abilities can be predicted by their perceived constructivist learning environments. Second, three dimensions of the learning environment uniquely contributed to Chinese university students' English productive abilities in a statistical sense. The main contribution of this study is the discovery of the environmental dimensions (i.e., student-student cooperation and learner autonomy) which have powerful positive effects on Chinese university students' English productive abilities. This study has also validated the two inventories (ISPLE and EPAS) which can be used to measure students' perceptions of their learning environment and their self-assessed English speaking and writing abilities.

The findings of the present research provide several practical implications for university English teaching. On the one hand, university English teachers are suggested to create constructivist learning environments, encouraging their students to learn both autonomously and cooperatively. On the other hand, teachers are also suggested to guide their students to be more able to perceive the affordances provided by the constructivist learning environments and to recognize the benefits of student-student cooperation and learner autonomy.

Despite its contributions, there were limitations to this research. First, the data were collected from one key comprehensive university. It is hoped that in future studies, data can be collected from more universities of different levels. Second, this study only assessed students' perceptions of the constructivist learning environments and their self-assessments of their English productive abilities, findings of which might be possibly biased due to subjectivity. It is hoped that in future studies, data can also include interview data and test scores, blending quantitative and qualitative research.

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