Li, Z. & Li, R. (2022). Students' perceptions of the classroom environment and academic achievement: a path analysis in university EFL classrooms. *International Online Journal of Education and Teaching (IOJET), 9*(4). 1974-1986.

Received : 17.06.2022
Revised version received : 22. 09.2022
Accepted : 23.09.2022

STUDENTS' PERCEPTIONS OF THE CLASSROOM ENVIRONMENT AND ACADEMIC ACHIEVEMENT: A PATH ANALYSIS IN UNIVERSITY EFL CLASSROOMS

(Research article)

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Abstract

The current study was designed to explore the relationships between students' perceptions of the classroom environment and their academic achievement in higher education. The participants were 846 first-year undergraduate students who were learning English as a foreign language (EFL) in China. Data of students' perceptions of the classroom environment were collected by the College and University Classroom Environment Inventory. Students' academic achievement was measured by a national standardized test for English competence (the College English Test). The results of path analysis showed that students' perceptions of innovative instruction and task orientation were positive predictors of their academic achievement; students' perceptions of equity predicted their academic achievement via perceptions of teacher-student relationships; students' perceptions of peer relationships had an indirect effect on student achievement mediated by cooperative learning. However, students' perceptions of learning autonomy were not related to their perceptions of other environmental factors and learning outcomes.

Keywords: Student perceptions; Classroom environment; Academic achievement; English as a foreign language; Higher education

1. Introduction

The classroom environment is defined as a global "assessment of the psychological, social, emotional, and organizational/managerial state of the classroom" (Babad, 2009, p. 54). The classroom environment is the sum of relationships, activities, and interactions in the classroom community (Li, 2014). It is an ecosystem which each individual teacher and student lives in and experiences. To improve classroom environment has been a central goal of educational reform initiatives in a large number of countries such as Canada, China, England, France, Germany, Israel, Singapore and United States (see the review of Wang et al., 2020). The importance of classroom environment is represented by the strong associations between classroom environment and academic, behavioral and socioemotional outcomes of students (e.g., Guo et al., 2022; Guo, 2018; Guo et al., 2017; Hattie, 2009; Lim & Richardson, 2021; Reyes et al., 2012; Trigwell et al., 2013; Wang et al., 2020). Evidence has specially confirmed that tertiary students' perceptions of the classroom environment significantly and positively predict their learning outcomes (Guo, 2018; Guo et al., 2017; Hizriania, Rufaidhab, Norc & Handrianto, 2022;Lim & Richardson, 2021; Mirici, 2019;Trigwell et al., 2013).

However, one disadvantage of the existing literature is that students' perceptions of the classroom climate were examined in a comparatively manner. For example, student perceptions were assessed by collective and simple factors such as teaching quality, work load or teaching management (Guo, 2018; Guo et al., 2017; Trigwell et al., 2013). Human perceptions of a particular social environment are complicated, and so is of the classroom environment. Hence, we considered student perceptions of the classroom environment should be more thoroughly scrutinized with various variables added into the package. For example, teaching quality of higher education includes criteria such as innovativeness, learner autonomy and individualization (Devlin & Samarawickrema, 2010; Gunn & Fisk, 2014; Little et al., 2007). In addition, student perceptions of the psychosocial factors of the classroom environment should not be neglected, including teacher-student relationships and peer relationships because interpersonal relationships are an indispensable part of the classroom environment (Alansari & Rubie-Davies, 2020).

With these thoughts, the College and University Classroom Environment Inventory (CUCEI; Fraser & Treagust, 1986; Nair & Fisher, 2000) came into our sight because it was exclusively developed and widely acknowledged for assessing students' perceptions of classrooms within postsecondary and tertiary settings (Alansari & Rubie-Davies, 2020; Li, 2014). The development of CUCEI was guided by the three-dimensional concept of human environments: the relationships dimension, personal growth dimension and system maintenance dimension (Moos, 1973). The relationship dimension is concerned with how teacher-student and student-student relationships are viewed, fostered and, supported (i.e., Teacher-Student Relationship). The personal growth dimension describes how classroom environments support students as individual learners and how students' experiences within those environments facilitate their academic development (i.e., Autonomy). Lastly, the system maintenance dimension focuses on the managerial role of the teacher, the extent to which the teacher can manage the classroom (i.e., Equity). Therefore, the current study was designed to adopt the CUCEI to investigate whether university students' perceptions of the seven factors of the classroom climate could predict their academic achievement.

2. Classroom Environment and Learning Outcomes in Higher Education

A large body of literature has explored the relationships between the classroom environment and learning outcomes in tertiary institutions, for example, GPA, learning approach, learning satisfaction, learning engagement, academic self-concept and test scores (Guo et al., 2022; Guo, 2018; Guo et al., 2017; Lizzio et al., 2002; Schauber et al., 2015). Most research has identified the positive relations of the classroom environment to learning outcomes. Some recent studies are reviewed in details as follows.

Trigwell et al. (2013) studied 773 undergraduate students from the full range of disciplines for the interrelationships among prior experience, perceptions of learning environment, learning approaches and academic relationships. The researchers evaluated students' perceptions of the learning environment using a two-subscale questionnaire (teaching quality and workload), and students' academic achievement was measured by an achievement degree classification system. The major results showed that students' perceptions of the learning environment had indirect effects on final degree results mediated via surface approach to learning.

A large scale longitudinal study was conducted with a sample of 1646 medical students (Schauber et al., 2015). This research assessed students' perceptions of the classroom environment in terms of emotional support, didactics, practical relevance, developmental potential, course structure and organization; Progress test scores were adopted as the indicator of student academic achievement. The results revealed that student perceptions of the classroom environment significantly predicted achievement gains via efforts invested in learning.

Guo et al. (2017) investigated 74,687 undergraduates from 39 universities in China. Using self-developed scales, students' perceptions of good teaching, student-faculty and peer interactions were collected. Students self-report of skill development and course satisfaction were used as the outcome variables. Also, this study found students' perceptions of good teaching, student-faculty and peer interactions were predictive of deep and surface approaches, as well as learning satisfactions and skill development.

Another study of Guo (2018) continued to investigate a large sample of undergraduate students (n = 2616) in China. Data of students' learning engagement, perceptions of course and curricular experience, cumulative GPA, self-reported skill development and learning satisfaction were collected and analyzed. The results of path analysis showed that students' perceptions of course and curricular experience indirectly affected their skill development via learning engagement; student perceptions of curricular experience directly and significantly predicted their self-reported learning satisfaction; however, students' perceptions of the learning environment did not significantly impact their cumulative university GPA.

The relationships between students' perceptions of online courses and learning outcomes were investigated with a sample of 413 undergraduate student from various disciplines in South Korea (Lim & Richardson, 2021). In this study, students' perceptions of teaching, cognitive and social aspects of 25 online courses were measured by a survey instrument. Students' learning outcomes and learning satisfaction were also collected by questionnaires. The results identified the predictive effects of student'' perceptions of teaching, cognitive and social features of the online courses on students' perceived learning outcomes and satisfactions.

A recent study was conducted among a large sample of university students in China (Guo et al., 2022). The researchers collected data of students' perceptions of course experience (good teaching and teaching organization), students' perceptions of curricular experience (university resources and university support), learning engagement, cumulative GPA, perceived skill developments and perceived learning satisfaction. The path analysis showed that students' perceptions of curricular experience directly predicted cumulative GPA and had partially indirect effects on perceived learning satisfaction mediated by student engagement. Furthermore, students' perceptions of course experience had partially indirect effects on perceived learning satisfaction mediated by student engagement and indirect effects on perceived skill development mediated by student engagement.

The existing literature has documented the positive relationships between students' perceptions of classroom environment and their subsequent academic outcomes. With fruitful findings, there were still some limitations. One limitation was the lack of robust measurement of the outcome variable. Some studies used students' self-report of learning obtains and satisfaction (Guo et al., 2022; Guo et al., 2017; Lim & Richardson, 2021), progress test scores (Schauber et al., 2015) or GPA (Guo et al., 2022; Guo, 2018) to evaluate students' academic

achievement. These measurements were subjective responses or cumulative assessment whose validity and reliability were both critically challenged. Instead, the current study considered the standardized test score a more trustworthy indicator of the achievement variable. Another major limitation was about the measurement of students' perceptions of the classroom environment. For example, students' perceptions of course experience (good teaching and teaching organization) may not be a well-defined construct due to the overlapping connotations (Guo et al., 2022). Students' perceptions of interactions with faculty (Guo et al., 2017) and university support (Guo et al., 2022) seemed not to be strongly related to their experience in the microenvironment of the classroom. Some research measured classroom environment in a too general manner, for example, teaching quality (Trigwell et al., 2013) and teaching presence (Lim & Richardson, 2021). Therefore, the current study was designed to conduct a large scale quantitative study with first-year undergraduate students who learn English as a foreign language (EFL), adopting the CUCEI to measure students' perceptions of seven dimensions of the classroom environment (teacher-student relationships, innovation, peer relationship, task orientation, cooperative learning, learning autonomy and equity), and using scores of the national standardized test (College English Test, CET) to measure student academic achievement. The research question that this study attempted to answer was whether university students' perceptions of the seven dimensions of the classroom climate could directly or indirectly predict their EFL academic achievement.

3. Methods

3.1. Participants

The participants of this study were 846 first-year undergraduate students who were learning English as a foreign language in a university in mainland China. They came from 29 classes with similar age but varied in gender, SES background, academic discipline, and prior achievement. At the beginning of their first-year study, these students were randomly assigned to each class. These classes had the same curriculum settings: the students sat in the EFL class for two sessions (270 mins in total) per week, which resulted in a comparatively stable interaction between the teachers and the students across 32 weeks. At the end of the first school year, each of them was required to attend the College English test.

3.2. Measurements

3.2.1 The College and University Classroom Environment Inventory (CUCEI)

The CUCEI was initially developed in 1986 (Fraser & Treagust, 1986) to examine tertiary classroom environmental characteristics. It was later modified in 1999 ((Nair & Fisher, 2000) and the current study used the version of CUCEI modified for Chinses tertiary students (Li, 2014). The seven dimensions of the inventory are: Teacher-student Relationship (extent of the instructor's concern for students' personal welfare and opportunities for individual students to interact with the instructor), Innovation (extent to which the instructor plans new, unusual activities, teaching techniques and assignments), Peer Relationship (extent to which students know, help and are friendly towards each other), Task Orientation (extent to which class activities are clear and well organized and goal oriented), Cooperative Learning (extent to which students cooperate on learning tasks and contribute to cooperation), Autonomy (extent to which students are allowed to make decisions about learning according to their own ability,

interests and rate of working), and Equity (extent to which students are treated equally by the teacher). Each dimension contains seven short and easy items, for example, “My teacher is helpful” and “I know everyone in the class.” For each of the 49 items in the inventory, participants are given five options ranging from False, Mostly False, Sometimes False Sometimes True, Mostly True, and True which are scored by 1, 2, 3, 4 and 5. The higher score represents perceptions of a more positive classroom. The CUCEI has been widely adopted by research on the association between student perceptions of the classroom environment and student outcomes in higher education, because its validity and reliability have been frequently documented to be robust with Australian, American, Canadian, New Zealand and Chinese undergraduate and postgraduate students (Alansari & Rubie-Davies, 2020; Coll et al., 2002; Dorman, 2012).

3.2.2 College English Test (CET)

All university students in China must take the College English Test which examines English language proficiency. The College English Test is a national standardized test in which the original score is transferred to be a constant modal normal score with a mean of 500 and a standard deviation of 70. Students who score more than 430 pass the test, and only those who have passed CET are qualified to receive their academic degrees. The test is held twice a year, in the middle and at the end of the school year. Before graduation, students can decide when and how many times to take the test. Usually, students will attempt the test at the end of their first school year. In this study, student CET scores at the end of the first school year were used and interpreted as their EFL achievement.

3.3 Data Collection

In June 2021, the 846 first-year undergraduate students were required to fill out the questionnaire (CUCEI) about their perceptions of the learning environment in the EFL classrooms. It was at the end of the first school year and the participants had had sufficient chances to perceive and interpret the classroom environments. The CUCEI was delivered via an online survey system; students filled them out on computers within one week and the system gathered all the responses and transferred the data into a SPSS file. Also in June 2021, the participants attended CET and their scores were announced in September, 2021. The researchers collected the data of CET scores from the teaching affairs office of the university with the consent of the participants.

4. Results

The descriptive data of students’ perceptions of the EFL classroom environment and CET scores are presented in Table 1 and the correlation matrix of each variable is presented in Table 2.

Table 1. Descriptive Data of Seven Dimensions of Classroom Environment and CET Scores

	TSR	INNO	ORIE	PEER	COOP	AUTO	EQUI	CET
M	4.37	4.05	4.24	4.29	4.33	3.78	4.55	454.48
SD	.78	.77	.69	.66	.71	.80	.41	75.63

Note: TSR, INNO, ORIE, PEER, COOP, AUTO and EQUI are the abbreviations of Teacher-Student Relationships, Innovation, Task Orientation, Peer Relationships, Cooperative Learning, Autonomy and Equity.

Table 2. Correlations between independent variables and dependent variables

	TSR	INNO	ORIE	PEER	COOP	AUTO	EQUI
INNO	.13						
ORIE	.14	.17					
PEER	.16	.09	.10				
COOP	.09	.13	.17	.78***			
AUTO	.10	.11	.08	.11	.12		
EQUI	.70***	.07	.07	.19	.09	.05	
CET	.35*	.69***	.55**	.25*	.32*	.11	.25*

Note. TSR, INNO, ORIE, PEER, COOP, AUTO and EQUI are the abbreviations of Teacher-Student Relationships, Innovation, Task Orientation, Peer Relationships, Cooperative Learning, Autonomy and Equity.

* $p < .05$; ** $p < .01$; *** $p < .001$

The correlation test showed that CET was significantly correlated with Teacher-Student Relationships ($r = .35$), Innovation ($r = .69$), Peer Relationships ($r = .25$), Task Orientation ($r = .55$) Cooperative Learning ($r = .32$) and Equity ($r = .25$). There was significant correlation between Peer Relationships and Cooperative Learning ($r = .78$), and between Equity and Teacher-Student Relationships ($r = .70$). The factor Autonomy was not correlated with any other variables. Hence, Autonomy was deleted from the subsequent path analysis.

Structure equation modelling (SEM) was conducted via the statistical tool AMOS to analyze the paths between variables. Figure 1 illustrates the model with significant paths. The fit of the model was excellent (Chi-square = 8.893, Chi-square/ $df = 2.223$, CFI = .98, GFI = .98, AFGI = .97, RMSEA = .038, SRMR = .01).

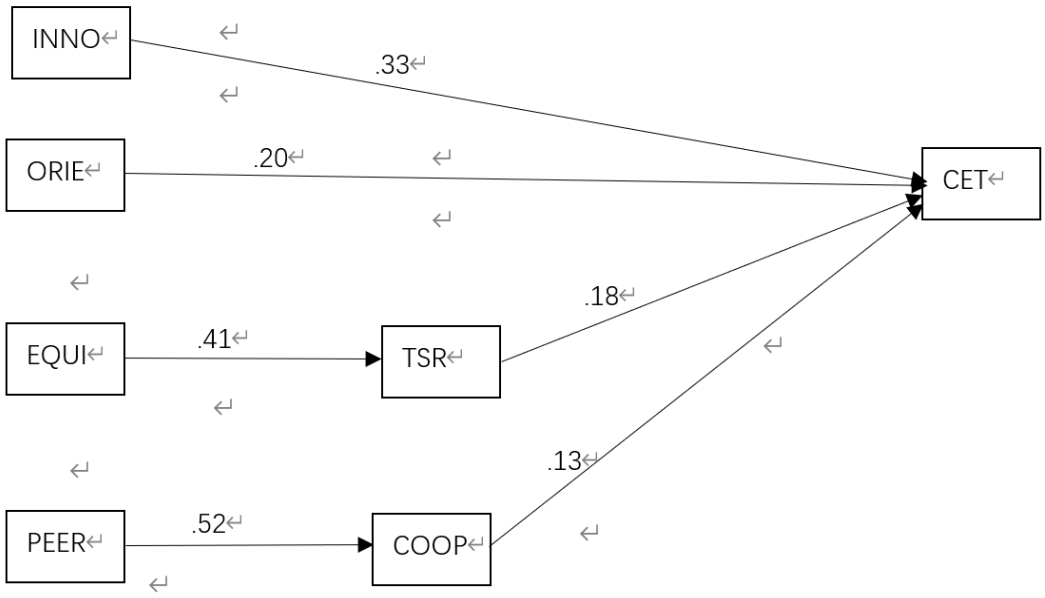

Figure 1. Path Model of Classroom Environment Predicting CET Scores

The results showed that Innovation and Task Orientation significantly predicted CET scores. Equity predicted Teacher-Student Relationships and Teacher-Student Relationships predicted CET scores, which suggested an effect of Equity on CET scores mediated by Teacher-Student Relationships (indirect effects = .072, $p = .004$). Peer Relationships predicted

Cooperative Learning and Cooperative Learning predicted CET scores, which suggested an effect of Peer Relationships on CET scores mediated by Cooperative Learning (indirect effects = .068, p = .015).

5. Discussion

The results of this study suggest that university students' perceptions of innovative and well-structured instructions account for enhancement of their EFL academic achievement. In addition, students' perceptions of the equal climate in the classroom shape teacher-student relationships, which contributes to academic gains. Students' perceptions of positive peer relationships influence cooperative learning in the EFL classroom, which in turn leads to higher academic achievement. However, student perceived autonomy is not related to their EFL academic achievement.

Innovative instructions are a predictive factor of academic success in higher education, because it facilitates student deep learning, creative learning instead of mastering low-order facts (Bereiter, 2002). It is acknowledged that innovation is an important criterion of teaching quality in higher education which faces changing needs of the modern society (Gunn & Fisk, 2014). Therefore, university teachers are responsible for continuously diversifying their knowledge base, thinking patterns and evaluation systems, and implementing new ideas, methods tools and contents in real classroom instructions and interactions (Zhu & Wang, 2014). The finding of students' perceptions of innovation predicting academic outcomes has confirmed the theoretical arguments that innovation is a core of human needs which benefits active learning of students (Zhu & Wang, 2014).

This study has found that students' perceptions of task orientation, well-designed and well-structured course instructions, is likely to have significant and positive effects on students' academic gains. Well-oriented instructions has also been explicitly documented as central themes and elements of teaching excellence in higher education (Gunn & Fisk, 2014). With clear learning objectives, smooth transitions between teaching phases, and coherent linkage between previous tasks and new tasks (Devlin & Samarawickrema, 2010; Panayiotou et al., 2021), well-oriented instruction is likely to promote the development of student EFL skills and competence.

The findings of indirect effects of peer relationships on student EFL learning mediated by cooperative learning activities have extended the understandings about impacts of peer relationships and cooperative learning on tertiary students. Previous research has focused on peer emotional support or cooperative learning respectively. A large number of studies have documented that peer relationships are strongly related to students' academic outcomes, such as school adjustment, GPA and school dropout (Aldridge & Rowntree, 2021; Contreras et al., 2022; Fujiyama et al., 2021; Mitic et al., 2021; Swenson et al., 2008). Considerable evidence has also shown that cooperative learning is an active learning methodology which greatly enhances student learning (Johnson & Johnson, 2006; Johnson & Johnson, 2009) by developing self-dependence, self-confidence, critical thinking skills and purposeful learning (Fernandez-Perez & Martin-Rojas, 2022; Johnson & Johnson, 2009; Zhang & Chen, 2021). However, the findings of the current study have indicated that peer relationships and cooperative learning should be jointly investigated. Cooperative learning is highly demanding of group member's responsibility, engagement, mutual faith and contribution (Johnson &

Johnson, 2009) which are just indeed the features of friendly relationships between peers. Given positive peer relationships, students may benefit more from cooperative learning and ultimately achieve greater academic success.

In addition, we also have found another indirect path from equity to academic outcomes via teacher-student relationships. Numerous studies have contended the importance of positive teacher-student relationships to student social and academic outcomes (e.g., Contreras et al., 2022; Engels et al., 2021; Patrick et al., 2019). Teacher-student relationships play a critical role to first-year college students who transition to higher education with relatively high uncertainty and anxiety (see the review of Hagenauer & Volet, 2014). The current study has confirmed the existing literature with evidence of university teacher-student relationships predicting student EFL achievement. Moreover, the findings of the current study has identified an important antecedent of teacher-student relationships in higher education — students' perceptions of equal treatments. Equity means undifferentiating treatments of the teacher towards different student cohorts. Research has shown that students, even very young students, are highly sensitive to the teacher's differentiating behaviors, for example, eye contact, wait time, and grouping pattern (Weinstein, 2002; Weinstein et al., 1982). The current study has suggested that in higher education, teacher-student relationships are largely shaped by the teachers' equal treatments. With an equal classroom environment, university students are likely to positively perceive and interpret their relationships with the teacher, which ultimately leads to their positive learning behaviors and performance.

The unexpected result of the present study was that the participants' perceptions of learner autonomy are related to neither CET scores nor other classroom environmental dimensions. This is contrary to the extant literature suggesting the support of learner autonomy is positively linked to students' academic experience and success (Little, 2007; Little, 2022; Wielenga-meijer et al., 2011). It is widely acknowledged that autonomy is a universal psychological need functioning as the inner resource for personality and behavioral development (Ryan & Deci, 2000). Students who enjoy appropriate learner autonomy are likely to achieve academic success by taking charge of one's own learning featured by responsibility, confidence, reflective proficiency and self-regulation (Little et al., 2007; Little, 2022). However, a recent study scrutinized perceptions of "autonomy" among first-year undergraduate students and found that college freshmen tended to misperceive their autonomy as "low", reporting a large discrepancy between their actual autonomy and what they believe is required by higher education because of their comparatively poor self-reflection and self-assessment skills (Henri et al., 2018). Evidence from our study seems to support the study of Henri et al. (2018): the average value of student perceptions of "Learner autonomy" was comparatively lower (M = 3.78) than perceptions of any other factors (see Table 1), which suggests a common underestimation of autonomy among the first-year undergraduate student cohort. This could be an explanation for why students' perceptions of autonomy were not a significant predictor in this study.

6. Limitations and Future research

The major limitation of this study was that it investigated first-year undergraduate students only. These participants entered a brand new educational level where adjustment became a critical problem. Therefore, the conclusions drawn from freshmen may not be able to apply to

senior college students. For example, first-year students' perceptions of autonomy were found not to be related to their academic experiences. Whether this is true with senior students should be scrutinized in future research. Another example is the indirect path from peer relationships to academic achievement via cooperative learning. Although cooperative learning is likely to contribute to student academic achievement, whether cooperative learning in higher education is greatly dependent on peer relationships remains unclear. It could be speculated that frequent and productive cooperation among students may enhance peer relationships, but the findings of this study showed the opposite direction of the effects. These unexpected results could be due to first-year undergraduate students' overreliance on social support of important others. It can be assumed that freshmen actively participate in cooperative learning only when they perceive the peers are friendly and supportive. Therefore, again, whether this is true with senior undergraduate students needs further explorations.

7. Conclusion

College students' perceptions of innovative and well-structured instruction are positively associated with their greater academic gains. This indicates that students in higher education are specially demanding of high-end cognitive learning tasks and sophisticated teaching designs. Meanwhile, the findings of the current study suggest the important role of social support in enhancing student learning in tertiary institutions. Peer relationships and teacher-student relationships matter a lot for first-year undergraduate students. Due to the stress of academic adjustment to higher education, first-year undergraduate students highly rely on the rapport with the teacher and peers. Therefore, the conclusion could be drawn that both instructional factors and social factors should be highlighted in first-year undergraduate students' adjustment to higher education.

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