An Empirical Study on the Multidimensional Learning Styles of Chinese EFL Students

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Abstract. This study investigated the learning style preferences of 500 EFL students enrolled in a university in China, one relatively neglected field of individual factors in second language learning. With the use of Oxford's SAS, which measures the multidimensional learning styles of learners, including perceptual, cognitive, and psychological preferences, the Chinese EFL learners' style preferences were examined, in association with several individual factors. Results revealed significant differences in learning style preferences according to gender, year of learning English, and study major. Suggestions for future research and classroom teaching are provided in light of the findings.

Keywords: Learning Styles, Chinese EFL Learners, Culture, Individual Factors

1. Introduction

In recent years an increasing number of studies have investigated the affective and cognitive factors of individual language learners, such as motivation, language aptitude, learning strategies, and self-esteem. However, though regarded as an important factor in learner differences, learning styles have not attracted as much attention in research as other factors have.

China, the country with the largest population of English language learners in the world, attaches great importance to English teaching and learning. Studies on learning style preferences of English learners are few and far between, most of them having Chinese learners as one of the sub-samples in cross-cultural investigations of ESL (English as a Second Language) learners. Studies that explore this factor among populations of Chinese EFL (English as a Foreign Language) learners exclusively are not abundant.

In view of the importance of understanding learners' style preferences as well as inadequate studies in this domain, particularly relating to the English learners in China, this study investigates the learning styles of Chinese EFL students enrolled in university study and examines the possible influences of culture and several other variables on their style differences, including English proficiency, gender, field of study, and year of English learning.

2. Literature Review

2.1. Definitions and Constructs of Learning Styles

Learning styles have been referred to "the composite of characteristic cognitive, affective and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment" [1]. Although different definitions have been proposed by researchers, it is commonly believed that one's learning styles can indicate how one takes in and processes incoming information and how one reacts in learning contexts. It is also commonly assumed that there is a relationship between learning styles and effective teaching methods, in other words, the same teaching method might be effective for some students while ineffective for others [2].

In an attempt to reorganize and integrate the numerous versions of definitions and constructs of learning styles, Curry [3] proposed an "onion model", which compares different theories and constructs of learning styles to an onion consisting of three different layers: instructional preference, such as the preference to learn by individual or in a group, or to learn through visual, auditory, or kinaesthetic modality, etc.; information

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processing style, such as the preference to rely on either concrete experience or abstract analysis to process incoming information; and cognitive personality processing style, such as the bipolar dimensions of field sensitivity vs. field independence, impulsivity vs. reflectivity and Myers-Briggs' four dichotomies of sensing vs. intuition, thinking vs. feeling, extraversion vs. introversion, and judging vs. perceiving.

2.2. Learning Style Studies in Language Learning

Studies on learning style preferences of language learners focus mainly on exploring the roles and influences of learning styles on individual language learning or acquisition, by using different instruments, either those developed in general education such as Myers-Briggs Type Indicator (MBTI), Witkin's Group Embedded Figure Test (GEFT), or Kolb's Learning Style Instrument (LSI), or those developed specifically for SLA (Second Language Acquisition), such as Reid's Perceptual Learning Style Preference Questionnaire (PLSPQ). Many of them examine the learning style preferences of language learners in relation to language achievement or proficiency, and include other individual factors such as age, gender, educational level, attitude, motivation, and anxiety. Another area of research attempts to investigate the cultural influences on learning styles and aims at mapping out the differences in learning style preferences across diverse cultural and ethnical groups.

Early learning style studies mainly used the GEFT to investigate the influences of field dependence (FD) and field independence (FI) learning styles upon language learning outcomes and the results seemed to favour field-independent learning, a learning style which was considered to be beneficial for language learning[4],[5],[6],[7],[8],[9],[10]. However, some researchers suggest that the cognitive style of FI and FD might contribute to different contexts, different aspects of language proficiency, or different language tasks [11],[12]. FI is thought to be related to a better performance on grammatical structure, sentence patterning, and tasks requiring analytical or restructuring power, and FI individuals succeed in formal classroom learning. FD, also called "field sensitivity", is related to better performance on communicative or oral tasks and in communicative or out-of-class contexts.

For the perceptual dimensions of learning styles, some researchers claimed that no single perceptual or sensory modality was more advantageous for second language acquisition than other modalities [13]. Instead it might be the case that different learning styles, with their own strengths and weaknesses, will have their own contributions to different types of learning tasks in different learning contexts.

It is generally believed that different learning modalities are developed during different maturation stages in a certain sequence, for example, tactile and kinaesthetic preferences are usually developed during the early years in children and visual and auditory preferences are developed in the later stages in primary school or early secondary school. Such a sequence of developing learning styles is more or less supported by studies on language learners [14],[15], which implies that visual modality is developed later and more often used as learners gradually develop their reading competency in school education.

Gender is another variable that has been extensively studied in association with learning style preferences and it is believed that males and females may possess quite distinctive features in their learning styles. Results are not consistent regarding which types of learning styles are preferred by male or female. Oxford [16] pointed out that male students tended to be more tactile or kinaesthetic while females students tended to be more auditory; and male students might also be more field-independent, analytic, objective, and logically minded while female students might be more field-sensitive, global, subjective, and emotional in processing language or in other contexts. However, the results in the study by Melton [17] showed female students to be more auditory in learning style preferences than male students, and more kinaesthetic than their male counterparts. Isemonger and Sheppard [18] also found that female ESL students preferred kinaesthetic and group learning styles more than male students did, which was not entirely consistent with Oxford's [16] findings.

Different learning style preferences are displayed by students from different fields of study. Fridland [19] found that there were no significant differences in learning styles between American and Chinese ESL teachers and both chose divergers as their major learning styles, which might imply the study major was a more powerful determinant of learning styles than culture was. A more recent study by Psaltou-Joycey and Kantaridou [20] of 1616 Greek university students in eight different areas of study revealed that although

visual learning and intuitive-random learning were major preferences of all participants, significant differences were found in learning styles among students with different major subjects, for example, economy and computer students preferred a more extraverted learning style while this was only a minor preference for all the other six majors.

2.3. Learning Style Differences across Cultures and Learning Styles of Chinese Students

Culture also has an impact on how people prefer to learn. The most well-known and frequently-cited study on cross-cultural learning styles is by Reid [21]. Employing the Perceptual Learning Style Preference Questionnaire (PLSPQ) developed by the researcher, it investigated the perceptual learning style preferences of 1,388 native- and non-native speakers of English in the US. The findings verified the assumption that students from different cultural backgrounds have distinctive learning styles. Other cross-cultural studies have been undertaken to explore the diverse learning styles of various cultural groups using Reid's PLSPQ [18], [22],[23].

A few studies explore the learning style preferences of Chinese EFL or ESL students, such as the study of Melton [17], a replication of Reid's study on the perceptual learning styles of 331 undergraduate and postgraduate students in five universities in China. Classroom learning in China, as traditionally influenced by Confucian culture, is often described as authority-orientated, and teacher-centred, with obedient, passive and examination-driven students [24], [25]. Chinese learners are also thought to use rote learning, memorization and repetition as their prevalent learning methods [26]. However, there are different opinions on Chinese learners. Biggs [27], [28] remarked that this stereotypical depiction of Chinese learners was a misperception and they had a strong preference for high-level, meaning-based or deep-learning strategies. This observation is partly supported by the results of the study by Zhang [29], which indicated that Chinese students strongly preferred teaching styles that encouraged creativity and collaborative work.

3. Methodology

3.1. Participants

Five hundred and sixteen first-year students from a university in the north-eastern part of China were selected as the participants for the study. All were enrolled in a required College English Course, which lasts for the first two years of their university study. After the procedures of administering a proficiency test and a questionnaire, valid test scores and questionnaire answers were obtained from a total number of 466 students. The remaining 50 students either did not take the test or did not hand in complete questionnaires. Table 1 provides detailed background information of the participants.

3.2. Instrument

Table 1: Background information of participants

		Percent-			Percent-			Percent-			Percent-
Hometown	Number	age	Major	Number	age	Years	Number	age	Gender	Number	age
Liaoning	339	72.7%	Computer and math	158	33.9%	6-9 years	228	48.9%	male	123	26.4%
Other 11 provinces	127	27.3%	Physics	63	13.5%	10 years and	238	51.1%	female	343	73.6%
			Chemistry and biology	22	4.7%	above					
			Humanities	223	47.9%						

An adapted version of the TOEIC (Test of English for International Communication) was used to assess participants' English proficiency levels. The TOEIC is widely used across the world to assess learners' English language skills and provide reliable data. Due to the limited time for testing, the original test

questions were reduced, with half of the questions in each of the sub-sections (including listening and reading) selected for use in this study. The adapted test takes about one hour and twenty minutes for students to complete.

The learning style questionnaire used in this study is based on the Style Analysis Survey (SAS) by Oxford [30], which is designed for second language learners and covers multiple dimensions of learning styles, including physical preferences (visual, auditory, kinaesthetic), personality preferences (extraverted vs. introverted), cognitive preferences (intuitive-random vs. concrete-sequential, closure-orientated vs. open-orientated, global vs. analytical). It has also been used in cross-cultural settings to investigate the learning styles of language learners with reported reliability alpha to be as high as .92 [31]. In addition to the original 110 items of the SAS, a brief introduction of the research project, short instructions on how to complete the questionnaire, and a section eliciting the participant background information, such as age, gender, hometown area, major fields, etc., were added to the questionnaire. The original English version of the questionnaire was translated into Chinese by the researcher, checked by a colleague with expertise in English-Chinese translation, and piloted on 40 students with similar background to that of the participants. The study was approved by the University of Otago ethics committee.

3.3. Data Collection and Analysis

The proficiency test was administered to all the participants, who had read the information sheets and signed consent forms. The questionnaire was administered two weeks after the participants took the proficiency test and took thirty minutes or so to finish.

The test scores were graded and the answer to each question on the survey was coded with a score from 0 to 4 for each different scale point of each question item. All the data, including proficiency test scores, answers of questionnaire items and participants' background information were entered into SPSS (Version 17.0) software and double checked to avoid input error.

Descriptive statistic analysis was conducted to show the means and distribution of students' proficiency test scores and their learning style preferences in each type. In order to find out the differences in learning styles in relation to the variables of English proficiency, gender, year of English learning, and field of study, a one-way ANOVA and a post-hoc Scheff étest were conducted, given the uneven group size in the analysis.

4. Results and discussion

4.1. TOEIC Score as English Proficiency

The English proficiency test scores range from 19 to 85 points, with an average score of 50.8 points. The test scores were in normal distribution. The participants were classified into three proficiency groups based on their TOEIC test scores: a low proficiency group: students with test scores less than (or equal to) 43, which made up 23% of the total participants; an intermediate proficiency group: students with test scores ranging from 44 to 58 (including 44 and 58), which made up 54% of the total; and a high proficiency group: students with test scores more than (or equal to) 59, which made up 23% of the total.

4.2. Learning Style Preferences

Table 2: Mean value of each category of learning styles (M: Mean; SD: Standard Deviation)

	Visual	Auditory	Kinaesthetic	Extraverted	Introverted	Intuitive- random	Concrete- sequential	Closure- orientated	Open	Global	Analytic
M	24.07	20.64	21.52	23.61	18.33	24.90	22.81	23.29	20.99	23.25	21.16
SD	5.38	4.93	5.27	6.42	6.76	5.81	5.03	5.03	4.97	4.59	4.42

According to Psaltou-Joyce and Kantaridou[20], major, minor, and negative learning styles are differentiated based on a 30-point scale, and the value for the dividing line is converted to the corresponding 40-scale to fit the current study:

Major: equal to or more than 21.6 points

Minor: equal to or more than 18.4 but less than 21.6 points

Negative: less than 18.4 points

In terms of the above standard, the major learning styles of the participants in this study include (from high to low value) intuitive-random, visual, extraverted, closure-orientated, global and concrete-sequential. Minor styles include (from high to low value) kinaesthetic, analytic, open-orientated and auditory, while the only negative learning style is the introverted style.

Auditory learning is the minor learning style in this study and this coincides with findings by Melton[17]. The difference between findings of that study and this one is that visual learning is one of the major style preferences of these Chinese EFL students but only a minor style preference in Melton's study. The kinaesthetic style, identified as a minor style in this study, is a major learning style in Melton's study. These different results might be due to the different instruments used in the two studies with Melton's study employing Reid's PLSPQ. However, the strong preference for visual modality by Chinese learners is consistent over several other studies, including those of Reid [21] and Sun [32].

The strong preference for extraverted and global styles found in this study is different from the findings of Sharp [33] and Oxford, Holloway, and Horton-Murillo [34], which suggest that Chinese students prefer introversion over extraversion, and they are more analytic than global.

When compared with the study by Psaltou-Joyce and Kantaridou [20], which used the same instrument (SAS), the learning styles of Chinese EFL students were similar to those of the Greek students in that visual, intuitive-random and global styles were the major styles and both groups of students chose introversion as a negative style. The differences between the two groups of students are that the Chinese students also had closure-orientation as a major style while for the Greek students this was either a major or minor style. The Chinese participants in this study had auditory learning as a minor style preference while the latter group had this as a negative style.

4.3. Statistics of Style Differences in Relation to Other Factors

4.3.1. English proficiency

Table 3: Learning style means according to proficiency groups

Learning styles	Low (n=	=109)	Intermediat	e (n=250)	High (n=	=107)
Dear ming styles	M	SD	M	SD	M	SD
visual	23.52	5.81	24.07	5.49	24.63	4.62
auditory	20.13	4.96	20.63	4.79	21.20	5.21
kinaesthetic	21.39	5.29	21.41	5.10	21.92	5.65
extraverted	23.06	6.22	23.84	6.70	23.62	5.97
introverted intuitive-random	17.85 24.71	6.32 6.17	18.49 25.03	6.93 5.71	18.45 24.79	6.81 5.72
concrete-sequential	22.14	5.20	22.90	4.93	23.28	5.06
closure-orientated	22.85	5.06	23.25	4.91	23.81	5.27
open-orientated	20.48	4.49	21.00	5.01	21.49	5.33
global	20.48	4.46	23.25	4.70	23.66	4.44
analytic	20.48	4.26	21.01	4.44	21.79	4.50

Although intermediate and high proficiency groups have generally higher means for each learning style category, one-way ANOVA analysis did not yield significant differences among the three proficiency groups in relation to any single learning style.

This result is consistent with the findings of other studies, such as the one by Reid [21], which did not find any significant differences in learning styles related to language proficiency as measured by the TOEFL test score. This may lend support to the assumptions and views of some researchers [13],[35] that learning style is value-neutral in relation to learning outcomes or proficiency and different types of learning style preferences, with their own inherent strengths and weaknesses, may contribute to different learning tasks or learning contexts.

4.3.2. Gender

There are significant differences in learning style preferences between male and female students in the following three learning style categories: visual, introverted, and global learning styles, with F(1,464) = 19.132, p = .000, F(1,464) = 10.067, p = .002, and F(1,464) = 4.153, p = .042, respectively. Female students are more visual and more global in learning preferences than male students while male students are more introverted than female students. Similar results that are consistent with these findings can be found in other studies. As suggested by Oxford and Anderson [36], female students might be more global than male students, just as females generally tend to be more field-dependent (sensitive) while males tend to be more field-independent.

Leauning styles	Male(r	n=123)	Female(n=343)		
Learning styles	M	SD	M	SD	
visual	22.28**	5.99	24.71**	5.00	
auditory	20.81	4.95	20.58	4.93	
kinaesthetic	21.78	5.35	21.43	5.24	
extraverted	22.76	6.70	23.91	6.30	
introverted	19.98**	6.76	17.74**	6.67	
intuitive-random	25.00	5.88	24.86	5.80	
concrete-sequential	22.34	5.37	22.98	4.90	
closure-orientated	22.65	5.31	23.51	4.91	
open-orientated	21.52	4.86	20.80	5.00	
global	22.53*	4.53	23.51*	4.59	
analytic	21.56	4.79	21.02	4.28	

^{*}p<.05, **p<.01

4.3.3. Years Spent Learning English

Significant differences in learning styles were also found in relation to the range of years that students have been learning English. According to the table, students who have studied English for ten years and more are more visual than students who have studied it for less than ten years, with F(1,464) = 8.833, p = .003. The same pattern is also found with three other learning styles, namely, extraverted style, intuitive-random style, and concrete-sequential style, with F(1,464) = 4.410, p = .036, F(1,464) = 3.966, p = .047, and F(1,464) = 4.132, p = .043, respectively. The significantly stronger preference for visual modality by students who have spent longer learning English ties in with the suggestions made by Rossi-Le [15] and Chen [14] that the visual modality preference is developed later and used more often by older students as they develop their reading competency, although in this case it is L2 literacy that is involved.

Table 5: Learning Style Means According to Years of English Learning

Learning styles	6 to 9 year	ars (n=228)	10 years and above (n=238)			
Learning styles	M	SD	M	SD		
visual	23.32**	5.41	24.79**	5.26		
auditory	20.22	4.45	21.05	5.33		
kinaesthetic	21.33	4.78	21.70	5.70		
extraverted	22.97*	6.40	24.21*	6.39		
introverted	18.28	6.48	18.38	7.03		
intuitive-random	24.35*	5.32	25.42*	6.21		
concrete-sequential	22.33*	5.15	23.27*	4.88		
closure-orientated	22.93	4.86	23.62	5.17		
open-orientated	20.82	4.73	21.14	5.20		
global	23.09	4.61	23.40	4.57		
analytic	21.11	4.22	21.21	4.61		

For all the other types of learning styles, although no significant difference is found between the two groups of students, the mean value of each learning style category is consistently higher for the group of students who have learned English for a longer time. Similar trends can also be found in several other related studies [17],[22] which show that students with more years of language study tend to have stronger

preferences in most categories of learning style preferences. This may imply that with longer years of exposure to learning a foreign language, experienced learners need to adapt their learning styles to the increased demands of language learning. For example, they may become more extraverted because they have more interactions with teachers and classmates to improve their communicative competence. The general trend of expanding virtually all the learning styles and having stronger preferences for each type of learning style, suggests that learning styles tend to evolve and change as learners go through the learning process.

4.3.4. Field of Study

Table 6: Learning Style Means According to Field of Study

Learning styles	Computer and math (n=158)		Physics	ics (n=63) Chemistry and bio		logy (n=22)	Human	Humanities (n=223)	
	M	SD	M	SD	M	SD	М	SD	
visual	24.45	5.91	22.54	5.94	25.64	5.21	24.08	4.75	
auditory	21.28	5.33	19.35*	4.95	23.18*	5.60	20.30	4.42	
kinaesthetic	21.75	5.43	20.62	5.20	22.00	6.75	21.57	5.01	
extraverted	23.95	6.53	21.95	5.75	26.05	5.98	23.59	6.49	
introverted	18.45	6.95	18.41	6.52	18.05	6.31	18.26	6.77	
intuitive-random	24.70	6.12	23.83*	6.61	28.27*	5.70	25.01	5.24	
concrete-sequential	23.49	5.14	22.02	4.80	23.36	3.19	22.50	5.13	
closure-orientated	23.99	5.13	21.94	5.70	22.18	3.63	23.28	4.80	
open-orientated	20.68	5.08	20.11	4.35	23.00	4.72	21.26	5.04	
global	22.84	4.80	22.59	4.32	23.95	4.05	23.66	4.53	
analytic	21.59	4.92	20.75	4.52	21.32	3.82	20.96	4.05	

^{*}p<.05, **p<.01

As shown in Table 6, significant differences in learning styles among students with different subject majors were found in two categories: auditory and intuitive-random styles. The post-hoc Scheff étest showed that the students majoring in chemistry and biology were significantly more auditory and more intuitive-random than students majoring in physics, with F(3,42) = 4.725, p = .003, and F(3,462) = 3.327, p = .020, respectively. There are also several other studies which did not find many significant differences in the learning style preferences in relation to different fields of study [17],[21]. Possible reasons for this may be that the participants in this study were all university freshmen who had studied their major subjects for less than one year, which might be too short a period for them to have developed distinctive styles for studying different fields and for the unique learning orientations and habits involved with different fields to have been shaped.

5. Conclusions and Implications

The results in this study may provide valuable information for EFL classroom teaching in China. A versatile teaching methodology should be adopted to cater to the multiple major style preferences of Chinese learners. An optimal way to react to multiplicity of learning styles of Chinese undergraduates is to design classroom activities, tasks, and assignments in a balanced manner by taking all the learning styles into account. Teaching methods in the English classroom in China today, to a large extent, are still dominated by traditional grammar methods, which may not meet the diversified style preferences of learners. For example, a teacher's exclusive use of knowledge transmission in class might be in serious conflict with a students' extravert learning style. As a possible consequence of this conflict, students' interest and motivation in learning might be affected and expected learning outcomes might not be achieved. Furthermore, the fact that different learning styles might be present in students of different gender, with different fields of study, or with different experiences in learning a foreign language, also needs to be given consideration in classroom practice by language teachers.

Given several inconsistent results between this study and related studies, as well as the limited number of empirical studies on the learning styles of Chinese learners, future studies should be carried out for a more

thorough understanding of learning styles. Qualitative methods and more comprehensive assessments of language proficiency which include measurement of speaking proficiency would be advantageous too.

6. References

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