Variation in learning styles in a group of Chinese English as a foreign language learners

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In this study, the Felder learning styles inventory was administered to students who were non-English majors in a Chinese University. Descriptive statistics identified that participants do vary in their preference for particular learning styles with a great variety of learning style preferences distributed unevenly among the sample population. A large number of the participants showed mild preference to Global, Visual and Sensing learning styles. The present study extended Felder's work to a group of Chinese English as a Foreign Language learners. Implications for English as a Foreign Language teachers in Chinese Universities are that it is important to be aware of varied needs of learners from different majors and to respond flexibly by employing a broad range of teaching techniques to better reach students of different learning preferences.

Learner, learning style, dimension, preference, difference, Chinese English, foreign language learner

INTRODUCTION

Many English as a Foreign Language (EFL) learners encounter the frustration that their teachers' teaching does not appeal to their own learning preferences because most teachers teach the way they learn (Sitt-Gohdes, 2001). The unfavourable learning condition consequently undermines students' motivation and diminishes their learning potential (Miller, 2001; Sitt-Gohdes, 2003). Teachers of English in Chinese universities share the same embarrassment that there are always some students who show a tendency to be inattentive in class and get bored with English learning even though teachers have made great efforts preparing for the class. This inefficient situation can be attributed to problems involving both teachers and students. Some researchers attributed the reasons for such a problem to a lack of motivation and self-efficacy from the students (Graham, 2006) and others to individual difference (Snow, 1986).

It is well accepted that when teachers are able to analyse their own teaching techniques and analyse the difference and needs of their students, the educational process is likely to become optimised for both students and teachers (Fairhurst & Fairhurst, 1995). Learning style is one of the concepts that are postulated by researchers to depict learners' differences and varied needs. Therefore, the present study aims to depict learning style difference among a group of Chinese university students and further to inform English learning and teaching practice in China.

RESEARCH QUESTIONS

This study aims to explore the following questions:

1. Do English as a Foreign Language learners in Chinese Universities vary in their preference for particular learning styles?

2. If they do vary in their preference for particular learning styles, what are the characteristics of the variation?

3. How can the variation of learning styles inform teaching of English as a Foreign Language in Chinese universities?

DEFINITION AND CLASSIFICATION OF LEARNING STYLES

Definition

Learning Style took its name in the 1970s. The origin of this concept has been attributed differently by scholars to individual differences, to the idea of "life styles" and to personality types (Zhang & Sternberg, 2005).

With the development of constructivist views of learning, many researchers began to be interested in depicting individual differences in the way people process information and gain understanding from different constructs (Chalmers & Fuller, 1996). Therefore learning styles, together with other constructs such as decision making and problem-solving style, mind style, perceptual style and thinking styles, with each addressing different aspects and features of human cognition, were postulated to depict the variances among individuals (Zhang & Sternberg, 2005). An earlier term that denotes an individual's consistent preference for particular ways of gathering, processing and storing information and experiences is Cognitive Style. Cognitive Style is associated with Learning Styles in that these two terms appear to address very similar issues of individual differences (Cuthbert, 2005) and share common origins (Sadler-Smith, 2001). Sadler-Smith suggested that both the two terms derived from four areas of psychology. These areas are perception, cognitive controls and cognitive processors, mental imagery, and personality constructs, both having cognitive, affective and sociological features.

The term Learning Style, as is used by Kolb (1984) and Honey and Mumford (1986), describes an individual's preferred or habitual ways of processing knowledge and transforming the knowledge into personal knowledge. According to Kolb (1984), individual differences derive from the psychological attributes that determine the strategies a person chooses while processing information. In the learning literature, theorists interpret the concept of Learning Style in different ways. Gregorc (1982) emphasised learners' mental qualities in his definition. He combined mental perception and ordering qualities to form Concrete Sequential, Concrete Random, Abstract Sequential and Abstract Random - four learning styles. Kirby and his colleagues (Kirby, Moore, & Shofield, 1988) defined learning style as the preferred way to learn and the way a person learns best. Keefe (1979) presented the notion of learning style as characteristic, cognitive, affective, and psychological behaviours that serve as relatively stable indicators of how learners perceive, interact with and respond to the learning environment. Incorporating the many features of learning style, the author holds that learning style is the habitual preference learners demonstrate in their learning activities; formed from the interaction of factors such as individual experience, cognition, personality and environment; and having the characteristics of individuality, consistency and stability.

Features of Learning Styles

The first integrative model that depicted the traits of learning styles is the three-layer "onion" model developed by Curry (1983). The innermost layer of the model is composed of measures of personality dimensions. The middle layer comprises style measures of information processing, and the outermost layer is composed of measures addressing each individual's instructional preferences. Curry hypothesised that the styles at the innermost layer, the personality dimensions, are the most stable ones and the styles at the outermost layers, the individual instructional preferences, are the dimensions that are most likely to be modified. In this sense, Curry's model suggests that learning styles are on a continuum with trait and state being the two poles; the

dimensions at the innermost layer are more trait-like and the ones at the outermost layer are more state-like.

There are two important points in understanding learning styles. The first is that learning styles do not suggest one's learning ability (Riding, 1997). The second is that different learning styles should not be judged as being better or worse; they are simply different (Zhang & Sternberg, 2005).

Classification of Learning Styles

Different theorists defined learning styles differently and therefore they belong to different classification systems. The learning style model developed by Felder and Henriques (1995) is adopted in this paper because this model was particularly designed for foreign and second language learners. In this work, learners are categorised as falling into five dichotomous learning style dimensions, namely Sensing or Intuitive learners, Visual or Verbal learners, Active or Reflective learners, Global or Sequential learners, Inductive or Deductive learners.

According to Felder and Henriques (1995), learners are classified with respect to perceptual behaviour as sensing or intuitive learners. Sensing learners are concrete and methodical; they are good at memorising facts and doing hands-on work and are more comfortable with following rules and standard procedures. Intuitive learners tend to be abstract and imaginative; they like innovation and dislike repetition.

Considering the ways in which learners prefer input information to be presented, they are categorised as visual or verbal learners. Visual learners are those who prefer information to be presented in their thinking or memory in the form of pictures, diagrams, films and demonstrations. Verbal learners, on the contrary, prefer information presented in the form of words.

With regard to the ways of knowledge processing, learners are thought to fall into two categories: Active learners or Reflective learners. An active learner, as suggested by the name, is someone who prefers to be actively involved in examining and employing knowledge with others, such as in group discussion. Reflective learners tend to examine and employ knowledge introspectively. Active learners benefit the most in dialogue, role-play and team work learning activities. Reflective learners are more inclined to ponder on perceived information.

Learners are classified as Global learners or Sequential learners in the ways they achieve understanding. Compared with Sequential learners, who tend to process and organize knowledge in a piecemeal fashion, Global learners are good at dealing with seemingly unconnected fragments of information and achieve understanding in a holistic way. In language learning practice, Global learners prefer holistic understanding of the broad context of knowledge and ignore trivial details, while sequential learners feel comfortable when the teacher divides passages and sentences into parts dealing with lexicon, grammar and structure, respectively.

Judging from the ways learners organise their learning, learners are classified as Inductive or Deductive learners. Inducing new material by linking it to one's observed material or prior knowledge is favoured by inductive learners (Glaser, 1984). Deductive learners prefer to be presented with a general concept that is then followed by supporting examples.

Learning styles were found to affect learners' learning behaviors. Learners having different learning style preferences would behave differently in the way they perceive, interact, and respond to the learning environment (Junko, 1998). Since learners differ in their preferences to certain learning styles, it will be important for teachers to examine the variations in their students on the features of their learning styles, because the information about learner's preference can help teachers become more sensitive to the differences students bring to the classroom (Felder & Spurlin, 2005). Adjustments can then be made to accommodate the students' varied needs. This

study, therefore, aims at depicting the variation of learners' learning style preference in the Chinese English as a Foreign Language learning community to bridge teachers' knowledge gap about learners' needs and improve their teaching practice.

RESEARCH METHODS

Participants

The participants in this study were 152 first-year college students enrolled nationwide at Qingdao Technological University. Most students were 18 or 19 years of age. The students majored in eight disciplines including Civil Engineering (n=29), Architecture (n=27), Engineering Equipment (n=22), Engineering Material (n=11), Engineering Topography (n=13), Environmental Engineering (n=10), Environmental Art (n=24) and Mathematics (n=16). Among the participants, 78 were males and 74 were females. The study was conducted during the second semester of their first academic year.

Research Design and Instrument

The instrument used in this study to assess learners' learning style preference was the Index of Learning Styles questionnaire devised by Felder and Soloman (Felder & Soloman, nd). The reason that this study employed the Index of Learning Styles as a measuring instrument was because most of the participants were engineering majors and the original goal of devising the instrument, according to Felder, was to offer some insights about teaching and learning based on his experience in engineering teaching (Felder & Silverman, 1988).

Though Felder and Silverman (1988) proposed five learning style categories in his work, no question in this questionnaire assesses the Inductive-Deductive learning style category. According to Felder, university students are predicted most likely to choose deductive as their favoured teaching condition because they do not want the trouble of making collections of observations and facts and making sense of the heaped up stuff; and this preference on the part of the students may make some teachers feel that it is justifiable to keep using the deductive paradigm in their teaching practice, which seems the most convenient way to organise instructional materials for them.

The forty-four multiple choice questions in the questionnaire reflect the psychological and behavioural characteristics of four dichotomous dimensions of learning styles described above. Questions in this questionnaire were written in English. Two choices in each question reflect the two dichotomous learning styles. For example, in the question "*When I get directions to a new place, I prefer (A) a map, (B) written instructions*", this question is trying to distinguish whether the learner is more a visual learner or a verbal learner. Participants were required to indicate their preference to either of these two answers with compliance to their normal practice. Participants who choose answer *A* are regarded as more of a visual learner while those who choose *B* are considered as more of a verbal learner in this case. An uneven number of questions evaluating each dichotomous dimension of learning styles guarantees that there is no chance a learner can get an even number of answers for two poles of the learning style continuum. The following example is to illustrate how to evaluate a learner's learning style preference based upon his or her answers to the questionnaire. Among the eleven questions designed to evaluate a learner as a visual or verbal learner, a selection of "*A*" indicates a preference for a visual learning style and a selection of "*B*" indicates preference for a verbal learning style. If a participant chooses *A* six times and *B* five times, he or she is regarded as more of a visual learner. And because the frequency of choice *A* minus the frequency of choice *B* (6 – 5) is within the scale of one to three, the participant is regarded as having mild preference for visual learning style and could easily achieve balance or adjustment between visual and verbal learning environment. If the value lies between five and seven, the participant is thought to habitually prefer the learning style which outnumbers another style and is more comfortable learning in such a classroom environment.

When the absolute subtraction value fits into the range from nine to eleven, the participant is classified as purely a single style learner and would struggle and suffer in the learning environment featured by another style of the dichotomous pair.

This questionnaire, used in the present study, has been installed on the World Wide Web since 1996. The instrument has been translated into Spanish, Portuguese, Italian, German and several other languages and later researchers have testified to the validity and reliability of the instrument (Cook, 2005; Cook & Smith, 2006; Felder & Spurlin, 2005; Litzinger, Lee, Wise, & Felder, 2005; Zywno, 2003). Test-retest correlation coefficients for the four learning style dimensions ranged from 0.7 to 0.9 for one month interval and from 0.5 to 0.8 for seven and eight months interval. Cronbach alpha coefficients were all greater than the criterion value 0.5 for attitude survey test.
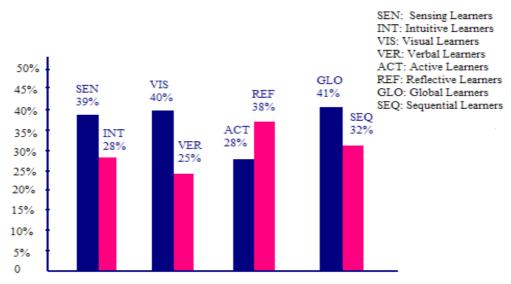
FINDINGS AND DISCUSSIONS

Preference Percentage Difference

Participants were asked to voluntarily take part in the survey and fill out the Index of Learning Styles questionnaire according to their usual practice. They were told to seek help from the researcher in case they had problems with understanding the wording of the questions. It took the participants an average of around 50 minutes to complete the questionnaire.

Figure1 shows that the percentages of participants displaying mild preference to Sensing-Intuitive, Visual-Verbal, Active-Reflective, Global-Sequential, the four groups of dichotomous learning style dimensions, were 67 per cent (39% to Sensing learning style, 28% to Intuitive learning style), 65 per cent (40% to Visual learning style, 25% to Verbal learning style), 66 per cent (28% to Active learning style, 38% to Reflective learning style) and 73 per cent (41% to Global learning style, 32% to Sequential learning style), respectively.

Among the participants who were identified as having mild preference to these learning styles, a large number of them (41%) displayed mild preference to Global learning style, Visual learning style (40 %) and to Sensing learning style (39%).

Figure 1. Mild Preference Percentage

In Figure 2, moderate preferences to the four groups of learning style dimensions were 30 per cent (18% to Sensing learning style, 12% to Intuitive learning style) for Sensing-Intuitive learners, 27 per cent (22% to Visual learning style, 5% to Verbal learning style) for Visual-Verbal learners, 29 per cent (12% to Active learning style, 17% to Reflective learning style) for Active-Reflective learners and 25 per cent (20% to Global learning style, 5% to Sequential learning style) for Global- Sequential learners, respectively.
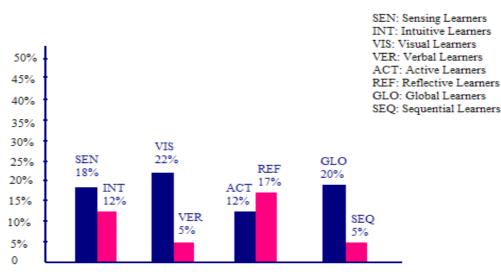
Figure 2. Moderate Preference Percentage

Figure 3 shows the percentages of participants displaying strong preference to the four groups of dichotomous learning style dimensions as 3 per cent (2% to Sensing learning style, 1% to Intuitive learning style) for Sensing-Intuitive learners, 8 per cent for Visual learners, 5 per cent (2% to Active learning style, 3% to Reflective learning style) for Active-Reflective learners and 2 per cent for Sequential learners. No learners were identified as having strong preference to Verbal and Global learning styles.
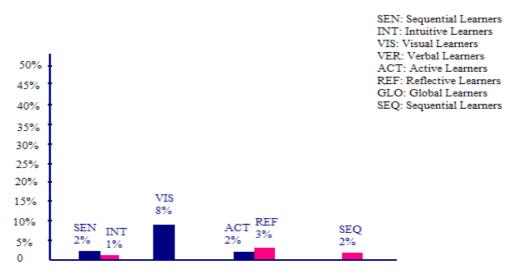

Figure 3. Strong Preference Percentage

As is indicated by the above three figures, mild preference percentages to the four dimensions of learning styles represent the majority of the participants. A large number of the students shared mild preference to the four dimensions of learning styles with a significant 41 per cent, 40 per cent and 39 per cent showing mild preferences to Global, Visual and Sensing learning styles, which indicates that this portion of the participants cannot be strictly classified as having preference for a single learning style; they shared a great variety of learning style preferences and were well balanced in the environment featuring both styles of a dimension.

Figure3 shows that the number of participants displaying strong preference for Visual learning style occupied the highest 8 per cent; students showing strong preferences to Intuitive, Active, Reflective and Sequential learning styles occupied 1 per cent, 2 per cent, 3 per cent and 2 per cent, respectively. None of the participants showed strong preference for Verbal and Global learning styles. The finding that only a small number of participants showed strong preference to

Intuitive, Active, Reflective and Sequential learning styles suggested that these participants would find it hard to fit into a learning environment that has an emphasis on Intuitive, Active, Reflective and Sequential learning styles. In other words, they were comfortable only with one learning style pole of a dimension and could achieve optimal learning results if only the opposite learning environment is provided.

Preference Difference across Subject Majors

Because research conducted recently found that learners' learning style preference differs across majors (Felder & Silverman, 1988; Litzinger, Lee, Wise & Felder, 2005) and many English as a Foreign Language learners in Chinese universities, including the participants in this study, take English classes together with their peers from other majors, the present study performed a learning style analysis with the participants being divided into different major groups. As data in this study were skewed and sample sizes from different majors were unequal, the most appropriate statistical test was the nonparametric Mann-Whitney test and $p < 0.05$ was considered statistically significant (Dancey & Reidy, 2004). The pooled standard deviation *"d"* (Rosnow & Rosenthal, 1996) indicating effect size was also employed to show, in each paired comparison, the degree of non-overlap for the two comparing majors score distributions (Cohen, 1988). To compute scores, answers categorised as favouring Sensing, Visual, Active and Sequential learning styles were assigned value 1 and answers categorised as favouring Intuitive, Verbal, Reflective and Global learning styles were assigned value 2. Statistics in Table 1 show that statistically significant differences in learning style preference across majors were found to be in Sensing-Intuitive ($p=0.002$) and Visual-Verbal ($p < 0.0005$) learning style dimensions.

Table 1. Test Statistics (Kruskal Wallis Test, Grouping Variable: Major_2)

	Sensing-Intuitive	Visual-Verbal	Active-Reflective	Global-Sequential
Chi-Square	22.275	26.674	13.490	9.498
Df	7	7	7	7
Asymp. Sig.	0.002	0.000	0.061	0.219

With respect to preference difference in the Sensing-Intuitive learning style dimension, as is shown in Table 2, separate paired analyses showed that participants majoring in Architecture differed significantly from those majoring in Engineering Material with a large effect size ($p=0.003$, $d=0.84$), Engineering Topography with a medium effect size ($p=0.021$, $d=0.52$), Environmental Engineering with a medium effect size ($p=0.028$, $d=0.39$), Environmental Art with a medium effect size ($p=0.024$, $d=0.47$), Mathematics with a medium effect size ($p=0.047$, $d=0.49$) and significantly from those majoring in Civil Engineering with a large effect size ($p < 0.0005$, $d=0.87$) and Engineering Equipment with a large effect size ($p < 0.0005$, $d=0.82$). Architecture students, as shown by the figures, tended to be more Intuitive learners in each paired comparison. Table 2 showed the mean ranks for Architecture students ranged from the lowest 21.35 compared to Environmental Engineering students to the highest 37.59 compared to Civil Engineering students; The mean ranks of the comparing majors range from the lowest 11.32 for Engineering Material students to the highest 21.08 for Environmental Art students.

Table 2.   Mann-Whitney Test Mean rank and effect size comparison across majors for Sensing-Intuitive learning style

Major Pair:	Architecture with	N	Mean Rank	Effect Size	Asymp.Sig. (2-tailed)
Sensing--	—Civil Engineering	27/29	37.59 – 20.03	0.87	0.000
Intuitive	—Engineering Equipment	27/22	31.39 – 17.16	0.82	0.000
	—Engineering Material	27/11	22.83 -- 11.32	0.84	0.003
	—Engineering Topography	27/13	23.43 – 14.42	0.52	0.021
	—Environmental Engineering	27/10	21.35 – 12.65	0.39	0.028
	—Environmental Art	27/24	30.37 – 21.08	0.47	0.024
	—Mathematics	27/16	24.89 – 17.13	0.49	0.047

Based on the above figures, a conclusion can be drawn that Architecture participants in this study, on the whole, tended to favour the Intuitive learning style more than any other majors.

With respect to preference difference to Visual-Verbal learning style dimension, as is shown in Figure 3, separate paired analyses suggested that participants majoring in Environmental Art differed significantly from those majoring in Engineering Material with a large effect size ($p=0.036$, $d=0.62$), Engineering Topography with a large effect size ($p=0.003$, $d=0.68$), Environmental Engineering also with a large effect size ($p=0.006$, $d=0.86$), Engineering Equipment with a medium effect size ($p=0.005$, $d=0.56$) and very significantly from those majoring in Architecture ($p=0.001$, $d=0.75$), Mathematics ($p<0.0005$, $d=1.07$) and Civil Engineering ($p<0.0005$, $d=0.94$) with large effect size in each case. Environmental Art students tended to be more Verbal learners in each paired comparison.

As shown in Table 3, the mean ranks for Environmental Art students ranged from the lowest 20.46 and Engineering Material students to the highest 36.65 when compared with Civil Engineering students.

Table 3.   Mann-Whitney Test mean rank and effect size comparison across majors for Visual-Verbal learning style

Major pair: Environmental Art with	N	Mean Rank	Effect Size	Asymp.Sig. (2-tailed)
Visual —Engineering Material	24/11	20.46 – 12.64	0.62	0.036
-- —Engineering Topography	24/13	22.77 – 12.04	0.68	0.003
Verbal —Environmental Engineering	24/10	20.46 – 10.40	0.86	0.006
—Engineering Equipment	24/22	28.75 – 17.77	0.56	0.005
—Architecture	24/27	33.50 – 19.33	0.75	0.001
—Mathematics	24/16	26.42 – 11.63	1.07	0.000
—Civil Engineering	24/29	36.65 –19.02	0.94	0.000

The finding that, when compared with Environmental Engineering students, Environmental Art students turned out to favour Verbal learning style more than other majors did not go with the author's expectation that these students should be more habitually Visual Learners. The author suspected that the result could be attributed to the fact that two thirds of them were females.

Engineering Topography students also differed significantly from Civil Engineering students with a medium effect size ($p=0.046$, $d=0.51$) and Mathematics students again with a medium effect size ($p=0.045$, $d=0.61$) in their preference for Visual-Verbal learning style dimension. According to the Mean Rank comparison, Engineering Topography students were found to be more Verbal Learners than Civil Engineering students and Mathematics students.

Preference Difference between Gender

An Independent Samples T-Test did not show any significant difference between gender. However, the author suspected that there might be gender difference within each major. A recent study found that female engineering students were more sequential, more sensing and less visual than male engineering students (Litzinger et al., 2005).

PEDAGOGICAL IMPLICATIONS

Findings from the study indicate that the participants did vary in their preference for particular learning styles. A great variety of learning style preferences were distributed unevenly among the sample population with Global, Visual, and Sensing learning styles mildly preferred by a large number of them.

The varied and uneven distribution of learning styles among learners implies that, as English as a Foreign Language teachers in Chinese Universities, it is important to be aware of the feature of learning style preference among learners and to respond flexibly by employing a broad range of teaching strategies to better reach students of different learning preferences. The optimal

condition is that teachers can help students acquire the ability to use their less preferred style modalities when appropriate and make those learners with strong preference to certain learning styles move toward a position of greater balance (Felder & Spurlin, 2005).

Teachers cannot expect to become all things to all students, however they can increase their ability to appreciate and understand learners' varied needs. Unfortunately, most Chinese English as a Foreign Language teachers show consistently favourable attitudes towards teacher-directed classroom activities in their teaching and they seldom develop a sense of appreciating and understanding learners' needs, which results in students' boredom and undermines their potentiality for achievement in learning.

To improve the situation, teachers can assign different tasks to different groups of students identified as sharing similar learning styles, that is style-alike groups, or provide classroom activities that cater for the learning style preference favoured by the majority of the learners. For example, for the sample population in this study, with a large number showing mild preference for Global, Visual and Sensing learning styles, the teacher can maximise his or her teaching efficiency by guiding learners through phases of guessing at words and searching for holistic understanding of the main ideas; presenting multi-media materials; and presenting knowledge in the way that learners can see how it connects to their prior knowledge or reflects the real world (Felder & Henriques, 1995). Because individual's instructional preferences are at the outermost layer of the "onion" model and are the dimensions that are most likely to be modified (Curry, 1983), teachers can encourage changes in learners' behaviour and foster guided style-stretching in a slow and consistent manner. For example, sequential learners can benefit from consistent activities that involve global understanding.

The possible limitation of this study lies in that the learning style preference tendencies identified for the sample population may not be applicable to English as a Foreign Language learners of other Chinese universities.

To conclude, a better understanding for English as a Foreign Language learning and teaching in Chinese universities is that different learners need different things. Teachers can appreciate and tolerate differences and maximise learners' potentiality by varying teaching strategies to cater for learners' preferences for different learning styles.

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