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Group Differences in Learning between Students and Employees

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Abstract. Our research focuses on learning styles and experiences and preferences for learning method and media in the Chinese cultural context. Based on 302 questionnaires collected from three group—Employees, graduate students, and undergraduate students, we found that the dominant Chinese learning style is "Diverging" and then "Assimilating", based on Kolb's (1984) theory of learning styles. Learning style is stable across different demographic groups in our sample, including gender, occupation, major, and educational experience. We also found that there was a higher level of consistency between frequency and preference for learning media and methods in employee group than for graduate student group and for undergraduate student group. Cross-group comparison showed that there is little difference in preference for learning method and media across three groups; however, in terms of experiences (i.e., frequency of use), there is a higher degree of differences across the three groups, with employees reporting a wider range and more frequent use in general. Possible explanations will be discussed.

Key word: learning style, learning method, learning media, Chinese culture, employee, student

Abstrak. Penelitian kami terfokus pada gaya belajar dan pengalaman serta pilihan metode dan media belajar dalam konteks budaya China. Berdasarkan 302 kuesioner yang dikumpulkan dari 3 kelompok—karyawan, mahasiswa S-2, dan mahasiswa S-1, kami menemukan bahwa berdasarkan teori Kolb (1984) gaya belajar China yang dominan adalah "menyimpang" dan kemudian "mengasimilasi." Gaya belajar pada sampel kami cukup stabil lintas kelompok demografik yang berbeda, termasuk gender, pekerjaan, pilihan utama (*major*) dan pengalaman pendidikan. Kami juga menemukan adanya tingkat konsistensi yang tinggi antara frekuensi dan pilihan media dan metode belajar pada kelompok pekerja daripada pada kelompok mahasiswa S-2 dan S-1. Perbandingan lintas-kelompok menunjukkan bahwa terdapat sedikit perbedaan dalam pilihan metode dan media belajar lintas ketiga kelompok tersebut; namun, dalam kaitan pengalaman (misalnya frekuensi penggunaan), terdapat derajat perbedaan yang lebih tinggi lintas ketiga kelompok, yaitu para pekerja melaporkan rentang yang lebih lebar dan secara umum lebih sering menggunakan metode dan media. Dibahas berbagai kemungkinan penjelasannya.

Kata kunci: gaya belajar, metode belajar, budaya China, pekerja, mahasiswa

As China becomes the world's "new lab," more and more multinational companies have started building their research and development hubs in China. According to the statistics of Business Bureau of China last year there were, more than 750 R&D centers have been established in China by multinational companies, a drastic change from a little more than 100 in 2000. As these R&D centers grow at a fast-moving pace, there are also increasingly higher expectations for R&D employees' high level technical skills. This demand pressures the training units within these multinational companies, and they find themselves facing the challenge of effectively and efficiently changing their employees into competent performers in a short period of time. Part of the challenge is rooted in the unique cultural context of China. Hofstede (1997) argued that a country's culture shapes its peoples' preferred modes of learning through their socialization experiences.

More recently, De Vita (2001) suggests that there is little room for doubt about cultural effects upon the development of learning styles. The current research is therefore situated in such a context where the Chinese learner's unique characteristics are being investigated. Specifically, we first explore the

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learning styles, experiences, and preferences of the Chinese learner. Secondly, we examine the influence of learning styles, educational background and work experience on learning experiences and preferences. Our research draws on Sadler-Smith's (1999) model that proposes that individual learning strategies (in Sadler-Smith's model, learning styles fall under "learning strategies") are influenced by the combinatory forces of external (the learning environment) and internal (cognitive styles, personality, gender, and nurture) worlds.

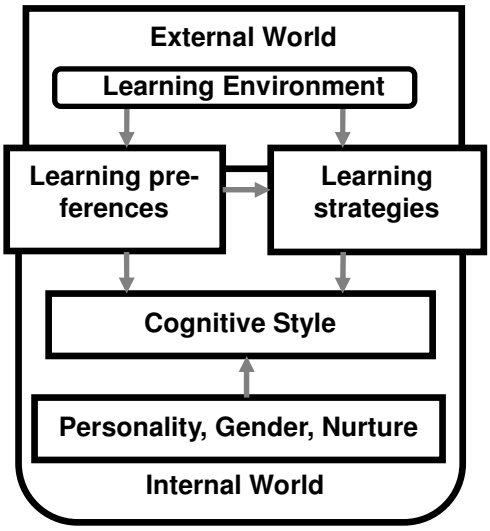

Figure 1. Simplified Sadler-Smith's (1999) learning model

Learning and Learning Styles

Taking an empiricist perspective, Kolb (1984) placed experience at the heart of learning. The learner is the central processor in the system, and his/her mental activities result in "modification" and "new experience." The spiral nature of learning determines that it is an adaptive process for the individual. In our research, we are particularly interested in these educational and training episodes that can be seen as "intended learning." That is, we are interested in learning as purposeful behavior, and individuals have the volition in choosing the motivation and effort exerted.

Cassidy (2004) defined learning style as "the preferred way in which an individual approaches a task or learning situation–their learning/cognitive style or approach or strategy." In our research, we used Kolb's (1984) model of learning styles. We chose Kolb's model for two reasons. First, Kolb's model reflects the totality of human activities: feeling, reflecting, thinking, and doing (Kolb).

Secondly, it has received special attention in the cross-cultural research (Hoppe, 1990). In Kolb's model, a person possesses each of four learning abilities: concrete experience (CE), abstract conceptualization (AC), reflective observation (RO), and active experimentation (AE). The CE abilities direct one to be sensitive to others' feelings and values. Those with the CE abilities tend to give importance to interpersonal relationships and are open-minded in relating to others. The opposite of CE is the AC abilities, which is closely related to applying abstract logic and ideas. People with the AC abilities tend to be good at thinking, analy- zing, and building conceptual models.

The RO abilities are closely related to reflecting on the basis of carefully listening and watching others. People with the RO abilities are good at perspective-taking and understanding the meaning of situations from different points of view. Finally, the opposite of RO is the AE abilities, which direct people to actively influence and change other people and situations. Those with the AE abilities strive to take responsibility, achieve results, and take actions and risks.

These four abilities form two bipolar dimensions orthogonal to each other. Four different learning styles emerge from combinations of these abilities (see Appendix). Accommodating style combines the CE and AE abilities, whereas Assimilating style combines RO and AC abilities. Along the other dimension, Diverging style combines CE and RO abilities, whereas Converging style combines the AE and AC abilities.

Studying learning styles in relation to culture is not new. Hofstede (1997) defined culture as a kind of collective mental programming. It is not surprising the individuals may subconsciously adopt different approaches to learning and these approaches may in some ways show patterns consistent with their cultural backgrounds. A most comprehensive, descriptive report on the relationships between culture and learning style comes from Yamazaki (2005), who

generated and tested 6 propositions regarding the relationship between cultural characteristics and learning styles (see Figure 2). Empirical results reviewed by Yamazaki showed some support for these propositions. Specifically, concerning comparison between Chinese and American cultures, Chinese samples showed a higher percentage of Diverging learning styles (CE & RO) as compared to American samples (Fridland, 2002). Furthermore, results from Auyeung and Sands' (1996) study showed that their Hong Kong and Taiwan samples emerged as "Assimilators" (RO & AC), which could be partially accounted for an emphasis on mathematics and Confucian teaching that encourage abstract thinking.

Therefore, there is evidence that Chinese cul-ture has characteristics that are associated with specific learning styles (Diverging and Assimilating). Our research seeks to replicate previous research in a wider range of samples that include full-time corporate employees. We will also seek to examine the stability of learning styles in different demographic groups.

Instructional/learning Methods and Media

Instructional methods are ways that instruction is presented to students. There are various typologies of instructional methods, depending on the variables by which categorization takes place. Smaldino, Russel, Heinich, and Molenda (2004) put instructional methods in two general categories: The teacher-centered approach, where the teacher defines the teaching materials and presents the information to the students, and student-centered approach, where the students construct their own understanding with teachers' facilitation. Hokanson and Hooper (2000) describe learning experiences in five progressive levels: Reception, application, extension, generation, and challenge. They described each level to be "better" than the level before in terms of giving students ideal learning experiences.

For our research, in order to understand what instructional methods Chinese learners use and prefer to use, we searched the literature and identified 20 specific methods. For the purpose of our research, we identify more with Sadler-Smith's (1999) model which focuses on the level of dependence in learning and categorize methods into dependent, interactive, and independent. In this model, students become progressively more self-reliant, and a teacher's role is gradually replaced by interactive ties among students and then finally by independently initiated activities by students. We identify with this model more because research has shown that Chinese classrooms tend to be teacher-centered and students tend to take less initiative in their own learning (Watkin & Biggs, !996).Based on these general observations, we are interested in understanding the extent to which Chinese students prefer and use the methods that allow different levels of dependence.

An instructional medium is a means of communication and source of information with instructional purpose. Similar with instructional methods, there are different ways to categorize instructional media. A basic typology proposed by Smaldino, Russel, Heinich, and Molenda describes six types of media, including text, audio, visuals, motion media, manipulative, and people. Text is the most common form of media; textbooks belong to this category. Audio includes all kind of sound coming from cassette tapes, CD, or other channels. Visuals include still pictures presented on different types of vehicles. Motion media typically include film, videotape, and animation. Manipulative refer to three-dimensional objects that can be touched by students. The last category, people, describes teachers, students, or the other types of experts that learners can interact with.

A more comprehensive typology proposed by Tsai (2000) presents 14 variables based on which media can be categorized, and these 14 variables are (1) the size of the audience, (2) location, (3) synchronicity, (4) the form of information display, (5) the potential for future information extension, (6) the potential for information updating, (7) content structure, (8) content flexibility, (9) interactivity with instructional content or with "virtual" instructor in the media, (10) interactivity with other learners, (11) production cost, (12) cost of use, (13) teacher's training, and (14) student's training. For the purpose of our research, we identified 25 types of media from the literature and we are primarily interested in the form in which information is displayed/channeled through these media. We also consider the "new" and "traditional" dimensions of

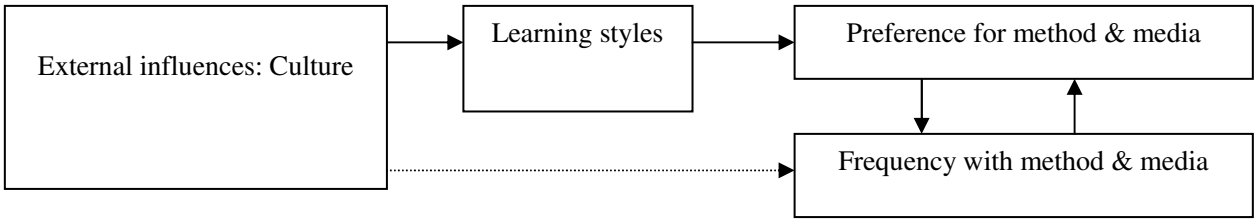

Figure 2. Research model and three main hypotheses

media. New media are those that emerged with more recent technologies, such as internet, iPod, and online space, etc. Traditional media, on the hand, relies less on new technology and more on materials or information channel that have been widely used in time.

Experiences vs. Preference

Curry's (1987) "onion ring" model depicts three "layers" of individual differences—cognitive personality style, information processing style, and instructional preferences. According to this model, although an individual's innate tendencies are less malleable; their instructional preferences are likely to be modified with intervention. These interventions may come from both without and within—instructors' choices as well as learners' own choices of methods and media. Therefore, a learner's manifested preference for a particular learning method or medium may be a result of both the interventions by the instructor or the training designer (i.e., how frequently a method or medium is used) and of his/her own innate tendencies, such as learning styles (Kolb, 1984).

One factor to consider here is the freedom in a learner's choice. Freedom in choice in general may restrict the manifestation of a learner's innate traits. Institutionalized learning imposes certain methods and media for instructional purposes based on a variety of factors, including content of learning, size of the audience, cost and ease of implementation, and of course, some degree of consideration of the learners' characteristics. Once beyond the formal education stage, a learner may find him/herself in a position where learning is largely self-initiated and self-structured, and therefore also gains more freedom in his/her choices. Therefore, it is not surprising that a learner with more freedom will choose according to his/her own innate tendencies. As a result, individuals' experience with and preference for instructional methods and media may be more closely associated in a more flexible context and less so in a more structured context.

Integration and Hypotheses

Based on our discussions above, we propose the following research model and three main hypotheses (see figure 2). (1) The Chinese learner will predominantly show Diverging and Assimilating style. Learning style will be stable across different demographic groups, including gender, major, occupation, and people of different levels of work experiences; (2) Correlation between preference for and frequency of use of methods & media: There will be highest level of correlation between frequency and preference in employees, medium level in postgraduate students, and lowest level in undergraduate students; (3) Comparison across groups: (a) The preference for learning method and media will tend to be more similar across three groups: Undergraduate students, graduate students, and employees; (b) The experience for learning method and media will be greater significantly different across the three groups;

Method

The respondents were randomly selected in company in Shanghai, Chendu, Dalian and Hangzhou. For students' part, they are from Zhejiang University, Sichun University and Dalian Marine Military College. Altogether the number of valid questionnaire is 302, including 103 employees, 114 graduate

students and 85 undergraduate students. There were 117 females and 184 males. Their average age is 24.71.

Questionnaire

The questionnaire consists of four parts. The first part is about demographic information, including gender, age and highest education level, major, occupation, etc. The second part is Learning Style Inventory. This inventory was invented to examine differences in individual learning styles conceptualized in Kolb's learning theory. The LSI employs a forced-choice method by which to measure an individual learning orientation toward four learning abilities: the CE, the AC, the RO, and the AE. The LSI is composed of 12 questions, each of which asks persons to complete a sentence by ranking four choices that correspond to the four learning abilities. The third part is about Experiences and Preferences for learning media which is developed from literature review. The fourth part is about Experiences and Preferences for learning media. The develop ment procedure is the same with the third part.

Results

Learning Styles

We use the measures of the Learning Style Inventory Cluster Analysis to calculate the Learning Style of participants to find that in agreement with our hypothesis the dominating learning style types are diverging (30.5%) and assimilating (26.8%) (see Table 1). The Chi-Square analysis shows that the difference of the number of people with different learning style is significant ($p< 0.01$)

The chi-square analysis shows that the differ-ence between the four learning style is significant ($p< 0.001$, dF=3). What is more, we also check the group difference in learning style and the group here is employee group, graduate group and undergraduate group. After One-Way ANOVA, the result demonstrated that no significant difference exists among the three groups ($p> 0.05$), that is, learning style is a stable "trait" which shows little change in Chinese learners. Using Crosstabs and chi-square to check the influence of gender on learning style, we still find the stability of learning style even among different genders ($p>0.05$)

Experience vs. Preference: Relationship between Frequency & Reference

From our results, in the learning method part, the most preferred methods are: Case study (M= 5.70), Conducting experiment (M= 5.32), Field observation (M= 5.30), cooperative learning (M= 5.11), and onsite simulation (M= 5.08). The most frequently used methods are Explicit teaching (M= 5.69), Writing essays & report (M= 4.48), Computer-assisted learning (M= 4.44), Demonstration (M= 4.39), and Case study (M= 4.38). In the learning media part, the most preferred media are Real objects (M= 5.47), Website (M= 5.26), Books other than textbooks (M= 5.05), Computer software (M= 5.05), and Audiotape, CD, & MP3 (M= 5.05). The most frequently used media are Textbooks (M= 5.93), Slides (M= 5.06), Website (M= 4.81), Books other than textbooks (M= 4.81), and Chalk/Whiteboard (M= 4.74).

Then we calculated the correlations between preference for and frequency of use of methods and media respectively. A clear pattern shows that postgraduates and employees tend to have greater positive correlations between preference and frequency for methods & media. Undergraduates, on the other hand, show much lower correlations overall and no significant positive correlations for methods. This shows that preference and experiences are less consistent for undergraduates than as for other groups. This may be an indication that undergraduates have less freedom in choosing what they actually prefer, and are often using methods that are chosen by the instructors.

Cross-group Comparison of Preference and Frequency

In general, for both media and methods, more items show significant cross-group differences in frequency of use than in preference. That is, groups

differ more in the frequency with which they use a particular method or medium, but their preferences differ less on these items.

As for learning method, methods considered more traditional, such as explicit teaching, demonstration, and drill & practice, three groups do not differ significantly in terms of their preference. For methods considered interactive and example-based, that is, cooperative learning (F= 4.13, p< 0.05), case study (F= 7.90, p< 0.01), learning by teaching others (F= 4.29, p< 0.05), and tutorial (F= 4.68, p<0.05), two or all three groups showed significant differences in preferences. More specifically, employee groups uniformly reported greater preference than undergraduate students. Details of the results are presented in Table 2.

In terms of frequency for learning methods, employees reported significantly more frequent use than postgraduate and undergraduate students of most of the methods listed with the exception of four methods: Computer-assisted learning (F= 1.19, p> 0.05), cooperative learning (F= 2.97, p>0.05), conducting experiments (F= 0.82, p> 0.05), and writing essays and reports (F= 2.57, p> 0.05). One more exception is with explicit teaching (F= 6.26, p< 0.01), where undergraduate (M= 5.81) and postgraduate students (M= 5.98) reported significantly more frequent use than employees (M= 5.28). These results may show that employees tend to have a wider range of available learning methods. With the exception of explicit teaching, it may be the fact that undergraduate and graduate in China still use the most traditional Chinese learning method and do not have so many options.

As for learning media, most of the learning media did not show significant difference in terms of preferences. Only five items considered more Internet or technology based showed lower preferences for undergraduate students than for graduate students and employees, and these items are: blog (F= 4.29, p< 0.05), email (F= 4.44, p< 0.05), podcast (F= 4.82, p< 0.01), slides (F= 4.82, p<0 .01), and shared online space (F= 7.99, p<0 .01). One exception is that picture/drawing/graphs also showed significant differences among three groups (F= 7.88, p< 0.01). Details of the results are presented in Table 3.

In terms of frequency for learning media, three groups reported similar level of use in audio tape/CD/MP3 (F= 1.60, p>0 .10), broadcast radio (F= 0.43, p>0 .10), chalkboard & whiteboard (F= 0.79, p> 0.10), chat room (F= 2.38, p> 0.05), computer software (F= 0.55, p> 0.10), forum/BBS (F= 2.14, p> 0.10), other books (F= 2.83, p>0 .05), PPT/slides (F= 0.08, p>0.10), and shared online space (F= 1.85, p>0.10). With most other media, employees reported significantly greater use than student groups, or at least the undergraduate student group. The only exception is textbooks (F= 7.90, p<0.01), where undergraduate (M= 6.01) and postgraduate students (M= 6.29) reported significantly greater use than employees (M= 5.50). This could also be interpreted as greater availability in employees' choice of learning media, whereas textbooks is the most common form of medium used in the formal school setting.

Discussion

Learning Style and Culture

The questionnaire results showed that the dominating Chinese learning style is diverging and assimilating, which is significantly higher than the others and diverging as the most widely used. Combined with literature review above, it is easy to understand why Chinese learning style is dominated by diverging and assimilating. Diverging reflects RO and CE learning abilities, which are mostly consistent with the characteristics of Chinese culture.

Besides, we also find that learning style is relatively stable in Chinese context, as learning style is not influenced by demographic groups, including gender, major, occupation, and people of different levels of work experiences. It may demonstrate a possibility that culture is a big factor that influences the learning styles. Learning style is a trait that would develop with a person's growth, during which social context or culture has a great impact. Thus we could observe a general learning style mode in a culture but we could not see significant difference within different demographic frames.

Experience vs. Preference: Relationship between Frequency & Preference

From the result about experience and prefe-rence, we could find that employees exhibit the most positive correlation between experience and preference while the undergraduate students exhibit the fewest.

The factor we would discuss here is the free-dom of choice. As we have mentioned above, in China, the formal education is still a teacher-oriented process. The teachers decide which methods and medium to use for students to learn. They are more or less ignorant of the characteristics of the learners and usually adopt the same and uniform methods and medium. But the restriction of choice concerning learning will disappear to some degree once beyond the formal education stage. In this sense, employee group have more freedom to choose than undergraduate student, which is true according to our result and the postgraduate student is in the middle of the two. From the results of group comparison, we could conclude that undergraduate have fewer choice to use than employees. In most of the items of learning method and media, there is significant difference among the three groups. The employees report all greater score than under and post graduate students except in textbooks of media and explicit teaching of method which undergraduate students report the most frequently used. These data shows the fact that under-graduate does have less choice regarding learning than employees.

Cross-group Comparison of Preference and Frequency

Our results show that the preference for learning method and media tends to be more similar across three groups, that is, undergraduate students, graduate students, and employees, while the frequency for learning method and media is significantly different across the three groups. The result is consistent with Hypothesis 3.

Undergraduate students tend to perform consistent preference, as they could not exhibit more individual characteristics in the more restricted and constructed learning environment, which is confirmed by our results. As employees have more freedom, it is not surprising that a learner with more freedom will choose according to his/her own innate tendencies and it is reasonable for them to perform more positive correlation than undergraduate students. As a result, individuals' experience with and preference for instructional methods and media may be more closely associated in a more flexible context and less so in a more structured context.

Limitations

Our results did not show clearly a pattern that which kind of learning media or method that the three groups will prefer. We can find that employee show some preference for interactive methods significantly. It makes sense, for employees may have more opportunity to practice interactive methods and find it more convenient and proficient. But they did not show such tendency for all active methods. The problem here is that the employees prefer more some interactive methods but not all. The same problem occurs for learning media. Employees prefer Internet-based learning media but not all.

The reason may be the items we used in the questionnaire are not so classified that we could get a uniform pattern. Some items overlap with others. What is more, it may also be the problem of the understanding of some words or some people who have not use some method or media just give a random rating to the item. The possibility here is to revise the questionnaire for further investigation.

Conclusion

The Chinese learners predominantly show Diverging and Assimilating style. Learning style is relatively stable across different demographic groups, including gender, major, occupation, and people of different levels of work experiences;

Correlation between preference for and frequency of use of methods & media: There is highest level of correlation between frequency and preference in employees, medium level in post-graduate students, and lowest level in undergraduate students.

Among the three groups, undergraduate students, graduate students and employees, there are greater

significant difference in experience for learning media and method than preference.

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Appendix

Kolb's Model: Learning Styles and Learning Abilities