

Comparing Chinese International and American-born Graduate Students' Beliefs about Teaching and Learning

Fangxia Zhao, Ed. D

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Abstract: This study examined the educational beliefs about teaching and learning of Chinese international and American-born graduate students in the disciplines of pure and applied sciences and mathematics at Auburn University by comparing their similarities and differences. The study reported (a) participants' demographic characteristics, (b) the dominant beliefs about teaching and learning of the two groups, (c) the two groups' educational beliefs about teaching and learning. One hundred and fifty-three graduate students who were in pure and applied sciences and mathematics participated in the study. There were 54 Chinese international students, and 99 American-born graduate students. Results indicated there were more similarities in beliefs about teaching and learning between Chinese international and American-born graduate students in the disciplines of pure and applied sciences and mathematics than differences. This study provided a new dimension in cross-cultural comparative investigation.

Key words: cross-cultural comparison, curriculum, teaching, learning, higher education

1 Introduction

More and more students from China have come to the universities and colleges of the United States for their academic degrees since China's Open Door policy in 1980s. According to the annual data reported from the Institute of International Education (2003, 2004, and 2005), Chinese overseas students have been the second largest international student body next to India international students in the US since the beginning of the 21 century. The question of how best to understand the beliefs about teaching and learning those Chinese international graduate students and their American peers bring to class has been an issue in the last twenty years. Researchers, however, have focused on characteristics that highlight Chinese students' uniqueness. These researchers have promulgated the image that Chinese students adhere to the concepts of collectivism, interpersonal harmony, interdependence, cooperation, conformity and self-sacrifice for the good of the greater society (Kim & Markus, 1999; Markus & Kitayama, 1991; Moy, 1992; Wang, 2001), while American students are considered to be individualism, independence, personal achievement and self-advancement as equally important to any contribution they may make to their field of study or to society (Kodama, et al, 2002; Krumm, 1988; Hofstede, 1980).

It may be true to some extent that students are greatly influenced by their own culture. According to Ruben's open systems theory (Ruben, 1972), however, a human being is not a "static package of more or less stable internal structure," but "a dynamic and self-reflective system" that continually renews itself through interaction with the environment (Kim, 2001, p. 35). Additionally, global economic development and cooperation, scientific and technological research and exchange, along with the development and utilization of computer networks, have connected people from all over the world as they migrate from one location to another and work together to overcome scientific and technological problems. Today, China is an integral part of the global community through international trade, technology, industrial and other economic ventures, and through collaborative research.

When one considers the realities of Chinese social economic reform and innovation, social transformation, which includes alignment of China with the developed countries' social, economic, technological and cultural track, and when one utilizes a constructivist theory of culture learning and a theory of dynamic cross-cultural adaptation, it becomes apparent that there may not be such a great divide between Chinese and American graduate students as has been stated by earlier researchers. One way to assess the similarity and difference between these two groups is to examine the educational beliefs about learning and teaching of Chinese and American graduate students attending American universities.

Several studies have looked at the effect of culture on students' belief systems, which in turn might have influenced the students' perceptions of and beliefs about knowledge and learning. Schommer (1997) reported that students' beliefs about the nature of knowledge and learning were related to academic achievement. King and Kitchener (1994) pointed out that students'

epistemological beliefs were also related to reflective judgment. Solano-Flores and Nelson-Barber (2000) asserted that students' personal experiences and beliefs about the nature of knowledge, rather than formal instruction, influenced students' learning in science and mathematics.

In order to ascertain whether the differences between American and Chinese cultural backgrounds are so deep as to result in differences in educational beliefs, this study examined Chinese international and America-born graduate students' educational beliefs about teaching and learning. The study was based on Jurgen Habermas' philosophical thought about knowledge and human interests (Habermas, 1971) as interpreted by Mezirow (1981) and Shirley Grundy (1987).

This study utilized Stephen Butler's Cognitive Interest Inventory (Butler, 1997), which was based on the model of educational beliefs about teaching and learning described above, to examine whether or not a difference existed between Chinese and American students' educational beliefs about teaching and learning. This instrument allowed categorization of respondents' self-reported preferences as technical, practical, or emancipatory. Since Chinese international and American graduate students study as a mixed cultural group at American universities, it is possible to study similarities and differences between the two groups. While their present experiences are similar, we can assume that these groups have been influenced by their different cultural and political experiences. In order to determine to what degree Chinese and American graduate students are similar or different in regards to their educational beliefs about teaching and learning, an exploratory study needed to be performed. There is no previous research comparing the educational beliefs of Chinese students attending American graduate school to those of their American counterparts. Such a comparison served as the focal point for this study.

Based on problem statement of the study, two research questions were conducted:

1. What were the dominant beliefs about teaching and learning of Chinese international and American-born graduate students in the disciplines of pure and applied sciences and mathematics at Auburn University?
2. Were there any statistically significant differences in beliefs about teaching and learning between Chinese international and American-born graduate students in the disciplines of pure and applied sciences and mathematics at Auburn University?

2 Habermas's three categories of human interests

For Jürgen Habermas (1971), learning takes place in relationship to people's specific interests in the technical, the practical, and the emancipatory in which knowledge is constituted. These knowledge and cognitive interests inform social organization through "work, language, and power" (Habermas, 1971, p. 313) and "together, create a unified whole" (McLeod, 2001). Each of these interests is constitutive and initiates a certain way of knowing because each "mediate[s] the natural history of the human species with the logic of the self-formative process" (Habermas, 1971, p. 196). Each also has its own "function of the objectively constituted problems of the preservation of life that have been solved by cultural form of existence as such" (p. 196). As Kimpston, Williams, and Stockton (1992) stated, "each perspective has its own integrity and logic, and each successive perspective respects that integrity within a broader formulation of what it means to know" (p. 170). The technical interest concentrates on skills and performance. The practical interest supports hermeneutic interpretations and shared understanding. The emancipatory interest generates critical and reflective thought and action aimed toward enabling empowerment and autonomy. In addition, each of these interests has its own beliefs and epistemology, or ways of knowing.

Terms for the technical interest include, empirical analytical science paradigm (Schubert, 1986), scientific-technical interest, instrumental learning (Mezirow, 1991), instructional action, and work (Habermas, 1971). Technical interest is regarded as being an instrumental and exploitable knowledge of control and prediction. It also broadly refers to the way that people control and manipulate their material environment, including other people. This knowledge to a great extent has become interwoven with positivism, in which knowledge is based on empirical investigation and is governed by hypothesis based deductive theories in traditional mathematics, astronomy, physics, chemistry, and biology (Habermas, 1971, p. 73). "Everything that can become the object of vigorous science counts as a fact" (Habermas, 1971, p. 74). Under positivism's influence, technical interest learning is

assessed in terms of efficiency and effectiveness (Cranton, 1996). It governs the way individuals learn to control, manage, and manipulate their environment to achieve their goals. Under this scenario, teaching may be always contextualized and grounded in human need but is still limited in object. Stephen Butler (1997) describes, “The teacher becomes deliverer of a directed curriculum and learning is controlled through the control of teaching, where the most efficient route to facts is the best route to travel” (p. 17). As a result, “the attitude of pupils must, on the whole, be one of docility, receptivity and obedience” (Dewey, 1938, p. 18). The technical interest perspective is also reflected in Ralph W. Tyler’s (1949) curriculum study. Using four questions with “simplicity” and “parsimony,” he framed his chapter titles as followings:

1. What Educational Purposes Should the School Seek to Attain?
2. How Can Learning Experiences Be Selected Which Are Likely to Be Useful in Attaining These Objectives?
3. How Can Learning Experiences Be Organized for Effective Instruction?
4. How Can the Effectiveness of Learning Experiences Be Evaluated? (p. 1)

Technical interest is not the only way of teaching and learning. As Young (1990) stated, “It has been argued that control-oriented knowledge is not necessarily an inappropriate form of knowledge in human affairs” (p. 1310). It is “a linear, cause and effect, measurable, and rationally controlled way of thinking and making judgments about who ought to learn what, whom, when, where, for how long, and why” (Henderson & Hawthorne, 1995, p. 9).

Another way of constituting knowledge, according to Habermas, is called the practical cognitive interest. Practical interest is also known as communicative learning and communicative action (Mezirow, 2000; 1991; Harris, 1999), communicative knowledge (Habermas, 1971), the historical or hermeneutical sciences (Schubert, 1986), and a Habermasian theory of knowledge (Harris, 1999). According to Habermas (1971), practical interest is basically an interest in understanding and making sense of conditions for meaningful communication and dialogue. It describes how “access to the facts is provided by the understanding of meaning, not observation” (p. 309).

The relationship between teacher and student using the practical paradigm is not the same as the scenario using the technical interest. While in technical interest orientated learning, the teacher student relationship is hierarchical, controlling, and objective, in practical interest orientated learning, the teacher may become the learner and the learner may become the teacher (Pritchard, 2000). In addition, according to Schubert (1986), the interaction includes teachers, learners, subject, and environment. The major role of a teacher is to take students to different environments and to have students then construct meaning based on their experiences. “Communication is a process of sharing experience till it becomes a common possession” (Dewey, 1916, p. 11). Mutual understanding, positive socialization, and consensus are the keys to encouraging learners to care for each and all individuals in a learning environment, no matter where they are from.

Language is the tool for mediating relationships and enhancing meaningful discussion. This communication and interaction, however, must be built on trust, integrity, legitimacy, and sincerity with the intent to create new knowledge (McLeod, 2000). R. P. Badillo (1991) stated that, when examined by hermeneutic science, language discloses an interest that not only involves an abstract comprehension or interpretation of text, for instance about persons, cultures or traditions, but more importantly, it aims at “*practically effective* knowledge” at “the possibility of creating and maintaining successful mutual interaction between two or more individuals.” According to Wilson (1997), language includes ordinary language communication and theoretical and practical discourses. “In every utterance a speaker makes a truth claim relating to the objective world, a rightness claim relating to the social world of normatively regulated interpersonal relations, and a truthfulness or sincerity claim relating to the speaker’s subjective world” (Wilson, 1997, p. 191).

Knowledge constitutive interests are unique to different disciplines and are instrumental in creating microclimates. Looking at the discipline of science, Aikenhead and Jegede (1999) reported that all students, both domestic and international, are in the process of assimilation and accommodation from their own culture to the microculture of science. Students in science, like people in any culture, “share unique combinations of norms, values, beliefs, expectations, and conventional actions” (p. 272). Education too has its microclimate. It “requires an in-depth knowledge of children,

content, teaching and learning, and commitment to educational virtues” (Henderson & Hawthorne, 1995, p. 7). Communication in education is the practice of an ‘ethic of caring’ to education, whereby the teacher is challenged to serve each student’s ‘best self’ (Noddings, 1984, p. 7).

Emancipatory interest uses the critical sciences paradigm or critical praxis (Schubert, 1986). It “refers to a freeing of one’s self to enable growth and development from the taken-for-granted ideology of social conventions, beliefs, and modes of operation” (Schubert, 1986, p. 318). “It refers to a basic human interest in rational autonomy, freedom from constraints, and removal from distortions” (Huynh, 2005, p. 40). Georgia Drake (2000) says, “The social organization empowers one to transcend constraints as imposed by socio-economic class structure controlling ideologies” (p. 42). Similarly, as Huynh, Lee, and Schuldt (2005) state,

Emancipatory interest is a growing process of personal transformation aimed at overcoming internal and external constraints. Rather than exploring a situation so as to control it or to understand it, an emancipatory interest seeks to free people from physical, mental and social distortions and injustice. (Boudreau, 1997, p. 1)

The emancipatory interest entails a concern for the moral and ethical dimensions underlying human action by asking what sort of activities and experiences will help lead people towards lives characterized by equity, caring, and compassion (Gore & Zeichner, 1991). Emancipatory interest is a belief, as well as an action. As Geelan, Taylor, and Day (1998) state,

emancipatory actions involve self-knowledge and reflection on one’s lived experience, and the problematising of power structures with a view of emancipation from the inequities. This mode is related to the empowering of human beings through the critique of ideology. (p. 105)

Emancipatory interest is the twin sister of critical theory. It shares the belief that truth is not based on evidence; instead, it is based on the consensus that all citizens, as social actors, have equal access, rights, and resources. Empirical and hermeneutic research help us to describe our world, but critical research, the emancipatory interest, tries to understand why it is and how it should be (Ewert, 1991).

In the context of education, emancipatory cognitive interest helps both teacher and student act rationally in a self-determined and self-reflective manner. Self-determination, according to Andy Hargreaves (2003), is “the capacity to be autonomous” (p. 183), and self-reflection is “the capacity to critically examine the cultural context and traditions where one is inserted, as well as one’s affective and emotional dispositions and constitution” (p. 183). The process of inquiry through self-determination and self-reflection, according to Patricia Cranton (1996), encourages a learner to “challenge his or her taken-for-granted assumptions, to engage in an open discourse of accepted values and practices, to seek out new perspectives, and to work toward changes eliminating or minimizing concerns” (p. 30). “Changes in attitudes, beliefs, interpretation, and concepts that give rise to new ones are considered the outcomes of emancipatory learning” (Huynh, 2005, p. 40). Therefore, as Peter Rennert-Ariev (2005) describes it, the process of emancipation may help reveal unjust or inequitable practices in education that serve to privilege certain groups and marginalize others. Teachers and students should discard authoritarian discourse and collaborate with each other to address the question “whose interests are served by outlooks and skills fostered by schooling” (Schubert, 1986).

The independent variable was dichotomously categorized by student citizenship, with the attribute variable being either a Chinese graduate student or an American graduate student in the disciplines of pure and applied sciences and mathematics attending Auburn University. The dependent variables were the survey results about educational beliefs. The survey scores classified graduate students as having the primary educational belief of technical, practical, or emancipatory as defined by Jürgen Habermas (1971).

3 Setting and Participants

3.1 Setting

The setting of this study was Auburn University, a land grant university in the southern United States. Graduate students at this university hailed from all 50 states and nearly 100 foreign countries and were enrolled in almost all disciplines. Chinese international graduate students’ enrollment was 214, representing 31% of international students at the university.

This research was limited to the colleges and departments with pure and applied natural sciences and mathematics programs. These were the College of Agriculture, College of Engineering, College of Sciences and Mathematics, College of Veterinary Medicine, and Department of Nutrition and Food Science in the College of Human Sciences.

Because there were some departments and schools whose programs were a combination of applied sciences and management, such as Fisheries and Agriculture, Forestry, and Pharmacy, it was not possible to easily determine any individual student's program focus. Those departments and schools were, therefore, excluded.

3.2 Participants

A total 1,175 American-born graduate students and Chinese international graduate students who enrolled in the pure and applied sciences in Auburn University's graduate school and registered in spring semester of the year 2005 were selected to participate in this study. Nine hundred and eighty-seven (987) American-born graduate students and 188 Chinese international graduate students were included in the study.

American-born graduate students were defined as American citizens who were born in and who received their education in the United States. "American-born" as the operational definition deliberately selected in order to include the diversity of Americans who in some way are affected by and participate in the culture and educational system of the United States. American citizens who were graduate students in pure and applied natural sciences at Auburn University but who were first generation immigrants were excluded from this study.

Chinese international graduate students were limited to those who came from mainland of China and were citizens of the People's Republic of China studying at Auburn University to obtain their master or PhD degrees. Taiwan is part of China; however, because Taiwan has been politically separated from mainland of China for more than 50 years, Chinese students who came from Taiwan and enrolled in University's graduate school were excluded.

Hong Kong returned to China in 1997; Macao returned to China in 1999. Before 1997, Britain occupied Hong Kong for over one hundred years; before 1999, Portugal governed Macao for over four hundred years. Chinese students who came from Hong Kong and Macao, therefore, were also excluded from this study.

According to enrollment statistics for spring semester of 2005, the majority of Chinese international graduate students at Auburn University were in the pure and applied sciences of Agriculture, Engineering, Mathematics and Statistics, and Veterinary Medicine. The total number was 188. These graduate students were 88% of the total Chinese international graduate students at Auburn University. Only 26 (12%) graduate students who came from mainland of China were in other disciplines, i.e. Education, Liberal Arts, Human Sciences, and some of the combination of applied sciences and management, such as Fish and Wildlife Management, Forestry, and Pharmacy. The numbers of American graduate students and Chinese international graduate students in the pure and applied sciences registered in spring semester of 2005 were all obtained from the Office of Institutional Research and Assessment (2005) of Auburn University.

3.3 Sources of Data

The target population included a total of 188 Chinese and a total of 987 American graduate students who pursued their Master/PhD degree in pure and applied sciences and mathematics at Auburn University. Participants in the study were a sample of that population. They included all Chinese international graduate students and all American-born graduate students who were in pure and applied sciences and mathematics at Auburn University of 1175. One hundred American-born graduate students and 55 Chinese international graduate students returned their survey. However, one Chinese and one American graduate student responded to the 45-item statements with the same response from statement 1 to statement 45. These two respondents' surveys were excluded from the data. Chi-square test was used to analyze the collected data.

4 Data Analysis Process

4.1 Demographic Information

The following demographic information from the survey was analyzed and reported by frequencies and percentage: gender, age, nationality, ethnicity, the state of residency, the specific state where the participant attended high school, academic degree sought, years at Auburn University, program name, college or school name, place where undergraduate degree was earned, and career goal(s).

4.2 Chi-Square Analysis and Results

Responses from individuals were analyzed to classify each respondent’s educational beliefs as technical, practical, or emancipatory. The chi-square test was selected because the data consisted of frequencies that fell into three categories. The chi-square test for goodness of fit was run for both Chinese graduate students and American graduate students to determine whether there were any preferences for one category compared to the others. In addition, the chi-square test for independence was used to examine whether or not there was a relationship between Chinese and American graduate students’ preference for technical, practical, and emancipatory educational beliefs.

5 Data and Result

The first research questions was: What were the dominant beliefs about teaching and learning of Chinese international and American-born graduate students in the disciplines of pure and applied sciences and mathematics at Auburn University? The results in Table 1 show that Chinese international graduate students had higher emancipatory beliefs (41.3%) than their American counterparts (20%). American-born graduate students demonstrated higher practical beliefs (39.1%) than their Chinese counterparts (23.9%). Their technical beliefs for American-born graduate and Chinese international students were 37.9% and 34.8% respectively. The beliefs were assigned the following values: technical = 1, practical = 2, and emancipatory = 3. Among the 153 respondents, eight Chinese international and 12 American-born respondents did not have a dominant belief paradigm.

Table 1 Chinese International and American-born Graduates’ Domain Beliefs

Respondents	Technical	Practical	Emancipatory	Total
Chinese	16 (34.8%)	11 (23.9%)	19 (41.3%)	46
American	33 (37.9%)	34 (39.1%)	20 (23.0%)	87
Total	49 (36.8%)	45 (33.8%)	39 (29.3%)	133

The second research question was: Were there any statistically significant differences in beliefs about teaching and learning between Chinese international and American-born graduate students in the disciplines of pure and applied sciences and mathematics at Auburn University? The frequencies of the two groups’ dominant belief paradigm were computed. The beliefs were assigned the following values: technical = 1, practical = 2, and emancipatory = 3. The chi-square test was computed and the result showed that there were no statistically significant differences between the two groups’ beliefs about learning and teaching in education, $\chi^2(2, n = 133) = 5.569, p = .062$ (Table 1). The results showed that there were no statistically significant differences in beliefs about teaching and learning between Chinese international graduate students and female graduate students in the disciplines of pure and applied sciences and mathematics at Auburn University.

Table 2 Differences in Belief Paradigms between Chinese International and American-born Graduates

Respondents		Technical	Practical	Emancipatory	Total
Chinese	Observed	16	11	19	46
International	Expected	16.9	15.6	13.5	46.0

graduates	% within citizen	34.8%	23.9%	41.3%	100.0%
American-born graduates	Observed	33	34	20	87
	Expected	32.1	29.4	25.5	87.0
	% within citizen	37.9%	39.1%	23.0%	100.0%
	Observed	49	45	39	133
	Expected	49.0	45.0	39.0	133.0
Total	% within citizen	36.8%	33.8%	29.3%	100.0%

Chi-Square Test Result		
Value	Df	Asymp. Sig. (2-sided)
5.569 ^a	2	.062

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.49.

6 Discussion

The first research question was designed to examine whether Chinese international and American-born graduate students' beliefs about teaching and learning were significantly different. A chi-square test showed that there were no statistically significant differences between the two groups' beliefs about learning and teaching in education, $\chi^2(2, n=133) = 5.569, p = .062$.

One important question is why the lack of significant differences between Chinese international and American-born graduate students' beliefs about teaching and learning. Much cross-cultural and inter-cultural research has focused on international students, immigrants, and refugees during their stay in a host country or institution. Very few research studies have been conducted on adaptive transformation with the students while preparing to go abroad to study in a specific country.

Today's reality of adapting international education to China has greatly decreased the culture gap and conflict for Chinese students studying in Western society. China has made every effort to connect its educational system with the world in terms of curriculum, especially in the natural sciences and engineering education. Organizations such as World Bank as well as educational researchers have noted that China's overall representation in the international scientific community has grown rapidly since its reopening to the world (World Bank, 2000; Zhong, 1998). Other adaptations have included adopting American and other advanced industrial countries' textbook for use with Chinese college and university students, inviting prestigious international professors to teach and direct Chinese students in China; and sending Chinese college professors to world famous universities for short term visits and training. According to the statistics based on estimates from the Division of American and Oceanian Affairs, Department of International Cooperation and Exchanges, Ministry of Education of China (China, 2006), there have been over 200,000 Chinese students and scholars studying in the United States since 1979. Meanwhile, 97 joint-venture international universities and colleges in China have been permitted to offer foreign degree certificates, 63 (or 65%) of them were from the United States and Canada. Since 1978 China's chemistry education, for example, has developed as a result of internal sociopolitical changes, international influences, and the influences of individual scholars returned from overseas (Wei & Thomas, 2004). Beijing University Professor Ma, a Fulbright scholar, states that higher education reform in China has adopted the American higher education system's model, and all changes in China's higher education are done with globalization and internationalization as the final goal (Ma, 2006). The curriculum policy has changed from uniform textbooks nation-wide to one syllabus and multiple textbooks (Wei & Thomas, 2004). For all of these reasons, Chinese international students once enrolled in universities and colleges in the United States, can readily adapt to American campus culture and can collaborate with their American peers in their teaching and learning. The lack of significant differences between the two groups in terms of their beliefs about teaching and learning, therefore, is not surprising and any differences are more likely explained by individual difference than by cultural group differences.

The lack of significant differences between Chinese international and American-born graduate students' beliefs about teaching and learning may also be explained by cultural adaptation theories and research findings. Adaptation to a different culture is not mere mechanical imitation in the manner of a parrot, or as J. Liu (2001) put it, it is not to "ape Westerners at every step" (p. 249). Instead, it is a process of maintaining the best part of one's own culture and absorbing the essence of the second culture. In the process students create a dynamic and new culture in which both newly arriving and local groups of people can seek their common goals and work together at common points.

7 Conclusion

This study explored similarities and differences in beliefs about teaching and learning among Chinese international and American-born graduate students. It seemed that similarity, instead of difference, dominated the relationship between Chinese international and American-born graduate students. The results uncovered in this study challenged some of the assumptions based on earlier research, especially those that had found Chinese international students, to be "obedient," "quiet," "bookish," "test-orientated," and "Confucian-orientated." These assumptions, when looked at in the context of contemporary Chinese history, the historical connections between China's education and the West, and the trend toward globalization in education, are untenable, outdated, and detrimental to the integration of today's Chinese international students into American university life, as well as to a positive and productive relationship between Chinese international students and their American peers. Finally, allowing these earlier studies to govern contemporary assumptions of differences between Chinese and American students, and by extension societies, is detrimental to the international education of all students.

This study of Chinese international and American-born graduate students' beliefs about teaching and learning has provided a new dimension for examining cross-cultural difference and similarity. The result of similarity enriches, benefits, and enhances collaboration and creativity in a society with a multicultural environment such that of the United States. American universities, however, must recognize the harmful effect of policies and practices based on outdated assumptions for international graduate students, including Chinese international graduate students, as well as for their American peers. In a time of international economic development and technology-compelled globalization, it is time to re-examine educational policy. Hopefully, the findings from this study will generate further cross-cultural research in the area of educational beliefs and practices.

8 Implication

This study examined the similarities and differences in beliefs about teaching and learning in terms of technical, practical, and emancipatory perspectives of Chinese international graduate students and American-born graduate students, who were in the disciplines of pure and applied science and mathematics in Auburn University's graduate school and registered in the spring semester, 2005. Since the findings showed more similarities than differences in these selected graduate students' beliefs about teaching and learning, it is time to focus on better integrating Chinese international graduate students into the comprehensive university life.

While recognizing cultural differences, this study has found similarities to be important to students' teaching and learning. For Chinese international graduate students in this study, the similarities in beliefs about teaching and learning imply that they share with their American peers common goals as students and these shared goals should be conducive to an environment which fosters positive interpersonal interaction and helps students view each other in less or ever non-stereotypical ways.

Understanding that they share similarities of beliefs about teaching and learning with their American-born counterparts will give Chinese international graduate students more confidence to seek opportunities for authentic collaboration. This will also enhance Chinese international graduate students' identity as members of the university community.

There are some obstacles to full integration of Chinese international graduate students into university life and academic collaboration. Although the two groups of graduate students shared similar beliefs about teaching and learning, their manner in class performance is not the same.

According to Liu's (2001) research, Chinese students generally do not like asking "low-quality" questions in class if they think everyone understands the material, while American students are very eager to share whatever they think with others in the class. This results in losing opportunity for Chinese international students to share their thoughts with their American peers and instructors. Chinese international students need to re-assess their class performance of the manner to prevent having their instructor and their American peers from misunderstanding them.

For American-born graduate students, the value of understanding commonalities with Chinese international graduate students lies in the fact that since Chinese international graduate students represented the largest international student body on campus, and most of them are enrolled in the disciplines of pure and applied sciences and mathematics, maximizing contact opens a window for American-born graduate students to understand a new and different culture. Secondly, although these graduate students are in the same disciplines, American-born graduate students could benefit from their Chinese international peers' alternative approaches to solving the same problems. Thus, a natural cross-cultural exchange and mutual learning environment and culture will be built. Thirdly, due to their prior learning experiences and adaptation to American curriculum in the sciences while they were in China, these Chinese international graduate students are able to participate on an equal basis with their American peers once they enter American universities. Therefore, Chinese international graduate students are able to enlarge and strengthen American universities' science teams. American-born graduate students have more colleagues and team members with whom to collaborate to achieve their academic goals and to face challenges. Lastly, American-born graduate students will reconsider the findings of previous research on Chinese international graduate students, as well as their preconceived ideas about the Chinese international students with whom they are teaching and learning together. When they notice differences in beliefs among Chinese international students, American-born graduate students will be aware that these differences in beliefs about teaching and learning are not based on of their cultural backgrounds and differences in nationality, but rather from personal and individual differences.

Many universities in the United States have started to commit to international education. For example, one of Auburn University's mission statements is to prepare students for the challenges of a global economy and to develop Auburn University into nationally and internationally recognized centers of excellence (Auburn University Vision and Mission Statement, 2006). As one of the largest international student bodies at Auburn University, Chinese international graduate students in the disciplines of pure and applied sciences and mathematics, actively participate in teaching, learning, and service during their academic degree study. Through their academic contributions they provide a unique Chinese perspective. More importantly, as this study demonstrates, their beliefs about teaching and learning are very similar to those of their American peers. For both of these reasons, the unique perspective and the shared beliefs, faculty members, educational policy makers, and other administrators would be well advised to look for ways to provide more opportunities for Chinese international graduate students to engage in the university's affairs in order to strengthen the authenticity of the university's international focus and create greater opportunities for international collaboration.

The gap between the espoused mission statement and actual practice of transforming universities into international and global institutions has not yet been reduced. University policy makers and other administrators should utilize the potential of Chinese international graduate students for increasing international presence. One of the characteristics of an internationalized university is its international curriculum. According to Whalley (1997), such a curriculum should have "an international orientation in content, aimed at preparing students for performing (professionally/socially) in an international and multicultural context, and designed for domestic students as well as foreign students" (p. 10). Chinese international graduate students in the pure and applied sciences and mathematics, on the one hand, bring their own culture of perseverance in science learning and research. On the other hand, because of China's adaptation and practice of American and other international curricula in the sciences, and as a result of electronic communication, which further familiarized Chinese international graduate students with teaching and learning at American universities even while in China, these students should prove critical when implementing an international curriculum within the various disciplines.

According to Chinese international students' opinion, it seems that some of the educational policy makers and faculty members have not become fully aware of Chinese international graduate students' adaptation to American culture and the similarities of beliefs about teaching and learning with those of their American peers and colleagues. In order to enhance Chinese international students' integration into American universities and in order to increase American policy makers' and faculty members' as well as students' international experiences, and in order to encourage collaboration in various disciplines, universities need to provide more opportunity for American graduate students to learn and to understand Chinese culture and include Chinese international graduate students in all aspects of university life.

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