Information Technology Education in the Top Accounting Programs: A Comparison between China and the United States

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ABSTRACT

Over the past two decades, Information Technology (IT) knowledge/skills have been increasingly emphasized by academics and practitioners in accounting education. This study verifies the differences of IT education provided by the top ten accounting programs of higher education institutes in China and the United States. The results of the study indicate that the top accounting programs in China offer better-designed IT curriculum for their students than the top accounting programs in the U.S. In addition, detailed analysis of this study shows that, on average, Chinese universities are better than American universities at providing balanced IT education with respect to both IT hands-on skills and conceptual knowledge.

Keywords: Information technology, Accounting information systems, Knowledge and skills

INTRODUCTION

Though the first accounting treatise was written by Luca Pacioli in 1494, the history of accounting is as old as human civilization (Alexander 2002). Whether its recognized history is five hundred or ten thousand years old, "accounting" has played a critical role in human economic development (Waymire & Basu 2008). By nature, accounting is a discipline focused on "information" and how it is derived to support day-to-day business operations. As defined by the American Accounting Association (AAA) in 1966, "accounting" is an information system that identifies, records, and communicates the economic events of an organization to interested users (Cheng 2007). Therefore, since the late 1970s, computer applications have been heavily used by accounting professionals to produce financial reports for business decision making. Subsequently, more accounting courses employ computer software by accounting educators in teaching relevant subjects to accounting students.

For more than five decades, much software development and many information technology (IT) innovations have been accomplished, which makes IT an enabler in creating new business opportunities and an integrator in coordinating business operations from logistics to sales and to after-sales services. Nevertheless, it was not until the late 1990s that IT was considered as an essential component required for all accounting majors (Ahmed 2003). Specifically, critical knowledge and skills such as *information compliance*, *computer ethics*, and *data security* were not seriously considered by the accounting educators until the outburst of *the Enron Event* (Blair *et. al* 2007; Fu 2003), which led to the pass of the Sarbane-Oxley Act in 2002 (Mehta *et. al* 2007; Dhillon & Mishra 2006). While the United States was experiencing much discouraging economic news, China was maintaining phenomenal economic growth that had begun in 1978. This nonstop growth has not only made China one of the largest economic entities in the whole world, but also created huge employment opportunities in the accounting field (Qiang, 1996). As more and more Chinese students come to the United States to study accounting (Cho *et. al* 2008), more accounting educators in China have started to pay more attention to the accounting education. Since IT is becoming increasingly important in the accounting field, it motivates the authors to investigate the *weight* (i.e., % of credit hours) and the *content* (i.e., the subjects) of IT knowledge/skills covered by the accounting programs of Higher Education Institutes between China and the U.S.

Our aim is to find out if significant differences in IT education for accounting students exist between these two countries. If they do exists, then what are the major differences, and why do they exist? To our knowledge, these research questions have yet to be answered. It is believed that our findings will shed some light on the curriculum redesign for the accounting major by either developing new courses with IT desired knowledge/skills or requiring accounting students to take more IT courses offered by other academic units. Our research results do show noticeable differences in both weight and content of the IT education of the top accounting programs in China and the U.S.. Detailed findings and discussions are provided in later sections. A literature review on IT knowledge and skills covered in accounting education is given in the next section.

LITERATURE REVIEW

As discovered by Dillon & Kruck (2004), most organizations today require entry-level accountants (i.e., new hires) to be familiar with necessary IT knowledge/skills to match employment trends. Specifically, accounting graduates must have sufficient technical skills, conceptual knowledge in accounting information systems, and know how IT could be integrated into the accounting process. To meet these growing needs for technologically savvy accountants, many colleges and universities have started to offer a concentration, minor, or even major in Accounting Information Systems (Fordham 2005). Since the *Enron Event*, research on IT's role and its topics to be covered for the accounting major have received great attention. Ahmed (2003) conducted very thorough research on what IT/IS skills must be included in the British Accounting Programs. His findings indicate that both the academics and practitioners agree that without sufficient IT knowledge and skills, most accountants cannot be successful in the business world. Gelinas & Gogan (2006) analyzed a real world case. Their findings indicate that accounting professionals play a critical role at multiple stages of pilot testing a new e-procurement system for the United States Department of Treasury Bureau. Another study by Dillon & Kruck (2008) indicates that different levels and types of IT knowledge and skills are required for different accounting professionals, depending on the actual function (e.g., auditing, accounting systems design) to be assumed by the position. In fact, there are quite a few such studies such as research completed by Cheng (2007), Stanely & Edwards (2003), David *et. al* (2003), Savage & Shaffer (2003), Bain *et. al* (2002), Doost (2002), and de Wet & van Niekerk (2001).

While IT knowledge and skills have received increasing attention in the accounting field in the U.S., a similar trend in economic development is also occurring in China. In 1978, Mr. Deng Xiaoping started economic reforms in China. Since then, China has maintained a steady and rapid economic growth at an average of 9.8% per year (GDP 2008). As pointed out by Chen & Feng (2000), one of the key determinants that lead to China's unprecedented economic growth is "higher education," of which the accounting field turns out to be the most demanded and popular program in higher education institutes (Woodbine 2007). To avoid wordiness, HEI is used hereinafter to denote "higher education institutes."

Over the past decade, many studies in China have been conducted on the topics and extent of IT knowledge/skills to be covered in the accounting program. Among them, seminal research was conducted by Lin *et. al* (2004). They surveyed three groups of people (i.e., accounting practitioners, educators, and students) by asking respondents to provide a "sequential index" (i.e., a ranking) for each of a defined set of knowledge/skills. Their study results are compared to those of an early study by Albrecht & Sack (2000). One interesting finding, with respect to IT knowledge/skills, shows that Chinese practitioners/educators emphasize more on IT skills (rank = 2) than conceptual knowledge (rank = 8), whereas U.S. practitioners/educators focused more on IT conceptual knowledge (rank = 2) than skills (rank = 4). Overall, Lin *et. al* (2004) concluded that China needs to strengthen the breadth of her accounting education by covering more interdisciplinary knowledge/skills, and specifically, emphasize more on the IT system concepts than technical computing skills. To verify these findings, the objective of this research is to give a detailed look on the IT courses required for the

accounting majors in China and the United States. To our knowledge, there is no such study available in literature today. The next section will detail the data collection and analytical method employed by our study.

DATA COLLECTION AND ANALYTICAL METHOD

The primary objective of this research is to verify the differences of IT education provided for the accounting majors by HEI in China and the U.S. Due to the large number of HEI in China (i.e., >2,000, cf. HEC 2009) and in the U.S. (i.e., > 6,400, cf. NEI 2007), collecting primary data through a questionnaire may not be easy and is, in fact, unrealistic, because not all HEI offer the accounting program, which may result in a high degree of quality difference among the respondents (i.e., research subjects).

Data Collection

To avoid unnecessary controversies, our data sources are confined to the top ten accounting programs in China and the United States based on the two most popular ranking indexes. For China, the ranking index is developed annually by the Chinese Management Sciences Institute, which is under the supervision of Wu Shu Lian (武书连). More detailed information can be found in Wu et. al (2008) or retrieved at http://www.dongao.com/kjzx/jrtj/200806/18421.html.

For the United States, the ranking index is based on the assessment results published by *U.S. News and World Report*, and detailed rankings are available at http://colleges.usnews.rankingsandreviews.com/college/spec-accounting. For convenient reference, the top ten undergraduate accounting programs in China and the United States are listed in Table 1 and Table 2 respectively.

Table 1: Top 10 Undergraduate Accounting Programs in China

Ranking	University Name	Code
1	Xiamen University (廈門大學)	XMU
2	Shanghai University of Finance and Economics (上海財大)	SHU
3	Renmin University of China (中國人民大學)	RMU
4	Peking University (北京大學)	PKU
5	Tsinghua University (清華大學)	THU
6	Dongbei University of Finance and Economics (東北財大)	DBU
7	Xi'an JiaoTong University (西安交大)	JTU
8	Zhongnan University of Economics and Law (中南財經政法)	ZNU
9	Zhejiang University (浙江大學)	ZJU
10	Southwestern University of Finance and Economics (西南財大)	SWU

As shown in Table 1, four of the top ten accounting programs (i.e., #2, 6, 8, and 10) are offered by universities with an intensive focus on "finance and economics." The remaining six are offered by regular "comprehensive" universities. A three-letter code is defined for each HEI.

Table 2: Top 10 Undergraduate Accounting Programs in the United States

Ranking	University Name	Code
1	University of Texas – Austin	UTA
2	University of Illinois--Urbana-Champaign Champaign, IL	UIU
3	University of Pennsylvania	UPE
4	Brigham Young University--Provo, UT	BYU
5	University of Southern California	USC
6	University of Michigan – Ann Arbor, MI	UOM
7	University of Notre Dame, IN	UND
8	Indiana University--Bloomington, IN	IUB
9	New York University New York, NY	NYU
10	Michigan State University, East Lansing, MI	MSU

Unlike their counterparts in China, all the top ten accounting programs in the U.S. are offered by regular comprehensive universities – five are private (i.e., #3, 4, 5, 7, and 9) and the remaining are public universities. There is no clear evidence that private universities are superior to public universities in accounting education.

Analytical Method

This study is primarily based on secondary data collected with necessary updates through phone or email validations. The detailed course requirements for each accounting program are first located via an Internet search on the university's website. If multiple versions or dated curriculum requirements were posted, then the contents were verified by a follow-up phone call to the university to ensure their currency. For some universities (e.g., University of Michigan), either a two-year or a three-year upper undergraduate program is offered for the accounting major, then extra efforts were made to search the comprehensive curriculum requirements by retrieving the university catalog to identify all IT-related courses (e.g., computer literacy, introduction to IT, etc.) from the university general education requirements to the common college core courses for all business majors. Our intent is to provide a fair assessment on all IT knowledge/skills required for an undergraduate student before he/she completes a major in accounting. Detailed results of collected data are presented in the next section.

IT KNOWLEDGE/SKILLS REQUIRED BY THE ACCOUNTING PROGRAMS

In contrast to existing studies that have been focused on the topics and specific skill sets to be covered for the first Accounting Information Systems course (Bain et. al 2002, Doost 2002) or accounting education (Badua 2008, Robson *et. al* 2003), our study focus on all IT-related courses that are required for an undergraduate accounting major to complete his/her bachelor's degree. Therefore, our data analyses are categorized into the two major components – an Aggregate Summary and a Detailed Summary.

Aggregate Summary

In this summary, all IT courses and the total number of credit hours for all IT-related courses required by each HEI for the pre-accounting major are recorded. Furthermore, the credit hours of all IT courses offered by the accounting program, both the required ones and the elective ones, are also recorded. Based on our collected raw data, aggregate measures (in %) were derived to reflect the "Extent of IT" education provided by the *undergraduate common cores* and the *accounting program* of each HEI. Table 3 summarizes the total IT education (in credit hours) required before and after an undergraduate student enters an accounting program in China. As shown, on average, 7.25 credit hours of IT-related courses have to be taken by a student before entering the accounting program. Once admitted to the accounting program, each student will take an average of 2.8 and 3.3 hours of required and elective IT courses, respectively, to complete his/her accounting major. Table 4 presents the statistics for the top ten universities in the United States. As shown, an average of 4.3 credit hours of IT

Table 3: IT and AIS Courses in Top 10 Accounting Programs in China

University Code	Pre-Major IT Courses			Accounting Major Courses						Total BA Degree Hrs (TBDH)	TITH/ TBDH (%)	TAIH/ TAMH (%)
				Required		Elective		Total AIS Hours (TAIH)	Total Accting Major Hrs (TAMH)			
	University Level	College Level	Total IT Hours (TITH)	Accting courses	AIS Courses	Elective Hrs	Potential AIS Courses					
XMU	5	3	8	43	2	16	8	10	61	165	4.8%	16.4%
SHU	2	2	4	30	4	21	2	6	55	169	2.4%	10.9%
RMU	6	0	6	18	3	18	0	3	39	168	3.6%	7.7%
PKU	6	3	9	13	2	45	2	4	60	137	6.6%	6.7%
THU	6	2	8	23	0	24	8	8	47	170	4.7%	17.0%
DBU	3	3	6	18	0	17	7	7	35	186	3.2%	20.0%
JTU	3	4.5	7.5	12	4	16	0	4	32	166.5	4.5%	12.5%
ZNU	6	3	9	23	3	19	3	6	45	162	5.6%	13.3%
ZJU	5	0	5	34	7	15	2	9	56	169	3.0%	16.1%
SWU	6	4	10	15	3	29	1	4	47	180	5.6%	8.5%
AVG	**4.8**	**2.45**	**7.25**	**22.9**	**2.8**	**22**	**3.3**	**6.1**	**47.7**	**167.25**	**4.3%**	**12.8%**

education is required before a student enters the accounting program, and it is almost 3 hours less than the students in China. Furthermore, the average required and elective IT credit hours for the U.S. accounting majors are 1.6 and 1.3 respectively. Again, China's top ten offers 1.2 more required and 2.0 more elective credit hours for their accounting programs. Note that, on average, the total credit hours for the accounting program and the bachelor degree in China are much greater than those of the U.S.

Table 4: IT and AIS Courses in Top 10 Accounting Programs in the U.S.

University Code	Pre-Major IT Courses			Accounting Major Courses						Total BA Degree Hrs (TBDH)	TITH/ TBDH (%)	TAIH/ TAMH (%)
	University Level	College Level	Total IT Hours (TITH)	Required		Elective		Total AIS Hours (TAIH)	Total Accting Major Hrs (TAMH)			
				Accting courses	AIS Courses	Elective Hrs	Potential AIS Courses					
UTA	0	3	3	12	0	6	3	3	18	121	2.5%	16.7%
UIU	6	0	6	26	0	7	6	6	33	124	4.8%	18.2%
UPE	0	3	3	12	0	6	0	0	18	120	2.5%	0.0%
BYU	0	9	9	27	3	0	0	3	30	120	7.5%	10.0%
USC	0	0	0	22	4	8	4	8	34	128	0.0%	23.5%
UOM	0	3	3	21	0	0	0	0	21	120	2.5%	0.0%
UND	0	3	3	21	3	0	0	3	33	126	2.4%	9.1%
IUB	0	6	6	24	3	3	0	3	30	124	4.8%	10.0%
NYU	0	4	4	18	0	0	0	0	18	128	3.1%	0.0%
MSU	3	3	6	17	3	9	0	3	29	120	5.0%	10.3%
AVG	**1**	**3.4**	**4.3**	**20.0**	**1.6**	**4.8**	**1.3**	**2.9**	**26.4**	**123.1**	**3.5%**	**11.0%**

Table 5: Detailed IT Education in Top 10 Accounting Programs in China

	Course Title	XMU	SHU	RMU	PKU	THU	DBU	JTU	ZNU	ZJU	SWU	Average
A	**Required IT/AIS Courses**											
	a. Hands-on Skills											
	Computer Fundamentals	3	2	3	3	3	3	3	3	3	3	2.9
	Intro to Database Language	2	0	3	3	3	0	2	3	2	3	2.1
	Total credit hours:	**5**	**2**	**6**	**6**	**6**	**3**	**5**	**6**	**5**	**6**	**5**
	b. Conceptual Knowledge											
	Introduction to MIS	3	2	0	3	2	3	2.5	3	2	4	2.15
	Accounting Info Systems	2	4	3	2	0	0	4	3	3	3	2.7
	Total credit hours:	**5**	**6**	**3**	**5**	**2**	**3**	**6.5**	**6**	**5**	**7**	**4.85**
	Total required credit hours:	**10**	**8**	**9**	**11**	**8**	**6**	**11.5**	**12**	**10**	**13**	**9.85**
B	**Elective AIS Courses**											
	a. Applications Skills											
	AIS & Lab	2				4	2		3		1	**1.2**
	AIS Auditing & Lab	4										**0.4**
	IT Skills Testing		2									**0.2**
	Database Applications									2		**0.2**
	b. Conceptual knowledge											
	AIS Software Evaluation	2										**0.2**
	AIS analysis and design						3					**0.3**
	e-Commerce				2		2			2		**0.6**
	IS/IT Ethics					4						**0.4**
	Total elective credit hours:	**8**	**2**	0	**2**	**8**	**7**	**0**	**3**	4	1	**3.5**

Detailed Summary

To verify the nature and content of IT education required by the accounting programs, our collected data are further classified into sub-categories, i.e., *conceptual* vs. *basic skills* and *conceptual* vs. *application skills*. Doing this detailed classification helps us identify whether there are fundamental differences in IT education for accounting students in China and in the U.S.

Table 5 provides a detailed breakdown of IT-related courses that students must take as requirements or electives before they can accomplish their accounting majors. For example, column one in Table 5 indicates that a student at XMU (i.e., Xiamen University) will need to take five credit hours of IT basic skills courses (i.e., *Computer Fundamentals* and *Introduction to Database Language*) and five credit hours of IT conceptual knowledge courses (i.e., *Introduction to MIS* and *Accounting Information Systems*) to fulfill both the university and the accounting major requirements. However, XMU also offers three more IT-related electives (i.e., *AIS & Lab*, *AIS Auditing & Lab*, and *AIS Software Evaluation*) with a total six credit hours that may be taken by an accounting student. In summary, the top 10 Chinese accounting programs require an average of five credit hours of basic skills and 4.85 conceptual knowledge courses in IT education. In addition, eight different accounting electives using IT are offered across these campuses, and only two universities do not offer any electives.

Similar detailed data for the top 10 accounting programs of the United States is also prepared in Table 6. As seen, the average number of credit hours required for the "basic skills" component is 2.95 and the "conceptual knowledge" component is 2.95. In total, there is a 3.65 credit hour shortage as compared to what is required in China. In other words, the top 10 accounting programs require at least one more basic skills course for their students. In terms of the elective courses, surprisingly, seven out of the top 10

Table 6: Detailed IT Education in Top 10 Accounting Programs in the U.S.

	Course Title	UTA	UIU	UPE	BYU	USC	UOM	UND	IUB	NYU	MSU	Average
A	**Required IT/AIS Courses**											
	a. Hands-on Skills											
	Computer Fundamentals	3	3	3	6	0	1.5	3	0	4	3	2.65
	Intro to Database Language	0	3	0	0	0	0	0	0	0	0	0.3
	Total credit hours:	**3**	**6**	**3**	**6**	**0**	**1.5**	**3**	**0**	**4**	**3**	2.95
	b. Conceptual Knowledge											
	Introduction to MIS	3	0	0	3	0	1.5	0	3	0	3	1.35
	Accounting Info Systems	0	0	0	3	4	3	3	0	0	3	1.6
	Total credit hours:	**3**	**0**	**0**	**6**	**4**	**4.5**	**3**	**3**	**0**	**6**	2.95
	Total required credit hours:	**6**	**6**	**6**	**12**	**4**	**6**	**6**	**3**	**4**	**9**	**6.2**
B	**Elective AIS Courses**											
	a. Applications Skills											
	AIS in Finance/Adm Info Sys	3										0.3
	b. Conceptual knowledge											
	Introduction to MIS		3									0.3
	AIS Analysis and Design		3									0.3
	Accounting Info System II					2						0.2
	System Security & Audit					2						0.2
	Total elective credit hours:	**3**	**6**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**2.2**

American accounting programs do not offer any other AIS elective courses, and altogether five different AIS electives are offered by the remaining three campuses.

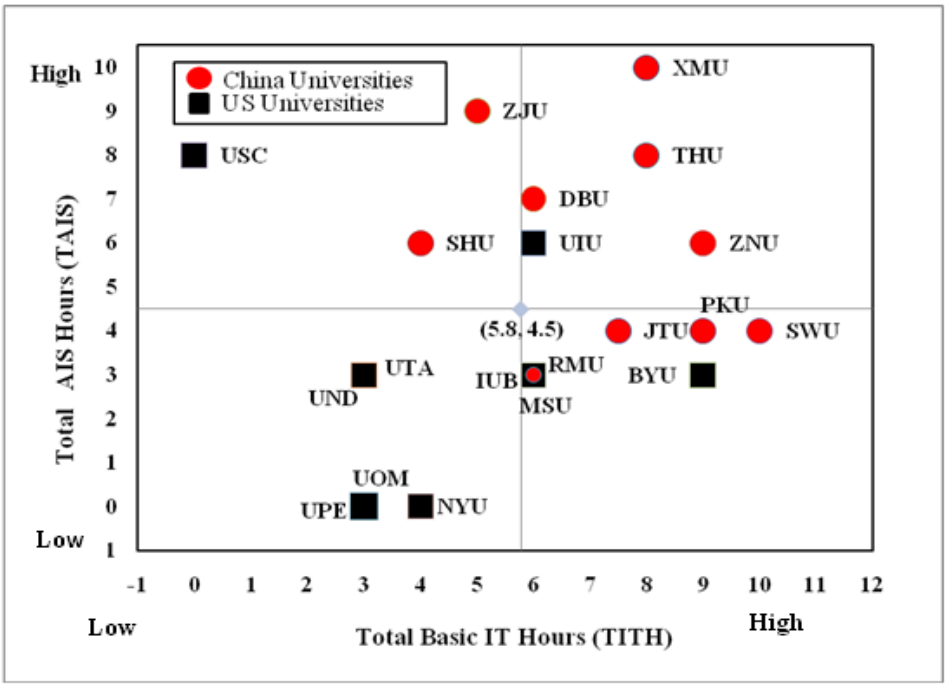
FINDINGS AND ANALYSIS

While numeric data are summarized in Tables 5 and 6, no generic insight can be seen without some tableau descriptions. To gain an in-depth understanding on the IT education, with respect to its *extent* and *content*, for the top accounting programs in China and the U.S., a "2 × 2" analysis is used.

Detailed Look at the "Extent" of IT Education

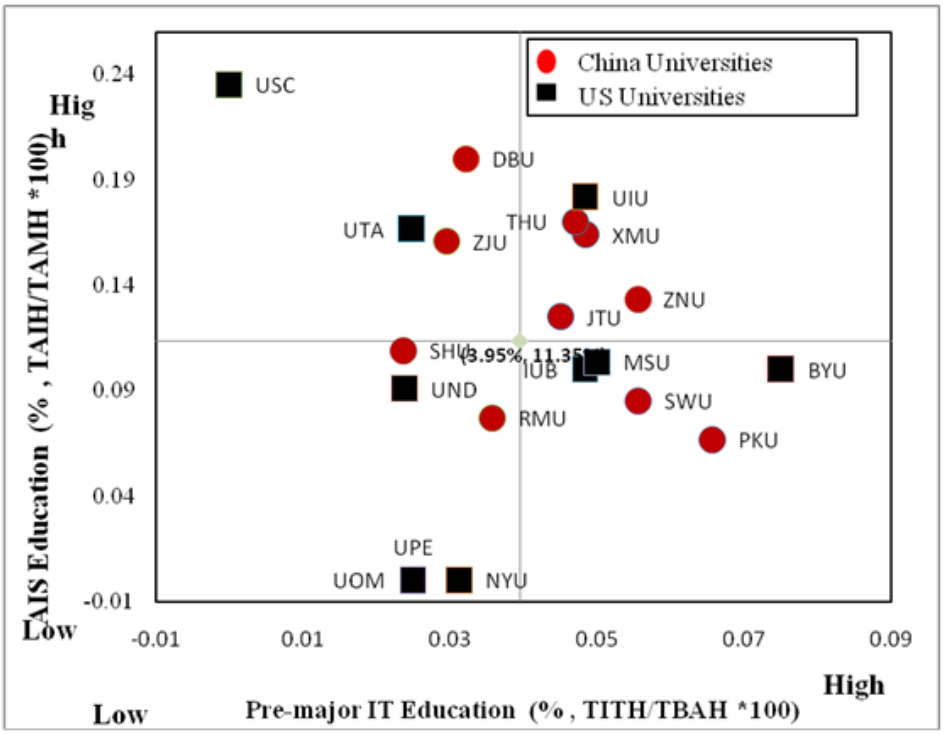
To examine the extent of IT education, two major factors are considered -- the *Total IT hours* (TITH, column 3 of Table 3) required for a pre-accounting major and the *Total AIS hours* (TAIS) that can be taken by an accounting major. A coordinate is formed by these two factors, i.e., (x = TITH, y = TAIS), for each university listed in Table 1 (China) and Table 2 (US). As shown in Figure 1, the centroid of this diagram is (5.8, 4.5) and seven out of the ten Chinese accounting programs have coordinates located to the northeast of the centroid. In other words, in terms of credit hours, the top Chinese accounting programs provide more IT education, both in basic IT and in AIS, than the top US accounting programs.

Figure 1: An Analysis on the Extent of IT Education Based on Actual Credit Hours



As pointed earlier, Chinese universities require more credit hours for the accounting program and the undergraduate degree as compared to their counterparts in the United States. As seen in Tables 1 and 2, the average number of credit hours required for the accounting program is 47.7 and the undergraduate degree is 167.25 in China, as compared to their counterpart's average of 26.3 and 123.1 in the United States. To alleviate the potential effect resulted from the different curriculum sizes, a second "2 × 2" analysis is conducted by using the percentage measurements (i.e., (TITH/TBDH) * 100 and (TAIH/TAMH) * 100, see last two columns in Tables 3 & 4) derived for each university. Figure 2 presents the coordinates using "percentage (%)" measurements of the top accounting programs in China and the U.S. As shown, based on the percentage measurements, there is no clear evidence that Chinese universities are superior to American universities in IT education, though a wide variation of IT education exists among the American universities. With the given diagram, the two accounting programs with a strong IT/AIS education are both from the U.S. - University of Illinois – Urbana Champaign (UIU) and Brigham Young University (BYU). However, the three programs with very little emphasis on IT/AIS are also from the United States.

Figure 2: An Analysis on the Extent of IT Education Based on % of Total Credit Hours

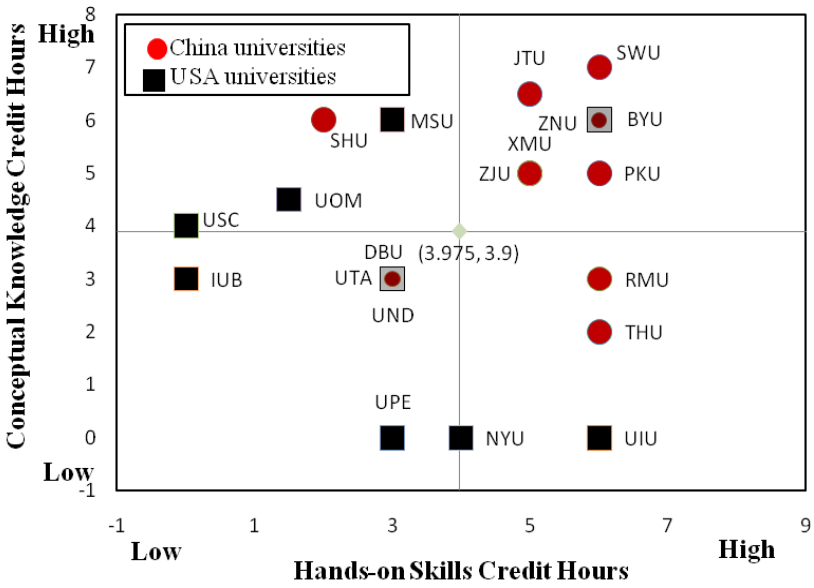


Detailed Look at the "Content" of IT Education

As addressed in the section of literature review, numerous studies have been conducted to identify proper IT topics to be covered for students with an accounting major. Essentially, IT/AIS courses can be classified into two major types: *hands-on skills* and conceptual knowledge (Lin *et. al* 2004). The same typology is employed to pinpoint the IT education content of the top ten accounting programs in China and the United States in order to verify our findings against the early results reported by Lin *et. al* (2004).

Figure 3 presents the content of IT education, with respect to *Total Hands-on Skills Credit Hours* (THOH) and *Total Conceptual Knowledge Credit Hours* (TCKH), provided by each university listed in Tables 1 & 2. As seen, the centroid of all plotted coordinates is (3.975, 3.9), and six out of the top ten Chinese accounting programs (i.e., SWU, JTU, ZNU, XMU, ZIU and PKU) provide better-than-the-average IT education, both in both hands-on and conceptual knowledge, for their accounting majors. Only one American university (BYU) provides better-than-the-average IT education, whereas four out of ten American universities (i.e., IUB, UTA, UND, and UPE) have weak IT education in both *hands-on* and *conceptual knowledge* areas.

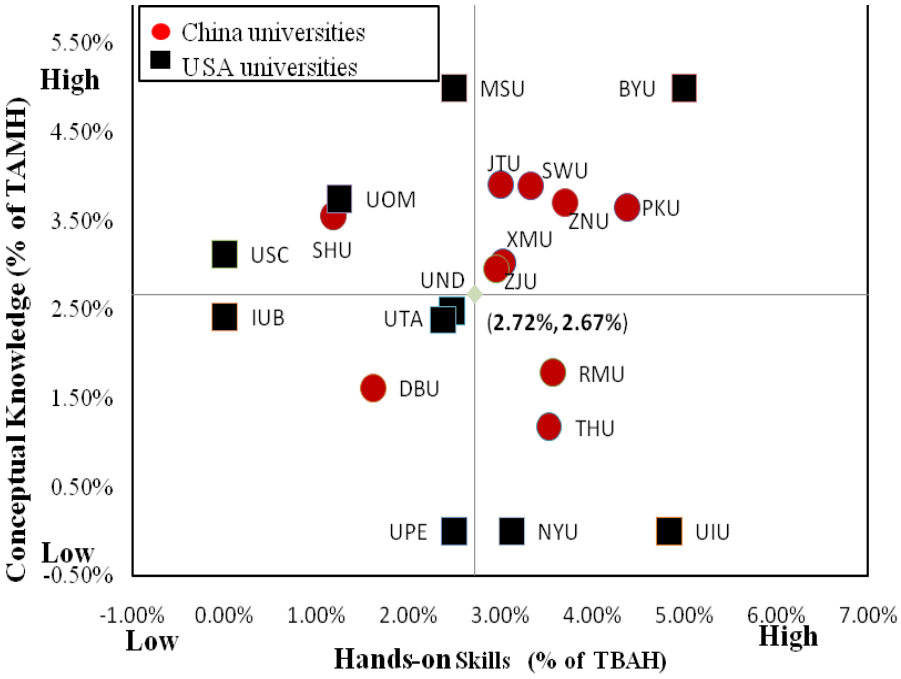
Figure 3: Content of IT Education Based on the Total Credit Hours of Each Type of IT/AIS Courses



Again, to ensure our analysis does take into account the differences of the curriculum size (i.e., the total credit hours required) between China and the US, a percentage measure on each type of IT education is derived for each university. In other words, *Hands-on Skills %* = THOH/TBAH * 100 and *Conceptual Knowledge %* = TCKH/TAMH *100. As shown in Figure 4, there exists a wide variation in the content

of IT education among the top 10 American universities. The three noticeable ones are: BYU is outstanding in providing both hands-on skills and conceptual knowledge of IT, MSU is strong in conceptual knowledge of IT, and UIU is strong in hands-on skills of IT. In contrast, though none of the Chinese universities have the leading position, six of the top 10 Chinese accounting programs have provided very balanced and above the average IT education in both hands-on skills and conceptual knowledge. It is clear that, by and large, the top accounting programs in China offer better-designed IT curriculum for their students than the top programs in US.

Figure 4: Content of IT Education Based on % of Total Credit Hours of Each Type of IT/AIS Courses



DISCUSSION AND FURTHER RESEARCH ISSUES

There is little doubt that both academics and practitioners have recognized the value and importance of IT knowledge and skills that are essential to the career needs and success of accountants. Our findings do indicate some differences in the "extent" and "content" of IT education in the top accounting programs between China and the U.S. Albeit our detailed analysis in Section 5.1 does not provide a statistical proof (due to small sample size), based on *the simple average of total IT/AIS credit hours* and *the percentage of total credit hours in IT/AIS courses*, it is clear that Chinese universities outweigh the American universities in IT education for the accounting majors. Furthermore, our detailed analysis on the "content" of IT education (see Section 5.2) also

indicates that, on average, Chinese universities are better than American universities in providing a balanced IT education with respect to both hands-on skills and conceptual knowledge. Our findings are different from the results reported by Lin *et. al* (2004), in which the authors maintained that American universities focused more on conceptual knowledge than hands-on skills and Chinese universities placed more emphasis on the learning of hands-on skills. Why do our study produce these findings even though the U.S. is more mature in IT and has more general and specialty applications that can be used for the accounting education?

Our research results do raise some questions: 1) Why do the top ten American accounting programs not show a strong emphasis in IT education? 2) Why do the top American accounting programs appear to have less IT/AIS education focus as compared to the top Chinese counterparts? 3) Why is there no clear correlation between the ranking of the accounting programs and their associated IT/AIS education in terms of credit hours and topics required for the accounting majors? Some potential causes are given below.

Potential Causes for the Differences in IT Education

For question 1 addressed above, some potential causes or explanations could be:

- The top 10 accounting programs in U.S. programs are all housed within top-tier research-driven universities. As known to most academicians, the program ranking often assesses based on the research productivity of faculty, i.e., journal publications, which usually has no connection to the curriculum design/content of their discipline. Therefore, the accounting curriculum offered by the top universities in the U.S. may not be a good representation for subjects such as IT that are still evolving.

- One critical fact that slows down the incorporation of IT education into the accounting program is due to the fact that few accounting faculty have an extensive background or much expertise in IT, which was reported in a number of studies (David *et. al* 2003, Doost 2002). The key accounting faculty's key concern is the immense amount time and effort involved in learning technology for teaching while maintaining confidence and success in career development (David *et. al* 2003).

- As pointed out by one of the reviewers, the accounting career is composed of positions with different requirements towards the level and type of IT knowledge and skills (i.e., conceptual knowledge vs. hands-on skills). Therefore, the overall IT knowledge/skills required by the accounting programs in China may be overkilled, and, more specifically, the accounting programs in the U.S. may be responding to the special accounting needs to better prepared their graduates with an in-depth preparedness (Dillon & Kruck, 2008).

In regard to the second question, why do the top American accounting programs appear to have less IT/AIS education as compared to the Chinese ones? Our conjectures are:

- The total credit hours required by Chinese universities is about 33% more than the total hours required by American universities (i.e., 167.25 vs. 123.1). This huge difference may give Chinese universities the flexibility and capacity in

curriculum design that requires students to take at least two to three basic IT courses at the university level, and at least one to two more conceptual IT/AIS courses after they enter the accounting programs. As shown by Tables 3 and 4, most of the top 10 Chinese universities require two basic IT courses (from five to eight credit hours) during the first two years, and at least one AIS course to fulfill the accounting majors, whereas most American universities require one at the university/college level and possibly another one for the accounting major.

- While there is no direct evidence provided in this study, IT has been one of the key elements that boosted China's economic development over the past 30 years. Not until recently, business education, especially accounting, has been considered one of the most popular disciplines that have high market demands. Unlike the American universities, accounting is a relatively new discipline in Chinese universities and the curriculum is vibrant and responsive to the employment demands that will recruit new hires with practical knowledge/skills in both accounting and IT and AIS. Therefore, as seen in Table 3 and Table 5, Chinese accounting programs do require more IT courses and only two universities do not require any AIS course as part of the requirements in fulfilling the accounting major. Moreover, eight out of the top 10 Chinese universities offer elective AIS courses as compared to only four out of the top 10 American universities. Of course, more investigations need to be conducted to validate this conjecture.

Finally, why there is no connection between the ranking of the accounting programs and the "extent" and "content" of IT education required by the accounting programs? One possible cause may still be related to the program foci and the expertise associated with the accounting faculty. To our knowledge, there is no explicit assessment criterion on the accounting program evaluation that ties the offering of IT/AIS courses to the overall quality rating of the accounting program, albeit some minimum requirements in IT/AIS are considered during the assessment process. In other words, given the current rating process – both in China and the United States – the highest-rated accounting program does not need to be one that provides a full-range of IT/AIS courses, and vice versa. This is, in fact, supported by our findings; the best accounting program that provides the most balanced IT/AIS education is Brigham Young University, which is ranked fourth in the U.S. Similarly, Xiamen University (廈門大學) is first in accounting programs, but its IT/AIS education ranked approximately fifth or sixth.

FURTHER STUDY ISSUES

Our research may have triggered more questions than answers, though our findings do show that there are differences in IT knowledge/skills coverage in the top ten accounting programs between China and the U.S. To further extend our study and validate the conjectures in our discussion, there are at least a few issues that deserve our further examination. A brief description is given on each issue.

- Extend the size of data sources for a more extensive comparison. This extension may provide more solid statistic analysis on the differences of IT/AIS between China and the U.S. Results may be different, but with our expectation,

they may just further prove that there exists differences in IT/AIS as claimed in this study. To ensure a robust improvement over the research reported herein, some further suggestions are: 1) select a representative set of universities that properly reflect the IT/AIS education currently provided in China and the U.S. Doing so requires clear selection criteria more than the ranking of the university; 2) define extra parameters that reflect the essence of IT/AIS education that are transparent to academicians, practitioners, and employers.

- Identify the best curriculum design for the AIS discipline or course development. As pointed out by Albrecht & Sack (2000), one specific area that has acute needs is to incorporate IT into accounting curriculum. While numerous studies have been conducted (Badua 2008, Chen 2007, Spathis & Constantinides 2004, Amhed 2003, Burnett 2003, Doost 2003, Bain *et. al* 2002), due to the dynamic nature of IT and business operations, there is a constant need to upgrade/revise the curriculum for Accounting Information Systems. The traditional approach in teaching AIS in one or two courses may not be sufficient to meet the upcoming needs coming from both the industry and the globalized economy. A duplication of IT subjects as covered in the MIS/CIS program is definitely not the approach to designing the AIS curriculum. Identifying topics to cover may turn out to be piecemeal work, which may not reflect the maturity of IT that has been developed to support business process integration and enterprise information processing in a collaborative environment. How AIS curriculum can be designed to max out the existing software resources using collaborative approach shall be considered.
- Assuming all other things are equal (e.g., teaching quality, market demand, and employment requirements) and China does provide more IT knowledge and skills for her accounting programs, then one immediate question needs to be answered: Does this training difference result in greater career "success" for Chinese students as compared to American students? While this study may not be easy, some careful research design with primary data collection and analysis may provide some insight into accounting curriculum design.
- Develop new pedagogy that improve the delivery of IT knowledge and skills that are suited for accounting majors. Much specific teaching pedagogy has been developed in support of AIS course delivery (Kachur 2008, David *et. al* 2003, McCarthy 2003, Stanley & Edwards 2003). The availability of emerging technologies such as Web 2.0 (O'Reilly 2005) and the Second Life (2009) provide an ideal infrastructure in support of a simulated or a game-based teaching environment for the multitasking generation. New pedagogy shall be developed to make the learning of Accounting Information Systems more effective and efficient.

CONCLUSIONS

The IT knowledge/skills covered by the top ten accounting preprograms in both China and the U.S. are compared using secondary data collected from the website (with phone verifications) of each university. Our study provides analyses on both the aggregate data (i.e., the IT/AIS course credit hours and the percentage of total credit hours in IT/AIS) and the detailed data (i.e., the classified hands-on and conceptual course

credit hours and their corresponding percentage of total credit hours). Our findings indicate that there exist differences in both the "extent" and the "content" of IT education of the top accounting programs between China and the U,S. With the simple mean value analyses using a 2×2 diagram, on average, the top Chinese accounting programs provide more credit hours and more balanced IT/AIS education than the U.S. in teaching IT knowledge/skills. Possible causes leading to these differences are discussed and further study issues are also addressed.

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