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Chinese University Students' Self-evaluation in Core Competences for the 21st Century

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Abstract

This study aimed to explore university students' perceptions on the possession of core competencies for the 21st century. A cross-sectional survey research using a self-report questionnaire involving 40 Likert-type items was used to collect data from 5,042 university students in China who voluntarily participated. Analysis with Rasch rating scale model found the data fitted the Rasch model well. The results showed that Chinese university students considered themselves as having acquired most of the competencies to some extent, especially in Character and Civic Literacy and Interpersonal Communication, but less so in Global and International Perspective and Creativity and Problem Solving.

Keywords: University Students; Core Competencies; 21st Century; Rasch Model

1 INTRODUCTION

To prepare future citizens to survive and develop in the challenging society of the twenty-first century, many countries and organisations have been searching for competency frameworks for educational systems. Among them are UNESCO, OECD, the DeSeCo symposium hosted by OECD, and major projects, such as the 21st Century Learning Outcomes Project and the Assessment and Teaching of Twenty-first Century Skills Project. In addition, there are other explorations on core competencies for the twenty-first century, such as Bok and his educational goals for future college students in his famous book, Our Underachieving Colleges (2006), and the Feasibility Study for the Assessment of Higher Education Learning Outcomes (AHELO, OECD, 2010).

Many indicators of core competencies have been set up, reflecting the requirements and expectations for future ideal citizens by individuals and communities from all walks of life. Based on the indicators of core competencies documented in the literature (e.g., Delors et al., 1996; OECD, 2010; Rychen & Salganik, 2003; Wiek et al., 2011), Mok and her colleagues proposed six domains of core competencies as the most important for twenty-first century university education in the studies of Chinese graduates (Cheng, Yeh, Liu, & Mok, 2011; Mok, Lee, Yao, Cheng, &Liu, 2011; Yao & Mok, 2018). They are basic and professional knowledge, creativity and problem solving, interpersonal communication, character and civic literacy, global and international perspective, and self-directed learning.

Comparing the rich literature on indicators of core competencies for the twenty-first century, only a few studies have considered the issues of university students' preparedness of core competencies for the twenty-first century. It is quite common that most of the scholars and researchers who proposed the core competencies seldom address the following question: do our university graduates have core competencies for the twenty-first century? Although an increasing number of studies have aimed to develop valid scales to measure university students' competencies (e.g., Coetzee, 2014; Lin et al., 2014), the reports of graduate preparedness of these competencies have remained limited.

In China, only a small amount of research has been done on the core competencies of university students, many of which focus on competencies for future career development. For example, a survey of 272 employers in Chongqing Municipality found that professional ethics, the ability to cooperate in teamwork, and extensive knowledge are highly

valued by employers, while foreign language and IT are less emphasised than before (Xiao, Liu, & Dai, 2008). Studies also reported that university students had a better mastery of subject knowledge (Ge, Zhou, Lu, & Li, 2011; Hu, Xu, Chen, & Wang, 2013), but were not good at teamwork, social adaptation, and compliance with moral constraints (Guo, Guo, & Li, 2014; Jin & Zhang, 2014; Li, 2011; Shen, Wang, & Guo, 2006). Most current studies were qualitative descriptions and lacked appropriate assessment approaches based on quantitative analysis (Lou, Zhong, & Duan, 2009).

2 METHODS

2.1 Participants

Participants for this study comprised 5,042 university students from Zhejiang Province and Macau who voluntarily participated at the study. There are 1,772 (35.1%) male students and 3,234 (64.1%) female students, while 36 students did not report their gender. There are 45.1% students from year 1, 23.1% from year 2, 19.3% from year 3, and 12% from year 4. The unbalanced gender ratio is partly a result of convenience sampling and partly a reflection of the disproportionate distribution of female and male students in the populations of the universities in the sample. The unbalanced distribution of students across year levels is mainly a result of convenience sampling.

2.2 Instruments

The 21st Century Core Competencies for Higher Education questionnaire (21CCCHE), first developed by Cheng et al. (2011) for research with university students in Taiwan, was found to have strong validity and reliability at that time and afterwards (Mok, 2011; Yao & Mok, 2016). In this study, students were invited to choose from a set of the four levels, namely, "Not at all", "To a small extent", "To a certain extent" and "To a large extent", in response to the question, "Do you think you have the following core competencies and qualities?" for each of the items. An item with a higher score indicates that the competency is rated as more adequately equipping the student than those with a lower score. The items are grouped according to six domains: (A) Basic and Professional Knowledge; (B) Creativity and Problem Solving; (C) Interpersonal Communication; (D) Character and Civic Literacy; (E) Global and International Perspective; and (F) Self-directed Learning. Except for domain E, which has 5 items, the other domains each has 7 items. Students voluntarily completed the questionnaire individually at the end of their lectures. Data collection procedures followed the ethical principles laid down by the universities of the authors.

2.3 Data Analysis

This study adopts the Rasch model (Rasch, 1960) in the analysis. Rasch model was developed to achieve objective measurement by converting ordinal raw scores into Rasch logit scores which were calibrated as interval scales. Recently, Rasch measurement has been used for assessments to measure person ability, attitudes, characteristics, and other personal traits particularly in psychological and educational settings, and widely applied in large scale assessments, such as the Programme for International Student Assessment (PISA) and the International Civic and Citizenship Education Study (ICCS). In this study, students' responses were analysed by fitting the rating scale Rasch model (Andrich, 1978) with computer program Winsteps (version 3.81.0) (Linacre, 2014). The analysis first reports the extent to which the items fitted the Rasch model, and then addresses the main research question by giving a profile of university students' self-ratings on competencies for the twenty-first century.

3 FINDINGS

3.1 Rasch Reliability, Item Fit and Item Difficulty

The analysis found that the assessment had a Rasch item reliability of 1.00, an item separation index of 21.03, a Rasch person reliability of 0.92, and a person separation index of 3.34. Both item and person reliabilities are statistically high suggesting an excellent reliability of the assessment (Linacre, 2014). The item separation index 21.03 means that the items can be separated into nearly 21 groups according to responses by the students. As to the person separation index, approximately three student groups can be separated by items. The internal consistency index of Cronbach's alpha is 0.96, indicating that the scale has a high degree of internal consistency.

The results show that these 40 items have Infit and Outfit MNSQ values ranging from 0.81 to 1.36, indicating a good fit to the Rasch Rating Scale model according to the criterion recommended in the literature (Linacre, 2014). In Table 1, the item difficulty estimated values are listed in the first column, ranging from -1.18 (item CC1: "Positive personality") to 0.76 (item PS2: "Self-potential development"). In this study, the larger the estimate of item difficulty, i.e., the more difficult an item is, the less sufficiency is attached to possessing a certain competency.

TABLE 1 ITEM PARAMETER ESTIMATES AND FIT STATISTICS

			Infit		Outfit	
Item	Measure	SE	MNSQ	ZSTD	MNSQ	ZSTD
Basic & Professional Knowledge (BK)						
1. Professional knowledge	0.66	0.02	1.35	9.90	1.36	9.90
2. Ability to express in writing	-0.17	0.02	0.82	-8.88	0.82	-9.23
3. Capacity for empirical deduction	0.28	0.02	0.86	-6.78	0.87	-6.24
4. Capacity for IT application	0.34	0.02	0.94	-3.08	0.94	-2.84
5. Capacity for logical analysis	-0.10	0.02	0.84	-7.87	0.84	-7.92
6. Ability for critical thinking	-0.08	0.02	0.95	-2.43	0.93	-3.18
7. Decision making	0.04	0.02	0.82	-9.02	0.82	-9.24
Creativity & Problem Solving (PS)						
1. Creativity	0.71	0.02	0.97	-1.26	0.99	-0.70
2. Self-potential development	0.76	0.02	0.94	-2.98	0.95	-2.25
3. Imagination	-0.03	0.02	1.04	2.09	1.04	1.92
4. Keen observation	0.14	0.02	0.98	-0.94	0.97	-1.29
5. Attitude for innovation and change	0.48	0.02	1.01	0.53	1.01	0.61
6. Adventurous spirit	0.62	0.02	1.20	9.23	1.22	9.90
7. Problem solving skills	-0.18	0.02	0.81	-9.51	0.81	-9.90
Interpersonal Communication (IC)						
1. Attitudes of respect and tolerance	-1.12	0.03	1.12	5.61	1.12	5.29
2. Verbal ability	-0.20	0.02	0.87	-6.56	0.87	-6.64
3. Ability to listen to others	-0.92	0.03	1.07	3.28	1.04	1.82
4. Ability to manage emotion	-0.31	0.02	1.10	4.61	1.09	4.35
5. Ability to work in team	-0.58	0.03	1.01	0.54	0.99	-0.45
6. Leadership and coordination	0.38	0.02	1.02	1.05	1.02	0.72
7. Ability to interact	-0.28	0.02	1.00	-0.15	0.97	-1.21
Character & Civic Literacy (CC)						
1. Positive personality	-1.18	0.03	1.20	9.18	1.16	6.56
2. Humanities and art appreciation	0.27	0.02	1.00	0.05	1.01	0.42
3. Empathy and moral standard	-0.96	0.03	1.09	4.43	1.07	3.22
4. Respect human rights and freedom	-1.04	0.03	1.05	2.48	1.04	1.62
5. Practice democracy and justice	0.19	0.02	1.15	6.87	1.15	6.88
6. Ability for social participation	0.08	0.02	1.00	0.12	1.00	-0.21
7. Ability for value judgment	-0.62	0.03	0.89	-5.39	0.87	-6.28
Global & International Perspective (GI)						
1. Capacity for second language	0.33	0.02	1.00	0.06	1.02	0.90
2. Open vision	0.08	0.02	0.91	-4.56	0.90	-5.10
3. Respect for cultural diversity	-0.45	0.03	1.04	2.01	1.02	0.99
4. Familiar with international affairs	0.74	0.02	1.09	4.08	1.10	4.60
5. Concept of global village	0.62	0.02	1.19	8.74	1.21	9.32
Self-directed Learning (SD)						
1. Capacity for independent study	0.19	0.02	0.97	-1.57	0.95	-2.24
2. Set learning goals and strategies	0.13	0.02	0.96	-1.88	0.95	-2.24
3. Control learning process	0.27	0.02	0.92	-4.04	0.92	-4.06
4. Manage learning environment	0.39	0.02	0.95	-2.35	0.95	-2.26
5. Ability to use learning resources	-0.04	0.02	0.86	-7.11	0.86	-7.11
6. Reflect on learning effectiveness	0.24	0.02	0.95	-2.21	0.95	-2.67
7. Ability to assess learning outcomes	0.31	0.02	0.96	-2.07	0.95	-2.20

3.2 University Students' Self-ratings on Competencies for the Twenty-first Century

The Rasch measurement provided item difficulty estimates for all the 40 items of the 21CCCHE scale, which represented students' perceptions on the possession of these 40 core competencies. According to the values of item difficulty estimate (see Table 1), students rated "Positive personality" (Item CC1), "Attitudes of respect and tolerance" (Item IC1), "Respect human rights and freedom" (Item CC4), "Empathy and moral standards" (Item CC3), "Ability to listen to others" (Item IC3), "Ability for value judgments" (Item CC7), and "Ability to work in a team" (Item IC5)

as sufficiently possessed competencies. The Item CC1, Item IC1 and Item CC4 each received a value above the average by one logit, and the other four items each got a value above the average by 0.5 logits. On the contrary, the top six competencies that students considered they possessed insufficiently are "Self-potential development" (Item PS2), "Familiar with international affairs" (Item GI4), "Creativity" (Item PS1), "Professional knowledge" (Item BK1), "Concept of global village" (Item GI5), and "Adventurous spirit" (Item PS6). According to the rule of thumb suggested by DeMars and Linacre (2004), this study chose 0.5 logits as a cut-point for determining the sufficiently possessed and the insufficiently possessed competencies.

Table 2 reports frequency counts (percentages) for each response option in the 21CCCHE scale. It can be seen that, in general, students perceive themselves as having acquired most of the competencies to some extent. The average percentage of responses associated with "Not at all" (scored as 1) is 2.9%. Note that "Professional knowledge" had the largest percentage of 8.6%, which will be discussed in the next section. In contrast, the figures of responses associated with "To a certain extent" (scored as 3) and "To a large extent" (scored as 4) are 52.7% and 20.6%, respectively. The option of "To a small extent" (scored as 2) ranges from 4.7% to 25.6%, indicating that some competencies, such as "Familiar with international matters" (25.6%), "Develop self-potential" (25.4%), "Adventurous spirit" (25.0%), "Creativity" (24.4%), and "Attitude for innovation" (22.0%), to name a few, are perceived as not well-possessed. The percentage of missing values is around 3.2%, which suggests that the majority of the items are competencies relevant to the students. As Table 2 shows, students perceive themselves as having possessed most of the competencies listed in the 21CCCHE scale to some extent. On average, these competencies received 80% agreement as possessed by the respondents to either a certain extent or a large extent, suggesting that they generally considered themselves having a better mastery of these competencies.

TABLE 2 PERCENTAGES (%) OF OPTIONS ON 21CCCHE SCALE ITEMS

	Item	Options				
		Not at all 1	To a small extent 2	To a certain extent 3	To a large extent 4	Missing
Average Over All Items		2.9	16.6	52.7	20.6	3.2
A.	**Basic & Professional Knowledge**					
1	Professional Knowledge	8.6	15.1	53.0	18.1	5.3
2	Ability to express in writing	1.8	7.8	61.5	26.8	2.1
3	Capacity for empirical deduction	2.8	14.0	58.9	19.5	4.8
4	Capacity for IT application	3.4	15.7	56.1	20.2	4.6
5	Capacity for logical analysis	2.2	9.2	59.0	26.5	3.2
6	Ability for critical thinking	2.7	10.6	55.4	28.2	3.2
7	Decision making	2.4	11.6	57.3	24.8	4.0
B.	**Creativity & Problem Solving**					
8	Creativity	4.4	24.4	49.8	16.7	4.7
9	Develop self-potential	4.4	25.4	48.4	16.2	5.7
10	Imagination	2.5	13.2	52.7	28.8	2.8
11	Keen observation	2.9	16.2	50.6	26.7	3.7
12	Attitude for innovation	3.7	22.0	48.8	21.5	4.0
13	Adventurous spirit	5.0	25.0	44.2	22.0	3.8
14	Problem-solving skills	1.8	9.5	56.4	28.8	3.5
C.	**Interpersonal Communication**					
15	Attitudes of respect and tolerance	1.3	4.7	40.2	51.2	2.5
16	Verbal ability	1.9	9.5	56.8	29.7	2.2
17	Ability to listen to others	1.5	5.4	43.8	47.0	2.3
18	Ability to manage emotions	2.2	10.5	49.8	34.8	2.8
19	Ability to work in a team	1.8	7.9	47.9	40.0	2.4
20	Leadership and coordination	4.2	19.1	50.0	23.2	3.5
21	Ability to interact	2.4	10.4	50.3	33.8	3.2
D.	**Character & Civic Literacy**					
22	Positive personality	1.2	5.2	37.9	53.4	2.3
23	Humanities and art appreciation	3.3	15.9	54.9	22.5	3.5

24	Empathy	1.4	4.8	44.5	47.6	1.7
25	Respect human rights	.9	5.1	42.8	49.2	2.0
26	Practise democracy	3.3	17.3	49.0	26.7	3.7
27	Ability for social participation	2.5	14.4	53.9	26.5	2.7
28	Ability for value judgment	1.3	6.0	51.2	38.4	3.1
E.	**Global & International Perspective**					
29	Capacity for second language	3.6	15.0	58.3	20.4	2.7
30	Open vision	2.4	14.0	55.2	25.5	3.0
31	Respect for cultural diversity	1.7	8.7	50.0	36.6	2.9
32	Familiar with international matters	5.3	25.6	48.4	17.9	2.8
33	Concept of global village	5.7	21.1	49.7	19.4	4.2
F.	**Self-directed Learning**					
34	Capacity for independent study	3.1	16.1	53.5	24.8	2.5
35	Set learning goals	2.5	16.1	53.6	25.9	1.9
36	Control learning process	2.9	17.5	54.0	23.2	2.5
37	Manage learning environment	3.3	19.5	53.0	21.5	2.7
38	Ability to use resources	2.0	12.1	56.7	27.0	2.2
39	Reflect on learning effectiveness	2.8	18.1	52.0	24.7	2.5
40	Ability to assess learning outcome	3.3	18.0	52.4	23.1	3.1

Fig. 1 shows students' perceptions on the possession of core competencies in 21CCCHE by six domains. The relative importance can be ranked by the within-domain averaged difficulty measures. The results show that there is no specific domain in which all the items are higher or lower scored than the other domains. Nevertheless, the relative adequacy can be ranked by the within-domain averaged difficulty measures. In descending order, they are Character and Civic Literacy, Interpersonal Communication, Basic and Professional Knowledge, Self-directed Learning, Global and International Perspective, and Creativity and Problem Solving.

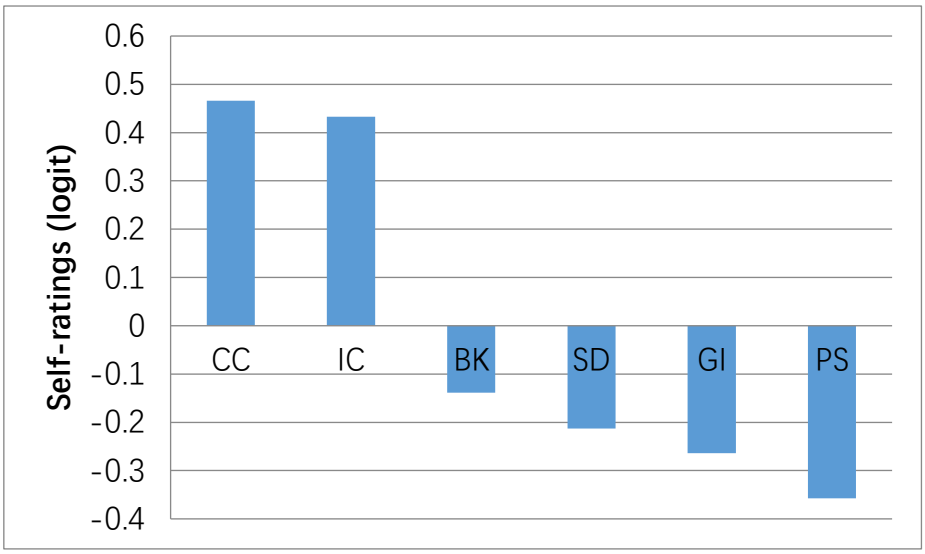

FIG. 1 SELF-RATINGS (AVERAGE) OF SIX DOMAINS

4 DISCUSSION

This study aims to gain a relatively explicit understanding of students' preparedness of core competencies for the twenty-first century by a self-report questionnaire with the question: How do university students rate themselves on core competencies for the twenty-first century? Results show that students perceived themselves as having acquired most of the competencies to some extent, but their evaluation of university education in developing core competencies was less positive. It should not be too optimistic about the high self-rating scores on each competency, since the evidence shows that self-assessment generally tends to overestimate (Breidert & Fite, 2009; Mattheos, Nattestad, Falk-Nilsson, & Attstrom, 2004).

Although self-assessment is regarded as less objective and precise than psychometric approach such as performance

test, there are two reasons for this study to adopt the method. First, it is unfeasible when a large number of competencies are tested simultaneously, not to mention that some of these competencies are lack of acknowledged instruments in existence, such as "creativity". Second, the students' perspective is very important because students are the key stakeholders of education. Once the perspectives of students have been ignored as the "missing perspective", and nowadays experts and researchers argue that students should have more engagement and perform as "active agents". In the process of policy making and instruction implementation, it is of great importance to take students' perspectives of their own development into account since they are one of the key stakeholders of education.

This study found that students rated themselves the best candidates in possessing the competence groups of Character and Civic Literacy and Interpersonal Communication. It is comforting that, in China, the long-cherished traditional virtues such as good character and moral standards are still valued by today's university students, and are even regarded as the most important competencies. In addition, competencies such as "Attitudes of respect and tolerance", "Ability to work in a team", "Humanities and art appreciation", "Verbal ability", "Empathy and moral standards", "Ability for value judgments" and "Sense of responsibility" are highly valued, which implies that contemporary students generally have high interpersonal awareness and moral civil consciousness. This result is not only in line with the previous research, but also meets the social expectation for high quality graduates with all-round development in China (Yang, 2013).

Students rated themselves at the medium level of mastery in the competence groups of Basic and Professional Knowledge and Self-directed Learning which are highly recommended as indicators for twenty-first century core competencies (Binkley et al., 2012; Delors et al., 1996; Rychen & Salganik, 2003; Wiek et al., 2011). Students' ratings show that modern university students still pay attention to knowledge and scientific learning methods, which conforms to the demands of the new era requiring graduates to possess sufficient knowledge and adopt life-long learning. It is encouraging to see that university students give priority to character and morality over knowledge. For a long time, the classical Confucian saying "a good scholar will make an official career" has encouraged generations of young people to invest their energy in study, to gain as much book knowledge as possible. The traditional teaching model in China has emphasised the accession of knowledge and ignored other aspects of talent cultivation (Guo & Nie, 2014; Ma, 2006). Recently, there has been increasing criticism of the traditional overemphasis on subject knowledge within the area of university education. Concerns arise about the quality of university students, and educational reforms are planned and practised under the government's support (MOE, 2012). As young university students in the twenty-first century, they should integrate new psychological and ideological changes caused by the new era and present new features of quality valued by society.

The competence domains of Global and International Perspective and Creativity and Problem Solving were rated as the lowest level of mastery among the six domains. It is not surprising that creativity and problem solving were ranked lower than some core competencies such as basic and professional knowledge. Since in Chinese university, the excessive emphasis on subject knowledge has caused the ignorance of other aspects of students' development (Ma, 2006; Yao, 2010). Although there are studies and education reform concerning students' creativity and problem solving skills, maybe the emphases from researchers and educators have not turned into students' needs. It echoes the view that there are gaps between perspectives of the institutional systems and those of individual students (Haigh & Clifford, 2011). As to the competencies of globalisation and internationalization, although they have attracted worldwide attention and affected national politics, economy and culture (Brodin, 2010; Li, 2013), they may have little effect on university campuses and students because of the exclusivity of the university. Some of the students may be too short-sighted to realise the importance of the global and international perspective because they live in a small and affluent place.

In addition, this study also contributes to theoretical and practical work in related domains, such as policy decisions and education references on university education. For example, it helps for universities to get an overall understanding of students' perceptions of core competencies for the twenty-first century, which could serve as the basis for teaching and learning and ensure the development of desired competencies. Moreover, it may strengthen the responsibility, self-awareness and reflection of participating students for their further development, and encourage teacher participants to reflect on their teaching and research.

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