

REQUIRED GRADUATE ATTRIBUTES IN HONG KONG AND THEIR RELATIVE IMPORTANCE

Tilo Li, EdD

Tung Wah College, Hong Kong

Abstract

Massification of higher education in Hong Kong and elsewhere has triggered public's concern about the possible fall or already falling in its quality. To gauge higher education quality, a set of quantifiable attributes is needed. The purposes of this study are to construct a quality hierarchy for higher education consisting of dimensions, aspects, and items; and prioritize attribute aspects and items among stakeholders – employers, academics and college administrators, college graduates, and tertiary students. A total of 530 questionnaires were collected. Ordinal Likert scale data were converted into interval-ratio logits using Rasch models with the computer software Winsteps. Multidimensionality was found using Rasch analysis and linear factor analysis. Different stakeholder groups had different views on quite a few attributes. For example, employers ranked 'sense of responsibility and commitment'; academics and graduates ranked 'problem-solving ability', and students ranked 'expression of ideas in oral English' the most important. This may explain why students at times complain about having to take courses outside their discipline and provides insight to college program developers how to align different perspectives of stakeholders.

Keywords: graduate attributes, higher education quality, quality attribute hierarchy, quality attribute rankings

Introduction:

The higher education sector in Hong Kong has been changed dramatically in the last two decades. It has been shifted from an elite 'ivory tower' university system to a mass education system (Mok, 2007) or a universal system (Wan, 2011). This structural change has come from both the public and private sectors. In particular the latter has grown rapidly since the early 2000s when the former Chief Executive Tung Chee Hwa set a policy objective to provide higher education places to 60 per cent of secondary school-leavers (Tung, 2000). The massive increase in the supply of higher education places exceeded the demand since the academic year

2005/2006 (Education Bureau, 2008). The unfilled places topped at 6,222 for the academic year 2014/14 (see Table 1 below).

Due to massification of higher education as if in other developed economies, the possible slide in its quality appears to be a universal problem. It has alarmed policy-makers in Hong Kong (Education Bureau, 2008) and elsewhere in the world (Hersh & Benjamin, 2010; Organisation for Economic Co-operation and Development, 2001; U.S. Department of Education, 2006; Wilson, 2010). This quality issue has also raised serious concerns from employers in Hong Kong (Chow, 2004; Hong Kong Lawyer, 1997) and other countries (Hassim et al., 2004; Henderson, 2011), educators and academics worldwide (Brown, 2010; Crumbley, Flinn & Reichelt, 2010; Dill, 2005; Li, 2010; Lomas, 2002; Lui & Suen, 2005; Sadler, 2009; Tam, 1999; Wan, 2011; Zhou & Xie, 2006). Wan (2011) alleges that in Hong Kong the number of quality university graduates has been decreasing.

The aim of this paper is to identify required attributes local graduates should possess, group these attributes into different dimensions, and rank their relative importance among different stakeholders.

The next section provides an overview of the higher education sector in Hong Kong, followed by discussion of graduate attributes, research methodology of this study, results and discussion of findings.

An Overview of the Hong Kong Higher Education Sector:

According to the Education Bureau (2015a), there are 10 government-funded higher education institutes. They are the eight University Grants Committee-funded (UGC-funded) institutes (collectively the “Big 8”), the Hong Kong Academy for Performing Arts (“HKAPA”) funded by the Home Affairs Bureau, and the Vocational Training Council (“VTC”) funded by the Education Bureau (“EDB”) and Labor and Welfare Bureau.

The UGC provides the Big 8 annually an average of 15,000 first-year-first-degree subsidized entry places (Education Bureau, 2015b) accommodating approximately 18 per cent of the total demand for tertiary education places from the 17-20 age cohort comparing with only 2 per cent in the 1970s (Wan, 2011). Yet, they are far below the 60 per cent objective. Students, who are not offered places by the Big 8, choose self-financing programs. A two-tier tertiary education system has gradually been developed. The UGC-funded programs are perceived as superior to self-financing programs. Notwithstanding the inferior perception of the general public the role that self-financing programs plays is increasingly crucial.

In the private sector, as of October 2015, there are 20 self-financed institutes offering various locally accredited sub-degree programs and 14 offering locally accredited degree programs. In addition, there are about 450 non-local registered and 740 non-local exempted programs (Education

Bureau, 2015c) from Australia, Canada, Mainland China, the Philippines, the United Kingdom, the United States and other countries. Non-local registered programs are overseas programs delivered in Hong Kong through a non-self-accrediting institute. Non-local exempted programs are overseas programs delivered through a self-accrediting institute, the Big 8. These programs are not locally accredited unless they have gone through the accreditation process with the Council for Academic Accreditation and Vocational Qualifications.

The higher education reform in the last two decades has been focusing on quantity instead of quality. In some years, excess supply (see Table 1) has intimated some self-financing institutes to admit students without meeting the minimum entrance requirements (Wan, 2011). Students may have become a profitable ‘dim sum’ of these institutes (Chan, 2012). The figures in Table 1 include places offered by the Big 8, HKAPA, VTC, Big 8’s continuing education arms, publicly-funded and self-financing sub-degree places. The excess supply since 2005/06 academic year has been substantial, and it topped in the academic year 2013/14. Given the input-output relationship (Blackmur 2010; Harvey & Green, 1993), it is skeptical how higher education institutes can possibly turn such a large amount of students into high quality graduates.

Institutes are allowed a quota for admitting students without meeting the minimum academic requirements. College admissions classify this as ‘special admission’ or ‘non-standard entry’ or alike. For example, mature students having several years of relevant work experience can be admitted; candidates having merits from other non-academic areas such as sports may also seek special admission.

Table 1: Supply of and Demand for Higher Education Places

Academic Year	Supply of Places	Actual Intake	Unfilled Supply
2000/01	24,047	23,758	289
2001/02	27,756	27,939	-183
2002/03	31,113	31,764	-651
2003/04	34,873	34,659	214
2004/05	41,971	42,822	-851
2005/06	49,382	45,779	3,603
2006/07	50,139	47,062	3,077
2007/08	52,832	49,696	3,136
2008/09	53,958	49,559	4,399
2009/10	54,015	53,621	394
2010/11	53,647	56,869	-3,222
2011/12	50,972	54,287	-3315
2012/13	80,975	81,694	-719
2013/14	62,115	55,893	6,222
2014/15	61,792	56,908	4,884

Source: University Grants Committee of Hong Kong (2010). 2000/01 – 2008/09; Luk (2015). 2009/10 – 2014/15.

The 2012/13 intake marked another structural change in higher education of Hong Kong. Bachelor degrees became four years instead of three; secondary school education became six years instead of seven. The Hong Kong Certificate of Education Examination for Form 5 students ended in 2010; the Hong Kong Advanced Level Examination for Form 7 students ended in 2012; the Hong Kong Diploma of Secondary School Examination for Form 6 students began in 2012. The 3-3-4 system (3 years junior forms, 3 years senior forms, and 4 years bachelor's degree) similar to North America and mainland China substituted the former 5-2-3 system (5 years secondary school forms, 2 years matriculation forms, and 3 years bachelor's degree) similar to the British since 2012.

Falling Quality of Higher Education:

In early March 2010, American President Obama warned the falling education standards of the United States, and the country was not producing the highest proportion of college graduates among wealthy nations (Wilson, 2010). Hersh and Benjamin (2010, p. 1) report that in the United States, 'more than half of college graduates cannot calculate the change from \$3.00 for a \$1.95 sandwich and a cup of soup for 60 cents.' In the United Kingdom, Henderson (2011, p.1) points out that education quality has been damaged fundamentally. Many pupils are 'functionally illiterate'; they do not have adequate knowledge in the basic 3Rs (reading, writing, and arithmetic). Many of them are unable to do simple arithmetic.

In Hong Kong, there are serious concerns (Education Bureau, 2008; Wan, 2011) about the quality of the sub-degree sector. Some even have suggested common benchmarks for all course providers to ensure quality standard (Education Bureau, 2008). Course providers are called to pay special attention to the exit standards. Although no qualified child should be left behind, there is a general consensus that colleges should adopt the 'lenient entry, stringent exit' principle (Education Bureau, 2008, p.58; Education Bureau, 2009, p.7).

In Hong Kong for many years, higher education institutes have adopted norm-referencing grading system that passes and graduates relatively better students. Although outcomes-based in assessing and measuring students' performance is adopted, institute management or academics moderate grades if the overall final grade distribution does not look good. They are reluctant to fail too many students for doing so may and can be interpreted as incapability of the instructor. Student intake is rarely blamed. As a result, college management and academics hesitate to fail students. This leads to the issue of grade inflation. Higher grades are awarded without the corresponding higher academic achievement. Grade inflation leads to credential inflation (Kariya, 2011) that contributes partially

to educated unemployment or underemployment (Wan, 2011). Sub-standard graduates having graduated through grade inflation are simply not prepared to take the challenge in the labor market. They then fall into the opportunity trap (Brown, 2003, 2007, Kariya, 2011).

Attributes to Quality Higher Education:

Blackmur (2010) alleges that quality in tertiary education has not been adequately conceptualized. He further comments that if there is no consensus in the definition of quality education, quality or quality assurance should not even be discussed. People are simply talking about different things.

Education quality is a slippery concept (Harvey & Green, 1993). It is conceptualized differently among different people (Harvey & Williams, 2010; Mok, 2007, Parri, 2006; Tam, 1999). Definitions of education quality from different literatures (Gibbs, 2010; Hager & Holland, 2006; Hersh & Benjamin, 2010; Lomas, 2002; Sarbu, Ilie, Enache, & Dumitriu, 2009; Storen & Aamodt, 2010) include excellence, fitness for purpose, transformation, value for money, perfection, and value-added. These definitions are not mutually exclusive (Fornari & Pompili, 2010). An excellent graduate could have been transformed, added-value, and fitness for purpose.

The conceptual framework of a quality hierarchical construct as depicted in Figure 1 provides guidelines for a top-down design of courses in a program curriculum. From the figure, quality dimensions consist of different aspects that are contributed by different items. Given the required attribute items, college program designers will ensure all items planted in different courses of a program. They can also prioritize and assign different weights of attribute items in the courses of a program aligned with their relative importance rankings. Colleges and universities can conduct employers' survey asking for opinion of their graduates' performance and the required graduate attributes for improvement as if surveys conducted by the Education Bureau (2010a, 2010b). Similar data can be collected from academics, graduates, and students. Quality dimensions, aspects, and attribute items will be reviewed for possible curriculum change in response to changing demands of the evolving world.

Comparing Figure 1 to a learning outcome hierarchy, quality dimensions are analogous to a college's mission statement; quality aspects are similar to program intended learning outcomes ('PILOs'); quality attribute items are matched with the course intended learning outcomes ('CILOs'). The flow goes as follows: students take different courses in a program attaining different CILOs (quality attribute items attained). Achieving different CILOs makes students attain PILOs (quality aspects).

The collective fulfillment of PILOs satisfies the mission statement (quality dimension) so that students will graduate with the required attributes.

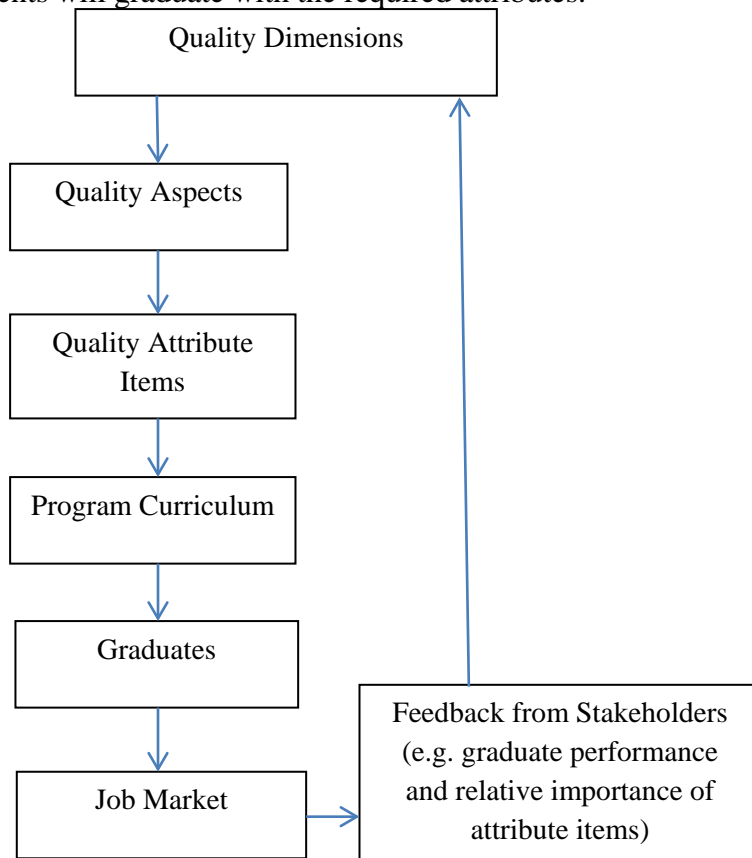


Figure 1: Quality Dimensions and Flow of Quality Attributes

Hughes and Barrie (2010, p. 325) define graduate attributes as ‘an articulation of the core learning outcomes of a university education’. Core learning outcomes consist of a set of skills. In general, the chain of articulation of core learning outcomes can be explained by Figure 1.

Hager and Holland (2006) in their book has a collection of papers from different authors exploring into graduate attributes, learning, and employability. Graduate attributes are also named graduate qualities, graduate competencies, or graduate skills. Whatever they are called, they are the employability skills. The authors list three skill types (generic, core, and basic) that have increasingly gained attention. Generic skills, visible or non-visible, refer to some kind of soft, personal skills that are inter-disciplinary, transferrable across different disciplines (Winch, 2006). Body language in interpersonal communications is visible, but analytical reasoning abilities are invisible.

In the list of Hager and Holland (2006, p. 2), generic skills or attributes include ‘logical and analytical reasoning, problem solving, and intellectual curiosity; effective communication skills, teamwork skills, and capacities to identify, access and manage knowledge and information; personal attributes such as imagination, creativity and intellectual rigor, and values such as ethical practice, persistence, integrity and tolerance.’ Some of these skills cannot be improved through practice. The list is by no means exhaustive and universal. Employers typically require ‘ability to work flexibly as part of a team, the ability to work autonomously, capacity to adapt to change, (and) ability to work creatively’ (Hager & Holland, p. 4).

Makulova et al. (2015) summarize graduate competences as the ability to process information, to solve problems, to think critically, to communicate in both native and foreign languages, to learn throughout life, and to participate in the political or civil life. While the last competency is different from other academics, other competencies are similar to authors mentioned above.

Glover and Hope (2015) point out that it is very difficult, if not impossible, to predict skills required in the workplace in the future. Technical skills learned today may become obsolete. Individuals must possess cross-discipline knowledge and develop soft, collaborative skills.

Although generic skills are different from disciplinary-specific knowledge, it is difficult to draw a clear-cut line between the two (Winch, 2006). For example, a social science research course teaches students to conduct research in the social science context. However, if the skills acquired from the course are applied in a different context, the course knowledge is transferrable; it is also generic. Basic language skills (English) help disciplinary skills (a course in business communication) that enhance generic skills (communication skills). Therefore, regardless of how we categorize a skill or an attribute, many skills or attributes are inter-related.

In the United States, the American Management Association (2010) has identified skills required for workers in the 21st century. These skills include the traditional skills in reading, writing, and arithmetic (known as the 3Rs). The association also has identified the 4Cs – critical thinking, communication, collaboration, and creativity as the must-learn skills.

In Hong Kong in April 2010, the Education Bureau (2010a, 2010b) published reports on opinions of 961 HKSAR employers of local sub-degree graduates of 2006 from 18 higher education institutions, and 1,972 local employers of bachelor degree graduates of 2006 from the Big 8. Rankings of the two most important skill aspects are the same for sub-degree and bachelor degree graduates. Chinese is surprisingly ranked more important than English for sub-degree graduates, but English is more important than Chinese for degree graduates.

In Australia, Queensland Department of Education Training and the Arts (2007) publishes a list of employability skills including communication, teamwork, problem-solving, initiative and enterprise, planning and organizing, self-management, learning, and technology. These skills must be embedded into training packages of the National Quality Council of Australia. Shah and Chenicheri (2011) list the key attributes of graduates that Australian employers look for. The four ability areas include personal, interpersonal, intellectual, as well as generic and specific skills and knowledge. They had approached 880 Australian employers and collected 400 valid responses. Among the top 10 important attributes, 4 are from personal abilities, 3 from interpersonal abilities, 2 from generic skills and knowledge, and 1 from intellectual abilities.

In Canada, the Conference Board of Canada (2000) lists 3 major skill areas in 11 groups of employability skills for the 21st century. These skills are fundamental skills (communication, information management, numbers, critical thinking and problem-solving), personal management skills (positive attitude and behavior, be responsible, adaptable, learning, and work safety), and teamwork skills (work with others, participate in projects and tasks).

Among developed economies, the Organization for Economic Co-operation and Development (2001) report, covering 16 European countries, Australia, Canada, Japan, New Zealand, and the United States, has published a list of graduate competencies for the 21st century. In addition to the 3Rs, graduates need to be equipped with the following three areas of competencies: interpersonal skills, intrapersonal skills, as well as information and communication technology skills. The report indicates that the world is moving towards a knowledge-based economy, and the workforce is 'upskilling'. Employers weight interpersonal and intrapersonal skills more than learned skills. In particular, employers rank initiative, motivation and communication skills as the most important competencies. They generally believe that job-related skills can easily be learned if new hires have good motivation and personal qualities.

Although graduate attributes are named differently among different studies across countries, a synthesis of these attributes will find that the coverage of EDB's studies is comprehensive.

The following sections will characterize different graduate attributes into different dimensions and rank the relative importance of them so as to answer the research questions. First, what are the quality dimensions and their respective attributes that our graduates should possess? Second, do stakeholders rank the quality attributes differently?

Methods:

Population, Sample Size, and Questionnaire Items:

The population of the study includes four stakeholder groups. Stratified sampling method has been used with their respective sample sizes listed in brackets:

1. Employers ($n = 59$)
2. Academics and college administrators ($n = 57$)
3. College graduates ($n = 75$)
4. Current tertiary students ($n = 339$)

The sample size was set following the Rasch tradition that normally has several hundred (Green & Frantom, 2002; Kubingerm, Rasch & Yanagida, 2009). Linacre (2011) does not specify the minimum sample size for using the Rasch model, but suggests 100 persons for Principal-Components Analysis (Rasch Factor Analysis) of items. The aggregate sample size for the current study is 530 persons with 46 items that are justified for using the Rasch model.

Each questionnaire contains 46 attribute items in 9 aspects adopted from the Education Bureau (2010b, p.5) study. The aspects and items are reproduced below:

- A. Chinese Language Proficiency
 - Expression of ideas in
 1. Written Chinese
 2. Cantonese
 3. Putonghua
 - Comprehension in
 4. Written Chinese
 5. Cantonese
 6. Putonghua
- B. English Language Proficiency
 - Expression of ideas in
 7. Written English
 8. Oral English
 - Comprehension in
 9. Written English
 10. Oral English
- C. Numerical Competency
 11. Comprehension of data
 12. Application of data
- D. Information Technology Literacy
 13. Use of standard computer software
 14. Adaptability to new software

15. Ability to make use of the internet and intranet to facilitate work and business
16. Locate, gather and organize information using appropriate technology and information systems
- E. Analytical and Problem-solving Abilities
 17. Common sense
 18. Foresight
 19. Analytical mind
 20. Problem-solving ability
 21. Creativity
 22. Ability to implement solution and act on opportunities for improvement
 23. Judgment
- F. Work Attitude
 24. Sense of responsibility and commitment
 25. Ability to work independently
 26. Perseverance
 27. Initiative and drive
 28. Receptivity and adaptability to new ideas and environment
 29. Professional/business ethics
- G. Inter-personal skills
 30. Inter-personal relationship
 31. Team work
 32. Negotiation and communication skills
 33. Able to accept and provide feedback in a constructive and considerate manner
 34. Able to manage and resolve conflict when appropriate
- H. Management skills
 35. Organization of work
 36. Management of staff
 37. Leadership
 38. Able to motivate team-members
 39. Management of available resources and ability to seek resources and assistance
- I. Technical skills required for the job
 40. Technical knowledge
 41. Ability to handle technical demands in work
 42. Ability to solve technical problems
 43. Ability to select and use appropriate tools and technology for a task or project
 44. Able to work to agreed quality standards and specification

45. Aware of occupational health and safety practices and procedures, and act in accordance with these

46. Relevant work experience gained as part of the study program

The last item 'relevant work experience gained as part of the study program' was added for the study. The validity of items is unquestionable since the EDB items are comprehensive comparing with similar studies from other countries and descriptions of graduate attributes in Hager and Holland (2006).

Data Collection and Analysis:

Primary data were collected through an online program my3q.com in which a questionnaire had been uploaded. Respondents were requested to fill in the questionnaire through personal and work email accounts and Facebook with a link. Respondents simply had to click the link, and they were directed to the online my3q.com questionnaire. Respondents were also requested to forward the email to their acquaintances and share the my3q.com questionnaire link through their Facebook accounts.

Hard copies were given to and collected from other respondents. Data from hard-copies were also entered into my3q.com that provides a response summary in Excel format. A total of 541 questionnaires were collected. Among which 377 (70%) were done online and 164 (30%) were hard-copies. There were 11 (2%) invalid questionnaires – 5 null and 6 extreme-value questionnaires. A total of 530 (98%) questionnaires were finally used.

Primary Likert-scale data collected in Excel were coded, exported to Winsteps (Bond & Fox, 2007; Linacre, 2011), converted into Rasch person measures in logits, and then analyzed by Winsteps and SPSS (Norusis, 2006). Item measures for the whole sample (N = 530), and for the 4 stakeholder groups were run. Since the EDB has targeted only employers in its surveys, this study has widened the coverage by including other stakeholders. This study has not only ranked the relative importance of quality attribute aspects and attribute items of local graduates among stakeholders, but also found the discrepancy between the views of employers and other stakeholders.

To answer my first research question concerning the quality dimensions, SPSS Factor Analysis (Norusis, 2006), Principal Component Analysis with rotation: Varimax with Kaiser Normalization was used to factor dimensions. For multidimensionality of items, Rasch Factor Analysis (Bond & Fox, 2007; Linacre, 2011; Wang, 2010) was used. SPSS Factor Analysis categorizes similar items into groups, while Rasch Factor Analysis identifies multidimensionality.

For the second research question concerning differences among stakeholders, comparison of attribute rankings by their logits values was

done. Person-item maps for the four stakeholder groups were combined into one map for each dimension (Figures 2 and 3).

Different stakeholder groups might hold very different views on an attribute (item), which is referred to as differential item functioning (DIF). For an item to exhibit noticeable DIF, the difference in the mean difficulties (effect size) between stakeholder groups should be at least 0.5 logits and the p-value smaller than 0.05 (Linacre, 2011).

Results and Discussions:

SPSS factor analysis identified two dimensions for the nine attribute aspects for the sample ($N = 530$). Rotation converged in three iterations with their communalities shown in Table 2.

The communality is ‘the proportion of the variance that is explained by the common factors’ (Bartholomew et al., 2002, p. 153). It is obvious from Table 2 that there are two factors/dimensions. The total variance explained by the first two components is 55.73% (printouts not reproduced). The first component has an eigenvalue of 3.81 explaining 42.31% of total variance; the second component has an eigenvalue of 1.21 explaining 13.42% of total variance.

Table 2: Rotated Component Communalities

	Component	
	1	2
Inter-personal Skills	0.825	0.104
Work Attitude	0.811	0.153
Management Skills	0.758	0.192
Analytical and Problem-solving Abilities	0.742	0.296
Technical Skills or Major Subject(s) Knowledge required for the Job	0.612	0.181
English Language Proficiency	0.153	0.735
Numerical Competency	0.063	0.718
Chinese Language Proficiency	0.188	0.618
Information Technology Literacy	0.383	0.583

Dimension 1 includes Inter-personal Skills, Work Attitude, Management Skills, Analytical and Problem-solving Abilities, and Technical Skills or Major Subject(s) Knowledge required for the Job. Dimension 2 includes English, Numerical Competency, Chinese, and Information Technology Literacy. The two dimensions are consistent with the curriculum of many bachelor degree programs, and they are not mutually exclusive. Statistically significant correlations between attribute aspects were found in all aspects.

Attribute items are not only inter-correlated, Rasch Factor Analysis has also identified multidimensionality among the attributes. From Winsteps output (results not shown), the total raw variance in observations is 65.2.

Raw variance explained by measures is only 19.2 (or 29.5%). Among which, raw variance explained by persons is 8.9 (or 13.6%), and by items is 10.4 (or 15.9%). Raw unexplained variance is 46.0 (or 70.5%). Unexplained variance in first contrast has an eigenvalue of 4.8 (or 7.4%). This indicates that it has the strength of about 5 items, somewhat bigger than the minimum eigenvalue of 2 for a dimension (Linacre, 2011). The small portion of variance explained means less unidimensional, and less unidimensional means more multidimensional. The eigenvalue of 4.8 after the first contrast and 3.4 after the second contrast further support multidimensionality of the items.

As far as multidimensionality is concerned, Mathematics, for example contributes to basic skills. Mathematic deduction models also can help analyze and solve problems. Therefore, mathematics contributes to both basic skills (Dimension 2) and analytical and problem-solving abilities (Dimension 1). This is within-item multidimensionality. Any study that takes the attributes as unidimensional may overlook the complicity and inter-relationship, inter-dependence of the attributes (Wang, 2010).

Relative Importance of Attributes and Differences among Stakeholder Groups:

The item difficulty measures in the Winsteps reports are the respondents' rankings of the relative importance of the 46 attributes. In the Rasch model, the highest score item is considered as the easiest item that has the lowest logits. Therefore, in this study, the lower the logits means the higher the score; the higher the score means the attribute is more important.

Table 3: Stakeholder Rankings of Attributes (in their respective aspects)

Ranking	Overall	Employers	Academics	Graduates	Students
1	Sense of responsibility and commitment	Sense of responsibility and commitment	Problem-solving ability	Problem-solving ability	Express in oral English
	<i>Work Attitude</i>	<i>Work Attitude</i>	<i>Analytical</i>	<i>Analytical</i>	<i>English</i>
2	Express in oral English	Express in written English	Analytical mind	Ethics	Sense of responsibility and commitment
	<i>English</i>	<i>English</i>	<i>Analytical</i>	<i>Work Attitude</i>	<i>Work Attitude</i>
3	Judgment	Comprehend in written English	Comprehend in written English	Initiative and drive	Comprehend in oral English
	<i>Analytical</i>	<i>English</i>	<i>English</i>	<i>Work Attitude</i>	<i>English</i>
4	Work independently	Express in oral English	Express in written	Analytical mind	Analytical mind

			English		
	Work Attitude	English	English	Analytical	Analytical
5	Express in written English	Comprehend in oral English	Judgment	Express in oral English	Problem-solving ability
	English	English	Analytical	English	Analytical
42	Application of data	Management of resources	Management of resources	Relevant work experience gained	Judgment
	Numerical	Management Skills	Management Skills	Technical Skills	Analytical
43	Adaptability to new software	Leadership	Comprehend of data	Management of resources	Management of resources
	IT Literacy	Management Skills	Numerical	Management Skills	Management Skills
44	Management of resources	Solve technical problems	Application of data	Comprehend of data	Application of data
	Management Skills	Technical Skills	Numerical	Numerical	Numerical
45	Foresight	Motivate team-members	Leadership	Application of data	Work independently
	Analytical	Management Skills	Management Skills	Numerical	Work Attitude
46	Work on agreed quality standards	Use appropriate tools and technology for a task	Motivate team-members	Creativity	Leadership
	Technical Skills	Technical Skills	Management Skills	Analytical	Management Skills

Figures 2 and 3 provide an overall picture comparing the relative importance rankings of attributes among the stakeholder groups for each dimension. As we can see from the figures, the distributions of persons and items are different among stakeholder groups, which is within expectation. From Figure 2, the Person measures of employers have the widest spread indicating the most diverse views. Employers may require different graduate attributes for different industries and different types of jobs. Students have the largest mean Person measure (1.87 logits) meaning they ranked on average all items more important than other groups. Employers have the lowest mean (1.12 logits).

Figure 2 shows that academics and college administrators had the largest range (3.53 logits) and the largest standard deviation (0.87 logits) of Item measures. This implies they had more differentiations of the items. Employers had a range of 3.35 logits for the items and standard deviation of 0.85 logits that were very close to the academics. Students had the smallest range (1.69 logits) and the lowest, smallest standard deviation (0.42 logits) implying they were less capable of differentiating the items. Distribution of items for the students was more clustered around the mean, while employers and academics had more widely spread-out of the items.

In Figure 3 for Dimension 2, employers had the largest range (3.16 logits) and the largest standard deviation (1.20 logits) for item measures. This implies they had more differentiations of the items. Students had the smallest range (1.27 logits) and the smallest standard deviation (0.41 logits) implying they had the least differentiation of the items.

Comparison of Stakeholders' Rankings of Attributes:

As in Figures 2 and 3, different groups of stakeholders had very different rankings of attributes, which can be referred to as Differential Item Functioning (“DIF”) (Linacre, 2011). To further investigate DIF items, the two dimensions were run separately. The number of DIF items has reduced from 15 to 12.

A limitation of this study is that the sample size of the employers group is not as large as the studies conducted by the EDB. Requests were made for the EDB data for this study but in vain. This suggests future studies in this area for the employers can be more industry-specific and assistance may be sought from the related trade association.

In Dimension 2, all items of the Chinese and numerical competency are statistically misfit items. These misfit items are actually not so bad practically in terms of the mean square errors. If we look at the relative importance rankings of these misfit items, we will find that the rankings among stakeholders for Chinese are very different, and there is no pattern. Items reflecting Chinese are ranked all over the places. Four Chinese items are DIF items. This reflects the diverse views across stakeholder groups concerning the relative importance of Chinese. For example, employers and students view the importance of Chinese very differently. It is not difficult to understand because employers in Hong Kong have to deal with many clients from the mainland, while students handle most college materials in English. Students can complete higher education without Chinese but not without English. Incidentally, both the academics and graduates have ranked ‘Expression of ideas in written Chinese’ as the 27th important. The item is relatively unimportant.

The implication of this result is that other stakeholder groups, in particular academics and students, need to understand what the employers need. Students have to be aware of that employers require expression of ideas in written Chinese. Accordingly, academics have to incorporate such skills in academic programs. As a result, students will become more ‘employ-ability’ (Hager & Holland, 2006) so that the problem of educated unemployment (Wan, 2011) can be reduced.

For numerical competency attributes, stakeholders have given them very low importance rankings. This helps explain why students on average do not perform well in quantitative courses. Hong Kong is not alone; low arithmetic standard among college students in the United States (Hersh and Benjamin, 2010) and the United Kingdom (Henderson, 2011) is a general phenomenon.

Results of this study indicate that employers rank English as more important than Chinese for local graduates. The finding is consistent with the EDB study for local bachelor degree graduates (Education Bureau, 2010b).

Persons				Items			
Students	Graduates	Academic s	Employers	Employer s	Academic s	Graduate s	Student s
XXXX				7			
				6.			
			x	5			
		x		6			
				5.			
XXXXX			x	5			
XX	XXX			5			
				4.			
XXXX				5			
XXXXXXXX	XX	X	x	4			
				3.			
XXXXXXXXXXXXX	XX	X		5			
XXXO000	XXX	XXXXX	x	3			
				2.			
XXXXO00000	XXXXXX	XXXXXXXX	x	5			
O0000000	XXXXXXXXXXXXXXXX	XXXXXXXX	XXXXXXXX	2	38		
XXXXO00000000000	XXXXXXXXXXXXXXXX			1.			
OO	X	XXXXXX	XXXXX	5	43	37	21
			XXXXXXXXXXXXXXXX		37, 38, 42,		
XO0000000000	XXXXXX	XXXXXX	x	1	39, 21	39	39
				0.			37, 25,
				5	40, 18	46, 35, 28,	23, 39,
O0000000	XXXXXXXXXX	XXXXXXXX	XXXXXXXX			36, 26	18
						46, 35	44, 46,
						25, 44,	36, 35,
					34, 35, 45,	42, 33, 34,	36, 35,
XXXXO00	XXXXXX	XXXX	XXXXXX	0	46	21, 22	43, 40,
						33, 38,	

For positive logits: 0 includes 0.00 to 0.49; 0.50 includes 0.50 to 0.99, and so forth. For negative logits: -0.5 includes -0.01 to -0.50; -1.00 includes -0.51 to -1.00, and so forth.

Students	Persons			Employers	Employers	Items		Students
	Graduates	Academics	Employers			Academics	Graduates	
XXX					6.5			
					6.0			
					5.5			
XX			X		5.0			
XXXX	XX				4.5			
XXXXX			X	XX	4.0			
XXXXXO	X	XX		XXX	3.5			
XXXXOO	XXX	XX		XX	3.0			
XXOOOOOOOO	X	XXXXXXXXXX	XXXXXX	XXXXXX	2.5			
XOOOOOO	XXXXXXXXXX	XXXXXX	XXXXXX	XXXXXX	2.0			
XXOOOOOOOOOOOOOO	XXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXX	XXXXXX	1.5	12		
XXXXXOOOOOOOOOO	XXXXXXXXXXXXXX	XXXX	XXXXXX	XXXXXX	1.0	6, 12, 3, 16, 11	11	12, 11
OOOOOOOO	XXXXXXXXXXXXXX	XXXXXX	XXXXXXXXXX	XXXXXX	0.5	15, 13	14	14
XXOOOO	XXXXXX	XX	XXXXXX	XXXXXX	0.0	2, 5, 14	16, 5, 15, 1, 2, 3	3, 6 12, 14, 11, 3, 4, 1, 16, 15, 13
XXXXO	XXXXXX	XXXX	XXXXXX	XXXXXX	-0.5		6, 13	1, 16, 15, 13, 7, 2, 4, 9, 10
X	XX	XXXXXX	XXX	XXX	-1.0	4, 1	8, 4, 10	5, 8
XX	X	X	X	X	-1.5		7, 9	
		X			-2.0	8, 10, 9, 7		
					-2.5			
					-3.0			
					:			
				X	-5.0			5, 6, 2, 9, 7

Figure 3: Person-Item Map of Dimension 2 for Stakeholder Groups

Employers rank work attitude as most important. This echoes the report of the Organisation for Economic Co-operation and Development (2001). Ironically, there is hardly any local institution that offers a course named 'work attitude'. Instead, institutes offer internship or practicum programs to equip students with some work experience prior to graduation. However, having work experience does not guarantee positive work attitude. Therefore, college management should consider offering at least one course that specifically trains students work attitude and develop appropriate assessment rubrics to assess performance.

It is obvious from the result that stakeholders have different views in the relative importance of different attributes, and this is within reasonable expectation. One size does not and cannot fit all. The Organization for Co-operation and Economic Development (2001) points out that there is very little agreement on which graduate competencies (attributes) make a difference. However, among the first five most important attributes, they all fall into the three attribute aspects: work attitude, English, as well as analytical and problem-solving skills.

College graduates and current tertiary students have also ranked the three aspects as the most important. Their selections include all that the other two stakeholder groups have chosen. Employers have missed out analytical and problem-solving abilities, while academics and college administrators have not chosen work attitude in the first five most important attributes. In the interview with employers, they said that they did not expect too much from new graduates. Analytical and problem-solving abilities may not be so important for fresh graduates. They simply have to follow instructions and get their assigned tasks done. As long as they have the right attitude, most tasks assigned to them can be done. Academics said that they did not expect much from the graduates either. They commented that graduates with the right attitude, English, as well as analytical and problem-solving abilities, they would be able to handle future studies or work. These skills are consistent with the cognitive and interpersonal or people skills suggested by Handel (2015).

The implication of the findings for the second research question is that we cannot have a common solution for all stakeholder groups due to their different views and needs. However, stakeholder groups have to understand one another. Students need to be very clear what they plan to do after graduation. If they need to look for employment, they will have to acquire skills that employers require.

Conclusion:

This study has identified two quality dimensions of local graduates and their respective attributes. Among the nine attribute groups, work

attitude, English, as well as analytical and problem-solving abilities are ranked the three most important attribute aspects. Divergence in the relative importance rankings of the attributes among stakeholder groups is inevitable. What is important is that college management must incorporate these attributes in the program curricula and explain to students what employers need.

With the attributes incorporated into study programs, the next question is how to monitor and ensure that students have acquired these attributes at graduation. English is relatively easy to be gauged. It can be benchmarked with international English tests such as The International English Language Testing System (also known as IELTS in short) or the Test of English as a Foreign Language (also known as TOEFL in short).

For work attitude, analytical and problem-solving abilities, it is very difficult to benchmark these attributes. As such, clearly defined rubrics must be in place to measure student performance in these areas. Assessors, whether they are employers or academics, need to review the rubrics regularly to ensure the descriptors appropriately assess the concerned attributes. As higher education is moving towards outcomes-based (or criteria-based) assessment, academics need to carefully assess, grade, and monitor student performance based on the pre-designed rubrics.

There are three things in this study. First, work attitude is ranked very important. However, there is hardly any college or university that offers a course training students work attitude. Second, technical and discipline-specific knowledge is relatively less important. It is consistent with the findings of the Organisation for Economic Co-operation and Development (2001). Program designers will really have to revisit their current program structures, whether some discipline-specific course(s) should be removed from the program. Third, at the government policy level, universal higher education is meant to increase social mobility and reduce income inequality. However, it does not appear to work.

The findings in this study are by no means conclusive and terminal. Future research in quality graduate attributes can be industry-specific for higher education programs meant to train labor force for a knowledge-based economy. Apparently attributes required for business graduates are different from computer graduates.

Industry-specific data can be collected with the assistance of trade associations. For example, if attributes of accounting graduates are needed, researcher can seek assistance from the Hong Kong Institute of Certified Public Accountants for data from its members; tourism graduate attributes from the Travel Industry Council; retail graduate attributes from the Retail Management Association of Hong Kong; just to name a few. Research

findings should be given to these associations and their members for reference.

Policy-makers and college administrators, not only in Hong Kong but also other countries especially other Asian countries (region) such as Singapore, Malaysia, Korea, and Taiwan that have a lot of similarities, will need to continuously investigate through stakeholders attributes to quality higher education as the world evolves towards a more knowledge-based, more competitive global village. Policy-makers of colleges and universities should infuse the attributes in academic programs, set clear learning outcomes, and assess them with standards. No qualified child should be left behind; no sub-standard students should be graduated. Exit requirements have to be kept and monitored closely for each graduate. As Smith (2011, p. 6) points out for the United States that ‘quality-assured mass higher education is the norm’. This is equally applicable to the situation of Hong Kong.

References:

- American Management Association. (2010). *AMA 2010 Critical Skills Survey*, 1-10.
- Bartholomew, D.J., Steele, F., Moustaki, I., & Galbraith, J.I. (2002). *The Analysis and Interpretation of Multivariate Data for Social Scientists*. Chapman & Hall/CRC.
- Blackmur, D. (2010). Does the Emperor Have the Right (or Any) Clothes? The Public Regulation of Higher Education Qualities over the Last Two Decades. *Quality in Higher Education*, 16 (1), 67-69.
- Bond, T.G. & Fox, C.M. (2007). *Applying The Rasch Model: Fundamental Measurement in the Human Sciences*. Second Edition, Lawrence Erlbaum Associates, Publishers.
- Brown, P. (2003). The Opportunity Trap: education and employment in a global economy. *European Educational Research Journal*, 2(1), 141-179.
- Brown, P. (2007). When merit means nothing. *Times Higher Education*. Retrieved from <http://www.timeshighereducation.co.uk/story.asp?storyCode=209727§ioncode=26>.
- Brown, R. (2010). The Current Brouhaha about Standards in England. *Quality in Higher Education*, 16(2), 129-137.
- Chan, K.C. (June 20, 2012). 供應多「學歷貶值」副學位加薪最少 [Excess supply: ‘credential inflation’, associate graduates receive the least pay-rise]. Retrieved from <http://hk.news.yahoo.com/供應多-學歷貶值-副學位加薪最少-211036100.html>.

- Chow, D. (2004). *Suggestions and in response to the 'Public Consultation on 2004 Digital 21 Strategy' of the Communications and Technology Branch of the Commerce, Industry and Technology Bureau*. Hong Kong Linux Industry Association, 1-10. Retrieved from <http://www.digital21.gov.hk/sc/relatedDoc/download/2003/HKScienceandTechnologyParksCorporation.pdf>
- Crumbley, D.L., Flinn, R.E., & Reichelt, K.J. (2010). What is Ethical About Grade Inflation and Course Deflation? *Journal of Academic Ethics*, 187-197.
- Dill, D.D. (2005). *The Public Good, the Public Interest, and Public Higher Education*. Paper prepared for the Conference Recapturing the 'Public' in Public Higher Education. The Graduate Center, City University of New York, 1-10. Retrieved from <http://www.unc.edu/ppaq/docs/PublicvsPrivate.pdf>
- Education Bureau. (2008). *Report of the Phase Two Review of the Post Secondary Education Sector*. Steering Committee, Review of the Post Secondary Education Sector.
- Education Bureau. (2009). *Good Practices in Quality Assurance: A Handbook for the Sub-degree Sector*. Education Bureau/Hong Kong Council for Accreditation of Academic and Vocational Qualifications/Joint Quality Review Committee.
- Education Bureau. (2010a). *Survey on Opinions of Employers on Major Aspects of Performance of Publicly-funded Sub-degree Graduates in Year 2006. Executive Summary*. Retrieved from [http://www.ipass.gov.hk/eng/Executive%20Summary%20_SD\(Eng\)_April_2010.pdf](http://www.ipass.gov.hk/eng/Executive%20Summary%20_SD(Eng)_April_2010.pdf)
- Education Bureau. (2010b). *Survey on Opinions of Employers on Major Aspects of Performance of Publicly-funded First Degree Graduates in Year 2006. Executive Summary*. Retrieved from http://www.edb.gov.hk/attachment/en/about-edb/publications-stat/major-reports/executive_summary%20_fd_eng__april_2010.pdf
- Education Bureau. (2015a). *Local Higher Education*. Retrieved from <http://edb.gov.hk/en/edu-system/postsecondary/local-higher-edu/index.html>.
- Education Bureau. (2015b). *Publicly-funded Programmes*. Retrieved from <http://www.edb.gov.hk/en/edu-system/postsecondary/local-higher-edu/publicly-funded-programmmes/index.html>
- Education Bureau. (2015c). *Non-local Higher and Professional Education Courses*. Retrieved from <http://www.edb.gov.hk/en/edu-system/postsecondary/non-local-higher-professional-edu/index.html>
- Fornari, R., & Pompili, G. (2010). Pursuing quality in mass higher education: the dilemma of equity and excellence in Italy. *Italian Journal of Sociology of Education*, 2, 17-46.
- Gibbs, G. (2010). *Dimensions of quality*. The Higher Education Academy, 11-13.

- Glover, P., & Hope, H. (2015). Preparing for tomorrow's world of work. *Technology, globalisation and the future of work in Europe: Essays on employment in a digitised economy*. In Dolphin T (ed), Institute for Public Policy Research, 42-47.
- Green, K.E., & Frantom, C.G. (2002). *Survey development and validation with the Rasch model*. International Conference on Questionnaire Development, Evaluation, and Testing. Charleston, SC, November 14-17
- Hager, P., & Holland, S. (2006). Introduction. *Graduate Attributes, Learning and Employability*. Chapter 1, Hager and Holland (eds.), Springer, 1-15.
- Handel, M.J. (2015). Beyond the headlines: Analysing skills data over the long term. *Technology, globalisation and the future of work in Europe: Essays on employment in a digitised economy*. In Dolphin T (ed), Institute for Public Policy Research, 48-55.
- Harvey, L., & Green, D. (1993). Defining quality. *Assessment and Evaluation in Higher Education*, 18 (1), 9-34.
- Harvey, L., & Williams, J. (2010). Fifteen Years of Quality in Higher Education. *Quality in Higher Education*, 16(1), 3-36.
- Hassim, M.H., Hamid, M.K.A., Hassan, M.A.A., Yusof, K.M., Hassan, S.A.H.S., & Esa, M. (2004). *Enhancing Learning through Cooperative Learning: UTM Experience*. Conference on Engineering Education, Kuala Lumpur, Dec 14-15, 2004, 1-6.
- Henderson, R. (2011). English Education and the Great Grade Inflation Fraud. *England Calling*. Retrieved from <http://englandcalling.wordpress.com/2011/01/12/english-education-and-the-great-grade-inflation-fraud>.
- Hersh, R.H., & Benjamin, R. (2010). *Assessing the Quality of Student Learning: An Imperative for State Policy and Practice*. RAND/Council for Aid to Education.
- Hong Kong Lawyer. (1997). Are Standards Slipping? *Hong Kong Journals Online – Hong Kong Lawyer, 1997*, 30-31.
- Hughes, C., & Barrie, S. (2010). Influences on the Assessment of Graduate Attributes in Higher Education. *Assessment and Evaluation in Higher Education*, 35(3), 325-334.
- Kariya, T. (2011). Credential inflation and employment in 'universal' higher education: enrolment, expansion and (in)equity via privatization in Japan. *Journal of Education and Work*, 24(1-2), 69-94.
- Kubinger, K. D, Rasch, D., & Yanagida, T. (2009). On designing data-sampling for Rasch model calibrating an achievement test. *Psychology Science Quarterly*, 51(4), 370-384.
- Li, Q. (2010). *The Quest for Quality in China's Higher Education*. International Higher Education. The Boston College Center for International Higher Education, Number 60 Summer 2010, 5-6.

- Linacre, J.M. (2011). *Winsteps® (Version 3.71.0) [Computer Software]*. Beaverton, Oregon: Winsteps.com. Retrieved from <http://www.winsteps.com/>
- Lomas, L. (2002). Does the development of mass education necessarily mean the end of quality? *Quality in Higher Education*, 8(1), 71-79.
- Lui, H.K., & Suen, W. (2005). The Shrinking Earnings Premium for University Graduates in Hong Kong: The Effect of Quantity or Quality. *Contemporary Economic Policy*, 23 (2), 242-254.
- Luk, T.Y. (2015). *Supply and Demand for Post-secondary Places*. Email correspondence.
- Makulova, A.T., Alimzhanova, G.M., Bekturganova, Z. M., Umirzakova, Z.A., Makulova, L.T., & Karymbayeva, K.M. (2015). Theory and practice of competency-based approach in education. *International Education Studies*, 8(8), 183-192.
- Mok, M.M.C. (2007). Quality assurance and school monitoring in Hong Kong. *Education Research Policy Practice*, 6, 187-204.
- Norusis, M.J. (2006). *SPSS 15.0 Guide to Data Analysis*. Prentice Hall.
- Organisation for Economic Co-operation and Development (2001). *Competencies for the Knowledge Economy*. Chapter 4, 99-118.
- Parri, J. (2006). Quality in Higher Education. *VADYBA/MANAGEMENT*, 2(11), 107-111.
- Queensland Department of Education Training and the Arts. (2007). *TRAINING PACKAGES @ WORK, BACK 2 BASICS, Ed. 3*, 25. Retrieved from http://www.qsft.qld.edu.au/assets/files/Back2basics_ed3.pdf
- Sadler, D.R. (2009). Grade Integrity and the Representation of Academic Achievement. *Studies in Higher Education*, 34(7), 807-826.
- Sarbu, R., Ilie, A.G., Enache, A.C., & Dumitriu, D. (2009). The Quality of Educational Services in Higher Education – Assurance, Management or Excellence? *Quality Management in Services*, 11(26), 383-392.
- Shah, M., & Chenicheri, S.N. (2011). *Employer Satisfaction of University Graduates: Key Capabilities in Early Career Graduates*. In Developing student skills for the next decade. Proceedings of the 20th Annual Teaching Learning Forum, 1-2 February 2011. Perth: Edith Cowan University. Retrieved from <http://otl.curtin.edu.au/tlf/tlf2011/refereed/shah.html>.
- Smith, P. (2011). From Scarcity to Abundance: Achieving Quality-assured Mass Higher Education. *Journal of Asynchronous Learning Networks*, 15(2), 6-21.
- Storen, L.A., & Aamodt, P.O. (2010). The Quality of Higher Education and Employability of Graduates. *Quality in Higher Education*, 16(3), 297-313.
- Tam, M. (1999). Quality assurance policies in higher education in Hong Kong. *Journal of Higher Education Policy and Management*, 21(2), 215-226.

- The Conference Board of Canada. (2000). *Employability Skills 2000+*. Retrieved from http://www.conferenceboard.ca/Libraries/EDUC_PUBLIC/esp2000.sflb
- Tung, C. (2000). *Chief Executive's Policy Address 2000*. Hong Kong Government Printer, 22-24.
- University Grant Committee of Hong Kong. (2010). *Aspirations for the Higher Education System in Hong Kong, Report of the University Grants Committee*.
- U.S. Department of Education. (2006). *A Test of Leadership: Charting the Future of U.S. Higher Education*. Washington, D.C., 2006.
- Wan, C. (2011). Reforming higher education in Hong Kong towards post-massification: the first decade and challenges ahead. *Journal of Higher Education Policy and Management*, 33(2), 115-129.
- Wang, W.C. (2010). *Recent Developments in Rasch Measurement*. Hong Kong: The Hong Kong Institute of Education.
- Wilson, S. (2010). *Obama warns of falling education standards*. Retrieved from <http://voices.washingtonpost.com/44/2010/03/obama-warns-of-falling-educati.html>.
- Winch, C. (2006). Graduate Attributes and Changing Conceptions of Learning. *Graduate Attributes, Learning and Employability*. Chapter 4, Hager and Holland (eds.), Springer, 67-89.
- Zhou, G. & Xie, Z. (2006). On the bankrupt of the private higher institutions in China. *Journal of Higher Education*, 27(5), 46-53.