Assessment and examination system education essay

Abstract

This paper aims to compare and contrast the public examination system and the school assessment system in both countries. It also explores the different emphasis and the possible factors of higher mathematics performance of Chinese students as compared to Malaysian students. These possible factors might include: a) cultural and political factor; b) emphasis of the 'Two Basics' principle of mathematics education in China; c) the quality of mathematics teachers; d) higher level of teaching content; and e) societal and parental expectations.

Keywords: Comparative study, assessment, examination, China, Malaysia

Introduction

Assessment and examinations are viewed as highly important in most Asian countries such as China and Malaysia. Often, public examination results are taken as important national measures of school accountability. Schools are ranked and classified according to their students' performance in major public examinations.

However, assessment is supposed to reflect the intended curriculum (Wong, 2002) and to show what is valued. Very often, assessment 'defines in detail what is regarded as acceptable and what methods for solving problems are preferred' (Kaye Stacey, 2002, p. 11). Yet, too much emphasis on assessment and examination may constraint or distort the implemented curriculum. For instance, assessment that focuses on skills will encourage " the teachers to use the 'explain and practice' strategy and the students will resort to 'practice and memorization'" (Wong, 2002, p. 3). On the other hand,

assessment that emphasizes on problem solving and proofing may push teachers to use teaching strategies that stress conceptual understanding. Therefore, the kind of assessment may determine the kind of mathematics teaching strategy and thus result in the kind of mathematics learning outcome of students.

Why Do a Comparative Study Between Malaysia and China?

Malaysia and China are both Asian countries. To some extent, both share a similar cultural background that emphasizes on mathematics education and examination. However, in international assessments, for example, The Third International Mathematics and Science Study-Repeat (1997-2001), Chinese students (from Hong Kong [ranked 3rd] and Taiwan [ranked 4th]) performed much better than Malaysian students [ranked 16th]. What are the possible factors? Are Chinese students more prepared for international assessment? Or are Chinese students more equipped with basic mathematical knowledge and skills? Are Chinese parents and society look more highly upon examination than their Malaysian counterparts? We hope that a comparative study on the two countries assessment and examination systems might provide us with some insight as well as act as a mirror to reflect on our own systems.

In brief, this paper aims to discuss and compare the various levels of public examination system and the school assessment conducted in both countries. In addition, this paper also explores the possible factors of higher mathematics performance of Chinese students as compared to Malaysian students, such as a) cultural and political factor; b) emphasis of the " Two

Basics" principle of mathematics education in China; c) the quality of mathematics teachers; d) higher level of teaching content; and e) societal and parental expectation.

A Comparison of Public Examination System in Malaysia and China

In Malaysia, the school system is divided into primary level (6 years), lower secondary level (3-4 years), upper secondary level (2 years) and Form Six or matriculation (2 years). There are four major public examinations conducted at each level. At primary level, there is the Primary School Assessment Test (UPSR); at lower secondary level, the Lower Secondary Assessment (PMR); at upper secondary, the Malaysian Certificate of Education Examination (SPM) and at Form Six, the Malaysian Higher Education Certificate Examination (STPM). Nevertheless, the most decisive examination is the SPM. Based on the SPM results, a student may choose to enter Form Six or matriculation; polytechnic or teacher training colleges, private colleges or universities, or to further his/her study in an overseas institution. However, lately the trend has changed to using the STPM results as an entrance yardstick to both local and overseas university. Anyhow, all the examination results are taken seriously by both schools and parents as a measure of school accountability and individual pride. It is a common phenomenon for the mass media to publicize widely the examination results league table with the names of schools and individual student's outstanding performance.

In China, the school system is slightly different in different parts of the country. For most places, the practice is 6 years of primary school, 3 years of middle school and 3 years of high school. The Education Law in China states

that the first 9 years of education are compulsory and usually no tuition is charged. There are three important entrance examinations conducted at the end of: primary school (Grade 6); middle school (Grade 9) and high school (Grade 12). However, in Shanghai, the school system is 5 years primary, 4 years middle school and 3 years high school. The primary examination has been abolished (the main reason of the abolition of primary examination in the middle 90s is to reduce the children's learning burden so that their physical and mental health is improved). Thus, there are only two major public entrance examinations conducted in Shanghai. One is conducted at the end of middle school so as to be able to enter high school and another one is conducted at the end of high school so as to be able to enter university. Although the rate of enrollment [å‡å¦] to high school or university for Shanghai students is as high as above 70%, but most students compete to enter key schools or universities[é‡ç‚¹é«˜ä¸æ-é‡ç‚¹å¤å¦]. Comparatively, these schools tend to have better school facilities and better teacher quality. Consequently, in order to better differentiate the ability of the students, the entrance examination questions are getting more and more difficult, thus increasing the pressure on the students, teachers and parents.

Besides the two entrance examinations, there are three more large-scale public examinations to be taken by Shanghai students. These are graduation examinations, which serve to certify students' qualification/graduation at each level: primary, middle and high school (similar examinations also exist in other parts of China). These examinations are summative in nature, thus the test items are set based on teaching objectives at each level. Almost all

students will get through these examinations. Therefore these examinations are less threatening for most students.

In Malaysia, the Examination Syndicate under the Malaysian Ministry of Education manages all the public examinations whereas in Shanghai, the Shanghai Municipal Educational Examinations Authority manages all the entrance examinations and the middle & high school graduation examinations. In China, the entrance examination of universities has always been the most important and rigorous examination, and in the past the Examination Center of the Ministry of Education took the sole charge of its question formulation, organization and management. However, for the last 20 years, in line with the education reform, the examination system is also undergoing reformation. By the year 2004, a total of 11 provinces have obtained the right to formulate their own examination questions, among which Shanghai was the first one. Hence, the Shanghai Municipal Educational Examinations Authority is in charge of the organization and question formulation of all public examinations, starting from middle school. However, the primary school graduation examination is organized by the various District Education Departments.

A Comparison of School Assessment for Mathematics in Malaysia and China

Besides public examinations, school assessments constitute the major parts of mathematics teaching and learning in most Malaysian schools and at almost all levels. Mathematics assessments are usually given in the form of formative tests such as short tests or monthly tests, as well as summative testing given at the end of every semester or the end of every year. Perhaps

this testing phenomenon has been overemphasized. There are some schools that set as many as six tests per year. Since one year has two semesters and each semester is about 20 to 22 weeks, this means that for every 6-7 weeks there is a test. Moreover, each test is scheduled for about a week for revision, a week for testing and a week for discussing the results. Thus, how many weeks are left for teaching? This is a worrying scene. This kind of 'teach to test' phenomenon is becoming widespread in many Malaysian schools now.

Similar to Malaysian schools, there are various assessment tests in Chinese schools. For example, there are mid-semester examination (usually on the tenth week), semester-end examination as well as formative assessment after completing every chapter. Furthermore, for high school students who are preparing for their university entrance examination, tests are given weekly and monthly. Chinese teachers always use examination and assessment tests to diagnose their students' learning outcome. They also like to use the examination results to rank students. They believe that this type of ranking will help to encourage the better-performed students to do even better while pressing the poorer-performed students to work harder. Nonetheless, recently, under the slogan of " reducing students' learning burden" [å‡è´Ÿ], the education administration departments of Shanghai have restricted the number of examinations given in schools. For non-graduation year students, they are to sit for not more than four examinations per semester, i. e. the mid-semester and end of semester examinations, and up to two more assessment tests. These tests are only allowed to be conducted during school hours.

What Are the Possible Factors for Higher Mathematics Performance of Chinese Students As Compared to Malaysian Students?

From the above comparisons, we notice that there are a lot of similarities in the public examination and school assessment structure of both China and Malaysia. There is a strong emphasis on examinations and assessment as a way to diagnose and keep track of students' progress. Most examinations are centrally controlled and the examination results are highly recognized as individual achievement and school accountability.

However, review of related literature and further analysis into other related factors such as the learning environment and the teaching practices led us to suggest the following as the possible factors that attributed to higher mathematics performance of Chinese students as compared to Malaysian students. These factors might include: a) cultural and political factor; b) emphasis of the 'Two Basics' principle of mathematics education in China; c) quality of mathematics teachers; d) higher level of teaching content; and e) societal and parental expectation

a) Cultural and political factor

Malaysia is a multi-cultural and multi-racial country that made up of three main races, namely Malays and indigenous (65. 8%), Chinese (25. 4%), Indians (7. 5%) and others (1. 3%) [Source: The Star newspaper, 12 November 2004]. To ensure equal opportunity in education and to reduce the economic gap between races, public examinations are set based on a national syllabus. To cater for weaker students, the content levels are set at

achieving minimum competency. Therefore, comparatively, the content level of the Malaysian mathematics curriculum is lower than the Chinese curriculum. In addition, the Malaysian mathematics assessment is based on norm-reference rather than criterion reference. Consequently, the passing mark for every public examination is set according to the performance of the norm and not the individual students. The passing grade is set based on the cohort students who set for the examination. Therefore, the examination results published tend to reflect the norm rather than the real ability and actual performance of individual students.

Whereas in China, though public examination is also norm-referenced, students' performance is ranked from the highest mark to the lowest. There is equal competition and equal opportunity. This ensures only the best student will gain entrance into the best universities or institutions. Perhaps this constitutes a motivating factor that pushes every student to study hard and strive for the best.

Besides, the Confucian culture, which had been the dominant culture in China for thousands of years, states that" ä¸‡èˆ¬çš†ä¸‹å“)¼Œå”¯æœ‰è¯» ä¹¦é«˜"¼Œ" å¦è€Œä¼˜å^™ä»•"¼Œ" åŠ³å¿ƒè€…æ²» äºº¼ŒåŠ³åŠ›è€…æ²» äºŽäºº", which means, respectively, " Studying is the noblest occupation", " Those who study well can become government officers (brainworkers)", " Brainworkers manage others, manual workers (those who do not study well) are managed by others". Influenced by such traditional values, Chinese people, whether the students themselves, the parents, the schools or the society as a whole, put great emphasis in studying and devoting to

education as if it is a religion. Chinese people hope to change their lives through education.

In addition, Chinese people value highly social achievement and group glory. Any student, school and the district education department involved that are chosen to represent China in any international assessment comparison take great responsibilities upon themselves. They believed that this is not only about individual or school glory, but it is also the honor of the nation. Thus, they strive their very best to prepare and to work very hard during the assessment. This might explain Chinese students' better achievement in many international comparisons.

b) Emphasis of the 'Two Basics' principle of mathematics education in China

Mathematics education in China strongly emphasizes the " two basics", i. e. basic knowledge and basic skills. Since the majority of the test items of the international assessment aims only to test the basic knowledge or skills of students, these items are not difficult for most Chinese students. This is because they are used to practice these types of questions during their normal classes in schools.

In fact, 'the high regard of basic skills has long been a tradition of mathematics education in Mainland China.' (Wong, Han & Lee, 2004, p. 41). Subsequently, the principle of Two Basics and 'three abilities' (calculation, logical thinking and spatial visualization) were stated explicitly as the goals in the 1992 mathematics curriculum. Thus, it has become the responsibility of every mathematics teacher to ensure that his/her students master these 'Two Basics' as the minimum requirement. With their abundance

experiences, most Chinese mathematics teachers have no problem in training their students, even those students who are less mathematical able, to score high marks in these areas.

In conjunction with the emphasis on the 'Two Basics', Chinese teachers tend to prepare large amount of exercises for their students to practice. Above all, they also prepare a variety of comprehensive test questions, with different difficulty levels, that enable the student to diagnose his/her own competency in the" Two Basics". For example, " function" is one important mathematical concept in high school mathematics curriculum. It is taught in Grade 10 in Shanghai (" Sets and Propositions" and " Inequalities" are the two other items taught in that semester). Let us refer to some test questions of the 2002-2003 first semester examinations to show how the questions reflect the emphasis on" two basics". Detailed analysis is displayed in Table 1.

Table 1: An analysis of test questions on the topic" function"

Question

Test Objective

Score

Sets and propositions, inequalities, calculator usage

(omitted)

29 points

Functions

2. The domain of the function is ã€,

The domain of functions, combined with calculations involving inequalities containing absolute values.

3 points

5. If ¼Œ¼Œthen

ã€,

Operations on functions. It is implied that in the domain of .

3 points

6. The inverse of the function .

Inverse functions and their domains.

3 points

7. If an odd function f(x) is defined on the set of all real numbers R, and it is monotonously decreasing on , then the ordering of , and is ã€,

Montonicity of functions.

3 points

8. If the function defined on [-2, 2] is even, then its minimum value is ã€,

The parity and the minima of functions.

3 points

9. It is known that one gram of iodine-131 deteriorates to grams after x days. A hospital bought 20g of iodine-131, and 8. 4g remains upon usage, then the iodine-131 has been stored in the hospital for days before use.

Model real-world problems with functions, determine the value of the variable according to that of the function.

3 points

10. If the even function y= f(x) is monotonously decreasing on the interval , and 1 Monotonicity, parity, domain and range of functions. Open-ended.

3 points

12. The quadrants passed by the graph of the function (a, b are constants,) are¼ˆ¼‰ã€,

¼ˆA¼‰lã€)llã€)lll¼›¼ˆB¼‰llã€)llllã€)lV¼›

¼ˆC¼‰lã€)llã€)lV¼›¼ˆD¼‰lã€)llllã€)lVã€,

Graph of functions. Two parameters are involved.

4 points

13. Given that , the graphs of the two functions andcan only possibly be¼ˆ¼‰.

Each of the choices¼ˆA¼‰ã€)¼ˆB¼‰ã€)¼ˆC¼‰ã€)¼ˆD¼‰ is a figure (omitted here).

Graph of functions. Two parameters are involved.

4 points

14. If function y= f(x) satisfies for any within its domain, then this function is a () function within the domain.

Monotonously increasing;

Monotonously decreasing;

Constant;

Neither monotonously increasing nor decreasing.

The definition of the monotonicity of functions, where the difficulty is increased by using a different representation.

4 points

16. Solve the equation

The application of logarithmic functions and the transform rules of logarithms.

8 points

18. Given ¼Œ¼ˆ1¼‰Determine the parity of the function ;¼ˆ2¼‰For , determine the monotonic intervals of f(x) and give the proofs.

Proofs based on the parity and monotonicity of the function f(x).

10 points

19. Given a trapezoid-shaped piece of material whose dimension is given in the figure below (unit: cm), we are going to cut a rectangular piece EBFP from it, where P lies on segment CD and | FP|= x. (1) Represent the length l of EP using x; (2) Represent the area y of the rectangle EBFP as a function of x; (3) What is the value of x when the area of the rectangle EBFP is maximized?

Model real-world problems using functions, combined with planar geometry knowledge and the extreme of quadratic functions.

10 points

20. When graphing a piecewise function on a computer or calculator, the function can be used. For example, the piecewise function can be represented as .

Let

¼ˆ1¼‰Represent f(x) as a piecewise function;

¼ˆ2¼‰Approximately sketch the graph of f(x);

¼ˆ3¼‰Let , does there exist a real number k so that F(x) is an odd function? If so, determine all possible values of k, otherwise give a proof.

Tests the combined ability of reading, comprehension and application; piecewise functions and their graphs; transformation of functions and the effects on their graphs (this exceeds the teaching requirements).

10 points

From Table 1, we notice that almost every aspect of the topic on 'function' is tested, often other previously learned knowledge must be used in addition to the concept of functions, and one concept or property is often expressed in different ways, so that the difficulty of the questions are increased, sometimes even exceeding the teaching requirements. Perhaps there is no surprise that the Chinese students are well trained to be very skillful in preparing for examinations.

c) Quality of mathematics teachers

Quality teaching comes from quality teachers. The better mathematics teacher professional development program in China might be another factor that ensures better teacher quality and therefore better teaching and better student performance in mathematics. In Malaysia, there is hardly much teacher professional development program for mathematics teachers. Teachers are left to fend for themselves and to improve on their own both in pedagogy and content knowledge once they have completed their training in teachers' colleges or higher institutions. There is not much motivation for teachers to further their study or to upgrade their professional level. This is because the teacher salary scheme is fixed and mainly based on the number of years of teaching and the basic teaching qualifications. There are also not much chances of promotion for the majority of mathematics teachers. For example, a mathematics teacher who has obtained a master or even a doctorate degree but choose to remain in teaching in school, will receive the

same salary scale as his/her counterpart who does not have a postgraduate degree.

Unlike Malaysia, in China, especially in the more economically developed regions, all levels of education administration departments pay great attention on teacher quality and teachers' professional development. A fairly complete lifelong education program for teachers has been established, as follows:

¼ˆ1¼‰Pre-service training

There are 30~40 normal universities in China that are directly administrated by the national or provincial Ministry of Education, and these universities are responsible for the pre-service teacher training. In Shanghai, most current mathematics teachers in middle and high schools are first-degree mathematics graduates from universities. In universities, they receive education on not only mathematics content but also pedagogy, psychology, and undergo teaching practice in schools teacher for several weeks. In this way, they have a fairly solid foundation on mathematics and pedagogy.

¼ˆ2¼‰Initial-service training

After graduating from university, during the first year of a new teacher's career, the employing school usually assigns an experienced teacher as his/her supervisor, who helps the new teacher on both teaching and management of students.

¼ˆ3¼‰In-service training

A new teacher usually become a " second-grade teacher" after one year's teaching, and with sufficient competency he/she can be promoted to a " first-grade teacher" after 3~5 years, during which he/she must receive 240 hours of in-service training. For further promotion to an " advanced teacher", another 540 hours of in-service training are required. These training courses cover numerous aspects such as classroom management, educational psychology, communicative English, three-dimensional animated software and curriculum design. These courses are conducted for 3 to 4 hours per week and run from a period of half to one semester. Many teachers found these courses have kept them up-to-date with the latest pedagogy as well as enhanced their teaching competency. These in-service teacher-training courses are organized by the various cities and state owned education colleges as well as the teacher training schools. Finishing these training courses is a necessary condition for the continuation and promotion of a teacher's career, thus it is an obligation for every teacher.

¼ˆ4¼‰Key teacher training

In practice, there are always some teachers who love teaching and have good experiences. These " key teachers" are the mainstay of the teacher population, and they are representative of the nation's level of teaching. In the late 1990s, the national Ministry of Education initiated a Key Teacher Training Program, and similar programs by local governments followed shortly after. The objective of this training program is for these key teachers, who usually relied heavily on practice and experience, to widen their horizon, update their teaching ideas, their mathematical knowledge and teaching

skills (e. g. teaching using multimedia), so that they can play a better role in education.

¼ˆ5¼‰Master of Education

Starting from 1997, teachers with a bachelor degree and at least three years of teaching experience in a primary, middle or high school can be enrolled as a master student on education (EDM) after examination. After taking courses and doing research, they will receive a Master of Education degree if they pass thesis defense. Such training is usually in-service, thus the teachers retain their job after getting the degree. Master education helps these teachers to obtain a composite knowledge structure involving both mathematics and pedagogy and a methodology that combines theory and practice.

¼ˆ6¼‰Combined teaching and research

In Shanghai's middle and high schools, management is done both per-grade (each grade has a group of teachers) and per-course (each course has a course teaching & research group). The teaching & research group of each course is the basic organization for the teachers to discuss their teaching and research efforts. For example, the mathematics teaching & research group holds a meeting every week, where the course schedule and requirements of the mathematics classes of each grade are proposed and managed, important and difficult problems in the school's mathematical education are discussed, and research projects are proposed and organized. Each level of education administration department has its own teaching research branch, which organizes and manages the research on teaching in

the administrated region. For example, most places in China hold " open classes " from time to time, where one teacher teaches while his/her colleagues observe and comment, this provides great opportunity for teachers to share and to learn from each other. This is especially helpful for those young and newly recruited colleagues. The research done by a teacher plays an important role in deciding who will get an award or promotion.

Under these programs, every teacher is required to continuously attend and participate in a variety of teacher professional development courses organized either at school, district or state level.

Furthermore, Shanghai teachers' salary is paid on two schemes. One of them is the basic salary given by the government. Another one is paid from their school fund and it is calculated according to the amount of workload (such as the number of teaching hours or head of department) and the quality of teaching and research (e. g. the student's achievements, colleagues' opinions of open classes, published research papers). This type of salary scheme could act as external motivators for teachers to work harder and to involve themselves actively in various professional development courses as well as the numerous teaching contests. Indirectly, this might lead to better teacher quality and better teaching outcome.

d) Higher level of teaching content

Other than the above factors, from informal interviews with Shanghai mathematics teachers, we observed that there are differences between Malaysian and Chinese teachers in how the mathematics curriculum is followed. According to them, in China, mathematics teachers tend to teach

more than what the curriculum content required. In fact, this is the expectation of school and parents that the mathematics teachers teach higher content level than the stated syllabus. On one hand, this is because the entrance examinations, especially the university entrance examination, are highly competitive. Every mark matters if the student wants to get into a key university. Therefore, the teachers must not only complete the parts specified by the curriculum, but they also believe that higher requirements for the students in everyday teaching lead to better scores in examinations. On the other hand, currently it is encouraged to cultivate the students' ability of innovation and exploration during mathematics education, and for this reason the university entrance examination in Shanghai includes a " composite" part, where the content of six courses, namely Politics, History, Geography, Physics, Chemistry and Biology, are combined. Most teachers hold the opinion that the content on the text book and the course requirements specified by the curriculum only covers the basics, thus it is not sufficient to cultivate the students' ability of innovation and exploration, therefore they tend to look for additional material to fulfill this objective. Due to the above two reasons, the actual content taught by teachers is often more difficult than that in the school textbooks and the planned curriculum, both in breadth and in depth.

In contrast, Malaysian teachers never teach beyond the intended mathematical content even though the stated content was aimed at achieving minimum competency. In fact, some teachers might choose to sacrifice some mathematical contents/topics such as probability that they felt is too difficult for their students. Instead they focus only on a few limited

topics so as to ensure that their students could master these topics and thus pass the examination.

e) Societal and parental expectation

Science and technology are advancing at an incredible pace nowadays, and every occupation requires people to have good abilities. Achieving a higher level of education, especially a diploma or a degree from a prestigious university, plays an important role in signifying one's ability. Both Malaysian and Shanghai parents put great hope on their children' education and their mathematics academic achievement. They are willing to invest a lot of money by sending their children for private tuition classes and buying extra workbooks for their children to practice. Even though the education administration departments of Shanghai strongly oppose anything that may further increase the students' burden, the 'single child' policy of China pushes the Shanghai parents to exert even more expectation and demand on their child's education. There are more and more parents sending their child to private or residential schools. Consequently, they also put very high expectation upon the school and teachers. On the positive side, this kind of higher expectation demand higher commitment and better quality of teachers.

Conclusion

Mathematics teaching is always affected by assessment. We acknowledge that too much emphasis on examination might defeat the real purpose of assessment. A culture that is too examination oriented might create negative effects on students' achievement. However, up to now, examination

remains the best assessment measure of students' achievement and perhaps the most objective and fairest of all.

A comparison of the two countries' examination and assessment system show that both share similarities in terms of school and examination structure. Perhaps it is the differences in terms of mathematics teacher quality and the emphasis on 'the two basics' that contribute to the higher mathematics performance of the Chinese students in international assessment. To upgrade the mathematics performance of the Malaysian students, it might be timely for the Malaysian Ministry of Education to put more attention on mathematics teacher quality through promoting its teacher professional development programme.