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Untangling the complex reasons behind success in the PISA test - an essay on Finnish and Chinese education

Xin Tang[1]

When I moved to Finland to pursue my doctoral studies in September 2013, questions about Finnish education always came to mind. What are Finnish schools like? Why do Finnish students perform so well in the PISA tests? These were the questions I most frequently asked myself. I come from China, where I received all my education up to a Master's degree level, and I had both good and bad experiences there. Like many other Chinese students, I somehow hated our education system, since we were taught to memorize much of what we learnt, with a negative impact on our creativity.

However, the success of China's Shanghai in PISA 2009 and 2012 led me to reflect on the matter a bit more. How had whole-class teaching and rote-learning, which are predominately used in Chinese schools produced such surprising outcomes, when we (and international experts) traditionally had judged such methods to be harmful to student achievement? Were Chinese students doing something right after all? With these questions in mind, I have attended courses and studied books and articles on the matter while in Finland, so as to develop my own explanations for this.

In this article, I will therefore give what I think are the reasons behind this success in the PISA tests. After comparing the educational contexts of Finland and Shanghai and reviewing traditional explanations for Finnish success in PISA, I argue that the most direct factor in this success is the effectiveness of the learning process.

Comparing education in Finland and Shanghai, China

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After being one of the first countries to join the Programme for International Student Assessment (PISA) in 2000, Finland established its world reputation by ranking in the top three for Reading, Mathematics and Science, nearly every time this triennial assessment was made (OECD, 2000, 2003, 2006, 2009, 2012). However, in the latest PISA, Finnish students ranked only 12th in Mathematics (OECD, 2012). Meanwhile, China's Shanghai participated in PISA for the first time in 2009, and has since beaten over 30 other countries to top the tables in all three areas (OECD, 2009, 2012).

If we directly compare the same aspects of education in both Shanghai and Finland, it seems there are significant differences. As table 1 shows, the most significant of these are (i) the pedagogical method used, and (ii) the time students spend studying. Regarding the former, Finnish teachers seem mostly influenced by constructivism (Bransford, Brown, & Rodney, 2000; Vygotsky, 1978), which advocates a child-centred approach to teaching; whereas Chinese teachers still follow a mainly teacher-dominated approach (Tan, 2012). As for study time, Finnish students spend less than 6 hours per day in school, right up to secondary education level, while Shanghai students spend about 7.5 hours per day in primary and 8 hours per day in secondary. In addition, Shanghai students spend a greater time studying after school (Conrad, 2010).

Table1. Comparison of Finland and Shanghai's Early Childhood Education and Basic Education

	Finland[2]	Shanghai
Early Childhood Education		
Pedagogy	Holistic way of learning 1. Playing 2. Physical activities 3. Artistic experiences and self-expression 4. Exploration	Mostly learning through play, however, there is a trend to teach more like in primary school (Ministry of Education, 2001; Qiqi, 2014)
Education level of teacher	Minimum of Bachelor's degree, but majority Master's	93.81% have Vocational Bachelor degree or above. (Xue, 2011)

[2] Most data of Finland from a course (MCE0210 Education in Finland) I attended in University of Jyväskylä.

teacher-student ratio	**0-3 yr-old groups** – Average: 12 children, 1 teacher and 2 nursery nurses – Adult-child ratio 1:4 **3-5 yr-old groups** – Average: 21 children, 2 teachers and 1 nursery nurse – Adult-child ratio1:7 **6 yr-old groups** – pre-primary education – Average: 21 children, 2 teachers and 1 nursery nurse – Adult-child ratio 1:7	There are 49,000 teachers and staffs and 480,600 children in Shanghai kindergarten, 2012. Adult-child ratio 1: 9.8 (Shanghai Municipal Statistics Bureau, 2013)
classroom size		Estimated average is 29.82 (Xue, 2011)
tuition fee	**1-5 yrs**: Depends on income level of family, with monthly fee ranging from 24-240€ per child **6 yrs onwards**: Free	Low expense in public kindergarten, however, 35% children study in private kindergarten, with high expense.(Shanghai Municipal Statistics Bureau, 2013)
study time	4 hours/day during the year before primary-school	From 8 a.m. – 4 p.m. (Shanghai Preschool Education, 2012)
Elementary Education		
Pedagogy	Child-centred, special needs education	Teacher-directed, whole class teaching
Education level of teacher	Minimum of a Master's degree	75% of teachers expected to have Bachelor's degree in 2015 (China News, 2012); 93.36% have a Vocational Bachelor's degree or above (Xue, 2011).
teacher-student ratio	1:14 (UNESCO Institute for Statistics, 2011)	1:16(Shanghai Municipal Statistics Bureau, 2013)
classroom size	typically 20–28; Mean is 19.41(OECD, 2014)	In national level, mean of class size is 38.49 (OECD, 2014), estimated average class size in Shanghai is 37.09
tuition fees	none	none
study time	19–25 lessons per week i.e., about 4-5 lessons per day	From 8 a.m. – 4 p.m.(Shanghai Municipal Education Commission, 2007)
Secondary Education		
Pedagogy	Child-centered, special need education	Teacher-directed, whole class teaching
Education level of teacher	Minimum of a Master's degree	99.64% have Bachelor degree or above. (Xue, 2011)
teacher-student ratio	1:10 (UNESCO Institute for Statistics, 2011)	1:12 (Shanghai Municipal Statistics Bureau, 2013)
classroom size	typically 20–28; Mean is 20.25(OECD, 2014)	At national level, mean of class size is 51.83 (OECD, 2014). Estimated average class size in Shanghai is 35.02
tuition fee	totally free	free, except for small tuition fee for upper secondary students
study time	28-30 lessons per week i.e., about 6 lessons per day	From 8 a.m. – 4.30 p.m.(Shanghai Municipal Education Commission, 2007)

The traditional explanation for Finnish students' success in PISA

Researchers from Finland have cited four factors as being key to their education system's success: policy, culture, teacher education, and inclusiveness in schools (Kuusilehto-Awale & Lahtero, 2014; Sahlberg, 2011; Valijarvi, Linnakyla, Kupari, Reinikainen, & Arffman, 2001). The education policy of Finland aims for equality and equity, to ensure that every student has the opportunity to engage in the same high quality education regardless of, for example, their socioeconomic background, ethics, or region (Kuusilehto-Awale & Lahtero, 2014; Sahlberg, 2011; Valijarvi et al., 2001). This is why there are no tuition fees and only nominal daycare fees. Finnish culture, which has its roots in the Lutheran Church, places a great importance on education, and teachers thus have a vital role in society (Kuusilehto-Awale & Lahtero, 2014). Added to this, is the benefit that cultural homogeneity has for the development of national policy (Valijarvi et al., 2001). Finnish teachers are required to be highly qualified. All primary teachers and above have required Master's degrees since the 1980s (Kuusilehto-Awale & Lahtero, 2014; Sahlberg, 2011); and in-service training for teachers is extensive (Sahlberg, 2011). Inclusiveness in the education system means that teaching is geared around the individual needs of each student and that teaching is as student-centred as possible (Kuusilehto-Awale & Lahtero, 2014). In addition, individual teachers, schools, and even municipalities have a high degree of autonomy with regard to their policies and plans (Kuusilehto-Awale & Lahtero, 2014; Valijarvi et al., 2001).

My thoughts

The traditional and somewhat complex explanation described above might, however, hide certain details from us. Indeed, many of those very factors which have been credited as being behind the Finnish success in PISA, seem not to apply in Shanghai. Equally, those factors seen to have had an adverse effect on student achievement in Finland have not seemed to be so for their Chinese counterparts. For example, research showed that interest was the most effective factor for success in the Finnish PISA results (Valijarvi et al., 2001), whereas for

Shanghai students interest was not an important factor in their high rate of achievement (OECD, 2013). In addition, research in Finland and other Western countries has found that learning in small groups, rather than just through whole class teaching, produces better results (Lerkkanen et al., 2012; Pressley et al., 2003) while Shanghai's schools mainly relying on whole class teaching (Tan, 2012).

Surely there must be a better way to explain the success in Shanghai and Finland when faced with this evidence? Although it is holistic, I believe the traditional explanation which credits this success to the interplay of political, social, cultural and economic factors does not uncover the most direct reason for success in PISA.

For example, a fisherman wakes up after a good night's sleep at 6 a.m., prays to God, has a good breakfast, kisses his wife, and goes out to fish in his boat. When he comes back at the end of the day with a hold full of fish, he thinks it must be because he slept well, had God's blessing, and has a loving family that he caught so many fish. But is this true? How many of these things directly affected catching the fish? The main reason for his success at fishing is, in my opinion, his fishing skill and nothing more. Without this how can he ensure he will capture fish every day?

Urie Bronfenbrenner (1998, 2006), in his second phase of work on Ecological System Theory, focused on the active role of a person. The context (i.e., at the micro, meso and macro levels), to which many had paid attention in his earlier work (Bronfenbrenner, 1979), was now regarded as a remote factor. And proximal processes were defined as the key component in human development.

Following Bronfenbrenner's core idea, I propose a preliminary model which can explain both Finland and Shanghai's success in PISA. That is, the direct reason for success in a test depends on whether or not the student has studied for the contents of that test. Good

results will only emerge if the student has spent time effectively studying the subject to be tested (i.e., the effectiveness of the learning process is the singlemost important factor).

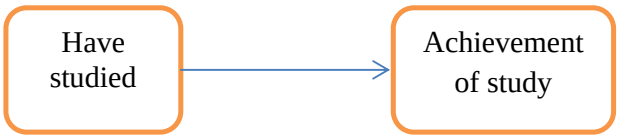

Figure1. Process-Product model for learning

What Finnish education and Shanghai education have both done well is to maximize their students' studying behaviours, but they have done this in different ways. The Finnish education system has done this by encouraging student motivation, respecting the particular needs of students, and developing each student's individual learning methods. In this way, Finns have been more likely to study both in and out of school. In Shanghai, the students may have lost a certain degree of motivation and were not encouraged to develop individual learning strategies, but through the greater amount of time spent studying they still proved in tests that they had learnt a lot, even though they might have been pushed to do so.

This model might explain why Shanghai students don't like studying so much but still outperform many other countries in the PISA tests and why teacher-dominated instruction has nevertheless still contributed to these good results. And it is necessary following this model to explain why Finnish students' performance went down in the PISA tests of 2012. In other words we should ask to what extent Finnish schools support or harm students' studying behaviour. We might, for example, discover that peer pressure, computer games, alcohol, or the state of the economy had a negative effect on Finnish students' studying behaviour. The complex model would seem to dismiss and, at the same time, hide such a straightforward answer from us. I therefore propose that the simple model (see figure 1) must be fully explored before considering other possible variables (see figure 2).

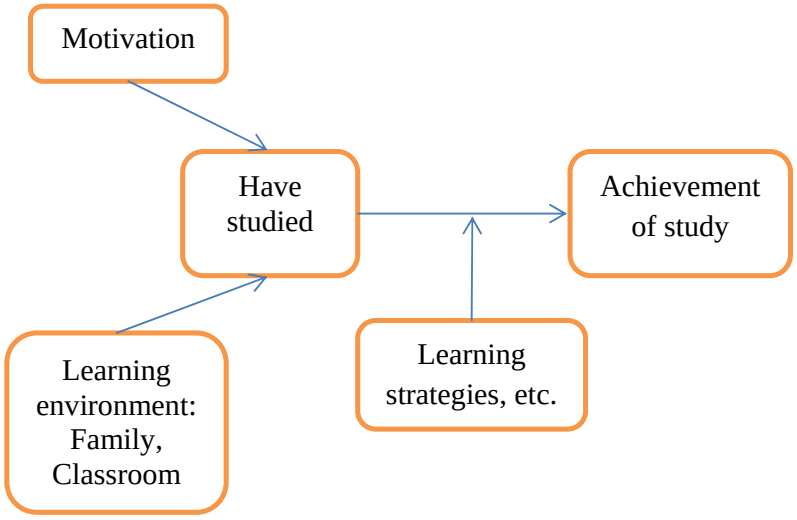

Figure2. Expanded Process-Product model for learning

In a recent meta-analysis review, Seidel and Shavelson (2007) compared seven teaching practice components in terms of their importance for ensuring effective learning. These were: (i) time allotted for learning; (ii) its organization; (iii) its social context; (iv) goal-setting/orientation; (v) execution of learning activities; (vi) evaluation; and (vii) regulation/monitoring. Their review, which covered 125 publications and 1,655 replications, indicated that the execution of learning activities was the component that had the largest teaching effect. In other words, the more proximal (or "domain-specific") the learning process, the more effective the teaching practice. Bandura (1977) proposed a model of behavioural change, in which self-efficacy (one key construct of motivation) is seen as a mediator of actions and achievement. Moreover, family, school, and community (Eccles & Roeser, 2011; Kiuru et al., 2014) have been shown to have an influence on student achievement and development, with human agency (Bandura, 1982, 1986) playing the central role in this socialization process.

PISA is just a test

I am in no way saying here that Shanghai's education system is better than Finnish education, simply because Shanghai students got top scores in PISA 2009 and 2012. I am just exploring

the direct predictors behind these PISA results. In fact, I think Finnish education is possibly better for reasons that cannot be simply explained by PISA results. The fact that Finnish students spend so much less time studying than their Chinese counterparts and yet still maintain such a high performance clearly speaks for itself about the effectiveness of the learning process that is occurring.

PISA is only a test, and it focuses particularly on the cognitive domain. Human development is, however, more than just a question of cognitive development. Chinese students perhaps spend so much time studying that, in many senses, they have less time to learn about and experience all the many other aspects of our colourful world. For example, in China we don′t have any courses in handicrafts, and there are very few arts courses available in music, sports, and painting.

The question remains as to how educators in China will, in future, balance cognitive development with social and emotional development, so that Chinese students will not just do well in PISA tests, but elsewhere in their future careers and lives.

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