



International comparisons of student achievement

Can they tell us which nations perform best and which education systems are the most successful?

Sam Winter

To cite this article: Sam Winter (1998) International comparisons of student achievement, *Education 3-13*, 26:2, 26-32, DOI: [10.1080/03004279885200181](https://doi.org/10.1080/03004279885200181)

To link to this article: <https://doi.org/10.1080/03004279885200181>



Published online: 30 Jul 2007.



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INTERNATIONAL COMPARISONS OF STUDENT ACHIEVEMENT

Can they tell us which nations perform best and which education systems are the most successful?

Sam Winter

This paper argues that international studies do not take sufficient account of sampling problems and input variables when comparing test results obtained in different countries. With regard to input variables, there is a need to allow for the full impact of allocated instructional time (AIT) which in Asian educational systems, is often very high, at least for a small range of subjects. Some of the negative consequences of this intensive teaching are explored, particularly in the context of Hong Kong.

INTRODUCTION

Over recent years, and with the publication of several cross-national studies of student achievement worldwide, Western educationalists have grown accustomed to reminders that students elsewhere (particularly Asia) perform much better than do Western students, and that we should therefore learn as much as we can from the education systems in which they have studied. The two questions I pose in the title of this paper are therefore crucial. Unfortunately, to each of them, the answer is 'probably no'. Let us take them one by one.

QUESTIONS

1. Do these studies tell us which nations perform best in the curriculum areas being assessed?

To judge which nations perform best in any curriculum area, one first of all needs to assemble student samples that are representative of the nations concerned. For some nations this is a difficult task.

Major problems arise when, within one nation, students' educational experiences are variable. This can happen where there is no standard national curriculum (resulting in variability between schools). It can also happen where there is fundamental social inequality – whether based on class, gender or geography – leading to variations in access to education, or in quality of education received. Let's take them in turn.

Absence of a standard national curriculum

Where there is no national curriculum, schools vary even more than usual in terms of what they teach, how and when they teach it, and how much time they allocate to teaching it. Consequently, it becomes difficult to select a school (or indeed student) sample which is, in terms of curriculum, representative. Look at Stevenson et al's (1986) work studying the proportion of time spent on various activities in US, Taiwanese and Japanese schools. At grade 5, in both language and mathematics, US schools displayed double the variation that Taiwanese and Japanese schools displayed. This is not all. Other research by the same research group shows that American schools are far more variable than their Taiwanese and Japanese counterparts in terms of what students do when they are studying a subject.

Social inequality

In some parts of the world there are children who do not have access to education (and who therefore do not appear in the research). Almost all are poor, most live in remote locations, and many are girls. Since they do not attend school, none find their way into the cross-national research on achievement. Some living in

remote locations may receive education (of a sort) but still never find their way into the research, simply because they are too hard to get to. All therefore represent an invisible underclass upon which the eye of comparative achievement research seldom falls. Children who do find their way into the research samples are therefore rendered unrepresentative. Let us look more closely at some of the issues.

First, the urban-rural divide. Much cross-national achievement research, including that of Stevenson and his colleagues already mentioned, is *urban* in nature. While this may not pose too much of a problem in developed and traditionally welfare-oriented societies like Great Britain or Australia (in which the urban-rural divide is relatively small), it can pose a monstrous problem in less developed societies in which the rural population is both large and – compared to urban counterparts – under-privileged. Consider mainland China. Stevenson and his colleagues (1990) have reported that, compared to children from Chicago, Beijing students perform very well in maths. However, recent UNICEF figures show that only 30 per cent of mainland Chinese live in cities, compared to around 76 per cent in the United States. Conservative rural attitudes towards migration ensure that those moving to cities tend to be comparatively resourceful and ambitious (with all that means for the family environment in which their children grow). For those left in the countryside life is tough, with an extremely conservative UNESCO estimate of 13 per cent living below the poverty line. In the poorest regions many schools are poorly staffed and equipped, and it is likely that many students still do not have full access to 'compulsory' education at all. These children never have a chance of participating in cross-national research.

As for girls, tradition combines with poverty in many countries to keep them in the home and deny them full access to school. UNESCO figures show that in South Asia there remains a 17 per cent difference between the sexes in school enrolment. In the Middle East there is 12 per cent gap. Consider mainland China again. While there are nine girls to every ten boys in Chinese primary school, by secondary school there are only eight girls. The missing girls will not be appearing in any international studies of achievement.

2. Do these studies tell us which education systems are most successful?

Education is a system. To judge success you have to look, not only at outcome (ie student achievement), but also input. Many of the most 'successful' systems generate their high student achievement at a massive expense of time; *allocated instructional time* (AIT). By AIT I mean the time schools, teachers and students themselves allocate to teaching and learning. Several factors serve to raise AIT in some of the higher performing societies. A list follows.

AIT through pre-school education

In some societies good pre-schools are widely available throughout the community. Consider Hong Kong, where almost 96 per cent of 3 to 5-year-old children are in kindergartens, with most of the rest in child-care centres (Opper, 1992, p 11). In other societies pre-school education is scarce. Even in the USA, a comparatively affluent country, only 58 per cent of 3-year-old children attend any form of pre-school provision. As for mainland China, recent government figures show that only 41.3 per cent of children aged 3 to 5 years are enrolled in pre-schools and pre-school classes nationwide. The consequence of such international differences is that, *insofar as pre-school facilities in some way provide instruction to the young child (as opposed to acting as child-minding)*, international differences in access to pre-school education mean international differences in early AIT.

Compulsory school entry age

Further differences in AIT arise out of international differences in school entry ages. While in some societies (developed as well as developing), children begin school at the age of seven years, in others they begin at five. This simple fact has major implications for international student achievement studies. For example, IEA studies have typically focused on grades in which are found the majority of 9 and 14 year olds (for reading: Elley, 1992), or 9 and 13 year olds (for science and mathematics: Law, 1996, 1997). The consequence is that, for example, in the Third International Mathematics and Science Study (TIMSS), Norwegian 9 year olds had received only three years of schooling by the time they were tested, little more

than half of the five-and-a-half years some New Zealand children had enjoyed. Such differences represent massive differences in AIT.

Length of the school day and school year

Societies differ not only in terms of the age at which children attend school, but also in the amount of time students are required to spend in class. Consider Taiwan, Japan and the USA. Stevenson et al (1986) report that these three countries differ greatly in terms of how many hours each week grade 5 students spend at school (44 hours for Taiwan, 37.5 for Japan, and 30 hours for the USA). More differences arise as a result of variations in duration of the school week, and in the number of holiday periods. These mean that, over a school year, Taiwanese and Japanese children attend school for around 240 days, compared with 178 days for American students. Again the result is massive international variation in AIT.

The reader should note that these figures do not take account of out-of-school work involving private tutors, tuition centres, after-school remedial classes, or homework (either school- or parent-allocated). All are common features in Asian societies. Homework is dealt with in another section.

Differences in instructional focus in pre-school and school education

Just as international differences in AIT can arise out of differences in *availability* of pre-schools, so too can they arise out of differences in *instructional focus in those pre-schools*. In some societies (those most influenced by the Western child-centred education movement) pre-schools seek to provide the child with opportunities to develop in all areas – pre-academic, physical, linguistic, emotional and social. In other societies (including many in the East) the focus is primarily on pre-academic skills and work habits, with pre-schools seeing themselves (and parents seeing them) as providing children with foundations for later academic success.

Consider Hong Kong. Nearly 90 per cent of the parents of young children in the city intend that their child should go on to university. Opper (1992) reports that, to give them an early start, the vast majority of parents place their children into a pre-school by the age

of three. In choosing a pre-school most parents consider its academic reputation. Indeed, this is the most important factor for high-income families. What precisely do they want their children's kindergartens to deliver? According to other research by Opper, they believe that kindergartens should emphasise 'academics' more than any other area of early learning – even language, self-sufficiency, social skills, or self-expression.

Hong Kong kindergartens – all of them private – compete for business among parents. Accordingly, as in other places in Asia, and to cater to the demands of parents, they have become highly academically focused. Opper (1992) reports that 98 per cent of them introduce Chinese reading at age 3. For writing, the figure is 95 per cent. Even for English, which enjoys a fringe status nowadays, the majority introduce English reading and writing at the same age level. Why? Well, one of the reasons is that the universities the parents wish their children to attend still employ that language as a medium of instruction. To complete the academic emphasis, the majority of kindergartens also give tests. Such practices would be alien to many Western pre-schools.

International differences in academic focus (and therefore AIT) extend to the elementary school years. More school time is devoted to academic activities in Asian classrooms (85 per cent for Taiwanese, 79 per cent for Japanese and 70 per cent for Americans at grade 1, and 92 per cent, 87 per cent and 65 per cent at grade 5). When these figures are combined with the data on time spent in school (presented earlier) it becomes clear that Taiwanese children spend more than twice the amount of time each week on academic activities than the Americans do, with Japanese children somewhere in between.

The three countries do not only differ in terms of how much available time is spent on academic activities. They also vary in terms of how academic time is distributed among different subjects. Stevenson et al (1986) found that Taiwanese and Japanese schools gave equal emphasis to maths and language, at least at grade 5. American classrooms, by contrast, gave little emphasis to maths, spending around half of the time that Japanese children did. I will return to the matter of differential allotment of AIT between subjects later on when I address the issue of de-emphasised (ie low-status) subjects.

Time allocated to homework

In many Asian societies homework begins even in the pre-school years. Consider the case of Hong Kong. Oppen (1992) reported that 95 per cent of kindergartens gave homework to children, most often in writing and number skills. By the time they come to school children are prepared to accept quite lengthy and daily homework in maths, English and Chinese; requirements that would be more onerous than in many Western societies.

The stress on homework extends to other Asian societies. Chen and Stevenson (1989) note that, as early as grade 1, Taiwanese teachers allocate 280 minutes of homework each week, with mainland Chinese teachers allocating 187, and Japanese allocating 105. The figure for American teachers (Chicago and Minneapolis averaged) is 49. Not surprisingly in view of the homework allocated, Asian children spend more time on their homework than do Americans; grade 1 Taiwanese children spend 494 minutes each week, with their counterparts in China spending 442, Japan 232 and America 130.

Korea shares the high figures for homework associated with other Asian societies. My own small-scale and unpublished research in Korea suggests that at grade 1, school children are spending around 210 minutes a week on homework, with the figure rising to 360 minutes at grade 5. Significantly, Korean children perform extremely highly in international maths and science studies (Law, 1996, 1997).

Incidentally, it is worth noting that homework in Asia often extends even beyond that allocated by school. Research by Chen shows that 36 per cent of children in Beijing reported engaging in some extra academic work at home, such as reviewing lessons, preparing for the next day's class, checking homework with parents, or attending special classes. The equivalent figure for Chicago children was only 10 per cent.

Poor age-grade matching

AIT issues get really complicated wherever we are looking at an education system that makes grade-promotion depend upon performance; either fast-tracking children to higher grades or making some of them repeat a grade. The result is always a spread of ages in any grade, and a spread of grades for any

given age. Both can make cross-national comparisons of achievement tricky.

Consider Hong Kong, which provides a good example of an education system in which repeating is widespread. As one moves up the school system one sees an increasing percentage of children who are either presently repeating or who have previously done so. Extrapolations from government figures suggest that in 1986–96 just under 8 per cent of primary 6 students repeated a grade, and therefore ended up being educated with their younger peers.

New immigrants (usually from mainland China) present an additional source of over-age students in Hong Kong classrooms. Government statistics suggest that in the 12 months to October 1995 alone there were 10,000 new immigrant students joining Hong Kong schools. Principals often place these newcomers in grades below those dictated by their ages as a way of helping them assimilate into the education system.

The end result of these practices is an education system with very poor age-grade matching. At the start of grade 6 (the final year of primary school) only 64 per cent of children are aged 11, with around 20 per cent aged 10, and 16 per cent aged anything between 12 and 16 plus. At the start of secondary form 3 (the final year of compulsory education), only 60 per cent are aged 14, with around 13 per cent aged 13, and 27 per cent aged anything from 15 to 21!

Such spread has a major impact on cross-national research on achievement. Consider the IEA study of science and mathematics, which was interested in testing children aged 9 and 13 years. In Hong Kong such children can be found in a wide range of grades. Rather than seek them all out, wherever they might be, researchers focused on the grades in which were to be found the *majority* of children aged 9 and 13. For Hong Kong 9 year olds this meant grades 3 and 4. For 13 year olds this meant the first two years of secondary school.

However, 1990 government figures show that only 73 per cent of 9 year olds are to be found in the two grades examined. The rest are scattered from grade 1 to 5, and their places in grades 3 and 4 are taken up by children aged anything from 7 to 16 plus. As for 13 year olds, only 87 per cent of these are to be found in the two grades examined. The rest are scattered across grades from primary 2 to secondary form 3,

with their places in years 7 and 8 taken up by children aged anything from 11 to 19.

'So what?' you might say. How does this undermine cross-national research on student achievement? Well, consider the difficulties interpreting achievement differences between students in Hong Kong and England; the latter of which, you will note, has traditionally adhered closely to age-appropriate grading. Both samples will have low-performers. However, in the case of Hong Kong the age-appropriate ones will be in lower grades (and will not appear in the research). True, their places will be taken by other low-performers, but these will be older ones who, because they are repeaters, have covered at least one year of curriculum *twice*. Put simply, they have got where they are as a result of substantially more instruction; they have enjoyed more AIT than the others. Their presence puts the Hong Kong sample at an advantage.

In short then, there is plenty of evidence to show that high levels of achievement are being generated, at least in some societies, at the expense of massive levels of AIT. Is this something to worry about? I suggest it is, since high AIT, often allocated to a narrow range of high-status core subjects, can generate unfortunate emotional consequences for students, can lead to a de-emphasis of other arguably important academic subjects, and can result in almost total neglect of curriculum areas concerned with broader personal, social, emotional and cognitive development of students. Let us take them one by one.

AFFECTIVE CONSEQUENCES OF ACADEMIC FOCUS

Common sense would dictate that an academically focused education system involving high AIT might cause stress, anxiety and depression among students. The Hong Kong research suggests this. When local Hong Kong secondary school students are asked what are the problems in their lives, the most common problems reported are almost always connected with school (Leung et al, 1986). Other research suggests high levels of stress among students, largely arising from school, and contributing to a deterioration in general levels of health. Again, local research shows that students experience great pressure from parents

to succeed at school, and that this pressure possibly has a debilitating effect on their performance, with school failure possibly even contributing to social isolation. Finally, research on student depression reveals prevalence rates much higher than the West.

DE-EMPHASISED (LOW-STATUS) ACADEMIC STUDIES

The Stevenson et al (1986) research reported that Taiwanese and Japanese children spent around double the class time on maths as did their American counterparts. Not surprisingly, Asians outperformed Americans in this subject. The finding in itself suggests that students perform poorly in low-status subjects enjoying little AIT in their education systems.

Hong Kong's education system provides another example of one that values certain subjects above others. In a typical Hong Kong primary school the three core subjects of Chinese, English and mathematics account for around 67 per cent of class time. By contrast, general studies (encompassing geography, Chinese and world history, physics, chemistry, earth and space sciences, life sciences and health education; all individually substantial areas) together account for only 12 per cent. The (potentially) expressive subjects (physical, musical, art and craft education) account for 18 per cent.

In view of the high AIT accorded to mathematics, Chinese and English in Hong Kong, one might expect students to perform well in international comparisons of numeracy and literacy. They do. For example, their maths performance places them in fourth position internationally at both age 9 and 13. But how well do they do in science; a clearly low-status subject in primary schools? Relatively poorly, with both 9 and 13 year olds scoring around the international average and (unusually) below both England and the United States.

The Hong Kong curriculum abounds with other low-status subjects enjoying little or no AIT; for example, civic and political education, international affairs, drugs, sex and health education, drama, philosophy, information technology, and graphic design. There are indications that, were there to be a cross-national study in any of these areas, Hong Kong students would be found wanting. For example, various reports (government and independent) reveal abuse of

tobacco and alcohol among students, lax attitudes towards use of other drugs, and ignorance in areas ranging across civic education, diet and hygiene, mental health and mental illness issues, as well as sexual issues like menstruation, masturbation, contraception and HIV. School arguably has a role to play in each of these areas.

NEGLECTED PERSONAL, SOCIAL, EMOTIONAL AND COGNITIVE AREAS

Just as an over-emphasis on a few high-status subjects can lead to neglect of others, so too can an academic emphasis result (regardless of subjects involved) in neglect of social, personal, emotional and cognitive areas of development in which schools arguably should play an important part. Space does not permit a detailed treatment of this matter. Instead, there follows a brief list of Hong Kong research findings (government and independent) that suggest possible needs that Hong Kong students may have in these areas. Indeed, some of these needs may actually arise *out of the school experiences that students have!* In any case, they arguably ought to be addressed vigorously by any school system genuinely concerned about students' overall development.

Hong Kong research shows that pre-schoolers in the city display higher levels of dependency and fears, more problematic temper tantrums, more faddy eating problems, more problems of peer and sibling relationships, and fewer social competencies than is the case for Western comparison groups. From pre-school onwards Hong Kong students begin to display clear and strengthening gender stereotypes. Indeed, their stereotypes seem stronger than for most other societies worldwide, even other ethnic Chinese ones. The stereotypes underpin sexist and homophobic attitudes in teenage years.

Turning now to civic education, many primary school students display negative attitudes in this area. They display worryingly high levels of materialism, together with low levels of personal responsibility and honesty. These characteristics apparently increase with age, at least between the ages of 9 and 12.

By adolescence Hong Kong students display a bewildering array of personal, social and emotional needs. Many are sadly uncertain in social relationships,

are lonely, socially isolated, and depressed. Depending on the instrument and cut-off point used, the depression rate appears to be as high as 31 per cent, with one in five students displaying a moderately severe level of sadness, pessimism, sense of failure and self-disgust, and 11 per cent fell into what may be called a 'severely depressed' category. As mentioned earlier, these figures are much higher than for the West. To make matters worse, adolescents are curiously isolated; one in four admitting being able to trust fewer than two adults. It is in this context that child and adolescent suicide in Hong Kong appears to be increasing.

With regard to self-concept, many students display low self-esteem, particularly in relation to academic achievement. While Chinese children everywhere tend to express a somewhat deprecating opinion of themselves, Hong Kong children's opinions appear particularly low, as well as declining steeply during the early school years. Many Hong Kong adolescents develop quite negative feelings about their physical appearance, with girls showing an unhealthy tendency to worry about their height, weight and body shape, and with the majority thinking that they should lose weight.

Finally, looking at cognitive development, writers like Ho (1994) have argued that Confucian culture has the unfortunate effect of generating among children an unwillingness to question either authority or orthodoxy, and an inability to think critically or creatively. The Singapore government has woken up to this problem, and recently sponsored a major international conference on thinking. It is also spending vast sums on the development of thinking skills within the school curriculum. In Hong Kong this need remains largely neglected.

In all these areas schools arguably have a part to play in helping children develop into well-rounded and well-adjusted individuals. Unfortunately, in an education system like Hong Kong's, these areas are hardly touched. Too many other things (or rather, just a few academic other things) are too important.

SUMMARY

So where does this leave us? I have argued that the achievement data from cross-national studies of achievement are suspect; albeit in some respects and

for some countries more than others. I have also argued that, no matter how good the data are, they provide no ground upon which to judge which education systems are the most successful. This is because they do not provide sufficient information about input variables. Most important among these, in my view, is AIT. The high AIT levels common to many Asian education systems raise important questions about costs to students, in terms of (a) undesirable emotional consequences; (b) important academic subjects that are marginalised; and (c) crucial personal, social, emotional and cognitive areas of development that are almost entirely neglected.

Events of recent months have prompted all of us, East and West, to re-examine the 'Asian economic miracle', and the 'Asian values' that underpinned it. Perhaps it is most timely that we look more soberly upon the 'Asian education phenomenon' which has so well reflected those values and fed that miracle. When one does so, one begins to see that some of the societies which have demonstrated high student performance, and whose systems some now say we should emulate, achieve those high levels at great cost to the students in terms of their well-being, and in terms of what students might have learned instead.

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Sam Winter worked in England, first as a teacher and then as an educational psychologist. He went to Hong Kong in 1984 and lectures in the Department of Education at the University of Hong Kong. His special interests are in educational productivity, and the problems of those who fail in our educational systems. He is married to a Korean and has a son who is just about to start school in Hong Kong.