



數據 講教育 EdData Speaks

November 2016
Topic: Introduction

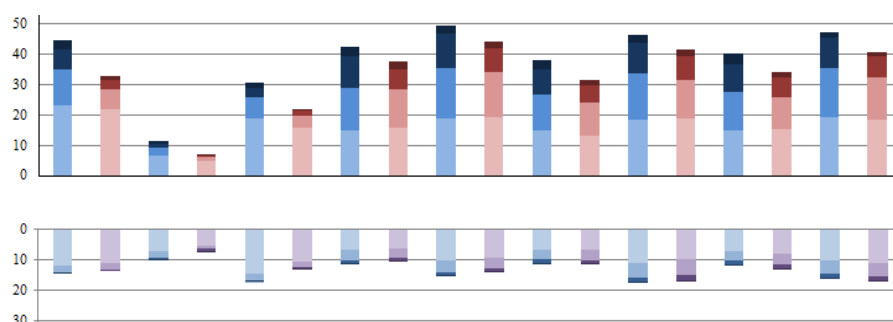
EDUCATIONAL DATA SPEAKS

Background of the Research and the Newsletters

In the world of big data, it is paramount that we need well informed evidence-based educational policies, teaching methods and parenting practices for our next generation. The present sets of pilot empirical studies are not to find out which schools or students are doing better than the others. The main purpose is to find out why some schools or students are making faster progress in their teaching or learning.

We make use of the world latest research design, sampling methods, and analytical strategies. The research questionnaire items are borrowed and adopted from world famous projects (such as PISA, TIMSS, PIRLS, NAEP, and other international studies on health, physical exercises, etc.), with very careful selection of the best items that are most relevant and sensitive to the Hong Kong situation. As these items (e.g., on students' interest on study) have been used across many large scale studies with very similar wordings, we are not providing the references of the individual items in each of our subsequent newsletters.

We struggle between providing more scientific technical academic journal types of reports or newsletter types that are much easily accessible to the general public. Our decision is to summarize all major findings in the simplest possible language and statistical methods, yet provide some more precise statistics (e.g., percentages, means) for those scholars if they would prefer to examine closer the evidences of our conclusion. Thus, for example, we provide regression beta weights whenever possible, which are of interest to researchers if they would like to compare the relative effects of different factors.





Sample

We adopted a disproportionate stratified random sampling method. The sample consisted of approximately 10% random and representative sample of Primary 3, Primary 6 and Secondary 3 (P.3, P.6, S.3) students in Hong Kong, with the minority non-Chinese speaking students being purposely oversampled to that we can have a more accurate estimate of their characteristics and behaviour. In 2015, we had 64 primary and 47 secondary schools participated with a response rate of 95% and 90% after replacement of schools in the same stratification cells. Students' and parents response rate ranged from 72% to 91% in different sectors. Appropriate weightings have been adopted so that the final estimates reported in the newsletter should be very representative of the characteristics of our targeted population (P.3, P.6, S.3) students in Hong Kong, probably among the best, if not the best, in terms of sampling that we are aware in similar studies in Hong Kong.

Specifically, in 2015, 4673 P.3, 4453 P.6 and 5740 S.3 students and their parents participated, which amounted to around 30,000 students and parents included in the project. The number of students and parents participated in other years varied, but we have adjusted for their representativeness through appropriate statistical weighting.

Basically parents and students responded to a short questionnaire, which we matched with their academic achievement scores. Our research team works with a data set without schools' and students' names. As in similar large scale studies, we are providing a sequence of school reports to school to help them understand their students. A double-key/blind method will be adopted so that the confidential reports to schools will be delivered to schools without the research centre knowing which specific school is receiving which specific school report. We hope this will remove the unnecessary pressure for the schools when comparing with others.



Research Methodology

Academic achievement was taken from students’ performance in the Territory-wide System Assessment. For the purpose of this study, we only use the relative performance of students, which was anonymously converted into a scale with mean = 500, standard deviation =100 scale. This is also the scale used in OECD PISA study (and in some other large scale studies). Students getting close to 500 points would be average ability students at their grade level (the 50-th students among 100 students). Students getting 600 points would be at one standard deviation above the mean or at the 16-th among 100 students), while that of 400 points would at the 84-th position. On average a difference of 100 points will be approximately equal to 3 years of education/schooling. Students getting 33 points higher than others will approximately be one year schooling ahead of their peers.

For ease of comparison and public understanding, we also divide students into 9 ability bands. So, bands 7, 8, 9 students are the high achievers while bands 1, 2, 3 are relatively low achievers.

Description	Ability Level	Rank in 100 people (Percentile)	Achievement Score
Very High	9	96 and higher	675.00 and higher
Above Average	8	90-95	625.00-674.99
	7	77-89	575.00-624.99
Average	6	60-76	525.00-574.99
	5	40-59	475.00-524.99
	4	23-39	425.00-474.99
Below Average	3	11-22	375.00-424.99
	2	4-10	325.00-374.99
Very Low	1	3 and below	324.99 and below

Figure 1 9 Ability Bands in Academic Achievement

The data so far we obtained is cross-sectional in nature. Though generally it is said correlations cannot be used to infer causation, we believe it is still possible to draw important causal relations in some specific situations in our analyses. As always, there are great individual variations across students, we believe our readers will make use of the results presented in facilitating their teaching or learning.

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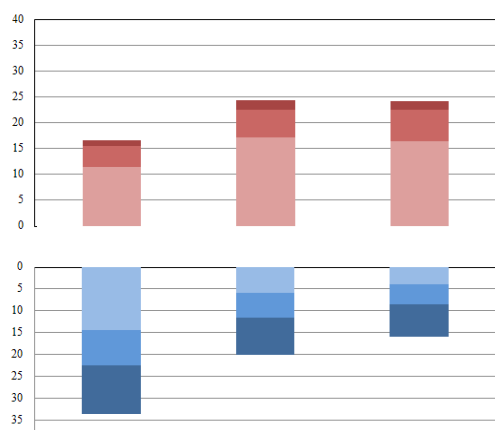
研究及通訊文章的背景

在大數據的世界中，為我們下一代提供證據為本的教學政策、教學法及家長管教子女方式是不可或缺的。目前我們的研究的最主要目的並非要找出哪一些學校或是哪一群學生的表現較好，而是希望找出為何一些學校或學生的教學或是學習進度比較超卓，從中學習。

我們的研究團隊採用世界最先進的研究設計、抽樣方法和分析策略。研究問卷的題目是參考及採用了世界知名的大型研究（如國際學生能力評估 PISA，國際數學與科學教育成就趨勢調查 TIMSS，促進國際閱讀素養研究 PIRLS，美國國家教育進步評估 NAEP 和其他有關於健康、體育運動等的國際研究）。我們精心挑選了當中最具敏感及與香港最相關的題目。由於這些問卷題目（如學生的學習興趣）均已在世界上各項大型研究中被廣泛採用，我們在此就不會在每期通訊中為每條題目提供個別的來源參考。

我們的研究團隊對於應該提供學術文章還是較易於普羅大眾理解的報告感到難以取捨。我們決定採用最簡單的語言和統計方法來總結所有的主要發現，但是顧及一些學者可能希望深入了解我們的研究結果，我們同時會提供一些更精確的統計數據（如百分比及平均值）。另一例子是，我們會盡可能提供迴歸系數 (regression beta-weights) 供學者比較各項因素的相對效應。

樣本



我們採用了分層非機率隨機抽樣的方法。我們的樣本包括約 10% 的隨機抽樣。學生及來自小學三年級、小學六年級及中學三年級的代表性樣本。另外包括少數特意過度抽樣的非華語學生，令我們可以有一個更準確的樣本去估計他們的特點和行為。在 2015 年度，我們共有 64 間小學和 47 間中學參與我們的研究，缺失學校以同一個抽樣分層的學校取代後，總回覆率分別為 95% 和 90%。在不同的年級中，學生和家長的回覆率由 72% 至 91% 不等。我們在統計過程中加入了不同的統計權重因子，令最終的數據更能代表目標人口（即全港的小三、小六及中三學生）的特點。

以 2015 年為例，我們一共有 4673 名小三、4453 名小六及 5740 名中三學生和他們的家長，即合共大概三萬名學生及家長參與了問卷調查。每年參與的學生及家長數目可能有所不同，但是我們已經在統計方法中加以調整而令到他們的代表性增加。

簡單來說，學生及家長分別回答一份簡短的問卷，然後我們將他們的問卷回應跟學生的學業成績配對。我們的研究團隊使用沒有標示學校和學生姓名的數據，進行研究分析。與其他大型的學術研究一樣，我們會為學校提供一系列的學校報告，讓他們更了解自己的學生。我們以雙重密封 / 盲評機制去確保學校報告的保密性。我們的研究所不會知道哪一所學校會收到哪一份學校報告。我們希望這個做法可以為學校消除因為與其他學校比較而帶來的不必要的壓力。



研究方法

學生的學業成績是從全港性系統評估中測得。為了是次研究，我們根據學生的相對表現把他們的成績自動轉化為平均數 500 分及標準差 100 分的量尺。這個量尺與國際及世界經貿合作組織的國際學生能力調查以及其他大型的國際研究所使用的量尺一致。如果學生的分數越接近 500 分，這代表他們越接近所在級別的平均能力（代表他們在一百位學生之中排行第 50 位）。如果學生的分數為 600 分，他們則比平均分高出一個標準差（代表他們在一百位學生之中排行第 16 位）。如果學生的分數為 400 分，代表他們在一百位學生之中排行第 84 位。平均來說，100 分的差異相當於大約 3 個學年的成績差異，或換言之，學生比其他同學高 33 分就代表他們領先其他學生一個學年的教育水平。

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為了方便比較和讓大眾更易理解，我們把學生分成九個學業能力等級。第 7、8、9 級的學生代表高能力的組別，而第 1、2、3 級的學生代表較低能力的組別。

描述	能力等級	100 人中排名位置(百分位)	成績得分
十分高	9	96 及	675.00 及以上
高於平均	8	90-95	625.00-674.99
	7	77-89	575.00-624.99
平均	6	60-76	525.00-574.99
	5	40-59	475.00-524.99
	4	23-39	425.00-474.99
低於平均	3	11-22	375.00-424.99
	2	4-10	325.00-374.99
十分低	1	3 及以下	324.99 及以下

圖 1 九級學業能力

到目前為止，我們獲得的數據本質上是橫斷面 (Cross-sectional) 性質的研究。雖然相關係數 (correlations) 不能用於推斷因果關係，但相信我們的分析中，在某些特定情況下仍然可以得出重要的因果關係。一如以往，學生間有很大的個人差異，我們相信讀者會善用研究結果來促進他們的教學或學習。



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Despite not being able to identify each and every contributor to the corresponding issue of the reports, it should be noted that a team of research staff and student helpers mostly from the Chinese University of Hong Kong has helped to identify the research questions, conduct analyses, write up results, prepare graphs, proofread drafts, and finish the artworks.

The EdData project has been partly commissioned by the Hong Kong Government, but the opinions expressed herein do not necessarily reflect the official views of the Government.

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