# Being and Becoming Gifted: Enhancement effects of socio-intellectual study programmes

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## Abstract

We report the findings of the very first longitudinal study concerned with the effects of a 1-year tutored socio-intellectual training programme, specifically designed to enhance participants' intelligence, as independently measured by pre- and post-course IQ assessments. Employing professional psychological testing instruments used in standard academic, educational and clinical environments (Wechsler), for which *no* significant increase in scores were expected to be found following a one year period of instruction for the general student population, pre- and post-course evaluations were conducted with a random sample of participants enrolled in one of three socio-intellectual training programmes held at each of three training centres in Hong Kong. For the last full academic year for which data were available (2005-2006), pre- and post-course evaluations of student IQ test score performances showed significant increases at the 95% confidence limit (Wechsler: Pooled data, $n = 94$, $p < 0.05$, 2-tailed). Controlling for age, individual test analyses for sub-cohorts of participants aged 2.7-6.3 yrs (K1-K3, WPPSI-III) and 6.0-16.0 (P1-S4, WISC-III) showed equally significant increases in their post-course IQ scores, in comparison to pre-course ($n = 28$, $p < 0.05$, 2-tailed, and $n = 66$, $p < 0.05$, 2-tailed, respectively). Individual course-type was also shown to be differentially

correlated with changes in IQ score and individual student's intelligence classifications, such that significantly more participants achieved scores consistent with 'gifted' classifications (from n = 6, to n = 16) after one year. These results support the claim that children may indeed achieve enhancements in their intelligence by participating in a 12-month special socio-intellectual training programme.

## INTRODUCTION

To the question 'What is intelligence ?', 14 experts have replied with definitions such as: (a) the power of good responses from the point of view of truth or fact (Thorndike, 1921); (b) the ability to carry on abstract thinking (Terman, 1921); (c) having learned, or having the ability to learn to adjust oneself to the environment (Colvin, 1921); (d) the ability to adapt oneself adequately to relatively new situations in life (Pinter, 1921); (e) the capacity for knowledge, and knowledge possessed (Henmon, 1921); (f) a biological mechanism by which the effects of a complexity of stimuli are brought together and given a somewhat unified effect in behaviour (Peterson, 1921); (g) the capacity to inhibit an instinctive adjustment in the light of imaginably experienced trial and error, and the volitional capacity to realize the modified instinctive adjustment into overt behaviour to the advantage of the individual as a social animal (Thurstone, 1938); (h) the capacity to acquire capacity (Woodrow, 1921); (i) the capacity to learn or to profit by experience (Dearborn, 1921). None of these 'experts' seemed to have answered the question directly, and there would appear to have been almost as many definitions of intelligence produced as there were experts asked to define it. In the 1930s, psychometricians had debated whether intelligence was mostly (if not entirely) the product of one's genes, or whether the

environment may also play a role (Herrnstein & Murray, 1996). Independent of the answer to these and similar questions, one of the most lasting traditional conclusions of intelligence measurement studies has been to view intelligence quotient (IQ) scores as holding relatively stable and unchangeable scores throughout the lifetime of any given human individual (Jensen, 1969), though not always perfectly so, appearing to fall as one moves towards the elderly (60+ years) phases of life.

So can IQ scores be changed as a result of an adequate environmental (preferably educational) stimulus? According to the Flynn Effect (Lynn, 1982; Flynn, 1999), IQ scores the world over would appear to be slowly rising at a rate of around three IQ points per decade (Flynn, 1999). Improved nutrition, a trend towards smaller families, better education, greater environmental complexities and heterosis are amongst the explanations one may put forward in accounting for these rising IQ scores (Mingromi, 2007). In Dickens and Flynn's (2001) study, there are, however, some seeming contradictions. These authors postulate that arguments regarding the disappearance of the shared family environment should apply equally well to cases of disparate groups separated in time, whereas the IQ changes as reported by Flynn's (2007) metanalysis is seen to be happening too rapidly to be explained by genetic heritability adaptations alone. This paradox can be addressed by observing that any measure of "heritability" necessarily includes both the direct effect of the genotype upon IQ, but also the indirect effects wherein the genotype will itself change the environment (or its response to it), in turn affecting predispositional IQ factors. For example, those with a 'higher IQ' may well tend to seek more stimulating environments that may lead to further increases in IQ. This more direct effect can initially produce a very large effect on IQ, even in adults (Jaeggi, 2008), but this effect may also

plateau (or even decay) over time, unless adequate stimuli continue to be sought and engaged on a continual basis. Such a model could be similarly adapted to include other possible factors, such as nutrition in early childhood, that may cause permanent effects upon cognitive development, including those being assessed in the course of IQ measurement. The Flynn effect may itself thus be explained by today's generally more richly stimulating environment for all people, and in a variety of countries all over the world. Similarly, the current authors would like to suggest that programmes specifically designed to increase student intelligence, would most likely produce concomitant long-term IQ gains, if they were to teach children how to transfer their learning outside the particular programme of instruction within which it is embedded. In this way, the kinds of cognitively demanding tasks and experiences that may result in such IQ gains whilst they are in the programme, will motivate students to persist in their replication long after having left the study programme.

Empirically testing Dickens and Flynn's (2001) claims for an optimal (practical) environmental setting affording increased measures of IQ, the current study tests for the significance of three well-established intelligence training programmes for children which claim to be specifically designed to enhance student intelligence. Focusing upon the claims for the development of children's sociopersonal skills, whole brain connectivity development, and effective, productive thinking skills, we set out to determine whether, and to what extent, participant students might show any measurable IQ gain (or not) according to the curricula changes afforded by the learning environments provided by them (e.g. programme setting and content).

## METHOD

### Participants

A cohort of 94 children, aged between 3-years to 15-years (mean age = 7.6), participated in the current study (59 boys, 35 girls). These self-selected students were enrolled in professional programmes designed to enhance their intelligence.

### Design and Procedure

All 94 participants were in their first year of either a People Impact Programme (PIP), Brain Spa Programme (BSP), Productive Thinking Programme (PTP), or mixed programmes (PIP and BSP, or PIP and PTP), studying in one of three training centres in Hong Kong. Fifty-two participants had joined PIP in one of three different levels (Evoke, for ages 3-6, n = 17; Exalt, for ages 7-10, n = 25; and Eureka, for ages 11-16, n = 10, respectively). Nineteen of the participants had joined BSP in one of three different levels (Minder, n = 12; Sage, n = 6; Wizard, n = 1). Eighteen participants joined PTP in one of three different levels (Invest, n = 8; Integrate, n = 8; Innovate n = 2).

Participants consented to join a 12-month training programme (either PIP, BSP, PTP or two programmes together) each with both pre- and post-course assessment components included for the determination of training effectiveness as measured by professional IQ test measurements. Participants completed their pre-course assessments within the first month of enrollment, thereafter attending 10 months of course training, and completed their post-course assessments on (or shortly after) the twelfth month after the first testing.

In People Impact Programme (PIP), participants focused on training the sociopersonal skills of Self-esteem, Anger Management, Teamwork, Communication, Coping Skills, Leadership, Time Management, Money Management, Planning, etc. In the Brain SPA Programme, participants were focused on brain development activities including Verbal Intelligence, Spatial Awareness, Memory, Number Puzzles, Logic, Definition, etc. For those enrolled in the Productive Thinking Programme, participants were mainly focused on training for effectiveness with productive thinking skills, including Numerical and Spatial Reasoning, Problem Seeking and Solving, Linguistic Reasoning, Critical Thinking and Reasoning via a variety of different task contexts and situational activities. All three programmes were designed to be delivered in a student-centered manner, each student being presented with tasks of an increasing level of difficulty according to their individual ability, and achievements in demonstrating incremental levels of intelligent behaviour.

**Measurements**

In order to determine the most reliable measures of all participants' IQ, standardised, professional testing tools were used in both the pre- and post-course assessment phases of this study: The **Wechsler Intelligence Scale for Children** 3rd Ed (**WISC-III, 1991**) and the **Wechsler Preschool and Primary Scale of Intelligence** 3rd Ed (**WPPSI-III, 2002**), for two age groups, respectively. The **Wechsler Intelligence Scale for Children** (**WISC**) is an intelligence test designed for use with children between the ages of 6 and 16, originally developed as a downward extension of the Wechsler Adult Intelligence Scale (WAIS, 1949). Modelled originally on the WISC, the **Wechsler Preschool and Primary Scale of Intelligence** (**WPPSI**) is an intelligence test designed in 1967 for use with children from ages 2 years 6 months to 7

years 3 months. In our study, participants who were 6-years old or above at the time of first testing were assessed using the WISC-III for both their pre- and post-course assessments (n = 66); participants who were below the age of 6-years upon first testing were tested with the WPPSI-III for both their pre- and post-course assessment sessions (n = 28). Classification of students as scoring at a level consistent with their showing 'gifted intelligence', was callibrated at a standard cutoff point of IQ = 130+ for the purposes of this study.

Participants also completed several other professional psychometric assessments along with their pre- and post-course assessment of IQ, often within the same sessions (the Rosenberg's Self-Esteem Scale was used for participants aged 3-years and above; the Torrance Tests of Creative Thinking, if participants were 6-years of age or above; and the Connell Critical Thinking Test for those participants 9-years of age or above). All professional psychometric testing was conducted by the same attending professional psychologists from a single testing and assessment company (Global Choice Psychometrics), using standardized professional methods of administration, and the recommended normative data collection procedures of individual test publishers, with strict adherence to the guidelines of the British Psychological Society (BPS, UK).

**RESULTS**

Analyses of the training function revealed that the mean IQ score performance of all training group participants showed significant improvement effects following the first year of study in their respective People Impact programmes. Pre- and post-course evaluations of pooled participants' IQ test score performances revealed a significant increase at the 99.99% confidence

limit (average IQ increase = 7.22, $t(94) = 8.925$, $p < 0.0001$, 2-tailed). This result is significantly above the level expected whether chance variation, or indeed as might predictably occur as a result of the Flynn effect (1-sample [+0.3], $t(94) = 8.89$, $p < 0.0001$, one-tailed). This and subsequent data partitioning for course type, and age level of course design, are shown in Table 1.

**Table 1. Summary of mean IQ score increases by student age and course type**

| Course | Test Type | Mean IQ Increase | Significance level |
|---|---|---|---|
| Pooled | WPPSI-III | +6.61 | $P < 0.0001$ |
| Pooled | WISC-III | +7.24 | $P < 0.0001$ |
| PIP | Pooled | +7.44 | $P < 0.0001$ |
| BSP | Pooled | +6.37 | $P < 0.01$ |
| PTP | Pooled | +8.56 | $P < 0.0001$ |

Controlling for age, individual test analyses for sub-cohorts of participants aged 2.7 - 6.3 years (K1-K3, WPPSI-III) and 6.0 - 16.0 years (P1-S4, WISC-III) showed equally significant increases in their post-course IQ scores, in comparison to pre-course evaluations ($t(28) = 4.209$, $p < 0.0001$, 2-tailed, and $t(66) = 7.951$, $p < 0.0001$, 2-tailed, respectively). More specifically, partitioning by course type, participants in PIP showed significant increases at the 99.99% confidence limit (average IQ increase = 7.44, $t(52) = 6.511$, $p=0.0001$, 2-tailed). Participants in BSP also showed significant increase at the 99% confidence limit (average IQ increase = 6.37, $t(19) = 3.510$, $p=0.01$, 2-tailed). Likewise, participants in PTP showed significant increase at the 99.99% confidence limit (average IQ increase = 8.56, $t(18) = 6.004$, $p=0.0001$, 2-tailed). No significant gender effects were found for any male versus female increases in IQ scores, either

for the pooled data ($t = 9.88$, $p = ns$), or for any of the other independent variable partitionings. However, further analysis of individual factors of age (see Table 2) and IQ level revealed a pattern consistent across course type. Although the effects remain highly significant with respect to IQ score increases, the following data will be provided in table form only, due to the increasingly smaller numbers of students per partitioning, and hence the degree of statistical power supporting each case.

**Table 2. Summary of mean IQ score increases by student age and course type**

| Course | Course Level | Mean IQ Increase | Significance level |
|---|---|---|---|
| PIP | Evoke | +4.65 | $P < 0.05$ |
| | Exalt | +8.60 | $P < 0.0001$ |
| | Eureka | +9.30 | $P < 0.005$ |
| BSP | Minder | +8.91 | $P < 0.005$ |
| | Sage | * | * |
| | Wizard | * | * |
| PTP | Invest | +7.86 | $P < 0.05$* |
| | Integrate | +9.50 | $P < 0.001$ |
| | Innovate | * | * |

**[* = insufficient data (n< 8) to support test of hypothesis]**

Surprisingly, increased IQ scores were equally evident for the subset of students already showing baseline (pre-course) performances consistent with 'gifted' levels of intelligence. Furthermore, with little or no significant differential course-type distribution densities (possibly due to the relatively small numbers involved ), we recorded almost a threefold increase in the number of participants achieving IQ scores consistent with 'gifted intelligence' classifications (from n = 6, to n = 16) after the study cohort had completed their respective one year study programmes.

## DISCUSSION

This study aimed to evaluate the Flynn effect in the context of specific environmental factors designed to enhance the intelligence of children learning in an educational setting. Our results are consistent with presence of a Flynn effect, and further suggest that IQ can be increased well beyond the +0.3 points per year predicted, to include a possible mean IQ gain of as much as 9.50 within a single year. But what is the reason for this relatively rapid increase in IQ score? As mentioned at the outset, it is our belief that environmental effects (including specific training and curriculum content designs) may underlay such rapid increases in the children's IQ.

The results of this study, although unable in and of themselves to confirm our own definitions of intelligence per se, are clearly consistent with the claims of Dickens and Flynn (2001), whose speculations concerning the putative environmental effects for rapidly increasing IQ now have some empirical support. Such support is further bolstered by our finding that for an admittedly small sub-population of our study cohort, children previously identified as possessing a 'gifted' level of intelligence also show significant increases in their IQ. This is all the more surprising because, given that such children are already performing at very high levels of attainment, it is increasingly difficult for them to show further enhanced performance due to the inevitable likelihood of their reaching a ceiling limit of achievement for a standard testing tool of this type. However, the Wechsler IQ tests remain, in our experience, a far more sensitive measure of IQ for children, in comparison to the likes of Raven's Progressive Matrices (CPM and SPM/SPM+ tests), for which the absolute ceiling levels are quickly reached by children now

past the age of 7-8 years, in many parts of the world. Apart from the finding that 'gifted' children may also continue to increase their IQ scores, one further finding of this study, flying in the face of those still desperately clinging to the 1950s dogma of IQ being a 'fixed' and immutable inevitability of genetic/biological determinism, has revealed instances of IQ score increases leading to the recategorisation of individual students to new heights possibly unnoticed before. We have found in the course of the current study that students previously scoring at levels consistent with 'superior', 'high', and in one case 'average' intelligence may reach performance levels attained by individuals possessing 'gifted' intelligence after participating in a specific course of instruction designed to enhance their intelligence.

Despite the robust and unambiguous findings of this study, several new questions now arise for further empirical determination. What specific features of an intelligence enhancement programme (within the training centre's setting, delivery method(s) or critical content) might really underlay the increases in IQ score now detectable? Might the PTP courses (or others like it) be expected to result in greater increases in IQ than the the likes of PIP or BSP programmes? Does training age affect IQ gains? In order to answer these questions, we will need to obtain larger sample sizes, with more equal age distributions and critically, a sufficient quantity of additional student participants to serve as [a] matched control group(s), for each of the specific PIP, BSP and PTP class' environmental, educational, and pedagogical content evaluation.

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