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ABSTRACT

The journal issue contains articles in either Chinese or English, each with abstracts in both languages. They include: "'Every Person Is a Creative Being': Teaching Method Designed To Cultivate Creativity from the Perspective of Educational Psychology" (Wai Man Lee); "Sex Differences in Problem Behaviour and the Self-Concept: An Investigation of Hong Kong Junior Secondary School Students" (Po Yin Drew, David Watkins); "What Motivates Teachers?" (Guat Tin Low, Lee Hean Lim, Lay Leng Yeap); "Image of the Principalship: Preservice Teachers' Expectations of School Leaders" (John Chi-Kin Lee, Allan Walker); "Language and Attitudes in the Transitional Period of Hong Kong" (Eva Fung Kuen Lai); "Innovation of Mathematics Education in Compulsory Education" (Yun Peng Ma); "Secondary School Science Education in Hong Kong: Prospect and Retrospect" (Kwok Keung Ho); "Children's Abilities in Formal Reasoning and Implications for Science Learning" (Din Yan Yip); "Are Science Teachers Prepares To Teach the Science-Technology-Society (S-T-S) Theme?" (Anissa Chan, Peter J. Fensham); "The Incorporation and Evaluation of Science, Technology and Society Components in HKIED Science Programme" (Kevin Chung Wai Lui, Sing Lai Chan, Yeung Chun Lee); "Methods To Enhance the Chinese Language Ability of Students in Hong Kong" (Hon Kwong Chow); "'Scholars the Ninth and Beggars the Tenth:" A Myth That Is Still Prevalent in Hong Kong's Secondary School Textbooks on Chinese History" (Jun Fang); "A Case Study on Preschool Physical Education Curriculum in Zhuhai, China: Implications for Preschool Physical Education Reform in Hong Kong and Macau" (Paul Shu Sing Wong); "'Statement of Aims' and Preparation for Working Life: Challenge and Opportunity" (D. B. Lewis); "Reflections of a New Teacher--Peer Supervision in Teacher Development" (Evelyn Yee Fun Man); and "How Do Secondary Students Perceive Their English Learning Experience: Report

on a 'Young Post' Readers Survey" (Christine Yu, Ngar Fun Liu, William Littlewood). (MSE)

NEW HORIZONS
In Education

No. 37 November 1996

教育曙光

香港教師會
教育學報

JOURNAL OF EDUCATION
HONG KONG TEACHERS' ASSOCIATION

第三十七期
一九九六年十一月

香 港 教 師 會

香港教師會於一九三四年成立，以促進教育同工之間的密切合作、提高教育專業人員的地位、維護會員的權益、增進會員的福利、加强國際間的了解爲宗旨。香港教師會除了是本港一個教育團體外，同時亦是多個國際性組織的會員，如世界教師專業組織聯合會及國際閱讀協會會員。

香港教師會的週年學術活動有：（一）教育研究大會，如一九九一年舉辦的「九十年代普及教育的挑戰」研究大會、一九九三年舉辦的「課程設計、實踐及評估」研究大會等；（二）本港教育專題研討會，如一九九〇年至一九九四年間舉辦的「幼稚園、小學與中學的銜接研討會」、「特殊學校音樂教育研討會」、「如何爲成績稍遜的學生提供有效學習研討會」、「中學新任教師座談會」及「家長教師携手育幼苗研討會」等；（三）定期出版 *教育曙光*。近年舉辦的國際學術活動，則有一九九〇年與國際自由教師工會聯合會合辦的第六屆及第七屆香港地區教育團體研討會、一九九二年主辦的「我們的下一代——大陸、台灣、香港、澳門基礎教育研討會」、一九九四年協辦在台北舉行的「世界經濟發展中，海峽兩岸暨港澳地區全民教育發展之展望」學術研討會，及一九九五年在上海第三屆海峽兩岸暨港澳地區教育學術研討會。

教 育 曙 光

教育曙光 是一份香港教師會出版的教育學報，每期均請專家評審；每年十一月出版，分發全港幼稚園、小學、中學及大專院校。

教育曙光 以促進專業發展與教學實踐爲宗旨，每期均刊登具實踐和研究價值的文章。文章的範疇包括專題探討、本港當前教育問題的剖析，教學、輔導及學校行政的研究，教育新趨勢和新意念的介紹等。

歡迎教師、學校行政人員、輔導工作者、教育學者及研究人員投稿。詳情請參閱每期刊登的徵稿啓示。

教育曙光 歡迎各教育機構免費訂閱。請將訂閱表格及郵費寄來香港教師會。

HONG KONG TEACHERS' ASSOCIATION

The Hong Kong Teachers' Association (HKTA), founded in 1934, aims at developing close cooperation among educational workers, promoting the professional status of teachers, protecting the rights and improving the welfare of its members and strengthening international understanding of teacher organisations. Apart from being a Hong Kong-based educational body, HKTA is also a member of international organisations such as Education International and the International Reading Association.

The academic activities of HKTA include:(a)the annual education conference, such as the 1991 Conference on Challenges for Basic Education in the Nineties, and the 1993 Conference on Curriculum Design, Implementation and Evaluation; (b)seminars on educational issues such as "Continuity in preschool, primary and secondary education","Music education in special schools", "Effective learning for the less able students" and "Orientation for new secondary school teachers", "Parents and Teachers together educate the next generation", which took place in 1990-94; and (c) the publication of *New Horizons*. Among the international activities organised more recently by HKTA were the conference on Education for Our Children: Basic Education in the Mainland, Taiwan, Hong Kong and Macau, held in 1992; and the conference on the Prospects of the Development of Public Education in the Mainland, Taiwan, Hong Kong and Macau in the Context of Global Economic Development, held in Taipei in 1994; Conference on Academic Eduation in the Mainland, Taiwan, Hong Kong and Macau held in Shanghai in 1995.

NEW HORIZONS

New Horizons is a refereed journal of education published annually in November by HKTA. It is distributed to kindergartens, primary and secondary schools and tertiary institutions in Hong Kong.

New Horizons is intended as a forum to stimulate and enhance professional development and practice in education. We publish papers that speak directly to practical school and classroom concerns as well as papers that are based on systematic inquiries into educational issues and practices, including those related to the announced theme(s). We also publish presentations of new developments and innovative ideas tried out in schools, in Hong Kong or elsewhere.

Submissions are invited from teachers, school administrators, persons with pastoral duties, educationists and researchers. General information about submissions can be found in the Call for Papers in each issue of the journal.

Free subscription to *New Horizons* is on an institutional basis. Institions are required to send in a request from and pay the postage.

Publisher : Hong Kong Teachers' Association

編者話

教育曙光主要是一本服務從幼稚園到大專教育工作者的雙語期刊，讓教師、學校行政人員、輔導工作者、教育學者及研究人員可以交流和發表他們從實踐與研究所得的新思維與發現。本刊已逐漸由一本地的期刊發展成一國際性的刊物，最近美國的教育研究資源中心（ERIC）更將本刊的作品儲存在其網絡系統內，方便世界各地人士查閱。

由於工作上的方便，本刊的顧問、評審員和編輯們多來自香港，但為著維持質素和水準，本刊亦有邀請外地的學者（澳洲、加拿大、中國、澳門、星加坡、台灣和美國）擔任顧問和評審的工作。通常每份來稿會交給兩位專長該範圍的學者用不記名的方式評審，在有些情況下更會多邀請一位參與，評審需時約兩個月，完成後編輯會將評審員的意見綜合後寄給投稿人參考，以便能修改或重寫後再投稿登出，

From the Editor

New Horizons in Education is a bilingual journal primarily for educators from kindergarten to the tertiary sector. Its role is to serve as a forum for teachers, school administrators, counsellors, educators and researchers to exchange insights and discoveries derived from their professional practices and inquiries. The journal has gradually developed from serving the local educational sector only to one recognized by the broader international educational community.

For convenience, advisers and reviewers are drawn mainly from Hong Kong. However, in order to ensure the quality of the contributions, reviewers are also elicited from Australia, Canada, China, Macau, Singapore, Taiwan and the U S A. We are especially pleased to announce that the ERIC (Educational Resources Information Center) has also included our journal in their data base, indicating the increased importance and standing of the journal internationally. For each manuscript, two reviewers are invited to review it anonymously. On some occasions, a third reviewer is asked to judge the quality of the manuscript. The reviewing process usually takes about two months. Suggestions from the reviewers are then sent back to the authors for modifications or resubmissions. We hope you continue to support this very worthwhile journal.

教　育　曙　光

第三十七期，一九九六年十一月

目錄

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「人人是創造之人」的教育理想：從教育心理學的角度設計培養創造力的教學法

李懷敏
香港理工大學

二十一世紀人類社會的發展，很大程度將取決於社會成員的創造力，因而也就取決於創造教育的開展。本文介紹培養創造力教學法的AR3模式，即建基於近年教育心理學界認識到創造力是一種普遍存在於每個身心健康者的心理能力這個理念，只要經過悉心訓練，教師是可以把每個學童潛在的創造力激發出來。AR3這個模式融合了六項智力的和非智力的心理機制，與社會文化相關聯的作用有機地整匯在一起，使每一個學童的創造潛力得以發揮。

"Every person is a creative being":Teaching method designed to cultivate creativity from the perspective of educational psychology

The socio-culturo-historical development of the twenty-first century to a large extent will depend upon the creativity of the people. The creativity itself in turn will be determined by the support of creative education. The AR3 Model to be discussed in this article-- a model that can be adopted to support creative education-- is based on the belief derived from educational psychology in recent years that creativity is a common ability for every physically and mentally healthy person. Through guided training and practice, the latent creativity can be released. The Model integrates six cognitive and non-cognitive components, together with other related socio-cultural factors, to form a dialogical circle which facilitates the process of creative venture.

一、引言

創造是人類社會生存和發展的必要條件，任何社會的進步，物質的和精神的，都離不開創造思想和創造活動。有些研究（Ripple，1989）指出，在眾多影響創造力的因素中，不滿足日常生活現狀而設法予以改善，是導致創造力湧現的最重要的一種動力。而二十一世紀人類社會的發展，很大程度上更將取決於社會成員的創造性，因而也就取決於創造教育的開展。那種只重視傳授知識的傳統教育思想和填鴨灌腸式的教學法，已不能適應新世紀的發展需要。

現今創造教學法的研究，普遍集中於發展個別的方法，例如吉爾福特（Guilford 1991）的擴散性思維法（divergent thinking），德．波諾（de Bono, 1991）的旁通思維法，中山正和的MN法等。這些個別的培養創造力方法雖有其優越之處，卻未能把培養創造力這項訓練放進一個整體全息（holistic）的脈絡來考察，且致未曾考慮及一些與培養創造力至關重要的非智力因素。在實際創造過程中，創新意識、興趣、愛好、情感、意志等非智力心理因素，將與其它智力的和社會文化因素相關聯而發揮綜合性作用（朱作仁，1991）。從微觀的教育心理學的角度審視，這些個別的創造思維訓練法也嫌過於簡單。

外國一些心理學家如托蘭斯（Torrance & Myers，1970）認為，每個心理健康的人，都具有創造性，都能表現出一定程度的創造力。一些心學家甚至認為，創造性能力的培養，好比給與神經官能病患者進行心理治療，培養病者克服他們自身看來是困難情境的能力。這種培養解決日常生活問題的能力，提高了病患者的心理穩定性。在這種情況下，起主要作用的，並非只是賦予病患者新的生活知識，而是變換策略和靈活地使行為正常化的意識和可能性。魯克（1985，頁93）指出，「根據這種觀點，『個人創造性天賦』與『正常人的心理』的概念的意義是相同的。」

半個世紀前，教育家陶行知先生在我國正當代最困難時期之一的中日戰爭期間，倡導「處處是創造之地，天天是創造之時，人人是創造之人」的創造教育理念

這理念與當今教育心理學力圖尋求最適度的教學環境，好讓學童的創造力得以盡情發揮的目標相吻合。陶行知先生在《育才學校手冊》發佈的《創造宣言》公開後的四十年，美國康奈爾大學教育心理學家利普爾（Ripple，1983）同樣提出了近似的概念——「平常創造力」（ordinary creativity），一再力圖打破創造力惟少數天才擁有的錯誤觀念，指出創造力人人皆備，只有程度上的差別，經過訓練和培養，即可發揮顯現。較早前，陶行知（1945，頁539）同樣認為小孩子多少都有其創造的能力，但正如他所說，「我們要真正承認小孩子有創造力，才可以不被成見所蒙蔽。」承認並且認識了兒童的創造力，才可望把兒童的創造潛力激發出來。日本當代創造教育心理學者恩田彰（引自朱作仁，1991）指出，每個幼兒都有如馬斯洛（Maslow）所謂的自我求成的創造性。這種自我求成的創造性，就他人來說，未必一定有新意可言，但從幼兒自身的角度來看，自我求成的創造性活動，卻是前所未有的，雖沒甚社會價值，倒可算是個人獨特活動的泉源。幼齡兒童的創造教育已日漸成為世界各國政府教育部門關注的項目。

驟眼看來，不論是陶行知的「人人都是創造之人」，抑或是利普爾的「平常創造力」，這兩個概念的名詞都有點自相矛盾，實質但非就是。只要細心想想，其實不論「人人是創造之人」也好，「平常創造力」也罷，無非都牽涉到一個實質的問題：那是說，什麼是創造力?

二、什麼是創造力和創造教育

創造力是什麼？如何界定？眾說紛紜，尚無定論（Ripple，1989）。儘管前蘇聯心理學家魯克（1985，頁129）在他的「創造心理學概論」裡，早已語重心長地指出：「企圖劃定限制的範圍和預先擬定機器思維永遠不能超越的界限，已經被證明是徒勞的，無論是誰都不會獲得成功。」因此，在這裡粗略地列舉一些常見的創造力定義或概念，正如大多數其它概念的定義一樣，最多只能被視為一些指標，給我們帶來初步的方向感。這些定義雖不能說是完美無缺，卻各自有其參考價值。

創造力是一個多向度、多含義的概念。不同年代、不同觀點的研究者，會提出不同的定義和看法，包括：智力發展的高級表現形式，是掌握認識事物發展規律的基礎上對事物的變革和創新（引自朱作仁，1991，頁33）；對社會中某些問題的有用和新穎的解決之道（Mumford & Gustafson，1988）；創造的成果是有意義而且新穎或具適應性的（Richards等，1988）；或創造力只有在特殊的解難技巧、個人及社會條件相吻合的情況下才能湧現（Tardif & Sternberg，1988）。我在這裡採用的觀念，基本上是承傳陶行知先生「人人是創造之人」的理念。此理念只是各種與創造力有關的理念的其中一種，與上文引述的數種觀念並沒有嚴重的分歧。所以採用此觀念，一方面反映出我的若干信念；更重要的是，這個觀念對下文將介紹的一個模式——ARS的討論有所裨益。

教育心理學界新近逐漸認識到，創造力是一種普遍存在的心理能力。這個觀點，有異於傳統心理學那種非有即無的邏輯，卻把創造力視為一種從低到高水平，存在不同程度的連續體。除病患及弱智者外，從兒童期開始，每個健康的人都具有的能力，問題在於有否把其潛存的能力激發出來，與及激發多少而已。有些教育心理學家（吉爾福特，引自許天鵬、張雯，1992）強調，創造也是一種技能，是可以經過訓練而培養起來的。

為什麼說創造力是一種從低到高、程度不同的連續體呢？根據人們解決問題的新穎性和獨特程度的不同，朱作仁（1991）建構出一個創造力「三層次模式」，現以圖表（表一）整合這個模式：

表一：初、中、高三層次的創造力模式及其相應的表現形式

創造力層次	表現形式
初級	意識到現有的或想當然的知識中的不足、問題，並敢於介紹性的提問和解答 學前、小學生大都具備這種能力
中級	在現有的知識或經驗的基礎上重新組合成仿作，改進或具有效益的新事物
高級	首創長期受發揮作用的學說，產生劃時代的新理論或發明

表一裡三個層次的劃分，並非是截然的，而是逐步生成和發展起來的，或出現同時並存的現象。低層次創造力的形成，雖然不是發展高層次創造力的足夠條件，卻是必須的基礎。形成高層次創造力的條件十分複雜，目前學術界並未能提供足夠的驗證研究結果。本文的主要篇幅，主要集中在培養初、中兩層次創造力的教育方式上，但ARS模式卻有可能從理論的角度，給高層次創造力的形成，提出一個可供探索的路向。

從與傳統教育的關係及其實現的形式或途徑這個角度考察，創造教育可分成廣義的、中義的和狹義的三種（朱作仁，1991）。廣義的創造教育與傳統教育相對立，要求整體地把創造教育擴散到現代教育的各個領域，摧毀一切推行廣義創造教育者認為不合理的傳統教育。主張中義的創造教育者的立場較為溫和；他們強調創造教育與傳統教育的一致性和承傳性。狹義的創造教育則視創造發明為一種專門的技能，通過設立若干專門講授創造發明的學科，訓練並且提高學生的創造發明能力，即可達到創造教育的目的。從銳辯思維（註1）（Lee，1993）的觀點觀察，狹義的和廣義的教育觀均有其偏頗的一面。教育界首先無法、亦無可能在朝夕間把傳統教育連根拔起，而且，傳統教育也絕非全無是處。

下文的討論重點，將集中如何在有限教育資源的情境中，採用低硬件成本、高創造心理回報的教學方法，激發學童的創造潛力。

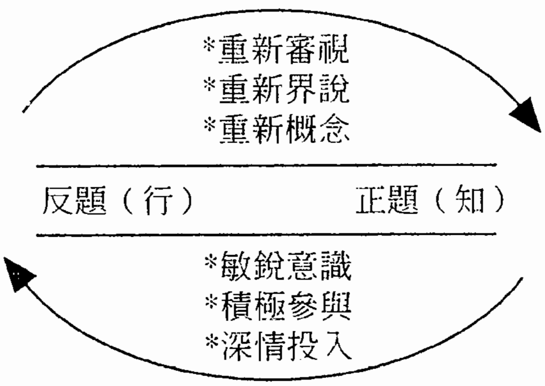
三、無序中的有序：AR3 模式

從遠距離看，創造力像它的基始狀態般紊亂無序，但正如混沌理論所顯示（格萊克，1990；Bergstrom，1991；詹奇，1992；李懷恢，編審中），創造行為的過程其實是無序中有序。下文討論的 AR3 模式，即嘗試從宏觀的社會、文化和歷史的角度，辯證地結合微觀的心理機制，系統地設計一套激發創造力的教學法。

AR3 模式是基於如下的一個信念。首先，它認為思想上多方面的分歧是事物本質的一部份，因此，這個模式要求人們不忙於作出最後的判斷或評鑑，因為過早地貼上標籤或作出絕對的判斷，限制了對新事物的敏感或不把它看成問題，因而使個人的經驗遜色（魯克，1985）。這個模式鼓勵人們採用種種不尋常的方式（包括反向思維）觀察事物，並且高度容忍那些以有異於常人的方式觀察事物和思考的人。倘使得要在信息不完備的情況下作出決定，AR3 模式主張人們仍需具備一思維的大無畏精神（魯克，1985，94 頁），有膽量把它們表達出來，雖然間或會更多地承擔錯誤風險。

AR3 模式（Lee，1993，1994）採用全貌的立場，嘗試以一個相對簡單的方法把培養創造力，屬於智力的和非智力的因素包涵起來。非智力因素是創造行為的重要組成部份，雖然非智力因素無法代替智力因素在創造行為裡的各種基本能力，卻與智力因素起著相互激發或制約的作用。廣義的非智力因素是指除去智力因素以外的一切心理因素，狹義的非智力因素則以動機、興趣、情感和意志為主。AR3 模式則以狹義的非智力因素為機制，討論培養和觸發學生在學習中發揮其創造潛力的教學法。在建構 AR3 這個模式的過程中，作者揉合了我國教育傳統裡的知行合一和儒家的銳辯思維，里格爾的三段邏輯辯證法，在施萊爾馬赫（Schleirmacher）詮釋圈的基礎上進行改造，引入六項（3A 和 3R）分別屬於智力的和非智力的因素（圖一）。這六個因素原非獨立存在，亦無先後次序之分，為了方便說清箇中來龍去脈，本文將逐點分別討論。

圖一：AR3 模式基本機理



簡要的說，AR3 模式的內容大致可以概括為：任何存著正面和反面關係的事物均相互依賴，與對立面的同一，一個概念有可能轉化成對立面的概念，並且在恆常的更換和運動發展中。而使其不斷運動和更換的機理主要有六點。這六點因素為敏銳意識和賦予意義，積極參與，深情投入（以上三點機理的英文名稱以 A 字母為首，故稱 3A）；重新審視，重新界說，重組概念（這三點機理的英文名稱以 R 字母為首，故稱 3R）。

敏銳意識和賦予意義

對一般人都似乎明確地習以為常或想當然的事物，具有高度創造力的人會視之成問題。他們抱有敏銳地尋找和適切地提問的能力，善於在一般人都看以為很清楚的地方找到問題。他們不願意輕率地接受想當然的看法，包括自己的或他人的，對一些說的真理（這些一去

認的真理（常常披著想當然的外衣出現）提出質疑，甚至對抗（曾克，1985）。他們有強烈的求知慾，事事喜歡問到底，不滿足沒有把握的資料。雖然他們對某些不明確的概念擁有相對較高的容忍力，並且善於運用模糊概念，視之為弄清概念過程中的挑戰來源，具有創造力的人不能忍受來自第二手含糊不清的敘述，非得親自查究，試圖弄清問題的本質和依據所在。信息稍有矛盾，出現邏輯不一致或牽強附會的情況，他們會給想當然的事情重新賦予意義（appropriation 註2）。這是為什麼能創造性地獨立思考的人，總是那樣吹毛求疵、要求嚴格，不僅對他人如是，對自己更善於自我覺察。懷疑的意識在這裡不僅針對外界事物，還包括對思考者自己本人的懷疑意識，即高度的自我覺察（self-awareness，曾克，1985）。這些個性反映高度追求自我確定的獨創性品質。

因此，鼓勵學生尋找和作出適切的提問，是激發他們的創造潛能的其中一項首要條件（Torrance & Myers，1970）。其實，一般兒童都擁有強烈的好奇心（即求知慾），往往總喜歡打破砂鍋問到底。可惜，不少家長和老師未能掌握機會，甚至反其道而行，以孩子多事作理由，扼殺兒童的求知慾。托蘭斯為教師的創造教學實踐而製定的五條原則和七點要求值得我們參考（參看附錄表一及二）。

因此，在教學中引導適切的「問題」，是激發學生的研究興趣其中一個良好方法。怎樣才算是適切的問題呢？朱作仁（1991）指出適切的問題至少擁有以下四個特性：

（一）具有學生個人參照系，即它直使問題與學生當前的智力發展和日常生活緊密地聯繫起來，而不僅具有智力或認知上的要求，且與情緒或情感上的要求協同，即把智力與非智力的因素都包含其中。

（二）問題不僅具有「其實式」的現成答案，並且使學生聯想到，還會有多於一個可能的答案（擴散思維和延遲判斷的結果）。

（三）引起疑問，[illegible]，問題的答案[illegible]有意思，學生[illegible]問題，[illegible]或不同的理解和認識，[illegible]種理解和認識，會隨著年齡、知識和經驗的增長而有所改變。

（四）提問並非只是為了考核學生的記憶或知識的多寡，更重要的是讓學生有意識地認識到，適切的提問不僅可以激發他們解決問題的能力和探索精神，並且改變他們現有的知識結構（參看下文）。

懷疑意識和適切提問實質上與美國教育學家杜威（Dewey）的「思維五步法」的第一步（疑難或問題的發現）和第二步（確定疑難的所在和性質）很有雷同之處。不過杜威思維要求培養學生採取積極的、主動的生活態度，而非實用主義所倡議的問題教學法，即只有在生活或活動中遇到困難時，才尋求解決之道（見朱作仁，1991）。

積極參與：動機的外延和體現

意識到問題的存在，下一步將如何？不少人可能就此停下來，拒絕透過行動來驗證其存在或可行以改進。ARS 模式底下的 2A3R 試圖提出打破此停滯不前的局面。2A3R 包括了屬於智力的（3R）和非智力的機理。首先，屬於非智力的機理有「2A」，即：深情投入（affectional commitment）和積極參與（active participation）。

在感興趣的領域裡傾其一生地勞動是創造性個體一項卓越品質。就某一對象未能產生興趣或愛好，那是難以激起創新意識的。曾克（1985，93頁）談到創造性個性的時候指出：「創造與勞動是分不開的」。在這裡，我想用一個語重而更寬廣的術語——「積極參與」——代替「勞動」這個詞彙。

積極參與是動機外延和體現的表徵。而動機則是驅使個體進行創造活動的內部動因，促成智力活動的持續進行。當個體的創造動機適中，就能朝著實現創造表現的目標前進。動機可視為一種心理能量，一旦出現，便能導致心理出現不穩定狀態，或是[illegible]理論裡的「引力場」（[illegible]，1992），產生張力，激發個體調動各種嘗試方式、[illegible]（[illegible]，1990），[illegible]策略。

深情投入

[illegible]

（即從何著手改善的問題）和難題（著手改善的問題是否具有一定的挑戰度），是成功地表現創造力（至少是中級的）最重要條件之一。魯克（1985，96頁）引述兩位公認具有創造力的科學家——牛頓和巴甫洛夫——的經驗，前者當被他人問及自己怎樣得出著名的定律時說：「很簡單，我只是無時無刻不在思考這個問題。」巴甫洛夫同樣表示他自己是「不停地思索」的。沒有好奇、頑強、目標明確的感情投入，創造力是很難實現的。因此，感情投入反映著堅強的意志，促使個體的創造行為更具目的性和方向性，在生活裡積極磨礪自己的敏銳意識，主動觀察生活周遭的環境，從隨意注意轉為有意識的注意，慣性的再造想像通過過渡到創造想像（申繼亮，1990），無意識的提問化成有意識的適切提問。正如積極參與是動機外延和體現的表徵，感情投入同樣是體現興趣的表徵，二者擁有相若的動力功能，激發或制約創造力的發展。

感情投入和積極參與，是提高「使人成為自然界內有系統中獨一無二的系統」（拉瑟洛，1985，頁86）的意識（conscientizacao，見 Freire，1970）及自覺的能動性（毛澤東，1938）的重要機理。唯有意識可使人超出當前實際經驗的局限，並有可能按照自己的意志去支配經驗，包括思維方式。人類歷史證明[illegible]，往往一次社會生產方式的改變，人們得要適應新的局面，這往往要求，我們要把我們的意識，提高到新的層次（[illegible]，1986）。

重新審視

學生的創造力是在長期的實踐活動中逐漸建立起的，這就是說明「工作合一」的重要性。這個觀念，要求教學過程的認識，重點不在於使學生成為單純的現成知識的承納人，而在一定程度上從事「再發現」、「再創造」。「再創造」的一項基本條件，是重新審視（re-vision）現成的知識。Revision 是 ARS 模式裡的其中一個 R，英文的意作「校訂」或「修改」解，這裡特寫作 re-vision，即重新審視之意。

面對世界的結構，往往是千變萬化、複雜模糊，在現今資訊及科技發展的年代，這種現象尤其明顯。[illegible]

具有運用不很明確的模糊概念的能力，是創造性思維的特徵之一（魯克，1985）。

訓練學生如何在這複雜模糊的狀況中，作出有效的（這裡以適當處理和改善生活質素作準）選擇或決定，因此便成為思維訓練的其中一項最重要環節，而對事物的模糊具有較大的容忍度和延遲判斷是兩種必備的能力。對模糊性具有較高的容忍力和延遲判斷，一方面可以防止過早架設框框或劃地為牢，另一方面會促使思考者對事物進行重新審視和界說。

思維一旦陷入凝滯或僵化狀態，便會自然地排斥新事物，這是慣性思維的局限，使思維在邏輯上的合理，變成事實上的荒謬（[illegible]，1991）。訓練學生逾越慣性、單一和簡化的思維和有限視野的能力，旨在促使他們明白事物的存在、運動、發展和個中聯繫，存著各種各樣的可能性，包括事物的矛盾、問題的潛伏、知識或改善方法的不完整、成份的殘缺和關係的不協調等，以激發他們發展多端的、靈活的和獨創的思維方法，同時做到宋朝學者朱熹在「讀書法」裡所說的：「讀書無疑者，須教有疑；有疑者卻要無疑，到這裡，方是長進。」（註3）

重新界說

[illegible]（[illegible]）曾論邏輯[illegible]，主要[illegible]問題之設想、持續地作[illegible]（吉爾福特，1991）引用格式塔心理學的研究，指出人常常是通過重新界說，即通過改變客體或問題的意義而成功地解決問題的，因而指出重新界說有助於作出新的[illegible]及創造思維裡的靈活性表現。[illegible]、隱蔽圖形測驗，是創造思維測試較常採用的方法之一。在大圖形中隱嵌了隱蔽的小圖形，受試者要找出小圖形，就得對其中一些線條加以重新界說，改變（即重新界說）這些線條的一些有關用法。

[illegible]考察，[illegible]的地方，可是仍有借鑒之處。我們在這裡且再看他另一段話，用以說明重新界說的重要。[illegible]（引自吉爾福特，1991，頁203）記載了[illegible]的一段話：「解[illegible]，若從零考慮起[illegible][illegible]……[illegible]教學的借鑑。

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概念重組：破舊立新之道

經驗似乎告訴我們，處理目前或行將出現的事物，最佳之道是採取過往行之有效的方法。在一些情況和一些事物，這也許未得不是最好的策略，但這些習以為常的行為，有其缺失之處，容易導致我們思想上的疏懶，忽略隱藏在事物深層的意義或逐漸顯現的新勢態，處理日常生活的事物，一律蕭規曹隨，並且錯誤地以為這些透過個人生活體驗積累得來的知識是唯一的知識基礎（Kvale，1992；Lee，1993），從此陷入自己繪製的框框，思想上劃地為牢，懶於從不同的角度、不同的層面、不同的尺度考察或衡量事物。打破或跨越這些框框，是創造行為的具體表現。

概念重組（reconceptualization）是一個由解構（deconstruction）和重構（reconstruction）二個部份辯證地組成的機理。它揭示了日常生活裡的一些似是而非的矛盾。表面看，解構和重構的互補性有點諷刺的意味，即立新必須破舊。解構又可被視為是一種培養直覺能力的辯證法或統攝法，即把看慣的東西當成看不慣的東西，而把看不慣的東西當作看慣的東西。解構把既成的思想或觀念打成碎片，抓著基本因素，借助反向思維，把它們重新組合起來，構成新的觀念和思想。

作為解構最佳的方法之一的反向思維，與慣性的邏輯思維正好相反。這種又稱為兩面神思維（註4），或逆向思維（徐建龍，1991）的方法，主張從反面（negation）來認識事物，即從對立面中，尋求並把握統一。它打破慣性的思維走勢，克服思維的單一性，具有明顯的求異性，從常規中求異變（夫龍，1991）。值得注意，AR3模式的解構很著重逆向存在的合理性，並不主張任何事物都可以或需要解構而且事物也非只要解構，便能打破慣性思維，從而取得突破。倘若持此態度，只會從一種慣性演化成另一種慣性吧了。這是說，以反向思維作為主要機理的解構過程，十分重視辯證思維的對立統一規律；換句話說，反向思維也決非是「非彼即此」的二元對立，而較多地接近我國傳統的系統思維的「亦彼亦此」的對立互補。

概念重組對日常生活的大大小小、習以為常、理當然的事物、文本和理論，抱有警戒的態度。它要求人們發掘隱藏在事物、文本和理論裡的深層的、或另類的意思，尤其得要從它的社會的、文化的、和歷史的角度去考察。對事物、文本和理論進行多次的檢閱，有助於我們揭示初始接觸或前所未見的意義或方面。只有當我們抱著開放態度，要求自己解決新與舊觀念間的差距，我們才有可能從建構的二元對立的束縛中解放出來，成為一個思想上相對自由的人。從這個角度看，所謂知（knowing），包括自知（knowing the self），是一個主體和客體持續對話、不斷改變和湧現的概念重組過程。解構既成的概念（破舊），意味該概念將被重構（立新），這在詮釋圈內將以往復循環的形式出現。

重新審視和重新界說都是轉化能力的心理運演過程的重要組成部份。此外，靈活性亦有利於這個過程的完成，而轉化能力的多樣性，則取決於創造者能夠接觸信息的多寡和藉以工作的媒體的種類（吉爾福特，1991）。

四、生生不息的創造力：螺旋型的往復循環

AR3模式的運作，有如湍流中的混沌性（chaotic vortexes）般，具有螺旋式的動力（spiral dynamics），在生生不息的往復循環中提升，在眾多有利因素的場合下突破邏輯思維的臨界點。AR3模式這種生生不息、具有螺旋式的動力狀態，與貝斯特朗（Bergstrom，1991）藉由生理實驗結果建立的混沌生發器（chaos-generator）模型相吻合。正如本文所立論，貝氏同樣主張創造活動裡的思考方法，是可以透過教育，訓練學生進行往復循環操作，由慣性思維層面轉化到更高層次的思維水平。AR3模式與混沌生發器模型主要不同之處有二：（一）在宏觀的層面考察，AR3模式把社會、文化和歷史的因素，與微觀的創造思維一起全息地予以考慮；（二）從微觀的層面來看，AR3模式把影響創造思維最重要的智力的與非智力的因素統合起來。混沌生發器模式則在（一）和（二）兩方面付諸闕如。

轉化能力是創造性才能的一個重要潛在來源和表現標誌（吉爾福特，1991）。這類能力使人們能夠對所經歷或認識的事物賦與新的觀點和意義而予以更新，從而產生出新的內容、形式和組合。轉化是防止人們被習以為常（即僵化了的）思維活動所阻塞，因而允許首創性的湧現。由是觀之，有什麼方法可以激發學童的轉化能力？轉化是一種實踐（praxis）的活動，即我國傳統教育裡強調的知行合一，「知」得要完成「行」的部份，才能算得上是「真知」，把「知」和「行」分割開來的

教育理念，歷來都為有識之士所啓揚（王陽明，1517；陶行知，1943，1945）。英國教育家杜氏（Dow，1982）更採取了我國的陰陽論，建議西方教育界應同樣把知行合一起來，作為教育的最終目標。

五、創造行為的個性化和社會化

群體和社會對創造活動抱持的態度，對激發生活在其間的每個人的創造力具有重大的影響。托蘭斯（引自朱作仁，1991）的研究顯示，在小學低年級裡，具有較高創造力的兒童，往往具有「頑皮兼愚蠢」的想法，而聞名於同伴中，並且通常被成人當作「野孩子」般看待。他們在觀念以致行為上不斷偏離文化規範，即使是首創性的行為或獨立的見解，不但得不到獎勵，甚至因此而被懲誡，成人社會常常採取「野蠻」的態度對付。社會歡迎的是那種被認為是孺子可教的（educable），即聰明伶俐、能夠作出老師預期的答案、在課堂表現循規伶俐的學生（Burt，1970）。到了小學三年級，那些原來具有較高創造力的幼兒，不斷經受那些負面（壓抑其創造力）的社化經驗，從此放棄表現其創造力，或學會把那些被成人世界視為「不切實際的想法」隱藏起來。

獨創性是創造力的一項重要本質，魯克（1985，頁99）說：「為了懷疑公認的東西，為了建立更好的東西而去破壞，思考誰也不思考的問題，在沒有精確的邏輯論理時相信自己的直覺，獨創性都是必要的。」因此，創造力的個性化便被許多研究人員視為創造力不可或缺的要素，甚至提出「沒有個性就沒有創造」的看法（朱作仁，1991，頁94）。根據這一觀點，主動性、洞察力、變通性、疑問性、興趣廣泛、自信心、堅持力、想像力、獨立性、勇氣、易衝動、幽默感、冒風險、創造精神和創造意識等等，被視為是創造性品質，是創造活動的動力因素。不過，這種基於個人的獨創性和發明能力的種種錯誤設想，近年受到重大的質疑（Lamb & Easton，1984）。本世紀進行的兩次對學術發現和發明的調查顯示，多重發現頻生，是新的科學探索的一種結構特徵，矯正了科學發展的個人英雄主義，科學發現不再被當成是「私人的」、「孤立的事件」，而被看作是一個進化的、群體的活動。

因此形成一種利於表現才能、創造力和欣賞的互相理解的社群風氣，至為重要（陶行知，1945）。在這種友善的風氣裡，每個成員的創造力都得到尊重和獎勵，而整個社會更得要承擔起激發兒童的創造潛力的責任。教師、父母和社會都要容許孩童有犯「錯誤」和做事「不切題的思想」的自由，對各個領域裡具有真正獨創性的努力，都持讚許和獎勵的態度。總結一句，創造教育並非是個別學生、教師或學校的事情，它還包括一種由群體、社會和文化顯現的激發和尊重創造性的風尚（恩田彰，引自朱作仁，1991；Lee，1993）。

儘管獨創性常常被喻成創造性個性的一個卓越的品質，前蘇聯創造心理學家魯克（1985，頁96）補充說，「一般而言，具有高度創造力的人，」「但又不是過分奇異、不是竭力強調自己的特殊性」的人。托蘭斯強調創造力的社會屬性，主張應為群體學習和解決問題提供更多園地，在符合教育目的和有意義的群體活動中，培養學生相互合作的能力（見朱作仁，1991）。「沒有對別人直接接觸的要求」的個性和「對社會正義的強烈渴望和社會責任感」的社會性，這種明顯的雙重性格，在具有極高創造力的愛因斯坦自白裡表露無遺（參看魯克，1985，頁100）。他是如陶行知（1943，頁15）所說般，以群體的力量（對社會正義的強烈渴望和社會責任感）來糾正個人主義（「沒有對別人直接接觸的要求」的個性品質）。顯示我們毋須把個性化和社會化作傳統的二元對立。

陶行知（1945，頁565）在四十年代提出過創造的社會教育，即「要用新的眼光和新的精神，呼籲解放老百姓的雙手、雙眼、嘴、頭腦、空間和時間，為的是要培養老百姓的創造力」（同上，頁567）。此外，朱作仁（1991，頁137）倡議的社會參與創造教學法，值得我們參考。他主張「走出去、請進來」教學法，把現實生活與課本內容聯結一起，作為學習的過程和目標。這種教學法可培養學生承擔一定的社會責任，倘把承擔這種責任與評核學習成績結合起來，讓學生在實際生活實踐中創造性地掌握教材所規定的知識，同時也能學到教材以外的知識、價值、技能和生活態度。這樣，也許便能夠把發揮創造力的個性化和社會化統一起來。

六、總結

ARS模式的基本精神與辯證思維（Benack等，1989；Lee，1993，1994）有著許多相同的地方。它強調知識和事物發展的動態性，它要求人們熱愛生活，主動和積極地關心日常生活事務，抱著開放的態度對日常生活的觀念採取新的思維方式和動態分析，經常判斷生活週遭的事物；對現狀抱有改造的意識，能夠作出適切的提問和反省，常常重新審視大多數人或許會想當然（take-it-for-granted）或人云亦云的觀念，具有了以解構和

重構的創新能力，在解決問題時，能夠提出多樣化的觀念，並且給事物賦予新的意義。

AR3 模式的創造教學法具有實踐性，它要求理論與實踐聯繫，亦即知行合一。它同時要求教學裡的兩大要角 -- 教師和學生 -- 把所授和所學的知識靈活而創造性地運用到日常生活的實踐中去（改善生活質素）。

AR3 模式雖然還是處於雛始建構的階段，需要修訂之處恐怕還是不少。基於凝證圈（又稱螺旋型詮釋圈）進一步發展或修訂的模式，在不同的學科或範疇裡都獲得採納（皮亞杰，1984；Kemmis & McTaggart，1988；Bergstrom，1991），顯示這一模式可供進一步發展的潛力。

註解

註 1：銳辯思維（critical thinking）一般譯作批判思維（參看楊思基，1992）。我棄用「批判」二字，改用「銳辯」，原因如下：（一）憲其過多負面含意；（二）銳字保留英文 critical 的部份原意；（三）辯字在這裡包含辨明、辨別、變等義，更保留思辯精神希臘古文「對話經術」dialectike 的原意。

註 2：Appropriation 也可解作「占有」（參看朱士群，1992，頁 70），意即將原先被遺忘之物當作自己之物對待。

註 3：引文見馮天瑜，1983，頁 174。又據台灣遠流圖書公司 1991 年出版，《朱子讀書法：宋儒朱熹讀書心法徹底研究》，朱熹（黎靖德編，陳仁華翻譯解讀）第 178 條，引朱熹弟子楊道夫記錄的文字則為：「讀書無疑處，須教有疑；有疑處，卻要無疑，讀到這般田地，方長進。」（161 頁）。

註 4：兩面神這裡指古羅馬門神，有兩個面孔，能夠掉轉方向觀察事物。美國精神病學和行為科學教授盧森堡以此借譬那些能夠從逆向方面思考而具有創造性的思維方式（見徐建能，1991）。

中英詞彙對照

連續體	continuum
解決問題	problem-solving
狹義	limited notion
模糊問題	ill-structured problems
解構	deconstruction
重構	reconstruction
寬容的互相理解	shared understanding
轉化	transformation
格式塔心理學	Gestalt psychology
動態分析	dynamic analysis
多重發現	multiple discovery
自我求成	self-actualization
賦與意義	appropriation
概念重組	reconceptualization
重新界說	redefination
重新審視	revision
敏銳意識	awareness

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附錄表一：托蘭斯 (Torrance) 建議的五條實踐創造教學的原則

條款	內容
一	尊重與眾不同的疑問
二	尊重與眾不同的觀念
三	向學生證明他們的觀念是有價值的，即承認學生的創造性
四	給以不計其數的學習機會
五	使評價與前後果聯系起來

附錄表二：托蘭斯 (Torrance) 給實踐創造教學訂定的九個方面的要求

條款	內容
一	對學生發揮出來的創造力感到由衷的喜悅並加以高度的讚揚
二	建立有助於維護個人的自尊心的人際關係
三	率直的共同感受
四	瞭解學生的能力界限和優點
五	不支配學生
六	創造性地寬容學生
七	不限制集體的意志和個人的意見
八	探求各種事物的真情
九	寬容與幫助的環境

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Sex Differences in Problem Behaviour and the Self-Concept: An Investigation of Hong Kong Junior Secondary School Students

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This study investigates the problem behaviour of Hong Kong junior secondary school students and its relationship with self-concept and gender. The subjects were 214 boys and 135 girls of 13-15 years of age. Significant sex differences were found both in terms of the boys being involved in more problem behaviour, and the correlations between self-concept and problem behaviour among the boys but not among the girls. Implications of these findings for modifying problem behaviour are then discussed.

香港初中學生問題行為與自我概念關係之研究

本文探討香港初中學生的問題行為與自我概念兩者之關係及性別上之差異。受試者為本港初中學生，男生214名，女生135名，年齡介乎13至15歲。研究結果顯示男生問題行為較女生為多；問題行為與自我概念的相關則只出現於男生當中。本文最後討論上述結果的含義，並論述有關改善問題行為的方法。

Introduction

Problem behaviour is an everyday occurrence within the school environment in Hong Kong. It ranges from truancy and dishonesty to aggression and vandalism. This disruptive behaviour has aroused great concern among school authorities and parents for it not only hinders the learning and development of individual students, it also interferes seriously with the teaching and learning process in the classroom and thereby upsets the smooth running of the school. It has been reported (Hong Kong Education Department, 1990) that there had been an increase in the incidence of problem behaviour among Hong Kong adolescent students, with students enrolling in the F.1 to F.3 classes constituting the majority of the school offenders. Teaches are now under more pressure to deal with problem students. In handling these problems, different strategies are sought and implemented by individual teachers and the school authorities. However, before taking measures to cope with these problems, it is necessary to identify the possible causes. The exploration of psychological variables such as students' perception of themselves may help bring better understanding about the problem and give insights to teachers or parents as to the best strategies to adopt.

Student Problem Behaviour

Different terminology has been used to describe student problem behaviour. For example, words such as 'maladjusted', 'disaffected', 'disruptive', 'disturbed', or 'troubled' have been used interchangeably with problem behaviour (Williams, 1988). To define this term is difficult as individuals vary in their perceptions of what constitutes problem behaviour. This applies to teachers, parents, and students. Even among teachers it is difficult to obtain a consensus as to what constitutes problem behaviour. Nevertheless the U.K. Underwood Report issued by the Ministry of Education in 1955 was the first official attempt to define what constituted problem behaviour. The report presented a list of behaviours or symptoms that were characteristic of problem students. There were items such as unmanageableness, temper, aggressiveness, jealous behaviour, demands for attention, stealing and begging, lying and romancing, truancy, and sex difficulties. Problem behaviour in school has also been classified into categories by the Scottish Education Department in 1977 as including disruptive or unruly behaviour, truancy, physical attacks on other children, vandalism, verbal abuse of teachers, extortion, breaking and

entering of school property, attacks on teachers by pupils, gang violence, racial violence, attacks on teachers and other adults.

With regard to Chinese students in Hong Kong, the nature and incidence of behaviour problem may differ from that of their Western counterparts due to the Chinese cultural context. In the territory-wide survey carried out by the Hong Kong Education Department since 1982, different items and categories of problem behaviour have also been identified (Education Department, 1990). The problem behaviour of Hong Kong secondary school students was grouped into two main categories viz. unruly behaviour and delinquent behaviour. Unruly behaviour includes disciplinary offences that students commit within the school-related environment. They are less serious compared to delinquent behaviour which involves criminal implications.

Unruly behaviour includes the following items:

Insolent or rebellious behaviour
.Disciplinary offences to attract attention
.Habitual truancy
.Acts of dishonesty such as cheating
.Regular use of foul language
.Malicious damages to school or other's property
.Bullying of pupils
.Habitual lateness
.Habitual failure to hand in assignments/bring textbooks or stationery to school

Delinquent behaviour includes the following items:

Acts of physical violence
.Stealing
.Involvement in gambling
.Suspected involvement in triad activities
.Intimidation such as blackmail
.Possession of pornographic materials
.Involvement in sex offences
.Conviction for one or more crimes

The frequency of occurrence of problem behaviour in Hong Kong secondary schools has varied over the last fifteen years. For example, it was reported that the total number of offences remained more or less the same from 1983 to 1986. The number significantly increased in 1987 and 1988 but stabilised in 1989 (Education Department, 1990). The majority of the incidents reported from 1982 to 1989 were of the less serious category of unruly behaviour, amounting to 93% of the total offences, while delinquent behaviour accounted for only about 7%. It was also reported that there was a higher proportion of boys involved in unruly and delinquent behaviour than girls and the proportion remained quite stable at about 70% and 30% respectively.

In another survey carried out by Hong Kong school social workers in 1993, it was pointed out that the most prevalent student problem behaviours are indulgence in playing and lack of motivation to learn, disruptive behaviour in the classroom, resistance to school rules or teachers advice, use of foul language, and truancy. It was also pointed out that incidents of problem behaviour were found in both Band 1 and Band 5 schools. In the same survey, the majority of the more than 300 experienced secondary school teachers who were interviewed considered that students' problem behaviour was more serious than it was five years before.

Theoretical Approaches to Understanding Problem Behaviour

Many researchers have pointed out that the incidence of disruptive or maladjusted behaviour is specific to particular situations, to particular individuals and to particular environments (Hallahan & Kauffman, 1978; Leach & Raybould, 1977; Roe, 1978 Ullman & Krasner, 1965). From an educational point of view, it has been suggested that the school and classroom organisation, examination system, and even specific teacher behaviours may influence student behaviour (Fontana, 1985; Mortimore et al 1984). Some researchers tend to attribute student problem behaviour to 'problems at home'. Young people who come from broken or problem families are more likely to have problems in school as well (Rose and Marshall, 1973). Another disparate view is that behavioural disorder is linked to neurological or physiological malfunctioning (Williams, 1988).

More recent research, however, has suggested a number of psychological factors that can lead to problem behaviour. Specifically, it has been suggested that student problem behaviours are related to the student's perception and evaluation of him or herself.

Self-Concept

Self-concept is a psychological construct which refers to the core of what an individual thinks about himself. It involves all the ways he uses to describe himself, his evaluation of these aspects of himself (self-esteem) and how important he considers each of these aspects plus how all these facets of himself are organised to produce what he recognises as himself (Watkins, 1995). The idea of self is often the basic motivating force of all human behaviour.

Previous research has shown that there is a persistent, significant relationship between self-concept and many aspects of human behaviour. People with higher self-esteem tend to be more confident in their abilities resulting in higher aspirations and greater chance of success in achievement situations. For example, self-concept influences our perceptions of reality and is associated with performance in academic and non-academic areas of our lives (Hattie, 1992). Alienation from school was found to be significantly associated with low self-esteem (Cohen, 1976). The latter also is related to active or passive relationships with students' college tutors (Cohen, 1976) and has also found to be associated with students' career aspirations (Hawkins, 1972).

Self-Concept and Problem Behaviour

A review of the literature suggests that behaviour problems of students are related to their self-concept. Fontana (1985) maintains that a student with a negative self-concept or poor self-esteem is far more likely to cause problem behaviour in school than if he or she has got a positive one. Laslett and Smith (1984) contend that a negative self-concept would seriously interfere with the pupils' academic and social functioning. Epstein (1979) suggests that a student who has an image of himself as undesirable, inferior to others, and not worthy of love, is likely to cause behavioural problems in school. Redl (1971) also confirmed that low self-esteem pupils do present difficult problems of management in school.

In a cross-cultural study of self-concept and delinquent behaviour, it was reported that among white school children, low self-concept is related to high frequency of delinquent behaviour (Drasgow et al., 1986). Another similar study carried out by Calhoun (1984) found a significant relationship between delinquency and self-esteem in different ethnic groups. Reid (1982) studying students at an inner city school in the U.K. found that persistent absentees had significantly lower self-concept and self-esteem. King and Fularczky (1981) also found in their studies that there was a positive relationship between delinquency and low self-concept. In a local study of delinquent behaviour among Hong Kong students carried out by Lau and Leung (1989), it was also reported that the self-concept measure is correlated with the students' delinquency index.

Aims of the Study

The present study aims to investigate the problem behaviour of adolescent students and its relationship with self-concept. It also explores the sex differences in the relationship of these two variables.

Method

Subjects

The subjects of the study were 349 Hong Kong secondary school students with ages ranging from 13-15. There were 214 boys and 135 girls drawn from four junior classes of two secondary schools of which one was a boys' school and the other a co-educational school. The majority of the subjects live in government public housing estates located near the schools and come from families of middle and lower-middle socio-economic classes.

Instruments

The measuring instruments were designed to measure the frequency of occurrence of problem behaviour and the general self-concept.

(a) Problem behaviour

The frequency of each subject's problem behaviour was measured by using a self-report technique. The subjects indicated the incidents of problem behaviour in which they had been involved within the six months prior to the study. Self-reports of problem behaviour by students have been used with success in previous studies in delinquent behaviour among Hong Kong school children (Lau & Leung, 1989). In this study, the categorisation of student problem behaviour is similar to the system adopted by the Education Department. It includes the following items and categories of behaviour:

Item	Unruly Behaviour
1.	Habitual truancy
2.	Acts of dishonesty such as cheating
3.	Regular use of foul language
4.	Disciplinary offences to attract attention
5.	Malicious damages to school or others' property
6.	Bullying of pupils
7.	Habitual lateness
8.	Habitual failure to hand in assignments
9.	Habitual failure to bring textbooks or stationery to school
10.	Cheating in tests or examination
11.	Insolent and rebellious behaviour

Item	Delinquent Behaviour
12.	Acts of physical violence
13.	Stealing
14.	Involvement in Gambling
15	Involvement in triad activities
16.	Intimidation such as blackmail
17.	Possession of pornographic materials
18.	Involvement in sex offences
19.	Conviction of one or more crimes
20.	Gang disturbance

The categorisation is not meant to give an exhaustive list of problem behaviour but represents some major behavioural categories that teachers and schools consider as problem behaviour. The advantage of such a classification system is that it can provide a common language and term of reference for problem behaviour investigators and teachers in schools of Hong Kong.

(b) Self-concept measures

For general self-concept, a Chinese translation of Rosenberg's Self-Esteem Scale was used (Rosenberg, 1965). This is a 10-item scale of self-esteem which is based on a 5-point response and is suitable for use in secondary school classrooms. The scale has been widely used in the self-concept literature and has shown good reliability in previous Hong Kong research (Chung & Watkins, 1992) as part of the Self-Description Questionnaire (Marsh, 1988).

Procedure

The questionnaires on problem behaviour and self-concept were administered by the first author during normal class hours. Teachers were not present so that the students could be at ease to answer the questionnaires without the teachers' surveillance. The subjects were told that the researcher belonged to a research group of a youth welfare organisation. The survey was conducted in order to collect more information about young people so that better youth services could be planned and provided. The subjects were assured that all data would be treated in strict confidence and the teachers and school authority would have no access to individual data provided by them.

Results

Problem Behaviour

The average number of incidents per student is 2.47. The total unruly behaviour constitutes 78.5% of the total number of offences whereas the delinquent behaviour constitutes 21.5%. As can be seen in Table 1, the boys (mean = 2.93; SD = 2.78) reported more problem behaviour than

the girls (mean = 1.86; SD = 2.33). A t-test showed that the sex difference in total problem behaviour scores is statistically significant ($t = 3.71$, $df=344$, $p<0.01$). A significant sex difference was also found for both the means of unruly ($t = 3.32$; $df = 346$; $p<0.01$) and delinquent ($t = 3.33$; $df = 345$; $p<0.01$) behaviours. Table 2 shows a further breakdown of the relative proportion of boys and girls involved in unruly behaviour, delinquent behaviour and total offences. They are 60% and 40%; 68% and 32%; and 61% and 39% respectively.

The results also reveal that for the boys, there is a higher incidence of unruly behaviour in items such as use of foul language (25.8% of all unruly behaviour), dishonesty and cheating (17.3%), habitual failure to bring textbook and stationery to school (14.2%) whereas gambling (51.5% of all delinquent behaviour), physical violence (16.7%), and gang disturbance (10.6%) are the major offences under the delinquent behaviour category.

As for the girls, use of foul language (22.2% of all unruly behaviour), habitual failure to bring textbook and stationery to school (20.3%), and dishonesty and cheating (19.6%) constitute the top three items of unruly behaviour whereas physical violence (34.4% of all delinquent behaviour), gambling (also 34.4%), and stealing (12.5%) are the major incidents of delinquent behaviour.

Self-concept

Table 3 shows the means and the standard deviations of the total self-concept scores for the boys and girls. The maximum value of the self-concept score is 40. It is noted that both the boys and the girls tended to report relatively positive self-concept as most subjects scored over half of the maximum values. The boys reported higher means in self-concept than the girls. The sex difference was also found to be statistically significant ($t = 4.43$; $df = 340$; $p<0.01$).

Problem Behaviour and Self-Concept

Table 4 shows the correlation between self-concept and problem behaviour for boys and girls. Self-concept and problem behaviour were negatively and significantly correlated among the boys but not among the girls.

Discussion

The results of this study indicate a higher incidence of behavioural problems as the average number of incidents per student involved was 2.47 compared to the figure reported by the Education Department in 1990 of 1.7. However, as the sample utilised in this study was not representative of Hong Kong secondary schools, it would be wrong to conclude that this indicates an increase in behaviour problems. The data also show that the majority of the problem behaviour that occurred is unruly behaviour (78.5%) while the percentage of more serious delinquent behaviour is 21.5%. There is a percentage increase in delinquent behaviour compared to the 7% reported before (Education Department, 1990). This finding may support the general concern and opinions of many school teachers that students' problem behaviour especially delinquent behaviour is on the rise but again such a conclusion awaits a more representative sample. Of course, any such increase in delinquent behaviour may reflect that students' problem behaviour is not only a problem within the school setting, but may be indicative of maladjustment in the society at large. As a result, the management and coping of problem behaviour could be beyond the abilities and resources of a school alone. For example, in dealing with delinquent behaviour that involves serious violence and triad activities, it would certainly need the collaborative effort of the police and other government departments.

The results also show that boys report more behaviour problems than girls. There is a much higher proportion of boys involved in unruly, delinquent and total problem behaviour than girls. As reported in the study by the Education Department, the proportion of boys and girls involved in school offences has been quite stable between 1982 to 1990. The result in this study confirms the same trend as the percentages are 61% and 39% for boys and girls respectively. The reason for the sex difference in behavioural offences can be interpreted in complex cultural, social, and biological context that should have implications for teachers and counsellors in their management strategies and should deserve further attention.

With regard to self-concept, even though both boys and girls have indicated generally positive self-concepts, the boys have shown a more favourable evaluation of themselves than the girls. Reviews of the research into gender differences in self-concept have indicated that there is little difference in overall self-concept but boys tend to obtain a higher self-concept than girls in specific areas such as physical abilities and maths but this trend is reversed when social and verbal self-concepts are considered (Hattie, 1992; Marsh, 1988). The findings of this study might be interpreted as indicating that within an oriental cultural context where traditional sex stereotyping is strong, boys still enjoy higher status and priority than girls in the Chinese social and family environment. It is therefore perhaps not surprising that boys assume a more favourable and positive image of themselves than their female counterparts. However, such a conclusion would require a wider sampling of Hong Kong adolescents to verify.

The data of this study show that the correlation between self-concept and problem behaviour is insignificant. A possible explanation is that though the general self-concept is not significantly correlated with problem behaviour, some specific areas of self-concept may be more related to it. Much recent research has adopted the hierarchical model of self-concept which depicts the academic, social, physical and emotional dimensions of self-concept (Shavelson, Hubner, & Stanton, 1976). A study carried out by Lau (1989) found that juvenile delinquent behaviour of Hong Kong adolescent students is not correlated with the subjects' general self-concept but some specific aspects of self-concept did show a significant correlation. It may be therefore worthwhile to look into the multi-dimensional aspects of self-concepts as it may bring more light to the relationship between the two variables. On the other hand, it is likely that problem behaviour involves a complex intertwining of psychological and environmental variables so no single factor can suffice to explain it.

However, while the association between the overall general self-concept and problem behaviour is weak for the sample as a whole, a sex difference is clear. The correlation between the two variables is significant among the boy but not among the girls. This sex difference may imply that boys and girls behave differently and they misbehave for different reasons. While it is dangerous to make causal interpretations of correlational data, for the boys problem behaviour is related to their self-concept and it is possible that an improvement in self-concept may lead to an improvement of their classroom behaviour. On the other hand, misbehaviour of girls may have to be interpreted in a different light. With a lower association between self-concept and problem behaviour, there is less reason to advocate self-concept enhancement training as a means to improve behaviours among girls.

Conclusions

The results of this study have shown a statistically significant relationship between self-concept and problem behaviour for Hong Kong boys. This relationship even if replicated in future research, does not necessarily indicate a causal link. Yet the prominent sex difference suggests that the sex variable could be given more attention in future self-concept and problem behaviour studies. Further research will also be needed to examine the multi-dimensions of self-concept and their relationship with problem behaviour. In particular, given the substantial (and possibly increasing) extent of problem behaviour amongst Hong Kong male students, these results indicate that intervention studies designed to enhance self-esteem may have an impact on limiting the misbehaviour of such students. There are a number of possible strategies which the school and/or the classroom teacher can adopt to maximise self-esteem. These include greater use of praise, mastery learning to allow each student a chance to experience success, the 'whole school approach', individual counselling, and social skills training (see Watkins, 1995, for further details).

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Table 1

Means,standard deviations and t-values according to category of behaviour and sex

	Unruly Behaviour		Delinquent Behaviour		Overall Offences	
	Boys	Girls	Boys	Girls	Boys	Girls
Mean	2.25	1.54	0.67	0.32	2 93	1.86
S.D.	2.06	1.82	1.09	0.69	2.78	2.33
t-value	3.71 p< 0.01		3.32 p< 0.01		3.33 p< 0.01	

Table 2

Percentage distribution of problem behaviour according to category and sex

	Unruly Behaviour (%)	Delinquent Behaviour (%)	Total Offences (%)
Boys	60	68	61
Girls	40	32	39
Total	100	100	100

Table 3

Means and standard deviations of self-concept scores for boys and girls

Group	Mean	S.D.	N
Boys	28.35	3.65	208
Girls	26.61	3.37	134

t 443 p< 0.01

Table 4

Correlations between self-concept and problem behaviour

Group	Unruly Behaviour	Delinquent Behaviour	Overall Offences
Boys	-.17*	-.20*	-.20*
Girls	-0.6	00	- 05

* p< 0.01

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What Motivates Teachers?

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In this study, 27 highly motivated primary and secondary school teachers in Singapore were subjected to an in-depth interview. The interview aimed at identifying factors which motivated these teachers. In synthesis, it was found that teachers were motivated by students, by administrators, by the nature of the job itself and for some, the motivator was their religion.

鼓舞教師士氣的動力

在這項研究中，我們對二十七位士氣高昂的中小學教師作了深入的訪談，訪談的主要目的是探討推動這些教師的因素。總的來說，鼓舞教師的動力是學生、學校的行政人員及其工作本質；另一方面，宗教信仰也是推動某些教師的教學熱忱的動力之一。

Over the years the amount of work required of teachers in Singapore has increased substantially. Changes in syllabi and curriculum emphasis have brought greater demands on the teaching profession. Much is demanded of the teaching profession, yet we find many motivated teachers in the education system. We want to know what motivates teachers. This study is part of a larger projret on teacher job satisfaction and motivation (Low & Mukhthar, 1992). The study used both a Motivation Questionnaire adapted from Luthans (1985) and Margerison (1979) and in-depth interviews. This paper will present that part of the study which involved the in-depth interviews.

This study attempts to identify factors which motivate teachers in Singapore. Such a study is undertaken because we strongly agree with Lawler (1973, p.289) that:

> *What happens to people during the work day has profound effects both on the individual's life, and on the society, and thus these events cannot be ignored if the quality of life in a society is to be high.*

Time spent at work takes up the major part of a person's waking hours and it is important that people find fulfilment in their work. This study therefore seeks to find out why some teachers are so highly motivated, what is it that kept them going and in what ways has teaching been fulfilling for them. It is apt at this stage that explanations or definitions of the terms used in this paper be provided.

Motivation is derived from the Latin word "movere". It is often equated with the words "aims", "desires", "drives", "goals", "incentives", "motives", "needs", "wants" and "wishes" in research studies (Likert, 1961; Bennis, 1967; Sergiovanni & Starratt, 1979; Kaiser, 1981; Ames and Ames, 1984). In this study, motivation refers to the performance investment level of teachers in their school work. The performance investment level is teachers' work that is above the minimum level of participation in school. Highly motivated teachers refer to teachers who work beyond the minimum, in contrast to lowly motivated teachers who do minimum work or less. Principals rate highly motivated teachers as high achievers who take pride in their work and display professionalism.

In a literature review of the definition of job satisfaction and its measurement, Chapman and Lowther (1982, p.3) shared the following three approaches:

1 Satisfaction is measured as the discrepancy between people's expectation of reward and their actual accomplishment;

2 Satisfaction can be measured as respondents' response to items asking about a person's overall experiences.

3 Factors contributing to job satisfaction can be identified as satisfiers or dissatisfiers, but are not assumed to be on a conceptual continuum. Some 'motivator factors' or satisfiers which contribute to job satisfaction include achievement, recognition, work itself, responsibility, and advancement (Herzberg, 1971). They correspond to Maslow's (1968) higher order motivational needs of self-esteem and self-actualization. In this study, an attempt is made to identify the motivators that provide a sense of job satisfaction to the highly motivated teachers.

Schools are concerned about students' progress, and research has consistently shown that significant differences existed between the scores of students taught by teachers with high job satisfaction and of those taught by teachers with low job satisfaction (Brumback, 1986). Brumback also found a strong relationship between teachers' job recognition and students' academic performance. It is thus necessary that research identifies the motivators that spur teachers on.

Further, in view of the emphasis placed in Singapore on improving schools, it makes sense that school improvement efforts would start with the concerns and needs of teachers. If teachers were highly motivated, then their performance will also improve for research has shown that performance is tied to motivation (Maehr, 1984). Teacher motivation is thus a crucial issue facing educators today.

A study to identify factors which motivate teachers will provide rich insight into why some teachers remain excited about their work even though they may have taught for many years. It would provide knowledge about factors which motivate such teachers and this would in turn enable administrators to try to provide such motivators for other teachers.

To Lortie (1975) teachers are motivated when they see students achieving desirable results. Menlo and Low (1988) studied teacher job satisfaction across five countries and found that teachers were most excited when students do well and when they understand what was taught. When students achieve good results, the esteem needs of teachers could be met for it reflects well on their teaching. And studies by Sergiovanni and Starrat (1979) suggest that esteem need is an important motivator.

Other studies (e.g., Wilby, 1989) found that teachers were motivated when they were involved in the formulation of school goals, given autonomy, provided with good working conditions and were valued as professionals.

Miskel (1974, 1979) noted the finding that principal leadership behaviours and organisational variables affect teacher job satisfaction. Studies by Holdaway (1978), Friesen, Holdaway and Rice (1984) and Johnston (1985) revealed that there were external factors within the control of principals that could motivate teachers. These include principals' supportiveness, principals' recognition of teachers' work and supervision and professional development. Jones (1979) held that the way subordinates are treated is the key to motivation and high productivity.

It is imperative that school administrators know what motivate teachers so that they can motivate their staff or at least avoid de-motivating them. And, in order to be motivators, school administrators must be aware of what quintessentially spurs teachers on in their work. Once that is identified, school administrators can then employ strategies, and even change their behaviours if it is required so as to motivate the teachers to higher levels of performance. "Motivation is (thus) a topic whose centrality to education can hardly be challenged" (Ball, 1984).

The present study attempts to isolate or determine factors which are associated with high teacher motivation, and the researchers agree with Lawler and Hackman (1975) that there are various ways of finding out what motivates people. Researchers could use pencil and paper tests, observation techniques and of course the simple act of asking those concerned what motivate/s them.

Accordingly, the next section will focus on the method used in the present study to find out what motivates the 27 teachers.

Methodology

In this study, the principals who were approached to nominate highly motivated teachers in their schools were involved in the one-year Diploma in Educational Administration (DEA) Programme which prepares school administrators. To keep the participants in this study more homogeneous, the principals were also requested to exclude expatriate teachers, relief teachers, cadet teachers, and teachers holding positions as Heads of Department.

Two primary school principals and four secondary school principals were involved. Each of the six principals were requested to identify four of their most motivated teachers in the school. Three of the principals gave us five names, thus a total of 27 teachers were interviewed. Ten of the teachers were primary school teachers while the other 17 were from secondary schools. Table 1 shows a profile of the teachers.

Table1 Teacher Demographics

Years of teaching / Sex	5-10	11-15	16-20	21-25	25 +	Total
Male	3	2	0	0	0	5
Female	5	1	3	6	7	22
Total	8	3	3	6	7	27

We conducted face to face interviews with teachers, i.e., we used the "fairly simple act of asking them" what motivated them. Teachers were interviewed individually and each was given as much time as was required. Questions were fairly open-ended, the aim being to provide them with an opportunity to talk. With the permission of the teachers, all the interviews were tape-recorded and then transcribed verbatim so that analysis of the data could be carried out.

Interviews were conducted in schools. Teachers were asked three main questions and where necessary, the interviewers were to probed for further information. The minimally unstructured, in-depth, qualitative interview as it is used in the present study is characterised as a "flexible strategy of discovery...Its object is to carry on a guided conversation and to elicit rich, detailed materials that can be used for qualitative analysis" (Lofland & Lofland, 1971, p.76). The role of the interviewer is to listen, to be sensitive to non-verbal cues and to probe where necessary. The following questions were asked:

1 How long have you been teaching?
2 Was teaching a profession of your choice? If so, why? If not, why did you join teaching?
3 Your principal has considered you to be a very motivated teacher, can you tell me what motivates you? What turns you on?

Teachers were given as much time as they required to answer the questions. All transcribed notes were then analysed. It was earlier decided that teachers would be given the opportunity to say as much as they wanted, but in the analysis of the data, the first three responses of Question 3 were coded based on the assumption that the earlier responses are good indicators of a teacher's reactions to a question and are generally the ones which the teacher feels more identified with. If a teacher gave more than three "motivators" the "extras" were not coded.

Limitations of the Study

For the purpose of greater homogeneity in the group of motivated teachers who were nominated by their principals, this study omits teachers belonging to the following categories on cultural and service grounds: expatriate teachers, relief teachers, cadet teachers, and teachers holding middle management positions. It also excludes school climate as a significant factor affecting teacher motivation (Anderson, 1982; Hoy and Miskel, 1996). This study works within the naturalistic paradigm in a qualitative enquiry into teacher motivation. It is by no means exhaustive because a multitude of situational and personal variables combine or interact to produce a continuum of motivation among teachers (Low and Mukhthar, 1992).

Results and Discussion

In this section results will be presented. No attempt is made to subject the data to any statistical test, instead

discussion of the data will focus on frequency counts and teachers' verbatim statements. Of the 27 highly motivated teachers, 22 were females and the remaining five were males. Lortie (1975) and Chapman and Lowther (1982) reported that female teachers were more motivated than male teachers. These researchers pointed out that female teachers found that teaching accommodates their role better than other jobs. One has to note that females dominate the teaching profession, thus the unbalanced sample (22 females and 5 males) appears to be quite acceptable.

Of the five male teachers, three had taught for less than 10 years while two for less than 15 years. No older male teachers were identified by principals. On the other hand, the teaching experience of female teachers was evenly spread out (see Table I).

Data showed that the 27 motivated teachers gave a total of 77 responses to Question 3. Some teachers only gave two motivators while others listed more than three, but only three were coded as had been discussed earlier. Some teachers spent the entire interview elaborating and giving instances of their motivators. For instance, one teacher said:

I'm motivated because I see the needs of the students. When kids have problems and they come to us and we are able to give them some advice, that's a challenge and it's a real turn on for me. Many of them don't have people to turn to.

This teacher then went on to tell stories of how she interacted with two of her students who were abused children. She talked excitedly about the students' progress both academically and socially. This elaboration took up the bulk of the interview time.

The 77 coded responses fell into 14 categories which centred around four clusters of motivators, namely:

1 Teachers who were motivated by their students;
2 Teachers who were motivated by teaching;
3 Teachers who were motivated by school administrators;
4 Teachers who were motivated because of their religious belief.

Table 2

Motivations	No of responses (N)
Motivations by students	35
Motivations by administrators	23
Motivations by administrators	12
Motivations by religious beliefs	7
Total	77

Table II shows that teachers were most motivated by students (N=35). In this cluster, data showed that teachers were most motivated when:

1 students showed progress in their work	N=15
2 they had good rapport with students	N=7
3 students responded to them	N=7
4 former students showed their appreciation	N=6

The relationship between teachers' motivation and students' academic performance deserves special attention. The data gathered in this study reveals that students' academic progress or achievement is the prime motivator. The teachers felt very satisfied and were encouraged to give more to their students when they saw progress in their work. Two teachers shared:

Last year I had a particular child who gave me lots of problems. I had to work with his grandmother because both his parents were in jail. His grandmother refused to co-operate with me. I then spent a lot of time talking to him. He "woke up" just before the exams and he passed! I was so glad that he actually made it. It was so good to see him putting in effort. On my part, I did what I could.

(Female teacher, 30 years of experience)

When you see students achieving so much, from nothing in the beginning, there is a sense of pride, a sense of gratification...and when they leave, you know that you have done a job well and you know that they will continue to do well...and you have made an impression on them.

(Female teacher, 8 years of experience)

When these teachers saw their students achieving, meeting the targets/goals that they had set for them, they were enthused, and this could be because their esteem needs

were met. According to Vroom (1964) and McClelland (1985), motivated teachers direct their work towards achieving goals. This motivation drive directs and excites them (Maehr, 1984). It is no wonder that for these teachers, their students made good progress for research has repeatedly shown that motivated teachers can affect student performance and achievement in a positive way (Ashton, 1984). Their attitude towards their work and work environment may affect students' achievement (Barry and Tye, 1972; Hallinger and Murphy, 1985). Motivation seems a sine qua non for them to ensure effective classroom performance.

This study supports the assertion that a positive link exists between teachers' motivation and students' academic performance (Lortie, 1975; Brumback, 1986; Menlo and Low, 1988). It is not a linear unidirectional cause-and-effect relationship, but one that interacts. A highly motivated teacher takes care to provide a conducive environment for students' academic progress. The resultant positive response from the recipients in turn serves as a motivator, in that it satisfies the teacher's higher motivational needs like self esteem. Satisfiers lead to job satisfaction. The motivated teacher proceeds to perform beyond the minimum level of work requirement. Such a cyclic perspective serves as a framework in the understanding of teachers' motivation.

Besides being motivated when students showed progress, these teachers were also excited when they established good rapport with their students (N=7). One female teacher with 25 years of experience said:

When I have kids who came back to school after they have graduated to visit me, it makes my day. I have an ex-student whom I met this year at a shopping centre and she came running up to me and ...asked me to loan her some money. I feel good that I have this kind of rapport or relationship with her, that she's not afraid to ask me for a loan. And she knows that I will lend it to her. When I can reach that kind of rapport with the students, I feel good.

Holdaway (1978) found that good relationship with students, teachers and principals gave teachers the highest satisfaction. For many teachers in Singapore, the reason they took up teaching was because they love to work with children. "Kids give me the zest to go on" thus it is not a surprise to find that the highest motivator for the 27 teachers is students, be it students making progress or students responding to them or students showing appreciation to them. One female teacher who has taught for more than 30 years recounted instances of her students coming back to see her. She said:

Years later out of the blue they come out and say, "You taught me this subject and it's because of it that I took up this subject in the university." This is most gratifying.

This recognition and appreciation for work well done is a powerful motivator. To four of the female teachers, this recognition and appreciation from students was more important than recognition from administrators. They felt responsible to their students, so when students responded and gave them the recognition they felt very rewarded. "One of my students hated Maths in the beginning and at the end of the year, she told me she loved Maths because of my teaching. That was really sweet music to my ears."

The second cluster of motivator is loosely termed "teaching itself". Teaching, according to one of the highly motivated male teachers is extremely demanding. He said, "...you need to put in lots of hours, 8 hours is not enough, sometimes it's 14 hours. Besides teaching, there's counselling, extra-curricular activities and a host of others. If you don't have 100 percent commitment, this job isn't for you." In spite of this onerous description of teaching, 23 responses fell into this cluster. In this cluster, data showed that teachers were motivated because:

1	they like teaching	N=8
2	of altruistic reasons, e.g., a desire to do something for children	N=7
3	through teaching they are able to meet their goal/s	N=5
4	they can teach the subject they enjoy	N=3

By identifying themselves with their work and being involved in it, teachers obtain satisfaction and reward (Nias, 1989). Two teachers shared:

I love entertaining my students. I like to see responses. I love to share things I love with the kids ... I love the English Language.

Every year I have a new batch of kids and I have so much to learn from them. Each group gives me different types of feelings. It's better to work with children.

Teaching offers them not only a chance to express themselves through the subject be it English Language or Mathematics but it also allows them to grow and to learn with and from the children. Some became teachers because they wanted to do something for children and in teaching the opportunity to work with children are plentiful. Others came with specific goals in mind, e.g., to help children, or to work with those from deprived homes and to help them to get on in life. And challenging and demanding as the goals may be, they were enthused as they achieved their goals.

A teacher said:

Teaching gives me the opportunity to work on my goal which is to motivate students. That's the main reason why I'm working so hard. It's lives that I'm building, not results per se.

According to McClelland (1985) motivated teachers direct their work towards achieving goals. Barbera (1980) stressed that challenging work, personal interest in the work itself, working conditions compatible with the teachers' physical needs, feeling of high esteem and rewards for performance are among the important conditions for motivation.

Teachers want to teach (Lortie 1975), in fact to many this is a need and when they are able to teach, particularly in what they have been trained to teach, they are motivated. Not to allow people to do what they have been trained to do or want to do is most de-motivating.

People are motivated in their work by a drive towards self-actualization. deCharms (1984) interpreted this drive as people's inner urge to do well. Intrinsically motivated people do not need environmental pushes as they are driven by their integrity to act positively. It is no wonder that a number of teachers said:

My character is such that if I'm given a job to do, I will do it well and only then will I be satisfied.

Pride in my work motivates me. Whatever work I've been given, I feel the satisfaction when I've done my job well. It could be any job, if I feel that it's my job and I do it well, I'm happy.

Twelve responses were coded for the third cluster of motivators termed "Motivated by Administrators". When administrators recognised the work they had done or when they were supportive, encouraging and being understanding, teachers were motivated. The teachers shared:

The administration motivates. The positive feedback I get, their expectation of me...since I joined teaching I've had good support from the administrators and it makes me feel that I want to do my best. With the recognition they give, I'm thoroughly motivated. It was a great boost to my morale when I was recognised for my contribution to the profession.

I believe that in whatever school I'm placed in I can still perform but if I'm placed in a school like this, it's a bonus. In this school, the principal and the vice-principal trust us and leave us alone and we have leeway to do a lot of things and that's good.

The important role administrators play in motivating teachers cannot be denied. Chapman and Lowther (1982) surveyed 5,764 teachers to examine their satisfaction with teaching. Their results showed that there was a strong positive correlation between recognition teachers received from administrators and career satisfaction. Research (e.g., Sergiovanni, 1967; Kaiser, 1981) has shown that when teachers' professional and personal needs and expectations are met by the schools and the profession, they will be motivated enough to work hard and to stay on the job.

Teachers in this study were motivated because principals trusted them and gave them considerable autonomy. In fact of the 12 responses in this category, only three were from teachers who said that they were motivated because of recognition from the administrators and nine talked about principal behaviours which energised them. Principal behaviours which motivated teachers include trust, support and encouragement. It would seem that to produce motivated teachers and in turn quality teaching in schools, studies could

identify principal behaviours which motivate teachers.

The last cluster of motivator is teachers being "Motivated by religious beliefs". Seven responses were coded in this category. These teachers, all females, shared:

Many of the children have very little sense of self-value and in their family, parents are so busy making ends meet they have no time for them. In school if we can give them a little more time, talk to them and help them in character building...this is not just a job for me, it's a vocation, a calling.

I'm a Christian, and as a Christian teacher I feel that I'm accountable to God and I must make sure that I'm worthy of my wages, make sure that I'm a good worker.

All people coming into contact with me are gifts to me. If I give sloppy work, if I give a bad impression--that's a very bad model.

These three teachers were motivated by a sense of responsibility or accountability to their beliefs. They were quick to emphasise that teaching is a calling not a job. They were responsible to a higher authority and therefore they demanded the best of themselves.

Conclusion and Implications

From the four clusters of motivators and their various categories, it can be seen that different teachers were motivated differently. It is significant to note that intrinsic factors must be present for maximum motivation to occur (Lim,1985).

This study seeks to draw the attention of administrators in particular to the fact that their practices and behaviours must work to motivate teachers. Administrators must become more sensitive and become more aware of their teachers' needs, for it is incumbent that they motivate teachers and to keep their enthusiasm and interest in work high. Motivated teachers are school assets. They are work-oriented, and centre much of their life on their work. They are characterised by the desire to go beyond themselves. The more motivated the teachers, the greater is their work commitment (Lim, 1985).

Providing a good working environment and giving teachers more resources are not quite enough, for when the higher order needs such as esteem and self actualization needs are met, the greater would be teachers' movement towards a higher stage of development (Sirgy, 1986).

Administrators can use their authority to provide the environment for teachers to interact with students, to teach and in the process enable their students to achieve. And this is possible for research (Duke, 1986; Pitner, 1986) has shown that most variables which actuated teacher motivation were within the power and control of the school administrators.

In sum, data from this study revealed that teachers were most motivated by students, in particular, when they showed progress in their work. Many teachers were also motivated by the job itself--teaching. Certain administrator behaviours also motivated teachers and a small number were motivated by their religious beliefs or a higher calling.

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Image of the Principalship: Preservice Teachers' Expectations of School Leaders

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This paper reports on primary preservice teachers' perceptions of principals. A group of preservice teachers currently enrolled in the Bachelor of Education (Primary Education) Program were asked to list what they expected of their principals when they began full-time teaching. Expectations were grouped in twelve categories. Results indicated that preservice teachers expected the principal to be open-minded and receptive to new ideas; willing to communicate with teachers and accept their opinions; be considerate of their work demands and be willing to recognise their professional qualification. Findings indicated that principals were expected to be supportive, open-minded and devoted. Implications are discussed for beginning teacher induction and staff development and for leadership training and development. The expectations uncovered also have the potential to create serious dilemma for principals and for teachers.

校長的形象：職前教師對學校領導者的期望

[illegible]

[illegible]

Recent approaches to education effectiveness stress the importance of school principals working closely with teachers toward improvement. For principals to work more intimately with teaching staff they require a deeper understanding of teacher needs, expectations and aspirations. Important among these are expectations which teachers hold of the principal as these may influence how teachers fit the overall school culture. Although research has attempted to identify practising teachers' expectations and beliefs about the principalship (Blase, 1987a & b) there is a dearth of investigation into expectations preservice teachers have of their future leaders. This study aims to partly redress this neglect through exploring the expectations a group of preservice teachers hold of school principals.

Background

A considerable body of literature supports the critical role of the school principal in maintaining and sustaining the overall effectiveness and educational quality of individual schools (e.g. Murphy & Hallinger, 1988; Cheng, 1995). Although some studies has been conducted recently on teachers' expectations and concerns about teaching (e.g. Veerman, 1984; Reeves & Kazelskis, 1985; Weinstein, 1988), little is known about how teachers at various career stages perceive the role of the principal. This is particularly so of preservice teachers' expectations of school leaders.

Calls from throughout the educational community for teachers to become more than passive participants in school reform through participating increasingly in school wide governance and curriculum decisions (Maeroff, 1988) are growing. Such trends are becoming reality in many settings but are plagued often by inadequate knowledge and understanding by both teachers and principals. This has profound implications for teacher educators and those involved in educational leadership training and development. As Daresh (1994, p.161) notes:

there has been a remarkable absence of discussion related to how well aspiring teachers are being prepared to step into professional roles which will call for much more than knowledge of subject matter and demonstrated mastery of pedagogical techniques.

Before teacher educators can plan for broader teacher commitment and understanding, there needs to be deeper understanding of how preservice teachers perceive the role of the principal. If principals are to encourage meaningful involvement by teachers they need, too, deeper understanding of how teachers perceive the role of leadership. If we can gain greater awareness of preservice teachers' beliefs about schools, and particularly educational leaders, we can cater more effectively for their smooth transition from university to schools. Such insights can also help empower teachers and principals for school reform.

Context of this study

Before 1995, there were no graduate posts in primary schools in Hong Kong. Education Commission Report No. 5 (Education Commission, 1992) recommended that by 2007, 35% of the primary school teachers would be in graduate posts. The report also recommended that a full-time 'Blister' B.Ed. programme be organised for providing preservice degrees in primary education. As a result, the Chinese University of Hong Kong and the University of Hong Kong established such degree programmes in 1994-95 with graduates from the Hong Kong Institute of Education.

Whereas the establishment of graduate posts in primary education has aroused some enthusiasm for pursuing degree, this has been somewhat tempered by the limited number of post made available. The Education Department (ED) has made available 180 graduate posts only for each of the 1994-95 and 1995-96 school years (Cheng, 1995). A further complication is that graduates from the full-time B.Ed. programmes cannot be guaranteed graduate teaching posts. In fact, it appears increasingly unlikely such graduates will be employed as graduate teachers in the foreseeable future. Such policy may well influence preservice teaches' perceptions not only of the system as a whole but also of the principals of the schools in which they will begin their careers.

The Study

The data presented here forms part of a large study which aimed to explore preservice teachers' perceptions and expectations of principals, how these perceptions may influence behaviour and attitude when they start in school and how preservice teachers' perceptions of the principalship may have been formed. The purpose of the section of the study described in this paper was to identify what a group of preservice teachers expected of the principal when they began teaching 'full-time'. Specifically, respondents were asked the following question:

•*When you teach at your first school following the B.Ed. course what do you expect of the principal?*

Respondents were drawn from first-year and second-year preservice teachers currently enrolled in the B.Ed. (Primary Education) programme at the Chinese University of Hong Kong. A total of 153 students participated in the study; this represented approximately 75% of the total number of students in the program and about 50% of the total preservice students studying BEd programmes in Hong Kong. The question framing this section of the study was one component of larger self-report instrument which includes both open-ended and more structured questions. Questionnaires were provided in both Chinese and English versions to maximise respondent understanding. Respondents were given the option of completing the questionnaire in either English or Chinese. For purposes of analysis, all responses were translated into English.

Data were coded according to grounded theory research which focuses on the discovery of substantive categories relevant to the phenomenon under study (Strauss & Corbin, 1990). The analysis of results was completed in an evolving process: coding data, sorting data, reviewing literature and developing a 'personal' theory. This process was an inductive, ongoing cyclical process in which categories and patterns emerged from the data, and was cross-checked by both researchers(Miles & Huberman, 1994). Once established, categories were constructed and sub-categories quantified to discover their approximate strength. Counting of the categories and sub-categories was undertaken to note and

confirm patterns and themes, to ensure the plausibility of data and to keep analysis honest (Miles & Huberman, 1984, pp.215-216). Future phases on the study intend to conduct content analysis of the expectations and in-depth interviews with a number of preservice teachers.

Results

Student expectations of principals fell approximately within twelve major categories:

- principal as a person;
- consultation and communication;
- consideration, encouragement and support;
- professional recognition;
- receptivity to change and new ideas;
- promoting co-operation;
- allocation of duties;
- freedoms;
- caring about students;
- participation in decision-making;
- teacher development;
- having vision and improvement of quality.

Table 1 shows the categories and sub-categories with the accompanying frequencies for both. Categories are organised in order for strength from highest to lowest. The

Table 1: Preservice Teachers Expectations of Principals by Category

Major categories	Sub-categories	Frequency	Sub-total
1. Principal as a person	(2.1) Kind (2.2) Open-minded (2.3) Fair (2.4) Democratic (2.5) Active / devoted (2.6) Responsible	8 22 19 9 17 5	80
2. Consultation & communication	(5.1) Consultation (5.2) Communication	51 25	76
3. Consideration, encouragement & support	(6.1) Encouragement & support (6.2) Consideration & understanding (6.3) Help	8 30 17	55
4. Professional recognition	(1.1) Recognition of qualifications (1.2) Give GM post (1.3) No bias	28 13 4	45
5. Receptivity to change & new ideas	(10.1) Principal accepts new ideas (10.2) Willing to try innovation	15 11	26
6. Promoting co-operation	(4.1) People getting on with each other	23	23
7. Allocation of duties	(7.1) Consider persons ability when allocating work (7.2) Fairness / consideration (7.3) Not too hard	14 4 4	22
8. Freedoms	(8.1) Freedom in school environment (autonomy) (8.2) Freedom in teaching	8 9	17
9. Caring about students	(11.1) Principal should care for students	17	17
10. Participation in decision-making	(3.1) Involved in decisions	12	12
11. Teacher development	(9.1) Opportunities for development (general & further study)	12	12
12. Having vision and improvement of quality	(12.1) Having a vision, improve school quality	11	11

frequencies within these categories reflect their strengths.

The strongest theme which emerged showed that preservice teachers expected principals to be a fair, open-minded, dedicated, kind and responsible. Amongst these attributes of the principal as a person, open-mindedness, fairness and devotion were considered to be most important (in terms of frequency).

Expectations that principals consult widely and communicate clearly and often with new teachers also emerged as a strong theme. Preservice teachers expected that the principal would not insist only on his/her own ideas but would accept theirs and others' opinions. They appeared to feel it was important that the principal would accept others' opinions and at least 'try-out' some of these. Respondents also regarded communication as important and many linked this to accepting others' opinions. They expected principals to be willing to listen to and discuss issues with them. Respondents also expected the principal to establish organisational channels of communication which would allow teachers a venue to express their views. In general, respondents expected principals to engage in open communication with teaching staff.

Table 2 shows preservice teachers expectations of principal consideration, encouragement and support. The trainee teachers hoped principals would give them encouragement and support. They also expected the principal to be considerate of their work demands and pressures and to understand their situations and difficulties. Principals were also expected to be sympathetic and caring towards teachers. A further sub-theme exposed respondents' expectations that the principal could help 'green' teachers to become immersed in their new environment and help them adapt more easily to the school context. Principals were also expected to provide guidance and ideas on teaching.

Table 2: Preservice Teachers Expectations for Principal Consideration, Encouragement and Support

Categories	Frequency	Category Examples
Consideration & Understanding	30	• understand and be considerate of teacher's work pressure • show sympathy towards teachers • understand teachers difficulties • caring about staff
Help	17	• help 'green' teachers immerse in new environment • provide assistance to new teachers so we can adapt more easily • give guidance and ideas on teaching
Encouragement & Support	8	• give encouragement & support • provide support • always encourage and support us

A further theme suggested preservice teachers expected the principal to recognise their newly-won professional qualification (B.Ed.). Thirteen respondents expressed a desire that the principal appoint them quickly as Graduate Masters/ Mistresses (GMs). An integral thrust of this theme was that a number of respondents expected to be promoted fairly rapidly. A number of respondents also hoped that principals would not be biased against them.

Closely linked to categories one and two was the expectation that principals would be receptive to change and new ideas. In line with expectations that that principal be 'open-minded' and 'accept others opinions', they wanted their principals to be willing to accept new concepts, such as new teaching methods, and allow experimentation with these ideas. Responses seemed particularly focused on trying new and different teaching approaches, but some referred more directly to implementing any innovations which had the potential for improving education.

Also allied to categories one and two was an expectation that principals work explicitly toward developing positive interpersonal relationships with staff. They looked for principals who could build unity and co-operation among staff members. They also indicated they expected principals to assist settling teachers' disputes and to encourage harmonious working relationships amongst the colleagues.

The preservice teachers hoped for principals who would consider teachers' abilities and strengths when allocating duties. They expected the principal to be able to select the 'right person to do the right job' and that work allocations be decided in a 'fair' fashion. Some mention was made of the principal's role in reducing the workload of new teachers and to 'not be too hard' when they first started work at the school.

A lesser theme related to the 'freedoms' new teachers expected in their new school environments, including the classroom. Freservice teachers expected the principal to grant teachers autonomy and not to control them. The principal, for example, was not expected to control how teachers dressed for school. These student-teachers wanted principals to allow them freedom in teaching; through trying out new ideas in the classroom. These 'freedoms' appear to link closely to categories one, two, three and five.

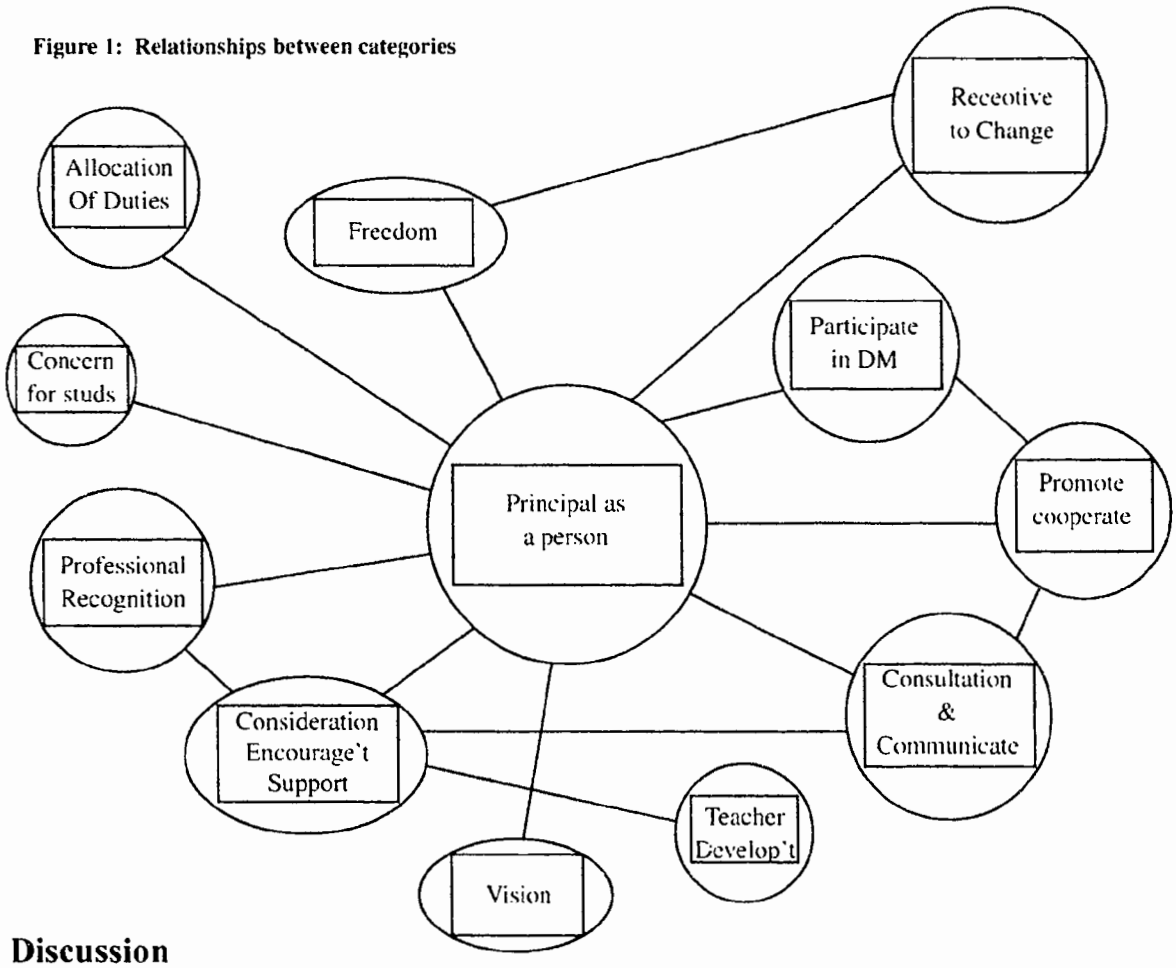
A further lesser theme concerned principals care for students. Respondents expected the principal to show concern and 'love' for the students in the school and to develop good relations with them. Respondents also expected to be given the chance to be involved in school-level decision-making. They expected, for example, that they would participate in the process of school policy implementation and take part in curriculum design. Expectations involving shared decision making could also be extracted form other categories dealing with consultation and communication, and the principal as a person.

The final two categories related to teacher development and educational vision. The pre-service teachers wanted principals to provide opportunities for and encourage further teacher development both in school and out of school. The principal was expected to provide them opportunities to learn and develop themselves. The final category showed some respondents expected principals to have a vision for improving the quality of the school.

As shown in Table One, 'principal as a person', 'consultation and communication', 'consideration, encouragement and support', 'professional recognition' and 'receptivity to change and new ideas' received the highest frequencies. The results indicated that preservice teachers expected the principal to be open-minded and receptive to new ideas. They expected principals who were willing to communicate with teachers and accept their opinions. They also expected that the principal would be considerate of their work pressure and be able to recognise their professional qualification. These findings implied that the preservice teachers expected principals who were supportive, open-minded and devoted.

Although responses were categorised for ease of reporting and to glean as ordered a picture as possible, relationships between categories were evident. Figure One shows relationships between the categories. These relationships will be more fully explored at a later date. At this stage the relationships are intended only to exhibit the interrelatedness of the themes identified.

Figure 1: Relationships between categories



Discussion

The expectations revealed a strong tendency for preservice primary teachers to value the 'consideration' factors similar to those found by Blase's (1987a, 1987b) in his study of effective and ineffective leadership from a serving teachers' perspective. The dominant expectations which emerged from this study were that: (1) principals should recognise their professional training (B.Ed. degree) and give them graduate posts; (2) principals should be fair and open-minded; (3) principals should show consideration, encouragement and support; and (4) principals should provide consultation and communication with teachers. These match fairly closely experienced teachers' beliefs as uncovered in Blase's study. Blase identified the following consideration-related leadership factors:

1. support in confrontations/conflicts;
2. participation/consultation
3. fairness/equitability;
4. recognition; praise and reward;
5. willingness to delegate authority -- open-mindness and goals/direction

The results were also consistent with some of the major elements of the psychological environment suggested by Weise & Holland (1994) for nurturing novice teachers. This included:

1. mutual respect (recognition of the value of the learners)
2. collaborativeness (using peers, sharing not competing)
3. mutual trust
4. supportiveness (teachers as learners accepted rather than judged)
5. openness and authenticity (teachers modelling through

articulating thoughts & feelings)
6. pleasure (learning experiences are enjoyable and challenging)
7. humanness (safe and comforting environment) (p. 224).

For example, the category of consideration, encouragement and support is in line with the elements of supportiveness and humanness, whilst the categories of principal as a person and consultation and communication echo the elements of mutual trust, mutual respect and openness and authenticity. The preservice teachers' expectations that principals should be receptive to new ideas (teaching) and change tend to support Lee et al.'s (1993) Hong Kong based findings that there was a significan positive correlation between the difference in primary teachers' participation and their expectations in curriculum development at the school level, and their level of job satisfaction. This suggests that principals may consider delegating more authority, or more freedom, to teachers to experiment with out new ideas related to curriculum and instruction.

Implications for induction of beginning teachers and staff development

One of the main aims of induction of beginning teachers is to help them cope with the demands of the school and tasks and to make them familiar with the school's culture (Weise & Holland, 1994). In view of the findings from this study, school leaders may consider carefully the induction for beginning primary teachers. The expectations uncovered here may form a worthwhile basis from which such an induction program may be developed. It is clear from the examples of different categories that preservice teachers expect principals to provide encouragement and support to the teachers, to accept others' opinions and to be able to communicate with subordinates, to encourage teachers to learn and further their study, and to recognise their qualification. To account for preservice teachers expectations and concerns, induction programs should focus on: provision of support, availability of consultation and communication, respect for new ideas and change, career prospect and professional development of teachers. At the same time, they should provide as realistic a picture as possible of promotion and other professional opportunities.

According to Pang and Cooke (1993, p.6), induction for beginning teachers can be broadly divided into five components: (1) provision of school information and specification of the duties of the teaching post; (2) supervision for monitoring teachers' performance and for helping them develop and try out alternative ideas; (3) pastoral care and concern by the principal, senior teachers and colleagues; (4) concessions for ensuring reasonable duties and workloads; and (5) developmental activities for extending teachers' repertoire. These measures would be conducive to meeting teachers' expectations of the principalship, which might lead to greater teacher satisfaction in the job. In addition, the principal should sponsor staff development sessions that enable the staff member to learn to articulate their beliefs and practise the skills of effective communication and conflict resolution (Blase & Blase, 1994).

Implications for educational leadership training and development

The findings from this study may suggest implications for principalship training in Hong Kong. The preservice teachers' expectations that principals should consult widely and communication openly with them may be highlighted in formal training programmes. Respondents expectations that principals should also be receptive to change and new ideas and provide more teacher autonomy, if properly realised, may help school improvement through teacher empowerment. Blase & Blase (1994,) suggest the following strategies which may be useful when developing future leadership education courses. Their suggestions appear in line with the expectations expressed by the preservice teachers involved in this study.

- listening to teachers with respect and trust;
- treating teachers as experts and professionals;
- helping teachers clarify and articulate their expectations;
- making oneself available to discuss new ideas with and

to handle professional problems encountered by teachers;

- support of risk taking and celebration of experimentation;
- providing professional development structures such as workshops and formal decision-making structures such as teams and committees to encourage autonomy and
- innovation for teachers; and
- showing genuine interest in instructional matters by involving oneself and demonstrating enthusiasm towards improvement. (p.30, 66 & pp.78-80)

It would appear that the importance of personal qualities such as open-mindedness, devotion and fairness, as well as communication skills needs to be emphasised in nurturing preservice teachers who may be school principals in the future. Introductory courses on educational administration may consider paying more attention to a balanced emphasis of administrative and leadership skills.

Emerging principalship and teacher dilemmas

It must be emphasised that whilst the images of principalship may differ from the perspectives of students, the school management committee, experienced teachers, the general public, the government and even the principals themselves, this study concentrates on preservice teachers' perceptions which have not been explored in Hong Kong. The findings emerging from this study address potential crises and opportunities both for school management and school development and for teachers in Hong Kong primary schools. These aspiring preservice teachers, when they begin full time work in schools, may well find they are not allocated graduate posts, or even an accelerated promotion in the near future. If their expectations in this area are not adequately addressed, conflict between the principal and teachers receiving university teacher education, and between new teachers and servicing teachers may surface. This could obviously create considerable problems for principals as they attempt to balance the needs of new, more highly qualified teachers and more experienced staff.

In many ways, principals may well face the unenviable spectre of disharmony in their schools with few options for solution. If new teachers expectations are not addressed during their initial, full-time school experience, stress and frustration may surface and result in a lack commitment and enthusiasm among the new graduates, adding to the growing problem of teacher wastage in Hong Kong (Education Commission, 1992). On the other hand, if new, more qualified teachers are given priority in terms of promotion and status, more experienced teachers will become similarly dissatisfied and demotivated.

The findings then, while recognising that preservice teachers' professional training and aspirations can be seen as an asset for school leaders and for boosting school reform, if care is not taken, such benefits may be displaced by fragmentation and jealousies within individual schools. Moreover, the spectre of unsatisfied expectations may detract from a smooth transition between university and schools for these teachers and the schools they will enter.

Also emerging from some of the expectations is a dilemma which may influence the future of Primary B.Ed courses in Hong Kong. Under present policies, it may be unlikely that many preservice teachers will be employed as graduate primary teachers in the foreseeable future calls upon the question "should we, preservice teachers, study a full-time B.Ed. degree with no prospect of immediate promotion or getting a graduate post?". This raises the urgency and necessity to cultivate the professional attitudes of preservice teachers progressing from self-centred professional attitudes to more others-centred attitudes which embrace altruism and devotion to the teaching profession and the educational circle and society (Pang, 1992).

Conclusion

The expectations presented in this paper signal the beginning of deeper understanding of preservice teachers perceptions of the principalship. Further research hopes to track how students developed their beliefs and how different types of principals may influence their work when they begin teaching in schools. Deeper understanding is necessary for principals, preservice program designers and the teachers

themselves. If principals are to fully utilise new teachers they need a solid understanding of their expectations. Trainee teachers, on the other hand, require a realistic picture of life and possibilities in schools. If schools are to improve principals and teachers must learn to work together harmoniously. This can be achieved only if greater understanding of each other can be achieved.

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Language And Attitudes In The Transitional Period Of Hong Kong

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This paper reports Hong Kong students' attitudes towards English learning before and during the transitional period to Chinese rule. The paper starts with a brief account of the status of English teaching in Hong Kong schools in the past 150 years to give the context in which local students learn. It goes on to review studies of language attitudes and second language achievements to give a theoretical background for the three surveys conducted in the past 15 years. The data, collected from more than a thousand students from different schools, showed an instrumental motivation in English learning with higher or lower percentages at different times. Attitude variables of students, nonetheless, correlated positively and significantly with their writing proficiency.

香港過渡期的英語和態度

[illegible]

As the British rule draws to an end on 30th June, 1997, it would be interesting to review the teaching of English language in Hong Kong over the past 150 years. The present paper examines English language teaching in Hong Kong from the eyes of local Chinese students. It also compares the attitudes of local students towards English learning within the past fifteen years in the transition to Chinese rule.

Background

In the 1840's, Western schools were established by religious groups to provide education for the poorer sectors of the local community. The wealthier families either employed private tutors or sent their children to mainland China for education. In these Westernized schools, the curriculum was different from the traditional Chinese ones. In addition to mathematics, geography and classic Chinese, English language was taught. "There was a strong belief that the English language was the door to a greater knowledge of trade and gain and that English literature opened up new horizons of knowledge." (Hong Kong Government, 1961:1) There were about 1000 students in these Westernized schools in 1860 (ibid).

As time went by, more and more schools were established. In 1935, about seventy years later, there were already 42,000 students. But the proportion of students going to university was still very small. Since the only university in Hong Kong was English medium, there was keen competition among students of Anglo-Chinese schools (English medium, modelled on the English Grammar school) to get into the University of Hong Kong. Some of the students in Chinese Middle Schools (Chinese medium with English taught as a subject) continued their studies in universities in mainland China while others joined the Government Special Classes Centre for a two-year course in English after they had passed the Hong Kong Chinese School Certificate. They could then be admitted to University of Hong Kong or get a job requiring good English Proficiency.

In 1958, the number of Anglo-Chinese and Chinese Middle school students was about the same: 25,863 for the former and 21,210 for the latter (ibid: 32-33). In the 1970's, with the expansion of trade, tourism and banking, the number of Anglo-Chinese schools increased rapidly and outnumbered the Chinese Middle Schools. With universal nine-year education in place in 1978, the medium of instruction has

became a great problem. A Visiting Panel on education stated that:

"no matter what strategies are used to improve language teaching in Hong Kong, the present lamentable situation concerning the use of English as a medium of instruction will remain because these measures do not confront the basic issue of whether is is possible to use a second language successfully as the vehicle for providing universal (compulsory) education in what is de facto, although not de jure, still a monolingual society as far as the vast majority of the population is concerned." (Llewellyn et al. 1982: 26)

What happens is that in a lot of schools, English textbooks are used, but instruction is given in a mixed code of English and Cantonese, the local dialect. The government tries to stop this by giving guidelines to assist secondary schools to decide on the medium of instruction and to give additional resources to schools using Chinese as the medium of instruction. (Hong Kong Government, 1990: 88). Teachers however, hold a different view. In a survey conducted by Hirvela & Law (1991), it was found that only 21% of the teacher respondents opposed to mixed code teaching in junior secondary schools. Obviously, the use of mixed code still prevails even when half of the secondary schools use Chinese as the medium of instruction for subjects such as science, mathematics and social studies (Hong Kong Government, 1990:89).

Overall, the status of English in the school setting changed in the 150 years in response to both financial and political influences, but more to the former. The next section describes students' attitudes towards English learning in different parts of the world.

Studies of language attitudes and second language achievement

The relationship of language attitudes and second language acheivement has been a controversial topic of study for a long time. What follows is the gist of some of the major studies.

Gardner & Lambert (1959:271) postulated that "the integratively oriented students are generally more successful in acquiring French than those who are instrumentally oriented".

Lukmani (1972) found, however, that female students in Bombay gave instrumental reasons for learning English. Oller, Hudson & Liu (1977) also found that Chinese students in United States were instrumentally rather than integratively motivated. To a certain extent, the findings of Gardner, Smythe & Clement (1979) showed a similar trend. Their results did not demonstrate such a strong association between integrative motive and French proficiency among the American students. Nevertheless, Oller, Perkins & Murakami (1980) reported that the proficiency scores of students learning English as a second language in Southern Illinois is inconsistently related to integrativeness.

Gardner (1980) suggested that Oller and his colleagues (Oller, Perkins 1978a, 1978b) were focusing on the theoretical explanations rather than " considering the underlying empirical foundation". He believed that the empirical data he presented (Gardner, 1980) invalidated Oller and Perkin's auguments.

Another study involving subjects from different parts of the world seems to be able to shed some light on this issue. Svanes (1987) found that European and American students at the University of Bergen, Norway, were more integratively motivated to learn Norwegian while Middle Eastern, African and Asian students were more instrumentally motivated.

Au(1988) evaluated Gardner's theory and analyzed it into five major propositions. The two that are related to the present study are quoted below:

"The integrative motive hypothesis maintains that intergrative motive is positively related to L2 achievement. This hypothesis was found to lack generality."

"The cultural belief hypothesis maintains that cultural beliefs can influence the development of the integrative motive and the extent to which the integrative motive relates to L2 achievement. Because little efforts has been expended

to define what constitutes a cultural belief, this hypothesis is very much an untested notion." (Ibid: 90)

Gardner (1988) responded in great detail to the criticisms in the same issue and pointed out that even though he did not agree with Au on his comments, he thought that the critique "is valuable in that it highlights a number of issues that language teachers and researchers should consider" (ibid:119)

MacIntyre & Gardner (1994:301) found that language anxiety and language proficiency were strongly related in the three stages in second language acquisition (input, process and output). They maintained that "global assessment of proficiency, such as course grades and standardized achievement tests are negatively associated with anxiety".

Similarly, Clement, Dornyei & Noels (1994:434) also found that "studnets who show little anxiety when using English evaluate their own proficiency relatively positively, and are satisfied with their current level of English proficiency and report positive and frequent contact with English" . Wheras they conducted their study in a unicultural Hungarian setting, they maintained that the results obtained are "similar to those obtained in North American studies. The integrative motive emerged with a definition which indeed corresponds closely to Gardner's (1985) discussion of the construct" (Clement, Dornyei & Noels ,1994).

After a comprehensive review of studies on language and attitudes, Baker (1992:36) maintained that "on balance, the integrative attitude does seem a valuable variable in analyzing second language achievement, but its relative effect must not be over-emphasised. Also, the integrative attitude must be viewed in a group and cultural context"

In the Hong Kong context, findings of attitude studies seem to be different from those conducted in the western world. On the whole, findings of attitude studies in Hong Kong share similarities with Lukmani (1972)(Indian subjects) or Oller et al (1977) (Chinese subjects). A large scale attitude study was conducted in Hong Kong by Fu (1975) with 561 secondary school students as subjects. There was a clear instumental orientation in the subjects she surveyed with regard to learning English as a second language. Her study was conducted in the 1970's when English was the only official language (until 1974 when Chinese was recognized as the other official language) and it was the lingua franca for international businesses as well.

Because of the changing socio-economic conditions (China trade expanding rapidly), and because of the changing political status (Hong Kong returning to China in 1997), it was considered worthwhile to study students' attitudes toward English learning at this point.

Procedure

The present author conducted three surveys (1980,1992 & 1995) to solicit junior secondary students attitudes. This paper reports the findings of the most recent one and compares with data collected in the previous two studies.

For the latest study, a questionnaire consisting of 15 items and one short essay question was given to students in 13 different secondary schools with a wide range of English proficiency. It has been shown in pilot studies that choosing fewer items can help to ensure more reliable responses and hence only items related to earlier studies have been selected. The questionnaire was written in standard Chinese, the respondents' native language to maximize comprehension. Only in the composition question were respondents required to write in English. The copies of questionniare were given to students through teachers taking a diploma course. It was clearly explained to students that data collected would not influence their course grades and that if they were not interested in such a survey, they would not be expected to participate. To avoid the problem of a biased report (Oller, 1979: 140) because of respondents inclination to put down answers expected of them, the questionnaires were anonymous. Appendix I shows the original questionnaire. No.16 was the short composition in which respondents were asked to write a self-introduction in English.

Data on the 15 items were computer analyzed using SAS. The short compositions were graded by two experienced markers holistically while giving emphasis on grammar.

Scores (0-10) given by the two markers were averaged out to show the writing proficiency of the respondents. This writing proficiency was taken to indicate their language proficiency.

Findings and discussion

For the present study, 452 copies were collected from students aged 12 to 17, 141 male and 303 females (8 respondents did not fill in the sex item). In the following paragraphs, the repondents' self-declared reasons for learning English (No.2 , App. I) are compared with those of previous studies.

TABLE 1
Reasons for Learing English

	1980	1992	1995
Important to future career	30%	13%	26%
Tool to acquire knowledge	28%	25%	4%
Compulsory subject in school	17%	20%	27%
English being an international language	13%	35%	36%
Personal interest in the language			
	N=382	353	452

The 1980 data of the present author are similar to Fu (1975) and it is understandable because both studies surveyed secondary school students in Hong Kong of the same period of time. The largest number of respondents (84%) of her study agreed that English should be studied to get a good job and that English was important to their own future (84%). The present study asked for a ranking of the statements as a whole instead of individual statements in Fu's.The highest percentages in the 1980's were "important to future career" and "tool to acquire knowledge" which seemed to correspond with Fu's findings.

Respondents' personal interest in English language was not high (12%) and "learning English to integrate into the English speaking world" was less than 1% in the pilot studies and thus got left out in subsequent studies. The findings on the whole suggested that learners in a monolingual society where English is important for business and finance have an instrumental orientation . To a certain extent, the findings of this study correspond with those of Lukmani (1972), Oller et al (1977) and Svanes (1987) and lend some support to Au's (1988:90) view that the integrative hypothesis "was found to lack generality" .

The drop in percentages from 1980 to 1992 over the item "important to future career" reflected a situation unique in Hong Kong. "Hong Kong and China are now each other's largest trading partner" (Hong Kong Government, 1992:54). As China trade was growing, learners might feel that English was no longer the most important language for business. At least that was reflected by some learners during casual talks and informal interviews. The drop in "tool to acquire knowledge" also corresponded to the shift in medium of instruction in local secondary schools because according to the government, 70% of secondary students would be going to a Chinese medium school in 1997.

There is an interesting observation here which may or may not be a coincidence. It appears that learners who look more like the target language speakers, for example, Svanes' (1987) European and American students were integratively motivated to learn Norwegian while the African and Asian students were instrumentally motivated. The same observation seemed to hold true for the Indian students (Lukmani, 1972), Chinese students (Fu, 1975; Oller, et al, 1977) and those of the present study.

TABLE 2
Attitudes towards English learning

	1980	1992	1995
Like English language	93%	64%	59%
Don't like English language	7%	36%	41%
	N=382	353	452

It can be seen that there was a steady drop in the number of students who claimed that they liked the English language, rather sharply from 93% in 1980 to 64% in 1992. At the same time, there was a big increase in the number of students who said that they did not like English language from 7% in 1980 to 36% in 1992.

However, even though 41% of the respondents (1995 survey, N=452) claimed that they did not like the English language, 81% of the 452 subjects still thought that it should be used as one of the official languages in future (i.e. after the handover in 1997)(No.8, App.I). 74% considered age 4 as appropriate to start to learn English and 13% considered age 6 as an appropriate age to learn English (No.1, ibid). That means altogether there is 87% of the respondents favouring

an early start in English which is quite worthwhile to note, given the fact that Chinese will be the official language in the very near future.

In Table 3, the findings of the present study are compared with similar statements in Fu's study (1975).

TABLE 3
Attitudes towards Western civilization

	Fu(1975)	1995
Western civilization is superior to Chinese	yes	46%
Chinese civilization is a great civilization	yes	87%
People in the English speaking world are more polite	yes	44%
English speaking Westerners are very friendly	yes	9%

Tables 1 and 2 show that students' attitudes towards learning English and towards the English language itself have changed significantly over the last fifteen years. Students' attitudes towards Chinese civilization or Westerners have not changed that much if it can be inferred from the two studies in Table 3. Even with a drop in numbers, there are still more Hong Kong students believing that Western civilization is not superior to Chinese civilization and that English speaking people may not be more polite. This goes in some way to suggest that Hong Kong students are not integratively motivated (ref. Table 1).

The writing performance of the respondents was normally distributed. The minimum score was 0 for those who did not write and the maximum was 9 out of 10. The mean was 4.408 (s.d. 2.177) and the mode was 5.

TABLE 4
CORRELATIONS between VARIABLES

	Q16	Q6	Q9	Q14	Q15
Q16 Proficiency score	1.000	0.212*	0.398*	0.235*	0.174*
Q6 Anxiety in English learning		1.000	0.365	0.243*	0.396
Q9 Liking English language			1.000	0.421*	0.217*
Q14 Attentiveness in English lessons				1.000	0.099
Q15 Self-evaluation of English performance					1.000

*=p<0.0001

As shown in Table 4, the language proficiency scores of students have significant correlations with the four attitude variables, though the correlations are just moderate to low. That is to say, the more they like English, the higher scores they get, or vice versa; the more attentive they are in English classes the higher marks they get or the other way round. For the students with lower proficiency scores, they are more anxious in English classes. The less inferior they feel about their English results in schools, the higher proficiency scores they have obtained. For all these findings, there was no significant difference between male and female subjects in their responses.

It is found that those who like English are less anxious in learning it and the less anxious students also pay more attention in class and take more pride in their English results. These are in line with previous attitude and language studies, for instance MacIntyre & Gardner (1994) and Clement et al (1994). If we just examine attitudes and language achievement, we can say that data collected in the present study demonstrated significant correlations between the two. Thus this study supports findings of previous studies in an Asian context though there is less support for integrative motivation.

Conclusion

A review of English language learning in Hong Kong shows the number of English medium secondary schools varied in response to needs of the business community. That is to say, when international trade and tourism flourish, there are more English schools than Chinese ones. The change in the political scene does not seem to have afftected the status of English learning up to this point, a year ahead of the handover.

The students surveyed also held a similar view. Even though 41% of them claimed that they did not like the English language, 81% of the same group felt that English should remain as one of the official languages in Hong Kong.

The close relationship between job opportunities and English learning is also reflected in students' attitudes

Students stated that they learnt English because it is an international language and because of future career. Even with an instrumental motivation, their English proficiency is moderately but significantly correlated with attitudinal variables. Such findings resemble some of the previous studies conducted in other parts of the world.

It has to be printed out that the findings from the 1995 study cannot determine the direction of the relationship: whether a positive attitude leads to a high proficiency or vice versa or both. On the one hand, we can postulate that positive attitudes lead to good language achievements. On the other hand, we also postulate that successful language learning helps to bring about positive attitudes.

As correlational studies cannot give causative support for these studies, we can have two equally compatible interpretations of the findings yielded by the present study. It would be interesting to conduct further research to determine the effect of attitudes on language achievement using other statistical tools.

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強迫教育中數學科的改革問題

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在強迫教育的條件下，怎樣認識數學教育的功能？如何使數學教育適合強迫教育的需要？怎樣進行數學教育的改革？是近年來研究比較多的問題。本文在分析和研究了不同國家地區的數學教育文獻的基礎上，在三個方面對這些問題進行初步探索：認識數學教育與強迫教育培養目標關係，把數學教育作為提高公民基本素質的一個組成部分，立足於廣大多數學生的發展進行數學教育改革；認識數學教育與學生全面發展的關係，使每一學生都能通過數學教育獲得應有的發展；搞好中小學數學教育的銜接，把中小學數學教育作為一個整體，全面考慮其目標、內容和方法。

Innovation of Mathematics Education in Compulsory Education

How to construe the function of mathematics education in the context of compulsory education? How to make mathematics education cope with the needs of compulsory education? How to implement innovations in mathematics education? These are the questions studies more often recently. On the basis of analysis and investigation of documents on mathematics education in several different countries and regions, this paper attempts a preliminary exploration of these questions from three aspects: clarifying the relationship in the objectives between mathematics education and compulsory education with the recognition of mathematics education as a component in the enhancement of basic qualities of citizens and of innovation mathematics education as for the development of the majority of students, understanding the relationship between mathematics education and students' development in order to enable students to have the appropriate development through mathematics education, and achieving a better, connection between primary and secondary mathematics education and considering holistically the aims , contents and methods by taking primary and secondary mathematics education as an integrated whole

數學教育是中小學教育的一個重要組成部分，歷來受到理論工作者和實際工作者的重視和研究。在科學技術飛速發展，社會不斷進步的今天，在越來越多的國家和地區大力推行普及強迫（義務）教育的情況下，數學教育也面臨著改革和發展的新問題。近年來，很多國家對數學教育的改革提出許多有益的設想，並實行了一系列改革措施，取得一定的成效。但是，在數學教育改革的過程中，也明顯存在著許多值得研究和探討的見解和問題。面對新的社會條件和教育改革中提出的許多新思路，正確地思考數學教育中存在的問題，對於深入認識，明確改革的思路是十分有益的。

一、數學教育與強迫教育培養目標

20世紀初葉以來，許多國家和地區都先後實施了強迫教育。英國1911年[illegible]，[illegible]香港1978年，中國大陸1986年，都先後在基礎教育階段實施了強迫教育。強迫教育的實施，要求教育的整體目標和各學科的教育目標都適合強迫教育的需要。數學教育也同樣應該按照這樣的一個思路進行改革。但作為一門邏輯性和系統性很強的數學學科，作為一門歷來被認為是普通教育中重要的學科之一的數學，多年來已形成一套比較嚴謹的，被世界各國數學教育工作者認可的課程體系和教育模式。這就為數學教育的改革帶來了一系列值得思考和研究的問題。其中一個重要方面就是如何使數學教育的目標與強迫教育的整體目標相一致。

強迫教育的整體目標是提高每一代公民的基本素質，[illegible]適應社會的需要。數學是[illegible]的發展，[illegible]數學素養的要求是越來越高，[illegible]未來社會的人，不論數學[illegible]數學計算[illegible]

數學給予人們的不只是知識，更重要的是能力，這種能力包括直觀思維、邏輯推理、精確計算和準確判斷。因此，數學科學在提高民族的科學和文化素質中處於極為重要的地位（中國科學院數學物理學部，1994）。可見提高公民的數學素養是提高民族素質的一個重要方面。

那麼，是不是數學教育的要求越高越好呢？是不是在中小學數學教育中培養出一批拔尖人才，多出幾個數學家，就標誌著數學教育的水平高，標誌著完成了強迫教育賦予數學學科的任務了呢？從強迫教育的總目標來看，並非如此。數學作為培養未來公民的一個重要學科，其基本目的是提高公民的數學素養，使每一個公民都有處理日常工作和生活中數學問題的意識和能力，進而提高公民的基本素質。這與作為數學專門人才的要求是不盡相同的。在強迫教育的條件下，應把數學教育作為公民教育的一個組成部分。在過去20年的綜合中等教育運動中，發達國家而現出了課程改革最強大的一些勢力，這個運動引起了對教育目標的重新檢驗。「數學和科學緊密聯繫，是近代社會發展和所有青年人日常生活中最革命的基礎，甚至最落後的學生也對進步和成就感興趣，聲稱數學能導致成功。我們可能很希望所有的學生在離校前都能顯示出其本身固有價值。」這一段摘自Newsom報告……這裡明確的提議，如果能說明數學的用途，只要如果學生能在使用數學時獲得成功，那麼數學應作為「全民教育」的組成部分（[illegible]，1991）。在普及強迫教育的新情況下，我們仍需要對以往的數學教育目標進行反思。在以往，數學教育可能只有一個目的，乃是發掘有數學潛質者（精英）而培育之。換言之，數學教師，尤以高年班而言，大可假設為學生未來在數理方面的發展，提供數學能力方面的準備（黃毅英，1993）。實施強迫教育後，數學教的目標就應當由這種「精英」的數學教育轉向「普及」的數學教育。要實現這樣一種轉變，就應當重新審視現有的數學教育目標，從數學教育的基礎性和普及性上進行研究。

數學教育的基礎性就是以完成普及強迫教育任務為目標，面向大多數學生，設計和實施適合大多數學生程度[illegible]的目標和內容，而不是單為中學和培養數學「精英」服務。[illegible]國家和地區的小學數學教育文件中，也都不同程度地體現了適應普及強迫教育的需要，保證小學教育的基礎性這樣一種思路。[illegible]

一是明確在小學數學教育中要注重聯繫學生的生活實際，培養學生的數學意識、數學興趣，培養學生解決日常生活中的實際問題的能力和態度。在日本的數學教學目標中，強調「從日常事和現象中看到數量關係」，「重視培養學生『處理（問題）』的能力和態度」（日本文部省，1992）。香港的數學課程綱要中規定，數學教學要「引起兒童對數學學習的興趣；讓兒童學習運用數學解決日常生活中的問題，誘導兒童對數和圖形的規律及結構的欣賞」（香港課程發展委員會，1983）。數學是作為一個未來社會的公民所不可缺少的素質之一，在中小學數學教育中，使學生認識到數學與生活的聯繫，逐步學會用數學的思想和方法解決日常生活中的問題，這是在普及強迫教育的條件下，數學教育的一個重要的目標，也是體現數學教育的基礎性的重要一環。

二是明確「最基礎的知識」的範圍和深度。中國強調：「使學生理解和掌握數量關係和幾何圖形的最基礎的知識」（中華人民共和國國家教育委員會，1992b）。香港重視「教授基本的數學概念及計算技巧，為中學的數學及科學的學習奠好基礎」（香港課程發展委員會，1983）。日本也強調掌握甚麼數量和圖形的基礎知識和技能，培養學生從日常事物和現象中看到數量關係，有條理地進行思考和加以處理的能力和態度（日本文部省，1992）。那麼，在小學數學中，最基礎的知識的範圍和深度怎樣才合適，具體的做法就有很大的差別。

中國傳統的小學數學教學內容是以算術知識為主的，1987年後有了很大的改進，適當增加了一些幾何和代數知識，知識的範圍有所擴展。但同日本、英國和美國等國相比，內容的範圍仍然比較窄。比如英國的小學數學教學內容中，不僅包括基本的算術知識和幾何初步知識，而且較早地引入代數的概念和方法，並從三年級開始就接觸負數的概念，甚至從低年級開始，就學習簡單的概率與統計的知識，以及初步了解概率與統計的思想。可見其數學教育的內容比較廣，並且比較重視數學的應用和學習與日常生活有密切聯繫的數學知識（Department for Education and Weles Office, 1995）。

中國的中小學數學教育內容，要求的理論性比較強，比較著重於培養學生的數學能力，以及選拔[illegible]方面確實有很好的作用，但是按普及強迫教育的觀點，就應當作一些調整。[illegible]

一定的偏深偏難問題。與日本的小學數學教學內容相比，中國的教學內容相對來說要求學生掌握的程度比較高。如「數的整除」方面的知識，日本教材中要求學生掌握的內容有「偶數、奇數、倍數、公倍數、最小公倍數、約數、公約數、最小公約數」。中國的教材中除了這些內容以外，還有「整除、能被2、3、5整除數的特徵、質數、合數、質因數、分解質因數」等內容。這顯然要比日本的教學內容要求得高（馬云鵬、孫連舉，1995）。

三是重視培養學生的數學能力。在各個國家和地區的小學數學教學目標中，對數學能力的培養都有不同程度的體現。但對於能力的理解和所規定的具體內容卻存在一些差別。至少可以列出下面一些關於小學教學中培養學生能力的表述：邏輯思維能力；空間觀念；解決實際問題的能力；數學的語言和交流能力；數學的思考能力；數學的策略和克服困難的精神；在解題結果中尋找範型；從日常事物和現象中看到數量關係；有條理地進行思考和加以處理的能力和態度；創造能力。

按照強迫教育的目標，在數學教學中應當培養學生哪些能力？這些能力怎樣具體化，並使之具有可測性？這是一個值得重視和研究的問題。

數學教育的層次性是指不能以一種方式、一種模式來設計和實施數學教育的目標。強迫教育是面向全體學生的教育，並不是一刀切的、一種規格和模式的教育。有的數學家主張，「數學教育的目的和作用應該分三個層次，一是數學作為當代的人生活在社會中之必備訓練……在今天就應該在各級教育首先是義務教育階段對各種不同年齡的學生提出由淺入深的要求。二是數學作為掌握某種知識的工具。三是數學在人們品質形成上不可代替的作用」（齊民友，1994）。更有學者將數學教育目的概括為「才、學、識」三個方面，即：「思維訓練、實用知識、文化素養」（蕭文強，1983；陳鳳潔、黃毅英、蕭文強，1994）。從普及強迫教育的基本目標來看，我們應當把着眼點放在未來公民的基本素質上。但從充分發揮學生潛能，培養學生個性的角度出發，又應該為每一個學生的充分發展提供必要的條件。因此，在確定數學的教育目標時，就要區分出作為未來公民所必備的基本數學知識技能和作為個體發展潛力所能達到的較高水平。前者是作為一個公民必須達到的基本要求，是每一個學生都應該達到的。後者是對於某些人的較高要求，是一部分人經過努力才能達到的，可以看作是個體發展的希望值。

許多國家和地區的數學教育文件中，都注意到教學目標的層次性。中國規定一些選學內容，如「三角形內角和」、「球和球的半徑、直徑的初步認識」等（中華人民共和國國家教育委員會，1992b）。香港也確定了一些選學內容，如「古代數字」、「縫曲線」、「對稱」等（香港課程發展委員會，1983）。

在英國的「課程綱要」中具體規定了學生所應達到的目標（Attainment Targets），分為四個範疇、八個水平。「在每一個階段結束時，學生達到哪一種水平的目標，教師要根據學生的實際情況作出判斷。」「第一階段（1-2年級）結束時，大多數學生達到1-3水平；第二階段（3-6年級）結束時，大多數學生要達到2-5的水平；第三階段（7-9年級）結束時，大多數學生達到3-7水平。而水平8是針對能力強的學生而定的」（England and Wales Department for Education, 1995）。可見其目標本身就具有很大的彈性，不同的學生可能達到不同的目標。

規定一些具有層次性的目標並不難，而在實施的過程中如何做到實現不同層次的目標，使每一個學生學到應該學的數學內容，達到預期的目標，確是一件不容易做到的事情。小學數學教育的研究還應該重點在這方面下功夫。

二、數學教育與學生的全面發展

數學作為中小學教育中的一門重要學科，歷來受到人們的重視。這與數學學科本身的特點是密不可分的。數學作為邏輯性、嚴謹性和應用性很強的一門學科，是學習其他學科知識的基礎和工具，同時數學知識和技能本身也是人們生活中所不可缺少的。隨着現代科學技術的發展，現代社會對人的基本素質要求的提高，數學的重要作用就越來越突出。這一點是任何人都不懷疑的。然而，數學教育除了向學生傳授數學知識和技能外，還應當包括其他一些功能。在現代教育改革的發展趨勢和普及強迫教育的新要求下，更應當充分發揮數學這門學科的多種功能，通過數學教學，促進學生的全面發展。

小學階段是兒童身心發展的重要階段，這一階段的兒童存在着極大的可塑性和發展潛能。兒童之間也存在着明顯的個別差異。從普及強迫教育的目標出發，要從整體上思考數學教育的目標和任務，使數學教育適合於大多數兒童的身心發展，使每一個學生不僅學到有用的數學知識，而且通過數學教育使學生在智力、技能、心理

品質和行為習慣等方面得到很好的發展，為將來成為合格的公民打好基礎。

從教育發展史上看，對於學校教育的目的，歷來存在著實質教育與形式教育之爭，這也同樣反映在數學教育的改革與發展的過程中。但無論是教授學生有用的數學知識，還是思維的方法，最終的目的都是使學生成為社會所需要的人，使數學的學習有助於學生的生存和發展。隨著時代的發展，人們也越來越認識到必須把數學教育的目標與學生全面發展的目標緊密聯繫起來，使學生通過數學的學習既掌握有用的數學知識和技能，又學會思維的方法乃至做人的道理，才能真正完成時代賦予數學教育的使命。為達到這樣的目的，近些年來人們主要從以下兩個方面進行了大量的研究和探討。

一是建立適應學生全面發展的數學教育的目標體系

建立目標體系就是在綜合分析小學教育的目標、數學學科的特點和學生身心發展水平的基礎上，確立一套具有時代特點的、符合實際的小學數學教學的目標。從60年代的"新數學運動"開始，人們就意識到傳統的中小學數學教育目標和內容與現代社會的發展存在著許多不適應的地方，並大膽地對數學教育的目標和內容進行改革。幾十年的努力，雖然走了一些彎路，改革的總趨勢是明確的。儘管許多人認為"新數"是失敗的，但很少有人認為，應該回到原有的數學教育模式中去。30年的數學教育的改革之路，最大的收穫也許就在於從曲折的改革過程中，逐步認清了適應現代社會的數學教育的

中國	美國	日本	香港	台灣
1. 理解和掌握數量關係和幾何圖形的最基礎的知識 2. 使學生具有進行整數、小數、分數四則計算的能力，培養初步的邏輯思維能力和空間觀念，能夠運用所學的知識解決簡單的實際問題 3. 使學生受到思想品德教育	1. 了解數學在現代社會發展中的作用，並能探索數學和所服務的學科之間的關係 2. 相信自己有學好數學的能力 3. 成為具有解數學問題能力的人 4. 學會運用數學語言交流思想 5. 學會數學上的推理	掌握數量和圖形的基礎知識和技能，培養學生從日常事物和現象中看到數量關係，有條理地進行思考和加以處理的能力和態度	1. 引起兒童對數學的學習興趣 2. 啟發兒童的數學思考，培養兒童的創造能力 3. 教授基本的數學概念及計算技巧，為中學的數學及科學的學習建好基礎 4. 讓兒童運用數學解決日常生活中的問題 5. 誘導兒童對數學和圖形規律及結構的欣賞	輔導兒童從日常生活經驗中獲得有關數學的知識，進而培養有效運用數學方法，以解決實際問題的態度及能力

目標，也就是適應學生的發展、適應現代生活的數學教育的目標。在"新數"運動中步子邁得比較大的國家和地區，對這方面的認識相對會比較深刻；受"新數"影響比較小的國家和地區，也從各國的改革中吸取了一些經驗和教訓，用以改革和完善本國的數學課程體系。從上表中所列幾個國家和地區的小學數學教育目標的表述中，我們就可以看出一些共同的趨勢。

首先，從內容上看，各國家和地區的小學數學教學目標，儘管在具體內容的表述方式上有一定差別，但總體的趨勢是一致的，大都包括基礎知識、基本能力和數學的學習態度、學習方法等幾個方面。在基礎知識方面來看，中國和日本都強調數量和圖形基礎知識，而香港和台灣則表述為"教授基本的數學概念"、"獲得有關的數學知識"，美國則更強調讓學生認識數學的價值和數學在社會中的作用。在培養學生的能力方面，中國與日本重視學生的邏輯思維能力的培養，"培養學生初步的邏輯思維能力"、"有條理地進行思考"，香港重視"培養兒童的創造能力"，[illegible]。在[illegible]數學的態度和方法方面，都比較注重把數學同日常[illegible]

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生活和實際問題建立聯繫，日本提出「培養學生從日常事物和現象看到數量關係，有條理地進行思考和加以處理的能力和態度」，香港強調「讓兒童運用數學解決日常生活中的問題，對數學和圖形的規律及結構欣賞」，中國是「能夠運用所學的知識解決簡單的實際問題」，台灣也重重視「解決實際問題的態度和能力」，而美國則強調「運用數學語言交流思想和認識數學與其他學科之間的關係」，中國的教學大綱中單獨提出使學生受到思想品德教育

由此可以看出經過幾十年的努力，人們已經形成了包括基礎知識、基本能力、學習的態度和方法等幾個方面的數學教育目標框架，並在許多方面產生了共識，特別是不同的國家和地區都充分注意到，數學教育不僅要向學生傳授基礎知識和基本技能，而且要重視數學能力的培養，注意使學生養成有條理的、合乎邏輯的認識周圍世界的態度和方法，這不僅是學習數學的需要，而且更是學生將來社會的合格公民的需要，也就是說，現在的數學教育目的，已經把促進學生的發展放在了重要的位置，這對於我們進一步思考數學教育的目標體系奠定了一個良好的基礎

二是在數學教育過程中採取有效的方法，力求使學生受到多方面的教育和薰陶

對數學教學過程和教學方法的改革相對來講有更大的難度，也是關係到教學目標是否能夠落實的重要因素，為此，許多教育家提出了改革的措施和方法，波利亞(G. Polya)早在50年代就提出在數學教學過程中，要重視教會學生解題的方法，不只是教給學生現成的結論，他認為「一個數學教師有著極大的機會，如果他把分配給他的時間塞滿了例行運算來訓練學生，他就扼殺了學生的興趣，妨礙了他們的智力發展，從而錯用了他的機會」，但是，如果他給他的學生以適合他們程度的問題去引起他們的好奇心，並且用一些吸引人的問題來幫助他們解題，他就會引起學生們對獨立思考的興趣並教給他們一些方法，」為此，他計了一個「怎樣解題表」，提出了解決數學問題的四個基本步驟，即弄清問題、擬定計劃、實現計劃、回顧(G. Polya, 1957)。在學習數學的過程中，利用這樣的策略，學生不僅可以學到數學的知識技能，更重要的是學到解題的方法，學會思考的策略。結構主義的代表布魯納(Bruner)提出的「學科結構"理論和與之相適應的「發現法」，更是對數學教育的改革產生了很大的影響。「發現法要求學生按照自己的方式探索境況，它在發展個體的創造思維和獨立思維上有著不可估量的作用。在這個系統中，記憶機械的答案不會使學生取得進步，他的內在興趣和競爭的本性促使他致力於解決所遇到的創造性問題」(杰夫里，豪森，1991)。這些教育思想使得數學教學在很大程度上著眼於學生數學能力和一般能力的發展，進而為學生的全面發展打下基礎

在中國，進行了多年實驗研究的「中學數學自學輔導法」和「小學數學嘗試教學法」也產生了一定的影響。它們的共同的特點是，在教學過程中給學生充分機會去自學、探索、嘗試，在學生理解數學知識的過程中，培養學生自學能力、獨立思考能力，促進學生的一般發展(馬雲鵬，1993)

數學教學過程和教學方法的種種改革，為數學教育深入改革提供了有利的條件。而在實施普及強迫教育的條件下，更需要進一步解決如何通過數學教學促進學生的全面發展問題。應當把數學的教學過程，看作是學生全面發展的一個重要的組成部分，把數學教育作為培養未來合格公民的一個重要的組成部分。數學教學方法的改革應該在培養學生適應未來社會的能力上下功夫。通過數學學科的教學培養學生的探索精神、適應能力、操作能力和分析問題解決問題的能力。學生在校的學習時間是有限的，即使學生從小學一直到大學畢業，學到的知識內容也只是人類文明的一小部分。他們在走向社會以後，會遇到各種各樣的新問題和新方法。許多問題僅用現成的知識是無法解決的。因此，需要學習新知識，掌握新的方法，適應新的環境。這一切都需要學生在掌握必要的基礎知識的同時，具備獨立地學習新知識，探索新問題的能力。從這個意義上說，更新數學教學方法的著眼點，應該放在培養學生的獨立思考能力、實際操作能力和解決實際問題的能力上。在實際教學中要提倡活動式、啟發式、問題解決式的教學方法

三、中小學數學教育的銜接

數學是具有系統的嚴謹的科學體系，學生的學習過程也是一個完整的、循序漸進的過程。對於每一個學生個體來說，在中小學的學習階段，是在頭腦中逐步建立數學這門學科的知識結構，不斷提高數學的素養。事實上，中小學教育是義務教育管理體系下人為劃分的兩個教育階段，但按照學生個體的發展，並不是分為小學階段和中學階段，按照不同的模式進展的。對於他們來說，

數學知識學習和數學能力的發展是一個循序漸進的、連續的過程，其思維水平的提高和思維方式的變化也是逐步過渡的，而不是跳躍式地從一種學習和思維的方式到另外一種思維方式。因此，從有利於學生學習數學和提高學生的數學素養的角度來看，不應該將中小學的數學教育截然分開，要用整體的思想全面地思考中小學數學教育問題，使中小學的數學教育形成一個完整的體系。這包括在教育思想上，在教育內容和教育方法上都應該形成一個整體的思路。

以往，我們過多地強調學生從小學升到中學，應當適應不同的學習環境和學習方法，用不同的思維方式和不同的解題思路來學習小學和中學的數學知識。比如，小學主要是用算術的方法來解題，而中學才用代數的法。小學學習確定量和可數量的數學內容，到中學甚至到大學才接觸不確定量和連續量的數學知識。而比較少地從教學目標和內容的銜接方面，認真地研究和採取有效的措施，使小學形成一個互相聯繫的，循序漸進的整體。

近些年來人們已經開始重視中小學數學教育銜接問題的研究。一些國家的數學教育文件中，也體現了這種精神。如，美國和英國的數學教學綱要（標準）所規定的關於數學教育的培養目標就體現中小學教育的銜接，把中小學階段作為一個連續的整體來看待，統一規定教學的目標與內容。英國的數學教育綱要，將中小學數學教學目標分為四個範疇，每一個範疇又分成8種水平，這8種水平是逐步提高的，並且每一種水平不是限制在小學或中學的某一個階段達到，而是互相銜接，互相聯繫，形成一個整體。在具體實施的過程中，也有一定的彈性（Department for Education and Welsh Office, 1995）。前表中所列出的美國的數學教學目標也是適用於中小學的。近年來，香港的數學教育工作者，在研究如何建立適合於普及強迫教育目標的數學課程時，也提出了「要重視中小學和中學與預科的銜接問題」（黃毅英，1995b）。

在教學內容的改革上，一新數一之後，許多國家也都比較謹慎地做了一些嘗試，試圖解決數學教育中的中小學銜接問題。主要是引進代數初步知識和概率統計的初步知識，適當加強幾何知識的教學等。但在執行的過程中，也遇到一些問題。如中國在1978年的小學數學教學大綱中，曾經增了一些代數和幾何的內容，包括「有理數的初步認識」和「簡易方程」等。後來由於種種原因，正負數的內容從教學大綱中刪除。香港在教學綱要中，只有正負數的初步認識，而不教正負數的加減法。但在具體的教學中，一些一中學教師通常有怨言，說最好不要教「正負數」，因為小學教師教錯了概念，要他們重新教過」（黃家鳴，林智中，黃毅英（待刊））。

由此可見，解決中小學數學教育銜接問題，並不是一件容易的事。對於這個問題進行認真思考，至少應該從以下幾個方面採取一些切實的措施。

一是進一步轉變教育思想，把中小學的數學教育作為一個整體來對待，減少中小學數學教育中人為的界限，使學生能夠自然地從小學階段過渡到中學階段的學習。這是實現中小學數學教育銜接的一個關鍵性問題。特別是教學綱要和教材的編寫者，更應該在這方面進行一深入的反思和認真的研究，以其對這個問題有一個清楚的認識。

二是在教學內容上突破中小學數學教學內容範圍的限制，統一考慮中小學數學教學內容設置和安排，使學生在小學階段就能從數量關係、數據處理、數學能力和學習數學的態度等多方面去到教育，讓學生較早接觸一些重要的數學觀點和方法，用學生可以接受的方式教授一些重要數學概念，為學生進一步到中學學習打下比較好的基礎，也可適當地減輕學生的負擔。而中學階段的內容，也不能一味地強調邏輯性和嚴謹性，也應適當地顧及到小學階段學生的知識準備和心理準備，用學生可以接受的方式呈現教學內容，使中小學的數學教學內容形成一個完整的循序漸進的整體。

三是在教學方法上進行深入細致的研究和實踐，特別是原有的中學數學教學內容下放到小學後，如何採取適合於小學生學習的教學方法，避免中小學學習同樣的內容時所產生的矛盾。為此，一方面要使小學教師多了解一些中學的教學內容和方法，也要使中學教師有機會了解小學數學的教學內容和方法。二者有效的溝通，有利於中小學數學教學方法上的銜接。

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香港中學科學教育的回顧與前瞻

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本文簡單介紹香港中學科學教育近年的發展，在課程歷史及內容、師資、學生水平及學習時間、教材及設備等各方面，嘗試與其他各國作一些簡單的比較。

Secondary School Science Education in Hong Kong: Prospect and Retrospect

This article introduced the development of secondary school science education in the past 40 years. In particular, brief comparison of the curriculum, teachers, achievement level of students, learning time, teaching material and equipment with other countries had been illustrated.

壹、回顧（一九七零年以前）

自十九世紀中葉以後的一百年間，雖然中國在社會和政治上極為動盪，但對於鄰近的香港的影響卻是很小，故香港成為當時中國省份，特別是廣東人民逃避戰亂的地方，當國內形勢回復安定之後，這些逃難的人便返回家鄉，留居在香港的不多。

二次世界大戰之後，隨著國內政權的轉變，往香港避難暫居的人倍多，但因著種種的原因，這次本來是暫時逃來香港避難的人，卻大多留了下來，使到香港起了根本的改變（Sweeting, 1995）。

在五、六十年代，國內動亂不息，逃港的難民無日無之，社會不安定，兩次廣大的騷亂，香港政府為了應付大量增加的新移民，在解決房屋、治安、教育等方面的問題已是左支右拙，遑論發展！這個年代可以說是香港政府各方面政策的扎根期。

進入七十年代，各方面的情況開始穩定下來，香港政府先在七十年代初年實施六年普及小學教育，隨後在七十年代末期推展至九年小學及初中強迫教育。

中學課程方面，在七十年代之前分為兩線：用中文教學的中文中學課程，主要是根隨以往中國的學制；而英語作為教育語言的英文中學則跟隨英國的學制。七十年代之後課程才統一起來，以英中的課程為藍本。

七十年代之前的中文中學科學課程，在初中時期已分為物理、化學及生物三科，而英文中學則合為一科普通科學，兩者俱為必修。在高中階段，中中學生的文理科界限並不清楚，唯一分別是理科班學生在數學方面多學一科甲組數學，而文科班學生仍要修讀物理、化學、生物各科。英中學生在高中階段，文科班可以免除修數、理、化等各科，在課程內另加一科普通科學，這些「偏」了理科的高中學修讀（七、八十年代間取消了），內容當然是較為淺易。

當時的理科課程主要是局限於學術理論方面，學生需要強記定義、定理，機械地運用公式去解答問題，老師被視為知識的來源，大部分老師都是採用單向口述或抄寫筆記的填鴨式教學法，課程內容以幫助學生鞏固其學術基礎為主，預備學生繼續升學，理化科被視為艱深而枯燥的學問，需要很好的數學基礎才能應付得來。

當時的中、小學教育尚未普及，能進入中學的學生只是同齡學生三分之一，這些學生在今日來說已是精英分子，但因理科無論在強記、理解等方面的要求都很高，故只有那些夠力及能持有的學生才能捱得過來！那時社會各方面尚在發展中，學生的其他出路及升學等方面的職業選擇少，故此一般中的學生都以能進入理科班為榮，修讀他科只是次佳的選擇。

貳、課程

一、發展

近年世界性科學教育的發展多追溯至五十年代，在東西方冷戰方酣之際，蘇聯成功地放射第一枚人造衛星，激發歐美各國急起直追的決心。適逢五、六十年代西方社會經濟富裕，人民大多數相信教育經費是一種社會投資，教育是社會改革的催化劑，故此投入教育發展，特別是科學教育的資源極為龐大（歐陽鍾仁，1988）

英美在科學教育方面的改革，延至七十年代初期才正式影響香港，當然又以英國方面的影響為主，這些課程的目標多是希望學生能通過體驗、實踐、探索、討論等過程，特別是從實驗方面去進行，使其明白理解科學的內容，進而瞭解日常生活和社會中與科學有關的事項，如圖一所示。從學習的層次來說，這比較以前背誦強記的知識層面為高

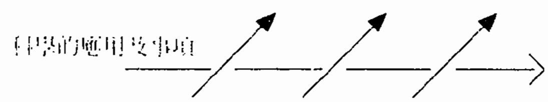
圖一：以學術知識為本的科學教育

香港的九年強迫教育於七十年代開始進行，剛接上了初中綜合科學課程的推行，此課程改編自蘇格蘭的綜合科學科程，內容精神已在上述簡單介紹。當時的科學教師對此科課程抱著極大希望，以為學從此可以拋棄強記、生吞活剝的學習，不再覺得科學是一門難學的課程

可是當這課程推行了一段時間後，老師們發覺學生對科學方面的學習，不但沒有期望中的容易，而且好像還較往日強記背誦為困難。究其原因主要是：強迫教育推行後，學生的平均學能較昔日下降；另一方面理解明白科學原理，需要較高的學習層次，對學生的要求更高，在此種種的情況之下，學生在科學課程的學習上比較往昔更為困難

外國的科學教育學者亦面對同樣的困難，發覺探索、實驗、理解並非原先預期那麼容易，若學科內容仍是以學科知識為本，那些原本學能已較低的學生的興趣將會進一步降低，故此提出另外一個科學教育的方向：從科學歷史及哲學，探索科技的應用及對社會的影響，使學生能更明白科學語日常生活的密切關係，如圖二所示。而六十年代末年發展的哈佛物理課程也許可算這方面的先鋒。九十年代香港的科學教育正值傾朝這個方向邁進（Lau, 1987）

圖二：以社會及科技應用為本的科學教育



在八十年代末期，高中的化學老師們積極研究這個發展方向，經過六年的討論和準備，於九三年九月正式推出新的中學會考化學課程，教學模式以社會及應用科技為主，著重培訓學生在學習過程當中的應變技能，其中包括：解決問題、傳意、及作出決定等。課堂活動除了傳統的老師講授和實驗外，還包括：辯論（例如香港應否有氯氣製造廠）、討論（例如食水附加劑的優劣點）、判斷練習（例如防銹的方法）、專題研究（例如香港空氣的污染）、資料搜集（例如酸雨所引起的問題）、海報設計（例如濫用塑膠所引發的環境問題）（柯明權，1993）

在九十年代開始，課程發展議會提議在高中階段設立一為非理科學生修讀的跨科目科學課程，其目的正如上段所述，內容包括五項主題：

一、健康生活：身體健康、飲食、性與健康、健身、科技發展與生活質素
二、物料的應用：自然材料、加工及合成材料的使用、物料結構、物料保護、循環使用
三、能源及其應用：能源與我們的關係、能源的傳送、家庭內的能源、不能再次使用的能源、其他能源、能再使用的能源
四、環境的污染及管理：[illegible]、[illegible]、環保
五、傳意科技：個人傳意、使用各種器材及影像的傳意

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因此科目內容從日常生活的主題引伸出來，對理科學生的學習興趣，相信會較六十年代或以前修讀那科普通學科為大。在初步調查中，有百分之七十六的中學表示歡迎增設這科，百分之廿五的中學表示會在其校內教授，其餘則表示要進一步看到各方面較詳細的配套才能決定 (Yip, 1994)

二、課程內容

國際教育評估協會在八十年代中與香港大學進行一系列的研究調查，有關科學教育的資料主要取自中四、中七和預科班（即中六和中七），分析香港學生在幾個階段在成就、學習態度、家庭背景、課程、學習時間、師資、課外活動及學校設備等因素與世界各國的比較 (Holbrook, 1990)

課程方面的研究集中在內容和過程兩方面，香港科學課程在有關地球科學的部分主要是放在地理科內，本文將不會觸及這方面。

一般來說，香港學生學習科學的進步較遲，在小學課程方面遠較外國為差，學習的東西較少，科學也在課程中只佔一個[illegible]的地位。

中三的課程內容，理化生三科實驗的範圍有點相若，並與其他各國相比，化學科方面比較[illegible]一點，而科目的課程內容，香港無論在實科方面都較國際水平為佳，惟在健康、技術及環境方面，香港所觸及的部分甚少。

在學習過程技巧方面，香港學生在中三時能學到的不多，在預科班時卻學得很多，因香港的預科課程較為學術化，學生又經過嚴格篩選，故對學生有很高的要求。

叁、學習時間及學生水平

在中一、二兩年間，香港的學生有平均每週[illegible]（四十分鐘）的綜合科學科，到中三的時候，很多學校都將綜合科學分為物理、化學、生物三科，[illegible]。若與其他國家相比，香港在中學學習科學的時間[illegible]。表二是各大洲的國家在學校中學習科學教育的平均時數 (UNESCO, 1986)

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	香港
上課時數	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

表二：各大洲國家在學校中學習科學教育的平均時數

國際教育評估協會各參與國在中三科學教育成績的比較，香港中三最低水平的四分之一學生，在科學教育中的成績實在令人擔憂，因為他們在這方面得分很少，平均來說是倒數第三，顯示香港中三學生的科學水平在各國中偏低 (Holbrook, 1990)

在高中（中四、五）階段，理科班的學生每週共有十二節的課，物理、化學、生物各佔四節，而文科班的學生通常只選生物或人類生物學一科，亦是每週四節，有些文科班學生甚至不修讀任何理科。

在預科（中六、七）階段，理科班的學生每週有多至廿七節的課，物理、化學、生物各佔九節，這實在是很大的比重，加上學生經過嚴格篩選，故此難怪香港的預科學生在國際評估測驗中會有多科名列前茅，特別是物理科方面。

一般來說，香港的學生可以說是努力的，他們在上課和做功課方面都很盡力，若學生成績跟不上，而他們的家庭環境又能應付的話，家長會讓其子女參加私人補習，希望學生能夠在功課方面迎頭趕上。

肆、師資

八十年代中期國際教育評估會有關理科教育的報告中，發現香港中學的理科教師較為年輕，半數以上是介乎廿六至卅七之間，大多數的教學年資在十年以下，這大概是因為香港在七十年代末期才開始九年免費教育，造成中學教師急劇增加的現象 (Holbrook, 1990)

在性別方面，男性的理科教師明顯較女性為多，尤以預科的物理教師為甚，男女教師的比例是十六比一，化學為五比一，生物科也有三比二左右，不過，這是一個國際性的現象，並非香港有甚麼特異之處。

在學歷方面，大多數的預科教師在大學時主修理科，[illegible]，香港理科教師有其本科的專科學歷，可以說是世界上最具專業資格的地方。

在師資培訓方面，因香港暫時並未有規定大學畢業教師在入行前務須接受師訓，而事實上師訓的課程尚在擴展中，故此百分之三十的理科教師尚未接受專業培訓。在職培訓方面，百分之四十二的初中理科教師在調查之前一年中，未曾接受任何有關的培訓課程，其他百分之五十八曾參與的培訓課程者多為一至三天的短期課程。高中理科老師在調查之前一年中，參與在職課程的比率高達百分之八十三，多為五天以下的短期課程。

初中的理科教師平均每週上課廿九節，四分之三的課是理科（初中）或其主修範圍。預科理科教師的教擔則在廿四至卅一節間，物理科教師多有兼教數學者。

初中理科教師每週平均要花7.8小時在備課及5.3小時在改簿中，而預科教師則要用十至十四小時備課及四至六小時改簿。

提供在職教師培訓的機構，主要是教育署及幾所大專院校。在七、八十年代間興起了一個數理教師學會，積極參與推動新課程的發展，除了組織大量的教師研討會、工作坊外，更要按課程需要設計大量低廉的實驗儀器，大大提高了老師們對新課程的興趣及接受程度（羅陸慧英，1993）。故在八十年代中葉教授預科班的理科教師，半數以上都曾成為其會員。進入九十年代，當年數理學會的中堅分子，陸續在香港教育圈內各機構爬升至管理或培訓階層，大大影響著整個香港教育各方面的發展。可是另一方面，數理學會內部後繼乏人，故近幾年的工作比以往遜色了許多。

伍、教材設備

雖然香港在七十年代末期開始大量興建中學，在十多年間建成的新校舍達一百六十所左右（賀國強，1993），但在總數四百多所中學來說，所佔的比率只是四成，故此有不少中學的校舍仍是較為陳舊和未達標準。

在實驗室方面，一般香港學校的設備尚算充足，通常每校都有三至四個實驗室，故此理科教學有百分之八十的時間是在實驗室進行，方便隨時進行示範或分組實驗，分組時每組的學生約在二至六個之間（平均是五人）。每校通常都有兩至三個實驗室技術員及實驗助理，支援在實驗室進行的各種教學活動。

香港的中、小學生通常在學習各科時都有指定的教科書，這些書多是由本地教師按實際需要編寫，故頗為適合香港學校使用。教科書的使用程度則隨年級遞增而逐漸下降，初中的理科教師有百分之九十五以上是緊隨著教科書去進行教導的，至預科時則已降至半數左右，教師通常是將教科書的內容整理後，以筆記的形式來教授學生。

教師在課室內教學時，通常仍是使用粉筆和黑板，在實驗室裡則間中使用高映機，而初中的課程若是遇著合適的課題，也會通過教育電視的形式上課。

學生的評核主要是考試和測驗，約百分之四十是多項選擇題，其餘則是常識性的問答題。進行分組討論或經常性實驗評核乃屬小數，現只在預科班的生物及化學兩科內進行。

陸、前瞻

香港在邁進廿一世紀之前，首先要面對九七回歸中國的問題，近期中英雙方在政制方面的爭執嚴重，惟在教育方面，香港特別行政區基本法內所爭及的很少，主要仍是維持現狀，故此可以預見在過渡期後一段時間，香港教育制度受中國影響還是不多。反過來說，那些在香港已推動著的教育政策或變革，將會維持一個時期。

香港的科學在九十年代初年，既已隨英美以及社會及科技應用為主導的概念發展，首先有高中化學科課程的改變，隨後是高中跨科目科學課程的建議，而其他在物理或生物科的教育學者們亦在近年大事鼓吹（Tao, 1988; Cheng, 1993; 韓承孝，1993），故此可以預見整個科學課程將會繼續朝此方向進行，也許要到廿一世紀之後，因著中國對香港的影響日增及英美科學教育課程有新的動向後，才會有一些較明顯的改動。

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Children's Abilities In Formal Reasoning And Implications For Science Learning

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Formal reasoning, the ability to reason in the abstract beyond the bounds of specific contexts, is essential for effective science learning. Performance on Piagetian reasoning tasks shows that most adolescents are incapable of formal reasoning and there is a serious mismatch between the cognitive level of secondary school students and the demand of the science curriculum. The present study challenges the validity of using formal reasoning tasks in assessing reasoning abilities and they tend to under-estimate children s formal reasoning competence. Using a more valid instrument for assessing cognitive potential, the results of this study demonstrate that the processes of control-of-variables and deductive reasoning are ..ffected by the context of the problems, the sequence of answering problems and the format of presenting information. These conclusions provide the guidelines for the design of training programmes to facilitate the development of formal reasoning skill in adolescents.

兒童的抽象運思能力及其在學習科學的含義

要有效地學習科學，需具有不局限於具體情況下的抽象運思能力。根據皮亞傑測試運思工具的表現，大部分青年都缺乏抽象運思能力，這顯示一般中學生的認知能力與科學課程的要求極不配合。此研究質疑這類傳統皮亞傑測試運思工具的有效性，這類工具往往低估兒童的抽象運思能力。利用一較有效的評估認知能力工具，此研究的結果顯示控制變數運思能力及推論運思能力的表現，深受某些因素影響，包括問題的內容、答題的先後次序、及展示資料的形式。這些結論提供指引作設計訓練計劃，用以促進青年抽象運思能力的發展。

Introduction

Science teaching should aim at developing understanding of concepts and principles, but in Hong Kong, science content is often learned by rote with little understanding. This general problem of science learning has been attributed to a variety of causes such as the dominance of expository teaching style, emphasis of examination questions on recalling facts and regurgitating information, and academically oriented subject content with little reference to the real world and the experience of the learner (Morris, 1985; Murphy, 1987; Biggs, 1991). All these factors are related to teacher's pedagogical beliefs and skills, local evaluation mechanisms and the curriculum content. However, a primary factor that causes learning difficulties that is often neglected is concerned with the children's reasoning abilities. If a child's cognitive ability is not up to the demand of the curriculum, it is not easy for the child to develop understanding of certain science concepts and consequently rote memorization is used as the main learning strategy.

It is widely recognized that formal reasoning ability, the ability to reason in abstract, is essential for understanding many concepts and principles of science and for decision-making in issues based on social or everyday context. A variety of skills involving formal reasoning are found to be essential for science learning (Shayer and Adey, 1981; Adey, 1987). For instance, proportional reasoning is necessary for comprehending the principle of moments and the law of definite composition, probabilistic reasoning for understanding the kinetic theory and Mendelian inheritance, correlational reasoning for detecting possible relationship

between causes and effects, control-of-variables reasoning for designing scientific investigation, and deductive reasoning for making valid conclusions from experimental results. A prerequisite condition for successful science learning is that the children must possess such reasoning abilities. Thus studies on cognitive development can help us understand some of the problems in science learning and on the basis of this understanding, we can design more appropriate curriculum that matches with our children's cognitive levels.

Studies on children's performance on Piagetian reasoning tasks have led many research workers to conclude that formal reasoning is not displayed by most adolescents (reviews by Chiappetta, 1976; Novak, 1977; Lawson, 1985; Yip, 1994). Accordingly, it has been asserted that many specific concepts in our science curricula, which require abstract thinking for their understanding, are too demanding for the majority of students who lack formal reasoning ability (Bearson, 1975; Shayer and Adey, 1981). Based on the notion that maturation process is the primary determinant for cognitive development, it has been suggested that the teaching of these abstract concepts should be delayed until our concrete-operational children have reached the stage of formal operation; we are not able to do anything until some innate prewiring of the nervous system is complete. This idea has directed the design of some curriculum innovations which aim at matching the cognitive demand of the science course with the abilities of average secondary school students (ASEP, 1970; Hall, 1971).

Before we can accept the above approach for designing the science curriculum, we must first resolve the following two issues: (1) Is the Piagetian reasoning tasks a valid instrument for assessing reasoning abilities of children? (2) Can the cognitive abilities of children be raised through exposure to appropriate learning experience? The present study attempts to seek answer to the first question and it is hoped that the findings of this study will cast light on the second question.

The validity of the Piagetian reasoning tasks as an indication of reasoning abilities has been queried in a number of studies which show that these tests tend to under-estimate the formal reasoning abilities of the subjects (Piaget, 1972; Danner and Day, 1977; Kuhn et. al., 1972). Empirical evidence shows that the process of formal reasoning is strongly influenced by the context of a problem. Performance on problems set in familiar or realistic contexts is usually much better than that on problems based on unfamiliar or arbitrary contexts (Wason, 1968; Johnon-Laird et. al., 1972; Lawson, 1992; Wollman, 1982; Yip, 1996).

Outline of the study

To provide a more complete and comprehensive picture of the power of formal reasoning in children, it is necessary to devise some suitable means for its assessment. With a more valid and reliable method of assessment, we can study how formal reasoning may be affected by various factors such as the context of a problem, the order of attempting the problems and the format of presenting the information. We can then look for the conditions that are most conducive to promoting the development of formal reasoning abilities and hence design relevant activities for training programmes that aid at development of formal reasoning in children.

The present study attempts to assess the reasoning ability of adolescent science students in correlation, control of variables and deductive reasoning and to identify the effects of various factors on each of these formal reasoning processes. The factors studied include the nature of the context, the format of data presentation of the problems, and the sequence of presenting the problems. The results of this study will form the basis for the design of training programmes for inducing the development of formal reasoning skills in adolescents.

Method

The design and construction of the reasoning tests

A series of three reasoning tests were constructed to provide a comprehensive picture of the development of different patterns of formal reasoning in Secondary 4 science students of Hong Kong and to identify the effects of different variables on the reasoning processes.

These are written tests assessing reasoning in correlation (Reasoning Test I), control of variables (Reasoning Test II) and deductive reasoning (Reasoning Test III). Each test consists of two versions. The first version is made up of problems that require the same reasoning process but are set in different contexts, starting from those based on novel or unfamiliar contexts to those based on more familiar contexts. The problems may also differ in the way in which the given information is presented or organized. Such a variety of test items is used because performance on them can give a more accurate picture of the power of reasoning of the subjects than would be obtained using items of novel or abstract contexts, which have been shown to seriously under-estimate the reasoning ability of children. Performance on different items of the first version of each reasoning test will also reveal the possible effects of context and organization of data of the problems on the reasoning process.

The second version is made up of the same items as the first version but they are presented in the reverse order, i.e. starting with problems set in familiar contexts and followed by those in more arbitrary or novel contexts. Presenting the simpler and easier problems first may alert the subjects to the reasoning process they are using and so may enable them to transfer the same reasoning process to the more difficult problems.

As the purpose of the tests is to assess a pupil's cognitive power rather than his knowledge in subject matter, the test items are constructed in such a way that their solutions do not depend on the possession of specific knowledge in science. All factual information needed to solve the problems is provided in the questions. Thus the pupil s responses should reflect only the reasoning strategies used to solve the problems, and not the amount of prior knowledge possessed.

After the drafts of the reasoning tests had been prepared, they were administered to a small group of Secondary 5 science students in order to determine whether the questions could be clearly understood or would be open to different interpretations, and to estimate the time required to complete each test. During this pilot study, the students were asked to identify any problems they had in reading and understanding the test items. The test items were subsequently revised, if necessary, to ensure that the failure of a student to solve an item would not be due to ambiguity of the questions or to language problems.

The results obtained from Reasoning Test I, which is concerned with correlational reasoning, have been reported and discussed in a previous paper (Yip, 1996). This paper reports and analyses the results on Reasoning Tests II and III, which assess control-of-variables and deductive reasoning respectively (Appendices 1 and 2). The test items used in the Reasoning Tests are constructed on basis of similar questions that have been validated in a number of previous studies (e.g. Johnson-Laird et. al., 1972; Lawson and Wollman, 1976; Wason, 1968; Yip, 1988).

The subjects

The study was conducted on 419 secondary 4 science students from four Anglo-Chinese schools in Hong Kong. All these students took Physics, Chemistry, Biology, Mathematics, English, Chinese and Religious Studies as their core subjects. The age of the subjects ranged from 15 years 5 months to 17 years 8 months, with a mean of 16 years 1 month. This age group is chosen because, according to Piaget and other workers, they are within the period in which formal reasoning abilities are most likely to be already developed (Inhelder and Piaget, 1958; Shayer and Adey, 1981). Furthermore, the students at this level were beginning to pursue a rather intensive science course which demands the constant application of formal reasoning processes. Thus, a study of the state of development of formal thinking in these students can help us to understand some of the difficulties they may encounter in science learning.

According to their results in public examinations, the students of these four schools perform slightly above average in science subjects. Therefore it may be assumed that the present student samples are slightly above average in academic achievement. While they may not be fully representative of Hong Kong science students, their performance may, nevertheless, reveal the general state of cognitive development of adolescents in Hong Kong.

Administration of the reasoning tests

The reasoning tests, each lasting for about thirty minutes, were administered to the subjects through their subject teachers during regularly scheduled classes. Each class took only one of the three reasoning tests. The class was divided randomly into two groups. One group, the Group 1 subjects, worked on the first version while the other group, the Group 2 subjects, worked on the second version of a particular reasoning test. At the beginning of each test, the teacher informed the students that the study would assess their power of logical thinking and the results would contribute to the development of science curricula in the future. The teacher then gave a brief explanation of the instructions and test items, and the pupils were asked to answer the questions in the right order and to justify their answers in writing. The pupils were allowed to ask questions freely during the test to clarify any parts that they had difficulty in understanding. The pupils were given sufficient time to think and write so that they did not have to hurry in deciding the answers and in writing down their explanation.

Evaluation of subjects' responses on Reasoning Tests II and III

Reasoning Test II

For each item of Reasoning Test II, a response is considered to be successful if the answer is correct and is accompanied by an adequate justification or explanation. Otherwise, it is considered as unsuccessful. Some examples of acceptable explanations extracted from the subjects' written responses are presented below:

Item 1:

(a) Conclusion: E [i.e. No definite conclusion can be made.]

Explanation: The two parts of the box are different in light intensity and in the amount of moisture. We don't know which condition caused the movement of the mealworms. So no definite conclusion can be obtained.

(b) Conclusion: A [i.e. The mealworms respond to light.]

Explanation: The two parts of the box are different only in light intensity and there are more mealworms on the brighter side. So it can be concluded that the mealworms have responded to light.

Item 2:

(a) Conclusion: E [i.e. No definite conclusion can be made.]

Explanation: The two pendulums are of different string length and bob mass. We cannot be sure about which one of these two factors affects the time for one complete swing. So no definite conclusion can be made.

(b) Conclusion: B [i.e. The mass of the pendulum does not affect the time for a complete swing.]

Explanation: The two pendulums are different in bob mass but the time for one complete swing is the same. So we can conclude that the mass of the pendulum bob does not affect the time for one complete swing.

(c) Conclusion: C [i.e. The length of the pendulum string affects the time for a complete swing.]

Explanation: The two pendulums are different in string length only and the longer pendulum takes longer time for one complete swing. So we can conclude that the length of the string affects the time for one complete swing.

Item 3:

(a) Conclusion: E [i.e. No definite conclusion can be made.]

Explanation: The second set-up differs from the first set-up in two conditions: the absence of light and carbon dioxide. We cannot be sure about which of these two factors affects photosynthesis. So no definite conclusion can be made about the conditions for photosynthesis.

(b) Conclusion: B [i.e. Light is not necessary for photosynthesis.]

Explanation: The two set-ups differ in the supply of light but photosynthesis takes place in both. So we can conclude that light is not necessary for photosynthesis.

Item 4:

(a) Conclusion: C [i.e. No definite conclusion can be made.]

Explanation: The two balls are different in mass and in height of dropping. So no definite conclusion can be made about the effect of mass on the speed of falling.

(b) Conclusion: A [i.e. The shape of the body affects its speed of falling.]

Explanation: The two balls are of different shape and they reach the ground at different time. So we can conclude that the shape of the body affects its speed of falling.

Reasoning Test III

This reasoning test consists of five items assessing deductive reasoning in hypothesis testing. All the five items are constructed on the same logical structure, but differ from each other in content. Each item presents a rule or hypothesis of the form "If p then q". On the basis of the given rule or hypothesis, the subject is asked to make predictions from particular instances. A response is considered to be successful if the subject can make correct predictions on all instances of an item. Otherwise, it is considered to be unsuccessful.

Item 1 (a) not certain
(b) yes
(c) not certain
(d) not certain
(e) no

Item 2 (a) no
(b) not certain
(c) yes
(d) not certain
(e) no

Item 3 (a) not certain
(b) no
(c) yes
(d) not certain

Item 4 (a) not certain
(b) not certain
(c) yes
(d) no

Item 5 (a) not certain
(b) no
(c) yes
(d) not certain

Results

1. Performance on control of variables

First Version of Reasoning Test II

The First Version of Reasoning II consists of four items that assess the reasoning ability in control of variables (Appendix 1). They are based on different experimental situations, varying in the degree of familiarity and complexity. The content of Item 1 (the mealworm problem) is most complex and unfamiliar while the subsequent items become progressively more simple or familiar.

Each item consists of a number of different experimental set-ups. A subject is considered to demonstrate reasoning in controlling variables in a particular item if he can answer all questions in that item correctly and give the right explanation.

The overall performance of the Group 1 subjects on the First Version of Reasoning Test II is summarized in Table 1. The results show that performance improves as the contents of the problem becomes more simple or familiar, with the poorest performance on Item 1 (25% successful) and best performance on Item 4 (56% successful). Performance at the individual level also indicates that a person who is successful in the abstract items, e.g. Item 1, would not usually fail in the realistic items, e.g. Item 4 (Yip, 1994). This pattern of response is similar to that of correlational reasoning (Yip, 1996) and demonstrates the impact of context on control-of-variables reasoning. A possible explanation for this effect is that a realistic or familiar context can be anchored readily into the existing cognitive structure of a person, thus facilitating the mental process in working out the relationships.

Table 1 Performance on first Version of Reasoning Test II

Correct report	Item 1		Item 2			Item 3		Item 4		N
	a	b	a	b	c	a	b	a	b	
No	25	46	53	55	60	45	32	55	66	88
	20		37			26		45		
%	25		46			33		56		

A review of the subjects' answers and explanations to the four items reveals some common errors committed by the subjects in control-of-variables reasoning. As in the case of correlational reasoning (Yip, 1996), many subjects did not follow the directions given when answering the questions. They often drew conclusions on the basis of what they know instead of the given information. In so doing, they failed to perform successfully on certain items. Below are some examples of such errors:

Item 1(a) The mealworms respond to light because they need heat energy

Item 1(b) The mealworms respond to light to make themselves warm and they also respond to moisture in order to take in water.

Item 2(a) The length of the pendulum string affects the time for a complete swing because a greater length provides more air resistance.

Item 2(b) The mass of the pendulum bob does not affect the time for a complete swing because according to the rules of Physics, the time is determined by the length of the string only.

Item 3(a) Both light and carbon dioxide are necessary for photosynthesis because photosynthesis cannot occur in the absence of either; both are the raw materials for photosynthesis.

Item 3(b) Carbon dioxide is needed because there is some air with carbon dioxide inside the wooden box; carbon dioxide is necessary because photosynthesis occurs only when carbon dioxide is present; no definite conclusion can be made because some starch may be present in the leaf at the beginning if the leaf has not been destarched properly.

Item 4(a) The mass of the body affects the speed of falling because the heavier the body, the greater is the gravity; the mass of the body affects the speed of falling according to the law of gravity.

Item 4(b) The shape and surface area of the body affect the speed of falling because of air resistance.

The common occurrence of such errors may be explained by the fact that the subjects are not familiar with this type of question. In school, they are trained to answer questions according to their subject knowledge. They are not used to drawing conclusions from a given set of information independent of what they have learned. This problem is particularly serious when the question deals with a topic that has been learned in the class, such as Item 3 on photosynthesis. When answering this item, many subjects did not base their reasoning on the information given, but attempt to explain the results by referring to experimental details such as whether the leaves had been destarched or whether the leaves were identical or not. Consequently, they could not make a definite conclusion, not because they realized that there were two different variables involved, but because they were not certain about the details of the set-ups. This type of fallacy in reasoning is also the main cause of failure for Item 4 (the falling body problem), as indicated by analysis of the written justification of the subjects. This accounts for the fact that some subjects who succeeded in the unfamiliar problems still failed in the more familiar problems.

While we cannot be sure of whether a person committing the above errors may also lack the ability to control variables, there are certain answers that clearly reflect a lack of deployment of this reasoning ability. In Reasoning Test II, two related experiments are presented in each item. In the first experiment, two factors are varied so that no definite conclusion concerning the effects of a certain factor can be made. In the second experiment, only one factor is varied and, in this case, a definite conclusion can be obtained. The results show that the performance on the second experiment [i.e. Items 1(b), 2(c) and 4(b)] is in general better than that on the first experiment [i.e. Items 1(a), 2(a) and 4(a)].

In the first experiment, which involves variations in two factors, most errors are caused by the subjects' failure to recognize the importance of separating the effects of two variables. For example, many subjects made the following wrong conclusions:

Item 1(a) Mealworms respond to both light and moisture because more mealworms are found on the brighter and drier side.

Item 2(a) The time of a swing of the pendulum is affected by both the string length and bob mass because the time is longer for the pendulum with a longer string and a lighter bob.

Item 3(a) Photosynthesis is affected by both light and carbon dioxide because the leaf which lacks light and carbon dioxide cannot carry out photosynthesis.

Item 4(a) The time of falling of an object is affected by both the height of falling and its mass because the smaller body, which is dropped from a greater height, takes a longer time to reach the ground.

Although this type of error was detected in all items, the tendency of committing it decreases as the content of the problem becomes more simple or familiar, as illustrated by comparing the scores of the subjects on Item 1(a) (25/80 = 31%) and Item 4(a) (55/80 = 69%).

The particularly poor performance on Item 1(a) can also be attributed to the fact that the behaviour of the mealworms is more complex because not all mealworms

respond in the same way. Thus although many subjects stated correctly that no definite conclusion could be made from the results of Experiment 1(a), they gave a wrong explanation by saying that not all worms moved to the brighter and drier side while a few still remained on the darker and moist side of the box . Their conclusion is therefore not based on an understanding of the principle of controlling variables. This varied behaviour of the mealworms also made many subjects conclude wrongly on Experiment 1(b) that no definite conclusion could be made.

The experiments on photosynthesis (Item 3) should be familiar to the subjects as they had just studied them in the first term of Secondary 4. The performance of the subjects on this item is, however, poorer than that on the pendulum problem (Item 2), which is not formally taught in secondary school science. The likely reason is that the experimental set-ups for photosynthesis, as in the mealworm problem, are more complicated. Quite a number of subjects were distracted by the presence of a black box and sodium hydroxide solution and they failed to relate these to the absence of light and carbon dioxide.

Many subjects experienced difficulties when they were presented with two set-ups that differ in one factor but produce the same results [Items 2(b) and 3(b)]. They did not know how to handle such information and simply concluded, though wrongly, that no definite conclusion could be made. The photosynthesis problem [Item 3(b)] was particularly intriguing because the results presented were in conflict with what the pupils had learned in their biology lessons. Consequently, many subjects failed to reason properly. They did not draw their conclusions from the given results, but used what they had learned about photosynthesis to explain the results. Although this is a rational behaviour, it reflects a very common characteristic of Hong Kong students that they rely on uncritical acquisition of scientific knowledge but pay little attention to the process of reasoning in science.

The inadequacy of this approach is fully demonstrated when the subjects were presented with results contradictory to their knowledge. For instance, when answering Item 3(b), many subjects simply considered the given results as wrong and justified this by suggesting that the leaves had not been properly destarched. These subjects failed to observe the instruction that they should draw conclusion from the given information only. As a result, the performance on Item 3(b) becomes poorer than that on Item 3(a) which should be more demanding on the ability to control variables as it involves the variation of two factors.

Second Version of Reasoning Test II

The Second Version of Reasoning Test II consists of the same problems as the First Version but they are presented in the reverse order, i.e. starting with those on familiar contents (Items 4 and 3) and followed by those on more abstract or complex contents (Items 1 and 2). Another difference is that, in each item, the set-up which aims to study the effects of one variable is presented before the set-up that aims to determine the effects of two different variables. The purpose of the Second Version is to find out whether the special sequence of presenting the problems can help the subjects transfer the reasoning skills used in the problems based on familiar contents to the more difficult problems.

The overall performance of the Group 2 subjects on the Second Version of Reasoning Test II is summarized in Table 2.

Table 2 Performance on 2nd Version of Reasoning Test II

Correct report	Item 1		Item 2			Item 3			Item 4		N
	a	b	a	b	c	a	b	c	a	b	
No	44	49	56	64	67	46	68	38	49	65	76
	30*		46*			41*			42		
%	40		61			54			55		

Improvement over performance on corresponding items of 1st Version:

* significant at 0.1 level

** significant at 0.01 level

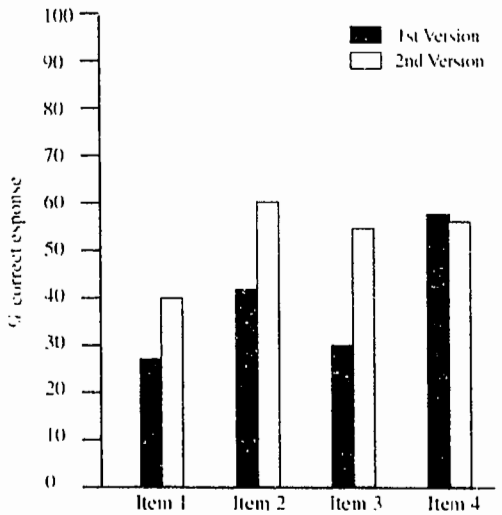
The initial levels of reasoning ability in controlling variables of the Group 1 and Group 2 subjects can be compared by considering their performance on Item 4, which is based on a familiar context. Results in Tables 1 and 2 show that the

two groups were quite comparable in cognitive power, as judged by their performance on Item 4. Thus any difference in performance of the two groups of subjects on the other items (i.e. Items 1 to 3) may be attributed to the different treatments in the two versions of Reasoning Test II, i.e. the different sequence of presenting the problems.

The following points can be noted from a comparison of the performance on the two versions of Reasoning Test II as illustrated in Figure 1:

1. While the performance of both groups of subjects on Item 4 is quite comparable, the performance of the Group 2 subjects on Items 1 to 3 is generally better than that of the Group 1 subjects on the corresponding items (for Item 1, $X^2 = 3.75$, $p < 0.10$; for Item 2, $X^2 = 3.19$, $p < 0.10$; for Item 3, $X^2 = 7.32$, $p < 0.01$). The consistent trend lends support to the conclusion that there is a systematic effect present. This suggests that some Group 2 subjects were able to transfer the reasoning skills which they had used when working on the problem set in a familiar content (Item 4) to those based on more abstract or complex situations. This transfer effect, though similar to that detected in the study on correlational reasoning (Yip, 1996), is much smaller and a majority of the Group 2 subjects still failed in Item 1.

Figure 1 Comparison of performance on 1st and 2nd Versions of Reasoning Test II



2. The improvement in performance on Item 3(b) by Group 2 subjects is quite spectacular in comparison with the poor performance on this item by the Group 1 subjects ($X^2 = 41.46$, $p < 0.001$). As pointed out previously, Item 3(b) presents two set-ups differing in one factor but with results contradictory to the subjects' knowledge in biology. One possible contributor to this marked improvement was the facilitation effect of Item 4. When Item 3 was presented immediately after Item 4, some subjects became aware of the similarity in logical structure between the two items, and they were alerted to analyse the reasoning process they had used on Item 4 and apply it to Item 3. Another possible reason for the improved performance is the way in which Item 3 is restructured in the Second Version. At the beginning of Item 3 of the Second Version, two independent experiments of identical set-up with contrasting results are presented:In the first experiment, starch is found in the leaf which has been exposed to light but starch is absent in the leaf which has been kept in the dark. In the second experiment, starch is found in the leaf which has been kept either in light or dark conditions.

These two experiments would have induced cognitive conflicts in the subjects so that they were urged to think actively to draw conclusions from the two different sets of results independently. These questions therefore alerted the subjects to reason on the basis of the given results and not just rely on memorized knowledge. Inducing cognitive conflicts has been successfully used in a number of training programmes as a strategy to engage children in active thinking (e.g. Bredderman, 1973; Adey and Shayer, 1990).

3. Despite the general improvement in performance on the Second Version, some Group 2 subjects still failed to transfer the reasoning process which they demonstrated on the easier items to those based on more abstract or complex contexts, and the performance on Item 1 was still quite unsatisfactory. This indicates that in addition to sequencing the problems according to their levels of difficulty, other strategies have to be employed at the same time. For instance, more guidance or practice is required to help the subjects to analyse and consolidate the reasoning process that they have used on the easier problems. For some subjects, direct teaching of the reasoning process may be necessary instead of allowing them to work it out by themselves.

Only slightly more than half of the Group 1 and Group 2 subjects were successful on Item 4. This suggests that the reasoning process involved in control of variables is more difficult than that of correlation. In view of the essential role of the concept of controlling variables in the process of scientific investigation, the relatively poor development of this reasoning skill in the subjects of this study reflects a serious problem in our science education. It supports the contention that local schools have put too much emphasis on the acquisition of scientific knowledge and that our science students are not adequately equipped with the necessary reasoning skills for understanding the processes of science and conducting independent scientific investigations.

2. *Performance on Reasoning Test III*

First Version of Reasoning Test III

The First Version of Reasoning Test III consists of five items that assess deductive reasoning in hypothesis testing (Appendix 2). They are equivalent in logical demand but are based on different contexts. Item 1, the card problem, is based on an arbitrary context. Item 2, the letter problem, is based on a realistic but rather complex situation. Item 3, the toothpaste problem, is set in a familiar but slightly complex context. Items 4 and 5, the plane problem and the time-table problem, are based on familiar and relatively simple situations.

Each item presents a rule or hypothesis of the form If p then q . On the basis of the given rule or hypothesis, the subject is asked to make predictions from certain situations. There are four different situations in each item, i.e. the p , q, not p and not q instances.

For example, Item 1 (the card problem) presents the rule that if a card has a vowel on one side, then it has an even number on the other side . In Item 1(b), the subject is given a card showing a vowel on one side and is asked to predict, on the basis of the given rule, whether an even number will appear on the other side. This is an example of the p situation. The corresponding p instance in the other questions are Items 2(c), 3(c), 4(c) and 5(c). Item 1(a) presents the q instance: the subject is given a card showing an even number on one side and is asked to predict whether he will expect a vowel appearing on the other side. Item 1(c) presents the not p instance: the subject is given a card showing a non-vowel letter and is asked to predict whether an even number will appear on the other side. Item 1(e) presents the not q instance: the subject is given a card showing an odd number and is asked to predict whether a vowel will appear on the other side.

Like Item 1, all other items have equivalent questions on these four situations. A subject is considered to show deductive reasoning in a particular item if he can make correct predictions for all instances of this item. The various questions of the five items are grouped together according to their logical nature in the following table.

Item	Instance			
	p	q	not p	not q
1	b	a,d	c	e
2	c	b	d	a,e
3	c	a	d	b
4	c	a	b	d
5	c	a	d	b
Answer	Yes	Not certain	Not certain	No

The overall performance of the Group 1 subjects on the First Version of Reasoning Test III is summarized in Table 3. The high success rates on Items 4 (77%) and 5 (84%) indicate that most subjects were able to demonstrate deductive reasoning in familiar contexts. Although these two problems are based on familiar contexts, it must be stressed that the questions are constructed in such a way that the subjects cannot answer them correctly by relying on intuition or factual recall. They must employ deductive reasoning in order to arrive at the right predictions. In other words, correct responses on these two items would indicate that the subjects have acquired a basic power of deductive reasoning.

Table 3 Performance on 1st Version of Reasoning Test III

Item number	1 a b c d e	2 a b c d e	3 a b c d	4 a b c d	5 a b c d	N
Correct response No %	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
overall No %	21 18	12 10	58 50	90 77	98 84	[illegible]

Performance on Item 3, the tooth-paste problem, is not so good as that on Items 4 and 5 but is much better than that on Items 1 and 2 which show the poorest performance. This can be related to the fact that the content of Item 3, though based on a realistic situation, is more complex than that of Items 4 and 5. Item 1, the card problem, is based on an arbitrary context and the poor performance on it supports the conclusion reached earlier in the study on correlational reasoning (Yip, 1996) that it is more difficult for a person to reason in an arbitrary or abstract context than in a realistic or familiar context. This result is consistent with the findings of similar studies reported by other workers (Wason, 1968; Johnon-Laird et. al., 1972; Wollman, 1982).

Item 2, the letter problem, is based on a more realistic context. Yet performance on it is even worse. This may be due to the fact that the process of deductive reasoning makes a great demand on abstract thinking and this problem is quite complex in nature and its context, though realistic, may not be familiar to the experience of the subjects, thus making the reasoning process exceedingly difficult. The above interpretation concerning the effects of contexts on deductive reasoning is consistent with the performance at the individual level which shows that a subject who succeeded in items based on arbitrary contexts, e.g. Items 1 and 2, usually would not fail in items based on realistic contexts, e.g. Items 4 and 5 (Yip, 1994). Thus, all of the nine subjects who were successful on Items 1 or 2, none of them failed in Items 4 and 5.

Analysis of the subjects' answers to individual questions in each item reveals some common difficulties encountered in deductive reasoning. In each item, there are certain questions with relatively low scores, i.e. Items 1(a), (c) and (d); Items 2(b), (d) and (e); Item 3(b); Item 4(d) and Item 5(b).

Items 1(a), 1(d) and 2(b) require the subjects to make predictions from the 'q' situation. The errors committed by the subjects are mainly caused by making the wrong implication of "If q then p" from the original proposition of "If p then q". Items 1(c) and 2(d) are based on the not p situation, and the errors on these items arise mainly by assuming that the original proposition of "If p then q" implies "If not p then not q", i.e. by equating a conditional statement (if p then q) to a biconditional statement (if and only if p then q).

These two logical errors in deductive reasoning are prevalent for Items 1 and 2 which are based on arbitrary or complex contents. On the other hand, such errors are much less common for Items 3, 4 and 5 which are set in more familiar contexts. This provides supporting evidence for the conclusion that in a familiar context, a person can exercise deductive reasoning more readily and therefore can make correct predictions from the q or not p instances more easily.

Given the proposition of 'If a person goes to Nagasaki, then he has to take a plane', if someone is taking a ferry, it is easy to deduce that he is not going to Nagasaki. On the other hand, if someone is going to a place other than Nagasaki, it is quite obvious that we cannot be certain whether the person is taking a plane or not.

In making the above predictions from a given proposition, we are employing deductive reasoning rather than relying on rote memory. When we are given a familiar context as in Items 3, 4 and 5, the reasoning process involved appears quite straight forward and spontaneous to us. However, the same reasoning process becomes exceedingly difficult for problems based on more abstract or complex contexts such as Items 1 and 2. Thus if a person fails to demonstrate deductive reasoning in certain items, it should not be concluded that this person is incapable of deductive reasoning altogether. It would rather suggest that the person is not able to detect the common logical demand of the different items and to transfer the reasoning process used on the easier problems to those of more complex or abstract contexts.

While the performance on all questions of Items 3, 4 and 5 is generally good, certain questions, such as Item 3(b) and Item 4(d), have a slightly lower score than the others. This is probably because the "not q" situation is more complicated and the subjects were more likely to commit mistakes in making the prediction if they could not concentrate on their reasoning throughout the test period. In other words, the mistakes might not be due to lack of deductive power but rather due to momentary lapses of attention. This explanation is supported by the fact that when these subjects were asked to explain how they had arrived at their answers in a later interview, most of them immediately realized their mistakes and gave the correct answers readily.

For the card problem, Item 1(d) is equivalent to Item 1(a) in logical demand. The inclusion of this question is to show whether the subjects have a consistent power of deductive reasoning or not. The performances on these two questions, as indicated in Table 3, are quite comparable to each other and this suggests that the subjects could perform quite consistently in the test situation.

For the letter problem, Item 2(e) is equivalent to Item 2(a) in logical demand. Letter 1 has a 40-cent stamp on it while Letter 5 has no stamp at all. Thus both letters do not have a 50-cent stamp, and this is a "not q" situation. However, the performance on Item 2(e) is much poorer. This can be related to the fact that sending a letter without a stamp is quite inconceivable in everyday life experience and many subjects did not know how to handle this instance although, according to the given rule, it should be under the not q situation. This is another example showing how the reasoning process can be adversely affected by preexisting knowledge if it is in conflict with the context of the problem.

Second Version of Reasoning Test III

This test consists of the same items as the First Version of Reasoning Test III but they are presented in the reverse order, i.e. starting with those on more familiar or realistic contents (Items 4 and 5) and followed by those on more abstract or complex contents (Items 1 to 3). The purpose of this version is to see whether the subjects can transfer the reasoning skills used on the easier problems to the more difficult ones.

The overall performance of the Group 2 subjects on the Second Version of Reasoning Test III is summarized in Table 4. The initial power of deductive reasoning of the Group 1 and Group 2 subjects can be compared by considering their performance on Items 4 and 5 which are based on familiar contexts.

Table 4 Performance on 2nd Version of Reasoning Test III

Item number	1 a b c d e	2 a b c d e	3 a b c d	4 a b c d	5 a b c d	χ
Correct response No %						
overall No %	36* 33	24* 22	69* 63	81 74	91 83	

Improvement over performance on corresponding items of 1st Version:

* significant at 0.02 level

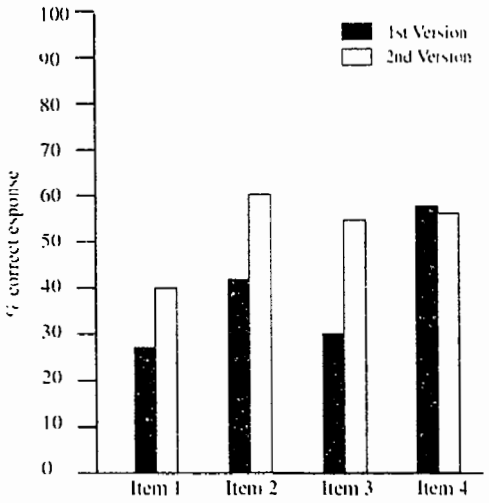
** significant at 0.05 level

The results in Tables 3 and 4 show that the two groups of subjects were quite comparable in reasoning abilities, as judged by their performance on Items 4 and 5. Thus any difference in performance on Items 1 to 3 may be attributed to the different treatments in the two versions of the reasoning test, i.e. different sequence of presenting the problems.

As illustrated in Figure 2, performance of the Group 2 subjects on Items 1 to 3 is significantly better than that of the Group 1 subjects (for Item 1, $X^2 = 6.58$, $p < 0.02$; for Item 2, $X^2 = 5.68$, $p < 0.02$; for Item 3, $X^2 = 3.98$, $p < 0.05$). This consistent trend of the results indicates that some Group 2 subjects were capable of applying the reasoning skills that they had used on Items 4 and 5 to the more difficult problems. Analysis of the responses on individual questions reveals that the better performance of the Group 2 subjects can be related to a significant increase in scores on Items 1(a), 2(b) and 3(a) which are concerned with the "q" situation, and on Items 1(e), 2(d) and 3(d) which are concerned with the not p situation. It thus appears that the present treatment helps the subjects to avoid making wrong deductions from the "q" and "not p" situations, which had presented the greatest difficulties to the Group 1 subjects.

Despite such improvement, most Group 2 subjects still failed to demonstrate deductive reasoning on Items 1 and 2. Deductive reasoning, concerned with hypothesis testing in particular, is a highly complex and abstract process. When dealing with a novel problem, the first step in deductive reasoning is to identify the logical structure of the question with respect to the given hypothesis; the next step is to compare the question with its counterpart in a realistic problem before arriving at the right prediction. This process involves more mental steps than correlational and control-of-variables reasoning and so makes a greater demand on the working memory. Sequencing the problems according to their levels of difficulty may not provide sufficient cue to alert the subjects to analyze the reasoning process involved in the familiar problems and then transfer it to the more difficult problems. More explicit guidance, instruction or practice may be necessary to provide a greater facilitation on the development and mastery of deductive reasoning.

Figure 2 Comparison of performance on 1st and 2nd Versions of Reasoning Test III



Concluding remarks

The present study has identified a number of factors that affect the reasoning power of a person. A consistent feature shown in reasoning tests on control-of-variables and deductive reasoning is that the nature of the context of the problem strongly influences the reasoning power of a person. Many subjects readily demonstrated specific processes of formal reasoning in problems based on familiar or realistic contents, but might fail to show the same reasoning process in more abstract or complex situations. This phenomenon has also been detected in correlational reasoning (Yip, 1996) and it is consistent with the findings reported by other workers (e.g. Johnson-Laird et. al., 1972; Wollman, 1982; Lawson, 1992). Within a familiar or realistic context, a person can readily construct a mental picture of the problem in his cognitive structure and thereby he can visualize and manipulate the various elements or factors mentally in working out the logical relationships between them. This reasoning process is, however, much more difficult in an abstract or complex context which may not form a meaningful picture in the cognitive structure of the person. The greater mental load presented by the problem also makes it more difficult for the subject to deploy the same reasoning process.

This context effect is quite strong for correlational reasoning (Yip, 1996), and is also detected to in control-of-variables and deductive reasoning. In Reasoning Test II, most subjects demonstrated reasoning in control of variables on Item 4, the 'falling body' problem, which is based on an everyday life context. On the other hand, most subjects, including many of those who succeeded in Item 4, failed in the 'mealworm problem' (Item 1), which is based on a complex and unfamiliar context.

Perhaps the most striking effect is found on deductive reasoning. The majority of subjects demonstrated deductive reasoning on problems based on familiar contexts in Reasoning Test III, such as the plane problem (Item 4) and the time-table problem (Item 5). As the contexts could readily fit into a person's existing cognitive structure, the subject was able to interpret the questions meaningfully. He could therefore appreciate the relationships between the p and q statements mentally, thus enabling him to make the correct predictions. For the card problem (Item 1), however, the arbitrary relationship between the p and q statements could not fit readily into the subject's cognitive structure, and it became highly demanding on the working memory of the subject to make sense of the relationship and then make predictions from it.

While most people can demonstrate formal reasoning in familiar contexts, it should be noted that if the given information based on a familiar context is in conflict with existing knowledge, the reasoning process will be seriously interfered. In such a situation, it would be extremely difficult for a person to reason logically and draw correct conclusions on the basis of the given information.

This point is illustrated by Item 3(b) of Reasoning Test II which presents an experimental result in conflict with a biological concept: a leaf can carry out photosynthesis in dark. Instead of using the reasoning process they demonstrated in the easier problems, such as Item 4, many subjects simply remarked that the result was wrong due to improper procedure in conducting the experiment. A similar response is detected in Reasoning Test III. In Item 2, Letter 1 has a 40-cent stamp while Letter 5 has no stamp. According to the given rule, both cases are of the same logical structure and represent

the not q situation. The result, however, shows that Letter 5 is much more difficult than Letter 1. This can be explained by the fact that, in the context of the problem the situation of Letter 5 is not consistent with the realistic situation. According to everyday experience, a letter without a stamp should not be mailed whereas according to the given rule, it can still be posted provided it is not sealed.

The conflict between the problem context and existing knowledge, on the other hand, can alert a person to engage in more active thinking. If suitable guidance is provided, such cognitive conflicts may motivate a person to reformulate their ideas and lead them to develop a deeper understanding of the concepts or reasoning processes under consideration. This strategy has been shown to be effective in causing conceptual change and development (Adey, 1992; Hewson and Hewson, 1984; Lawson, 1988; Nussbaum and Novick, 1982).

The way of presenting information can also affect the process of formal reasoning. Complex and disorganized information provides more 'noise' to the thinking process and increases the mental load of the problem. Well organized data, on the other hand, may facilitate a person to identify possible relationships between different variables more easily. For instance, the information given in the 'mealworm' problem (Item 1 of Reasoning Test II) is presented in a less organized form than the other items. To draw a valid conclusion, the subjects have to count the mealworms and then compare their distribution in different conditions. Because of this additional load, many subjects experienced greater difficulty in relating the responses of the mealworms to the different treatments and, consequently, failed to draw a correct conclusion on the effects of various factors. This impact of information format is particularly strong for a reasoning process that involves a comparison of frequencies or ratios, such as correlational reasoning (Yip, 1996).

The findings in this study demonstrate that most subjects could readily deploy formal reasoning in familiar or realistic contexts, but only a small proportion of them were capable of using similar reasoning processes in abstract or complex contexts. In other words, only a small number of the subjects were capable of formal reasoning irrespective of the contents of the problems.

If a person demonstrates a certain formal reasoning skill in realistic contexts only, how can we help him transfer this skill to more arbitrary or complex contexts? One way to facilitate the transfer is to alert the person of the reasoning process he has used. This strategy is used in the second version of the three reasoning tests which starts with two problems based on familiar contexts. To make the Group 2 subjects aware of the reasoning process which they have used in these two problems, the subjects are asked to explain how they arrive at their conclusion. By writing down their reasons in words, the subjects are forced to reflect on and analyze the reasoning process used. The next step is to present the subjects with problems of more abstract or complex contexts. The subjects are instructed to think about the reasoning process they have used in arriving at their answers in the first two questions and try to use similar reasoning methods to answer the remaining questions. It is hoped that this sort of instruction given in the second version of the reasoning tests can provide the necessary prompts and guidelines to help the subjects transfer their formal reasoning abilities to a wider context.

The performance of the Group 2 subjects shows that this approach is quite effective in facilitating the transfer of various formal reasoning skills. Nevertheless, the facilitation effect is still not widespread in the population and it depends on the complexity of the logical structure involved. This is particularly evident for deductive reasoning as only 33% and 22% of the Group 2 subjects were successful on Items 1 and 2 of Reasoning Test III respectively. With all the strategies employed in the Second Version, some subjects still failed to state explicitly the reasoning process they used on problems of familiar contexts, or to appreciate the logical similarity between different items so as to effect a transfer of reasoning skills. Furthermore, the instruction has been primarily designed for those subjects who demonstrate at least a basic level of formal reasoning; it is not applicable to those who do not demonstrate formal reasoning even in familiar contexts. As these subjects should not benefit from the instruction, it is understandable that their performance did not improve even after receiving the instruction.

The results of the present study clarify the nature of formal reasoning and suggest a more valid method for the assessment of various formal reasoning skills. The effects of

context, problem sequence and format of presenting information provide some useful guidelines for the design of learning activities that would facilitate the development of formal reasoning skills. By integrating more direct instruction into the approach used in the second version of the reasoning tests, a training programme can be devised for use in classrooms, with the hope that it can effectively induce a more universal and definite improvement in the formal reasoning abilities of adolescents. This is the main theme of study for the next stage of the present research.

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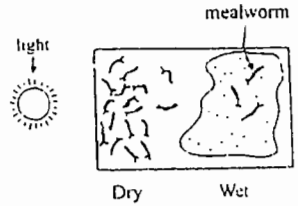
Appendix 1 **Reasoning Test II (1st Version)**

1. Anne wanted to test the response of mealworms to light and moisture.

(a) To do this she set up a box as shown in Fig. 1. She used a lamp for the light source and wet paper in the box for moisture. In the centre of the box she placed 20 mealworms that had crawled to the different ends of the box (Fig. 1).

Figure 1

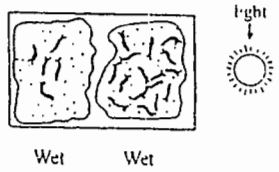


Consider the result of this experiment and decide which of the following conclusions you can make from it. Explain your answer briefly.

A. The mealworms respond to light.
B. The mealworms respond to moisture.
C. The mealworms do not respond to light.
D. The mealworms do not respond to moisture.
E. No definite conclusion can be made.

(b) Anne repeated the experiment with a slightly different condition. The set-up and the result of this experiment is shown in Fig. 2.

Figure 2



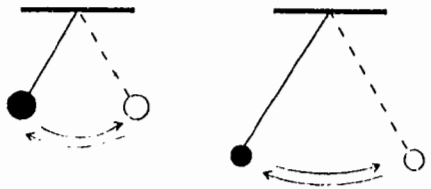
Consider the result of this experiment and decide which of the following conclusions you can make from it. Explain your answer briefly.

A. The mealworms respond to light.
B. The mealworms respond to moisture.
C. The mealworms do not respond to light.
D. The mealworms do not respond to moisture.
E. No definite conclusion can be made.

2. Michael wanted to study the factors affecting the time taken for a pendulum to make a complete swing. To do this, he set up three experiments.

(a) In the first experiment, he used two pendulums of different string length and bob mass (Fig. 3)

Figure 3



Time taken to make 1 complete swing 2.0 s *Time taken to make 1 complete swing* 2.0 s

Examine the result of this experiment and decide which of the following conclusions you can make from it. Explain your answer briefly.

A. The mass of the pendulum bob affects the time for a complete swing.
B. The mass of the pendulum bob does not affect the time for a complete swing.
C. The length of the pendulum string affects the time for a complete swing.
D. The length of the pendulum string does not affect the time for a complete swing.
E. No definite conclusion can be made about the factors affecting the time for a complete swing of the pendulum.

(b) In the second experiment, Michael used two pendulums of different bob mass (Fig. 4)

Figure 4

Time taken to make 1 complete swing 2.0 s *Time taken to make 1 complete swing* 2.0 s

Examine the result of this experiment and decide which of the following conclusions you can make from it. Explain your answer briefly.

A. The mass of the pendulum bob affects the time for a complete swing.
B. The mass of the pendulum bob does not affect the time for a complete swing.
C. The length of the pendulum string affects the time for a complete swing.
D. The length of the pendulum string does not affect the time for a complete swing.
E. No definite conclusion can be made about the factors affecting the time for a complete swing of the pendulum.

(c) In the third experiment, Michael used two pendulums of different bob mass (Fig. 5)

Figure 5

Time taken to make 1 complete swing 2.0 s *Time taken to make 1 complete swing* 2.0 s

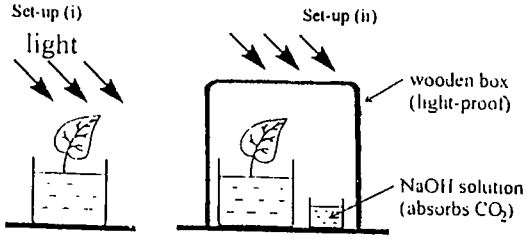
Examine the result of this experiment and decide which of the following conclusions you can make from it. Explain your answer briefly.

A. The mass of the pendulum bob affects the time for a complete swing.
B. The mass of the pendulum bob does not affect the time for a complete swing.
C. The length of the pendulum string affects the time for a complete swing.
D. The length of the pendulum string does not affect the time for a complete swing.
E. No definite conclusion can be made about the factors affecting the time for a complete swing of the pendulum.

3. Two experiments were set up to study the conditions required by green leaves to carry out photosynthesis. Each experiment consisted of two set-ups. After exposing both set-ups to sunlight for two hours, iodine tests were performed on the leaves to show whether starch was present or not. Presence of starch indicates that photosynthesis has occurred. The following results are obtained from each experiment (Fig. 6 and 7).

(a) Experiment a

Figure 6



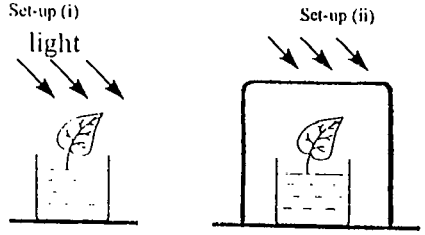
Result of iodine test: Starch is present. (i.e. Photosynthesis has occurred.) Starch is absent (i.e. Photosynthesis has not occurred.)

On the basis of the result of this experiment, decide which of the following conclusions you can make about the conditions for photosynthesis. Explain your answer briefly.

A. Light is necessary for photosynthesis.
B. Light is not necessary for photosynthesis.
C. Carbon dioxide is necessary for photosynthesis.
D. Carbon dioxide is not necessary for photosynthesis.
E. No definite conclusion can be made about the conditions for photosynthesis.

(b) Experiment b

Figure 7



Result of iodine test: Starch is present. (i.e. Photosynthesis has occurred.) Starch is absent. (i.e. Photosynthesis has not occurred.)

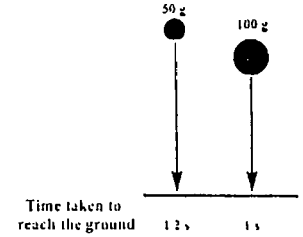
On the basis of the result of this experiment, decide which of the following conclusions you can make about the conditions for photosynthesis. Explain your answer briefly.

A. Light is necessary for photosynthesis.
B. Light is not necessary for photosynthesis.
C. No definite conclusion can be made about the conditions for photosynthesis.
D. Other conclusions (Please state your conclusion clearly.)

4. A scientist wanted to study the effects of mass and shape of falling bodies on the speed of falling. He therefore performed two experiments using bodies of the same material.

(a) In the first experiment, he dropped two bodies of different mass at different heights (Fig. 8).

Figure 8

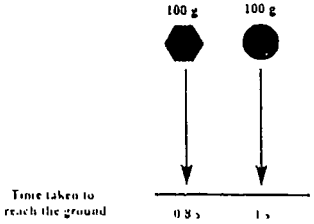


On the basis of the result of this experiment, decide which of the following conclusions you can make about the factors affecting the speed of falling of a body. Explain your answer briefly.

A. The mass of the body affects its speed of falling.
B. The mass of the body does not affect its speed of falling.
C. No definite conclusion can be made.
D. Other conclusions (Please state your conclusion clearly.

(b) In the second experiment, he dropped two bodies of different shape from the same height (Fig. 9).

Figure 9



On the basis of the result of this experiment, decide which of the following conclusions you can make about the factors affecting the speed of falling of a body. Explain your answer briefly.

A. The mass of the body affects its speed of falling.
B. The mass of the body does not affect its speed of falling.
C. No definite conclusion can be made.
D. Other conclusions (Please state your conclusion clearly.)

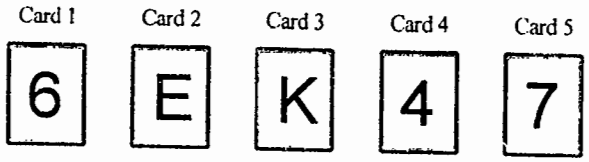
Appendix 2 **Reasoning Test III (1st Version)**

In each of the following items you are given a rule or a hypothesis. On the basis of the given rule or hypothesis, deduce the answer for each question.

1. In a pack of cards, each card has a letter on one side and a number on the other side according to the following rule:

   If a card has a vowel on one side, then it has an even number on the other side.

   Shown below are five cards taken out from this pack:



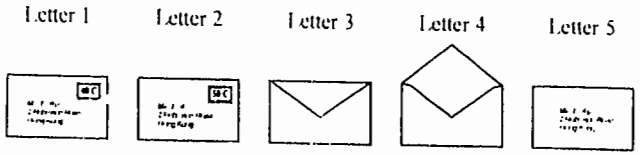
   Assuming all these cards follow the above rule, answer the questions below by stating "Yes", "No", or "Not certain".

   (a) Do you think that a vowel should appear on the other side of Card 1 or not?
   (b) Do you think that an even number should appear on the other side of Card 2 or not?
   (c) Do you think that an even number should appear on the other side of Card 3 or not?
   (d) Do you think that a vowel should appear on the other side of Card 4 or not?
   (e) Do you think that a vowel should appear on the other side of Card 5 or not?

2. Imagine that you are a post office worker sorting letters according to the following rule:

   If a letter is sealed, then it has a 50-cent stamp on it.

   Shown below are five letters that are found to be following this rule:



   Answer the following questions by stating "Yes", "No", or "Not certain"
   (a) Do you think that the back of Letter 1 is sealed or not?
   (b) Do you think that the back of Letter 2 is sealed or not?
   (c) Do you think that the front of Letter 3 has a 50-cent stamp or not?
   (d) Do you think that the front of Letter 4 has a 50-cent stamp or not?
   (e) Do you think that the back of Letter 5 is sealed or not?

3. Suppose you are a dentist and you put forward the following hypothesis:

   If a person uses fluoridated toothpaste, then he will have good teeth.

   Assuming that your hypothesis is true, answer the questions below by stating "Yes", "No", or "Not certain".

   (a) If Albert has good teeth, do you think he is using fluoridated toothpaste or not?
   (b) If Betty has bad teeth, do you think she is using fluoridated toothpaste or not?
   (c) If Cindy uses fluoridated toothpaste, do you think she should have good teeth or not?
   (d) If David does not use fluoridated toothpaste, do you think he should have good teeth or not?

4. You are given the following rule:

   If a person goes to Nagasaki, then he has to take a plane.

   Assuming that this rule is followed by all people, answer the following questions by stating "Yes", "No", or "Not certain".

   (a) If Peter is on a plane, do you think he is going to Nagasaki or not?
   (b) If Tom is going to Surakarta, do you think he is going to take a plane or not?
   (c) If Joyce is going to Nagasaki, do you think she is going to take a plane or not?
   (d) If Nancy is on a ferry, do you think she is going to Nagasaki or not?

5. Suppose you have the following time-table:

   If it is Monday, then we have an English lesson.

   On the basis of this rule, answer the following questions by stating "Yes", "No", or "Not certain".

   (a) If we have an English lesson today, is today Monday or not?
   (b) If we have no English lesson today, is today Monday or not?
   (c) If today is Monday, should we have an English lesson or not?
   (d) If today is Friday, should we have an English lesson or not?

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Are science teachers prepared to teach the Science-Technology-Society (S-T-S) theme ?

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A study was conducted on a group of secondary science teachers in the state of Victoria, Australia, who explicitly identified themselves with the process of teaching Science-Technology-Society (STS) science in the science curriculum.* This study investigated the beliefs and conceptions (a set of values, ideas and understandings) of these 'STS' teachers about science teaching and their science STS curricula in practice. Case studies of these nine teachers were used as the overall research methodology in this interpretive study. Four curriculum constructs, Curriculum Emphases, Aspects of Learning, Teaching Strategies and Approach to Content in Science Learning were used in this study as conceptual tools or constructs to access and analyze the curriculum data which came from classroom observations, curriculum documents and interviews with the teachers. This paper will report some of the major findings, amongst which the followings were found to be posing a serious challenge to STS teaching : i) the 'technology is applied science' view, being an inadequate and misleading account of technology, was predominantly held by all the teachers, ii) students were not taught how to make decisions on science-related social issues although this was stated by the teachers as an objective of teaching science, and iii) there was a lack of teaching of the philosophical and historical aspects of science resulting in an impersonal, scientistic and unsocial presentation of science. Unless these issues are resolved, it remains in doubt whether science teachers are ready to teach the STS theme.

理科老師能否勝任教授"科學、科技與社會"

[illegible]

INTRODUCTION

Since the early 1980s, under the banner of Science for All, school science education has been described at the international, national and local levels as moving inexorably towards the learning and teaching of science in the context of its technological and social milieux, that is, towards Science-Technology-Society (STS) science (Yager, 1993). International and national organizations of STS researchers, educators and teachers have been formed along with conferences, communications networks, newsletters and publications (e.g. International Organisation for Science and Technological Education, IOSTE; National Association for Science, Technology and Society, NASTS). Since 1980, government educational policies (Science Council of Canada, 1984; National Commission on Excellence in Education, 1983; Department of Employment, Education and Training, 1989; Curriculum Development Centre, 1988) and the policy

* As this is a study of STS teaching learning within a science curriculum and since it is from a science education perspective, the term 'STS' used in this article is understood to be the same as 'STS science' whereas 'science' is throughout here to mean 'traditional science'.

statements of Science Teachers Associations (National Science Teachers' Association, 1990; Science Teachers' Association of Victoria, 1988), that are aimed at developing scientific literacy for all citizens, have been formulated in the STS context. In the last ten to fifteen years there has also been a proliferation of STS curriculum projects and programs (e.g. PLON in the Netherlands; LoRST and STSC-Chemistry in Canada; Salters Chemistry and Science, SATIS and SISCON in Britain; CHEMCOM and CEPUP in the United States; and the Science Framework Project in Victoria, Australia).

The Science Framework Project in Victoria, Australia, when it was launched in 1984, was one of the first official curriculum projects with an explicit STS theme in a context that set out to provide Science for All. It defines the goals of science education as the development of scientific knowledge, solving of practical problems, understanding of science as a human activity and personal development. It encourages co-operative and small group learning, negotiated curriculum, and teaching strategies that begin from children's interests, beliefs and conceptions. The Project produced a core document, Science Framework P-10 (Malcolm et al., 1987) which sets out the principles, guidelines and illustrations in the form of case studies. This document formed the basis on which the Victorian science teachers were to develop their own curricula in their school situations.

This paper describes a research which set out to analyze and interpret cases of STS teaching and learning - the beliefs and conceptions of a number of Victorian 'STS' teachers and their endeavours to enact the STS innovation in their schools' science curriculum.

At the time of the study the Victorian school system had had a number of years of strong official commitment to school based curriculum development for all the years of schooling except for the final Grade 12, for which there was state-wide curriculum content and external examinations (with a 25-50% school component), the results of which determined university selection. During the 20 years of school-based encouragement, many teachers had initiated curriculum developments and it was not uncommon to find different approaches to science content and pedagogy in neighbouring schools. Central curriculum initiatives took the form of guidelines that were supported and encouraged through in-service activities and materials, but they were in no sense mandatory. This meant that the Science Framework, the latest set of guidelines at the time of the study, had only been taken up seriously by some schools. The nine teachers in the study are thus examples of science teachers who have personally chosen to teach science as STS. The extent to which the members of this group are able to introduce its range of features into their teaching is of considerable interest to situations where more mandatory expectations in this direction are being considered.

THE RESEARCH

Case studies of nine individual teachers were used as the overall research methodology in this interpretive study of their thinking and their curriculum in practice. Four curriculum constructs identified from the literature on STS courses, Curriculum Emphases, Aspects of Learning, Teaching Strategies, and Approach to Content in Science Learning were used both to access and to analyze the curriculum data from classroom observations, curriculum documents and interviews with the teachers. In this paper, only three of the constructs, Curriculum Emphases, Aspects of Learning and Teaching Strategies, and some of their major findings will be reported.

Curriculum Emphases

"A curriculum emphasis is a coherent set of messages to the student about science...which provide answers to the student question: "Why am I learning this ?"...such messages can be communicated both explicitly and implicitly... An implicit message about science can be communicated by what is not stated, then, as well as other contextual devices ... Paradoxically one has to consider simultaneously what is stated (about the subject matter) and what is not stated."
(Roberts, 1982, p.245)

The category system of the seven Curriculum Emphases, **Structure of Science, Scientific Skills Development, Correct Explanations, Solid Foundation, Everyday Coping, Science,Technology,Decisions, and Self as Explainer,** developed inductively by Roberts (1982, 1988)

were used as conceptual constructs in the present study. A brief description of each is given below :

(1) Structure of Science - this is about science as a conceptual system which is cumulative and self correcting in its growth and development. Such message is communicated through, for example, discussion on the use of a particular model for explaining certain natural phenomenon.
(2) Scientific Skills Development - it places a heavy emphasis on the physical and conceptual processes of science. The message being communicated to students is that skilful use of such processes would yield the correct products.
(3) Correct Explanations - this Emphasis stresses the products as the focus of attention. It appeals to the authority of scientific community to determine the correctness of ideas.
(4) Solid Foundation - science is taken as a complex system which takes many years to master and the science instructions in the junior levels are used to prepare students for study at higher levels.
(5) Everyday Coping - science is needed for understanding and controlling everyday objects and events. The essence of this Emphasis is a functional understanding of scientific principles and how they are applied in practical situations.
(6) Science,Technology,Decisions - this expresses a more realistic view of the potential of science. It focuses on the limits of science and technology in value-laden considerations in social and personal decision making.
(7) Self as Explainer - science is understood as a "conceptual system whose development is influenced by the ideas of the times, the conceptual principles used, and the personal intent to explain" (Roberts, 1988, p.45). The focus is on science as a cultural institution and the person doing the science.

These seven Curriculum Emphases were used in this study as "a linguistic handle for talking about a very sensitive area: teacher values' (Roberts, 1982, p.252). Schooling or education as a social institution has to meet a number of often competing social, economic, and political demands (Fensham, 1988). Various stakeholders in the community may have different demands on education and hence different views of what should the curriculum emphases be. Teachers often have to respond to these demands and make practical and defensible choices. Thus the set of messages expressed by the teacher about the role of science reflects a value position on **what science education is for**. Furthermore, because each of these Curriculum Emphases mirrors an aspect of science, allegiance to particular emphases and failure to incorporate others into the science curriculum can convey or imply a view of what the teacher conceives science is, and what science is worth learning.

Aspects of Learning

The curriculum construct, Aspects of Learning, in this study refers to what is the intended learning - the subject matter of a course, its content, concept and skills, as well as activities or work requirements in a school's/teacher's science curriculum. Three broad aspects were considered - A1 Science Learning, A2 STS Learning, and A3 Personal Learning.

The analysis of the Aspect A2, STS Learning, included recognition of (i) the interaction of science, technology and society, (ii) the nature and development of science, (iii) scientists and careers in science and technology and (iv) technology, problem solving and making decisions in science and technology. These four sub-aspects of STS Learning led to a questionnaire being developed, the STS Learning Inventory, which consisted of a total number of thirty four learnings in science (See Appendix A : STS Learning Inventory). It was used as a checklist in the interviews with teachers. The teacher's answers to the Inventory provided information on the range and extent of STS Learning in his/her science curriculum. For example, teachers' answers to three items about the relation between science and technology in sub-aspect A2 (i) could be analyzed in terms of the relationships Gardner (1993a & b) describes for these social phenomena and compared with the relations they presented in their classrooms (see below).

Teaching Strategies

The ideas of STS education have basically re-defined the role of the science teachers from being couriers of information and developers of standard laboratory techniques, to being involved in teaching and learning which is often associated with the following teaching/learning perspectives

or principles (Aikenhead, 1991; Daugs, 1991; Malcolm et al., 1987; National Science Teachers' Association, 1990)

(1) learning in a real-life context
(2) student reflecting on learning and contributing to management and direction of learning
(3) student active participation (through taking risks and responsibility for learning in issue topics)
(4) co-operative learning
(5) a constructivist view of learning

Associated with these clearly overlapping set of teaching/learning principles are a variety of teaching/learning methods characterized by their interactive and open-ended approach, e.g. role play, debate, decision making, simulation, small group investigations of real life problems.

The construct, Teaching Strategies, is therefore described in terms of the teaching methods used in the classroom and the statements about them that teachers make. Analysis of these related data again enables an interpretation of the teacher's views of teaching and learning in her/his science curriculum.

DATA COLLECTION

Data, as indicated above, was collected from three sources and in three stages : class observations of STS teaching, written curriculum documents, and formal and informal interviews with teachers. Stage One involved a first visit to a total of twelve schools to discuss with one or two teachers with responsibility for the science curriculum in use in Grades 9 and 10. During that meeting, the teacher(s) was/were interviewed on semi-structured questions asking for a general description of the organisation, emphasis, teaching approach and assessment policy of the science curriculum. The schools were chosen on the basis of science consultants' knowledge that these schools were incorporating STS in their science curricula. Subsequently nine of the teachers who were interviewed at this meeting were invited to participate in Stages 2 and 3 as (i) they have indicated prima facie that STS teaching/learning was conducted to some extent in their science curricula, and (ii) they showed apparent willingness to share information with the researcher on their own teaching and personal thinking on science teaching. Thus these nine teachers represented a specific group of science teachers who have explicitly identified themselves with the process of enacting STS teaching/learning in their science programs. Any findings and interpretations of the case studies of these science teachers have to bear this in mind. In Stage 2 these nine teachers gave the researcher access to observe their STS classes and after each lesson responded to a brief informal interview to clarify specific observations of interest. After these classroom observations of the teaching of a whole topic (up to 8 lessons), these teachers participated in Stage 3, involving an extended interview conducted in two sessions. In the first lesson, the Elicitation Activity (see Appendix B) - one form of the Kelly's Repertory Grid Technique, was used to find the teacher's conceptions of the objectives of teaching science. The second lesson was an in-depth clinical interview to get the teacher's views on the content of the science curriculum, teaching /learning methods and approaches, and on her/his concerns about science teaching.

FINDINGS

The findings are described under the three curriculum constructs : Curriculum Emphases, Aspects of Learning, and Teaching Strategies.

Curriculum Emphases

In the course of analysis of the data collected, it was found that the following modifications to Roberts' categorization of the seven Curriculum Emphases were needed to reflect adequately the empirical data.

(i) Roberts's emphasis of 'Self as Explainer' could not be found in any of the case studies
(ii) The term 'Science, Technology, Decisions' needed to be replaced by 'Science, Technology, Society (STS)' to classify pieces of curriculum that did give explicit attention to these elements of STS and their interrelations, but which did not necessarily have the element of 'Decision' that is integral to Roberts's original description of the category.
(iii) A new emphasis of 'Personal Development' was added to this category system in response to data collected in

this study which clearly indicated that this was a curriculum message communicated to students as a purpose for studying science. This 'Personal Development' emphasis addresses the development of personal skills, abilities and attitudes which are of personal importance and value to the students. Such skills and attitudes are not, in the general sense, content dependent but learning experiences in sciences, particularly STS science, are useful means of developing them. The existence of this new category was not unexpected in view of the fact that the Science Framework explicitly included 'Personal Development' as one of the specific goals of science education alongside those associated with Science, Technology and Society.

The set of Curriculum Emphases used in this study thus compose the following seven categories, **Structure of Science, Scientific Skills Development, Correct Explanations, Solid Foundation, Everyday Coping, Science-Technology-Society, and Personal Development.**

The findings on the Curriculum Emphases of the teachers are summarized in the following table which gives the distribution of the seven Curriculum Emphases in the actual teaching (from the classroom observations) and among the teachers' concept ons (from the interviews).

Table 1
Distribution of Curriculum Emphases of the teachers in their actual teaching and conceptions

Curriculum Emphases (popularity ranked)	Number of teachers (N = 9) actual teaching	conceptions
1 Correct Explanations	9	9
2 Everyday Coping	8	9
3 STS	7	7
4 Scientific Skills Development	8	6
5 Solid Foundation	2	8
6 Personal Development	5	4
7 Structure of Science	2	3

The Structure of Science emphasis clearly ranked lower on both scores than the other six. The teachers only seldom conceived of or taught science in order for it to be understood as a conceptual system which is provisional and uncertain in nature, and which has an internal process of generation and validation. As each emphasis parallels some aspects of science, the low popularity of the Structure of Science emphasis implies that the learning of the philosophy of science or science as a form of knowledge having its own characteristics and limitations would also be given a low popularity in the science curricula of this group of teachers. The findings on the Aspects of Learning confirm this.

The absence of the Self as Explainer emphasis was confirmed by the fact that none of its associated aspects, such as human and cultural perspectives of the development of science or technology were present in the many lessons observed. Students were not given the opportunities to look at the development of science from the historical and human perspectives, or to see how scientists had made mistakes but, given the prevailing circumstances, their explanations were deemed to be reasonable and acceptable. Students were not encouraged to see the importance of personal intention to explain and to construct meaning, or of explanation as the origin of knowledge. The absence of this emphasis and the common occurrence of the Correct Explanation emphasis reinforced the message to the students that there is in Science an authority for the absolute truth and Science is about right answers. Furthermore, the neglect of the personal intent to construct meaning from the circumstances led, as will be reported below, to an absence among the pedagogies used by this group of teachers, of a number of the procedures that are now commonly associated with constructivist views of learning.

Detailed examination of the data for the STS emphasis revealed that two meanings for it were in operation : (i) awareness or knowledge about science and technology being human endeavours that involve human values and judgement, and that are influenced by the cultural, social and environmental contexts in which they occur, and, (ii) problem solving or decision making based on informed and practical reasoning about science-related social issues.

Six of the seven teachers whose data included this STS emphasis stated that the latter was an objective of teaching science, but in none of their lessons could this second meaning be identified. Instead what was present in the actual teaching of all seven was awareness and knowledge about the interactions between science, technology and society - an objective explicitly stated by only one of them.

Aspects of Learning

The STS Learning Inventory is the instrument that was used in the case studies to find out specifically what these teachers intended to teach about the Aspect, A2 STS Learning. Its structure also helped to analyze the STS Learning in their actual teaching.

Table 2 gives the findings on the distribution of the teachers' intended teaching of sub-aspect A2 (i), the relation between science and technology.

Table 2
Distribution of the teachers' conceptions of the relation between science and technology

Relation	No of teachers (N = 9)
Technological artifacts or processes important in scientific research	5
Technological artifacts or processes developed from scientific principles	6
Development of technology independent of science	2

Most of the teachers intended to expose students to the idea that science and technology are mutually dependent on each other for development. However when searching through the data on their actual teaching, a different picture emerges. In the lessons, students were asked to study the science behind the technology, or the scientific principles that help to develop the technology. Rarely did the lessons include subject matter of the reverse message or contain any learning experiences that would suggest how technology has helped to develop the science, in spite of five teachers declaring this an intention. Thus, the strong and unequivocal message in the content in the classroom was that technology is a form of applied science.

This conception was evident in the definition of technology given by most of the teachers - technology as the applications or the end products of science (in one case the teacher suggested that all technology is science but not the reverse). This was also consistently reinforced in their teaching. Technology as a practical problem solving process, through steps like designing and planning solutions, and constructing, testing and modifying them, was mentioned by only a few teachers. Even these few included in their lessons only those technological processes that were based on and related to the science knowledge that was also being taught.

The teachers' answers to the STS Learning Inventory also revealed that sub-aspect A2 (ii), the nature and development of science, was stated by seven teachers as their intended learning. But only two of these nine teachers were, however, observed actually teaching it in their science lessons. This sub-aspect of STS Learning would, as already mentioned, include subject matter of the history and philosophy of science and of the human perspectives of it, content that would be associated with Roberts's two emphases, Structure of Science and Self as Explainer.

Teaching Strategies

A variety of teaching methods were used by this group of teachers in their actual teaching. All but one used at least one method that focused on technology or science/technology in society. Traditional whole class instruction and laboratory exercises were commonly observed to provide the learning of facts, theories and skills that could be built upon for future studies and careers in science. For these teachers, the Solid Foundation emphasis (though not given explicitly high priority in Table 1, perhaps because of the STS context in which they knew this research was set) through the acquisition of scientific knowledge, was an underlying familiar purpose of school science. Four of the teachers were observed using more innovative student-centered activities, such as library research, oral presentation of practical work and research assignments, and brainstorming, as methods in their teaching repertoires for knowledge acquisition.

Three teachers engaged their students in technological processes of designing, constructing, testing and modifying

for problem solving. Five of them employed teaching methods which were specifically to teach about science or technology in society. The specific topics were building of a nuclear power plant, a couple seeking in-vitro fertilization, a chemical plant producing products that may be carcinogenic, renewal of a licence to a mining company, and an environmental protection bill on ozone. Role play was used in teaching three of these topics, and jigsaw strategy with guided discussion and debate were used in the other two. In each case the teacher ensured that adequate and relevant information was available for the students. The teachers also structured the learning experiences and the classroom environment for the students to engage in active and meaningful learning. They were certainly not, in these topics, teaching in a traditional sense to the class.

Two issues, however, arise from these lessons. Firstly, the methods, as observed, were used to develop knowledge or awareness of the interactions among science, technology and society (the first meaning the STS emphasis referred to earlier). They were not used, as they could have been to convey the second meaning of decisions based on informed practical reasoning about science-related social issues. This observation alone would not cause any concern if it were not for the fact that three of the teachers (among the seven in Table 1) explicitly stated that their main objective in teaching STS was this second meaning of the emphasis.

Secondly, one of the teachers gave science a visible and definite place as the factual basis throughout the whole teaching sequence of lessons. The other four teachers did not give such a role to science or technology, either during or at the conclusion of the teaching sequence, although scientific and technological knowledge was in the background information given to the students before the lesson. The researcher was told by some of the teachers that they would be content if, by the end of the lesson, the students would come up with some sort of ideas, opinions or views on the issue, even if they could not base their arguments on science. One teacher stated that he would not mind if this topic was taught in disciplines other than science, e.g. in sociology.

A number of the teachers articulated very distinctive views about teaching and learning which were also seen in the practice of their actual teaching. These views and practices can be paraphrased in order to compare them in Table 3 with the STS teaching/learning principles that were derived from the literature and presented earlier in the paper when this construct was introduced.

A comparison of the teaching/learning principles and practices among the case study teachers with those often associated with STS teaching

Teaching/Learning Principles and Practices	Case Studies	STS Teaching
1. Learning in real life context	✓	✓
2. Student reflecting on learning, and contributing to the management and direction of learning	✓	✓
3. Student active participation (through taking risk and responsibility in cases studies)	✓	✓
4. Co-operative learning	✓	✓
5. A constructivist view of learning	✓	✓
6. Student as individual learner (responding to interest, concern and capability of student)	✓	

This comparison reveals that there is a striking similarity between the two. Thus, the teaching practices that were observed within this group of self-declared STS teachers do include most or all of the recommended teaching/learning principles of STS, and so can be regarded as exemplary. Two differences are however apparent. The first one is the teachers did not refer to the notion of the construction of meaning by individual students or students in groups engaging in this sort of STS task. In this sense, and in the absence of practices like sharing existing conceptions, concept mapping, explicit linking exercises, and P.O.E.s, a constructivist view of learning was absent. This is consistent with the absence among the teachers' curriculum emphases of Self as Explainer. However, in another sense, principles and practices included in 2, 3 and 4 in Table 3 are ones that are also commonly advocated for constructivist learning. The second difference is the presence in a number of the case study teachers of the sixth principle/

practice, namely, the individuality of learning when STS contexts are being considered. This may be because advocates of STS in the literature are writing at a level of generality that ignores the individual students that these teachers clearly had in mind. One of the teachers described her teaching perspective as "contextualised, personal and individual".

DISCUSSION

In discussing these findings from the case studies of nine self-declared STS teachers' views and of their practices in teaching one major topic in their science curriculum, some of the features found and some not found are worthy of comment. The frequency of what is found is not of great moment, since it is possible they would appear for other teachers if another of their topics had been observed. Likewise it is those features that are absent in intent but not in teaching, or vice versa, and some that are absent in both that are of interest. One of the features that was found was the strong message from these teachers to their students that technology is applied science. This notion of the relation between science and technology is also promoted by the designers of some of the most readily available STS curriculum materials like SATIS (Holman, 1987). However many science educators have argued that this view gives an inadequate account of technology as direct knowledge in its own right, and as the practical means to solve real world problems (Aikenhead, 1990; Fensham, 1991; Layton, 1988). Furthermore, it presents a distorted version of the historical development of technology by implying that it depends on science. Consequently, science is regarded as the most socially valuable, and hence its study has more worth and status. Technology is seen only as a subordinate of science, rather than sometimes being a facilitating factor in science, and sometimes as having a quite independent existence (Gardner, 1993a & b). Finally, the manner in which technology was taught in the science curricula of these teachers would only contribute, using Fensham's terms (1991) to "technology awareness/ understanding" but would not help to develop in their students "technological capability" or "technological literacy/critique".

The interest of most of the teachers in decision making with respect to socio-scientific issues as an objective in science teaching was well supported by the choice of topics (listed above) that five of them were observed teaching. It was not, however, followed through in their teaching which concentrated on enabling students to become more knowledgeable about the social, political or environmental aspects of the particular issue, and more aware that such science/technology-related issues are complex in nature with many factors involved. This group of science teachers had difficulties, as reports of other STS teachers concur (Eijkelhof & Lijnse, 1988; Solomon, 1984, 1987; Eijkelhof et al, 1987; Aikenhead, 1988), in using (or were unaware of) pedagogical means to help students bring the scientific knowledge to bear on their value judgements and practical reasoning about the socio-scientific issues. It is likely that there has been very little in the training of these teachers (in science or in education) in Australia (Speedy et al., 1989) or elsewhere that would prepare them to use the pedagogies for this purpose that are commonly included in the training of humanities, social science and environmental education teachers.

The lack of a clear role for the scientific knowledge and for scientific reasoning in the teaching of four of the five teachers is consistent with the findings by Roberts & MacDonald (1991) or the conceptual difficulties science teachers have in teaching STS materials based on "practical (STS) reasoning", as distinct from "theoretical (science) reasoning". On the other hand, these teachers may be intuitively recognizing what Bingle and Gaskell (1994) have recently pointed out. In many of these issues, the complexity is so great that the relevant scientific knowledge is either incomplete before decisions have to be made, or is limited to those aspects of the issue that particular stakeholders perceive as important and are willing and able to fund. Given the partiality of the science in these complex issues, Bingle and Gaskell argue that the more democratically accessible social values that the students can share with the stakeholders, should be the bases on which decisions should and will be made.

The absence of any philosophical or historical teaching of science or technology is related to the absence of the Self as Explainer emphasis and the weak presence of the Structure of Science emphasis. Again it is likely that the teachers' own educational backgrounds have left them with nothing to share

with their students in these aspects. This is seriously at odds with recommendations in the literature for STS teaching. It is widely argued that science teaching should move from the impersonal, scientistic and unsocial presentation of science towards the learning of science in its humanistic and historical contexts. This would also be more in harmony with contemporary epistemological ideas of how science is developed. The neglect of these social and humanistic aspects of science, Hodson (1985) argued, has resulted in a "consequent adverse image of science, (which) is detrimental to the production of future scientists, but considerably more detrimental to the production of a scientifically literate citizenry." (p.27)

A number of STS curricula, for example, LoRST, SISCON, PLON and Science: A Way of Knowing, include some study of the philosophy and/or history of science in relation to understanding of science as conceptual tool. Their authors regard this as essential knowledge in order for students to understand the interactions between science, technology and society and to handle complex science or technology-related social issues. Science educators like Fleming (1986), Millar & Wynne (1988) and Solomon (1988), from their own research studies, also by drawing on findings from other studies of students' views and perceptions of socio-scientific issues have argued that a naive view of school science being represented as content-laden and as accumulation of factual knowledge, is not useful for analyzing socio-scientific issues. They all recommend that the provisional nature of science, the internal processes by which science is generated and validated, and its limitations and possibilities be included as part of the knowledge component of the science curriculum if there is to be adequate learning about these sorts of STS issues.

This gap in attempts to teach STS and the others reported in this paper need to be made foci for the in-service education of existing science teachers. Otherwise, Bybee's concern in 1987 that "science teachers are not prepared to implement the S-T-S theme" (Bybee, 1987, p.680) will be a recurrent finding. This view was echoed by Jennings (1987) who, from a survey on prospective science teachers, found that teachers were favourably disposed towards STS education but they had inadequate knowledge and understanding in the philosophical and historical aspects of science - a problem the nine Australian teachers still certainly shared.

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APPENDIX A - STS Learning Inventory

I.THE INTERACTION OF SCIENCE, TECHNOLOGY AND SOCIETY

A.THE INFLUENCE OF SCIENCE OR TECHNOLOGY ON SOCIETY

1. Has there been any study of examples in which new scientific or technological processes or devices have brought benefits to society ?
2. Has there been any study of examples revealing conflicts between science and technology and ethical, environmental and/or social concern ?
3. Has there been any consideration of problems that science and technology alone cannot solve ?
4. Has there been any study of examples of scientific or technological processes in one country that may have an impact on other countries ?
5. Has there been any study of risks that are involved in some scientific or technological processes ?
6. Has there been any consideration of occupational health and safety issues that may be associated with occupations of scientific or technological nature ?
7. Has there been any consideration of how advances in science and technology have affected the personal life styles and experiences of Australians (or people living in a modern technological society) ?
8. Has there been any study of examples in which significant discoveries or changes in scientific theories challenged the existing beliefs and attitudes in the society ?
9. Has there been any study of examples of jobs or careers that have been created i.e. quite new sorts of jobs, by advances in science and technology ?
10. Has there been any project about how science relates to the local community (home or school environment, local science or industry) being carried out by the students ?

B.THE INFLUENCE OF SOCIETY ON SCIENCE OR TECHNOLOGY

11. Has there been any study of examples of technological processes or devices that linked their developments to the needs of the society at that time ?
12. Has there been any study of examples of technological processes or devices that enables students to see that public attitude can have an influence in deciding on the use of the processes or devices ?
13. Has there been any study of examples in which the Government has passed laws to regulate, control or forbid the use of technological processes or devices or chemicals for the benefits of the society or the protection of individuals ?
14. Has there been any study of examples in which the Government had supported research in science and technology ?

15.Has there been any study of examples of investment of business and industry in scientific research ?

C.THE RELATION BETWEEN SCIENCE AND TECHNOLOGY

16.Has there been any study of examples of technological artifacts or processes which are important in scientific research ?
17.Has there been any study of examples of technological artifacts or processes which were developed from scientific principles ?
18.Has there been any study of examples of technological artifacts or processes which were invented without the knowledge of the scientific principles behind them ?

II.THE NATURE AND DEVELOPMENT OF SCIENCE

19.Has there been any consideration of the roles of experiment and observation in scientific research?
20.Has there been any study of the characteristics of scientific knowledge which distinguish it from other forms of knowledge or beliefs ?
21.Has there been any study of examples of how scientific concepts, laws or theories had been changed or modified in the face of new evidence ?
22.Has there been any study of examples of how the development of a scientific theory was influenced by the ideas of the times and the conceptual principles used i.e. the social and intellectual climate of the scientific community ?

III.SCIENTISTS AND CAREERS IN SCIENCE AND TECHNOLOGY

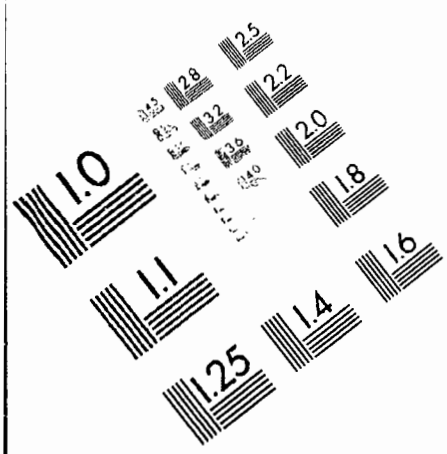
23.Has there been any study of examples of jobs available to scientists and technologists in Australia ?
24.Has there been any consideration of the differences between the work of a scientist and a technologist ?
25.Has there been any class visit to an industry or science institute ? Has there been any worker from these industry or institute being invited to speak to the students ?
26.Has there been any study of the life stories and work of scientists and their impact on the society ? Who are the scientists being studied ?
27.Has there been any class activities in which the students are asked to describe their image of scientists ?
28.Has there been any consideration of the motivation and social responsibility of scientists ?

IV.TECHNOLOGY, PROBLEM SOLVING AND DECISION MAKING RELATED TO SCIENCE AND TECHNOLOGY

29.Have your students learned how to use some common products of technology ?
30.Have your students been involved in any class exercise in which they design, build and test some technological devices ?
31.Have your students studied areas of technology which relate to their daily experience ?
32.Has there been any study of examples of current advances and developments in technology ?
33.Have your students been involved in exercise to develop solutions to technological problems and evaluate their solutions according to economic, environmental and social desirabilities ?
34.Has there been any class exercise in which the students are required to make decisions as
i)consumers of scientific or technological products
ii)citizens in a modern technological society ?

APPENDIX B - Elicitation Activity, and Element List

The teacher was asked to give a list of learnings in science which was a good representation of what she/he would normally aim for in her/his grade 9 or 10 science curriculum - element list of the teacher. To help the teacher, a fairly extensive list covering the three major areas of learning: science, technology and science/technology in society was shown to her/him (Appendix : Element List). This list of learnings in science was basically developed from the Science Framework document and its associated curriculum development documents, and revised by discussions with experienced science teachers on what they would normally expect students to learn in a grade 9 or 10 science curriculum in the Victorian school context. The teacher was invited to use the list in whatever way she/he liked. She/he could select the relevant learnings from the list and used the same wording



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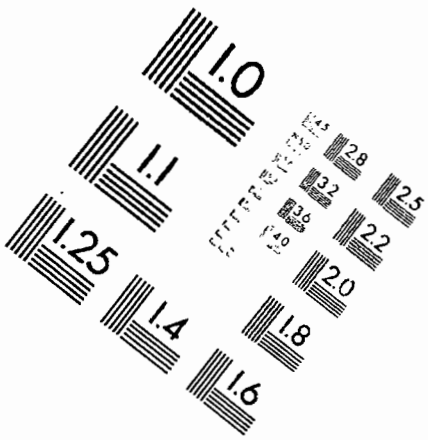

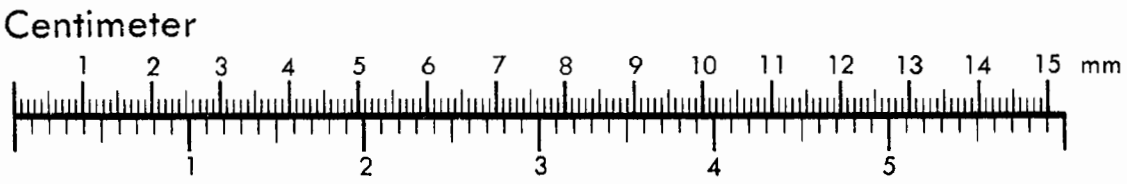

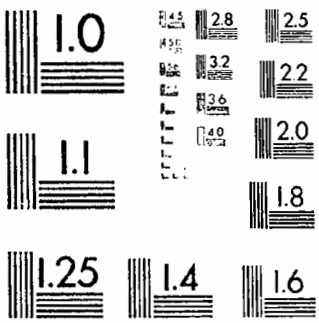

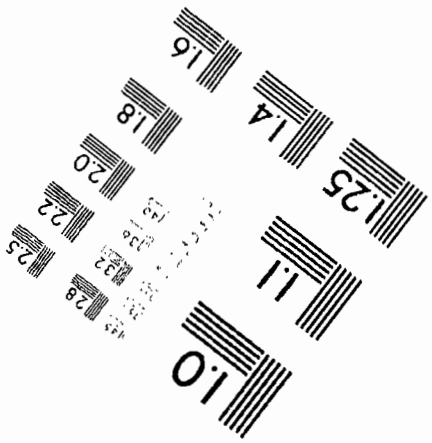

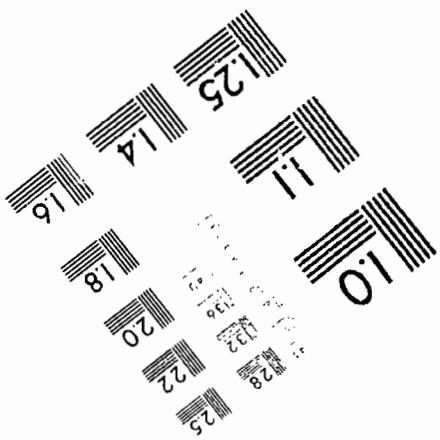

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or modify them. Alteratively she/he could simply devise her/his own list without reference to any of them. What was important is that the list eventually produced by the teacher was a good representation of learnings in her/his grade 9 or 10 science curriculum and that the words describing the learnings were clear and meaningful to her/him.

The teacher was then asked to sort out the learnings in her/his list into groups of any size such that learnings in the same group were alike but different from learnings in other groups in terms of what she/he conceived to be the objectives of studying science that could be achieved through these learnings in the grade 9 or 10 science curriculum. This sorting was conducted until all possible groupings were exhausted and each learning could appear in more than one group. For each grouping, the teacher was asked to describe in detail how or why the learnings being sorted into the same group were alike. Description or reason given by the teacher for each group became the Objective Construct which represented the teacher's conception of the objective of science teaching. At the end of the elicitation, the teacher would be asked to read through the Objective Constructs to check if his/her major objectives of science teaching have been solicited by this exercise.

Element List

I. SCIENCE CONTENT, SCIENTIFIC SKILLS AND PROCESSES, NATURE OF SCIENCE

1. Students(S) study the nature of the physical, chemical and biological worlds
2. S study aspects of science which take materials and situations from everyday experiences
3. S study key concepts, laws and theories of science to explain the natural and man-made objects and events
4. S study the current advances and developments in science
5. S carry out systematic observation of phenomena, accurate measurement and recording of observation
6. S collect, interpret and analyze data in a variety of forms such as graphs, charts and diagrams
7. S design, conduct experiments and evaluate the experimental design
8. S use scientific models to explain and predict natural phenomena
9. S communicate, in writing and orally, using the language of science
10. S collect, select and synthesize information from a variety of sources, organize and present their findings
11. S study the characteristics of scientific knowledge which distinguish it from other forms of knowledge or beliefs
12. S study the roles of experiment and observation in scientific research
13. S study examples of how scientific concepts, laws or theories had been changed or modified in the face of new evidence

II. TECHNOLOGY, PROBLEM SOLVING AND DECISION MAKING RELATED TO SCIENCE AND TECHNOLOGY

14. S learn how to use some common products of technology
15. S design, build and test some technological devices
16. S study areas of technology which relate to their daily experience
17. S study examples of current advances and developments in technology
18. S develop solutions to technological problems and evaluate their solutions according to economic, environmental and social desirabilities
19. S involve in exercises in making judgement and informed choices on scientific and technological issues e.g. as consumer of scientific or technological products, or citizen involved in debates on scientific or technological issues.

III. SOCIETY : THE INTERACTION OF SCIENCE, TECHNOLOGY AND SOCIETY, AND THE HISTORICAL AND CULTURAL ASPECTS OF SCIENCE AND TECHNOLOGY

20. S study examples of technological processes or devices that linked their developments to the needs of the society at the time
21. S study examples of technological processes or devices to see that public attitude can have an influence in deciding on the use of the processes or devices
22. S study examples in which the Government had passed law to regulate, control or forbid the use of a technological device, process or chemicals for the protection of the individuals or benefits of the society

23.S study examples in which the Government had supported research in science and technology

24.S study examples of investment of business and industry in scientific research

25.S study examples in which new scientific or technological processes or devices have brought benefits to the society

26.S study examples revealing environmental, ethical or social conflicts with developments in science and technology

27.S study examples of problems that science and technology alone cannot solve

28.S study examples of scientific or technological processes in one country that may have an impact on other countries

29.S study examples of risks that are involved in some scientific or technological processes

30.S study examples of occupational health and safety issues that may be associated with occupations of scientific or technological nature

31.S study examples of how advances in science and technology have affected the personal life styles and experiences of Australians or people living in a modern technological society

32.S study examples of jobs or careers that have been created by advances in science and technology

33.S carry out projects to investigate how science relates to the local community (home or school environment, local science or industry)

34.S study life stories of prominent scientists and their work and impact on the society

35.S study examples of how the development of a scientific theory was influenced by the ideas of the times and the conceptual principles used i.e. the social and intellectual climate of the scientific community.

36.S study examples in which significant discoveries or changes in scientific theories challenged the existing beliefs and attitudes in the society.

The Incorporation and Evaluation of Science, Technology and Society (STS) Components in HKIED Science Programme

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When the Certificate of Education Courses (CE) in the HKIEd were developed in 1994, there was a general consensus among the science lecturers that the new science programme should include some modules with Science, Technology and Society (STS) elements. It was felt that teacher trainees could acquire a better understanding of the advances of science and technology as well as their impacts on society through discussion of everyday life problems and social issues.

Three modules with STS elements are developed for the Science Programme for the teacher-trainees of the HKIEd, namely Science, Technology and Society, Science and Everyday Life I & II. The students' view of the programme content and teaching strategies are clearly understood after an analysis of the results of a module evaluation conducted through self-designed questionnaires and interviews with lecturers and students. This paper has provided some very useful insight for further review and improvement of these STS modules.

香港教育學院科學課程中「科技與社會」成份的編入和評估

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INTRODUCTION

The development of science programmes with STS themes has been a world-wide trend since 1980s (Hofstein & Yager 1982; Bybee, 1985; Yager, 1986; Solomon, 1988 a & b). When the Hong Kong Institute of Education (HKIEd) was established in September 1994, a curriculum development team, with a number of working groups, were formed to develop the Certificate of Education (CE) Primary and Secondary Courses. The science working group, including one of the writers of this paper, has then arrived to a common consensus that the new science programme should incorporate elements of Science, Technology and Society (STS) for it was felt that prospective science teachers should acquire a better understanding of the advances of science and technology as well as their impacts on society through discussion and analysis of everyday life problems and social issues. Furthermore, they would need to be equipped with the relevant knowledge and skills essential for teaching STS themes in Primary or Secondary curricula.

This paper focuses on the development as well as the implementation of these STS modules, with detailed discussion in respect of the theoretical background, objectives, content, method and evaluation of the modules concerned.

CURRICULUM DEVELOPMENT OF STS MODULES

I.THEORETICAL BACKGROUND

The world-wide movement toward STS in science education is to help students see the relevance of learning of science to everyday experiences and to engage them actively in making sense of the impact of scientific and technological progress on mankind and their world. The benefits brought by connecting science, technology and society have been discussed elsewhere by various authors (for example, Holbrook, 1985; NSTA, 1990-1991; Cheek, 1992). It is not our intention here to expound on the advantages of the STS approach but rather to consider the implications of such approach for the local teacher education programmes. From the review of literature, work has been accumulating on the development and implementation of STS programs at various levels (for example, Eijelhof & Lijnse, 1988; Hart & Robottom, 1990; NSTA, 1990-91; Yager, Tamir & Kellerman, 1994; Yager & Lutz, 1995). One of the most influential ones is the position paper put forth by the National Science Teachers Association (NSTA) on the primary features of STS program (NSTA 1990-1991). Some of those features are considered as crucial for the development of STS curricula. They are:

a. Student identification of problems with local interest and impact.
b. The use of local resources (human and material) to locate information that can be used in problem resolution.
c. The active involvement of students in seeking information that can be applied to solve real-life problems.
d. The extension of learning going beyond the class period, the classroom, the school.
e. An emphasis upon process skills that students can use in their own problem resolution.
f. Identification of ways that science and technology are likely to impact the future.
g. Some autonomy in the learning process (as individual issues are identified).

Along these lines, Yager et al. (1994) has presented some distinguishing characteristics between instruction exemplifying STS approach and those typically found in the science classroom. They are based on the instructional strategies initially defined by NSTA (1990-1991) and further elaborated by Hurd (1991). Those strategies Yager et. al. considered important for STS programmes which could be applied to the local and institute contexts are highlighted as follows:

a. Student-centred.
b. Directed by Student questions and experiences.
c. Uses a variety of resources.
d. Cooperative work on problems and issues.
e. Students are considered active contributors to instruction.
f. Teachers build on student experiences, assuming that students learn best from their own experiences.
g. Teachers plan their teaching around problems and current issues.

These strategies are in marked contrast to the existing practices of Hong Kong schools which involve mainly teaching of science facts and concepts through a "guided rediscovery" approach. The locus of control rests with the teacher rather than the learner with the transmission of knowledge being the paramount goal and the process of exploration and social relevance subservient to it. Despite students being engaged in all sorts of 'discovery' activities carefully and neatly orchestrated by the teacher, or better to say, textbook writers, students are far from being active participants in their own learning and seldom take initiatives in exploration and making their own judgments in solving problems. We feel that if the spirit of STS approach is to be realized at the classroom level in local primary or secondary schools, science teacher educators have to be fully prepared both conceptually and pedagogically before they could help their student-teachers to put theory into practice.

II.NATURE OF THE STS MODULES AND TARGET GROUPS

Our previous discussion on the features of STS programmes and the characteristics of STS instructional strategies vis-a-vis local reality could provide a backdrop for considering the development of STS modules in the teacher education courses of the HKIEd. The science programme of the certificate course is divided into two areas: curriculum

studies and academic studies. The former involves the study of science curricula and teaching methodology while the latter aims to broaden students' knowledge base so that they could handle the subject matter of science with enough competencies. As regards Academic Studies, three modules were developed with the incorporation of STS elements. These three modules are:

a. "Science, Technology and Society"

This module is offered in the preparatory year (1st year) of the 3-Year Certificate of Education Course as one of the electives amongst other non-science modules. Most of the students entering into the preparatory year of the Course are Form 5 graduates with most of them from the Art stream.

b. "Science and Everyday Life I" & "Science and Everyday Life II"

These 2 related modules are offered consecutively in the second year of the 2-Year Certificate of Education Course. The students coming into this Course are Form 7 graduates who have satisfied the entrance requirements and may teach Science or General Studies when they are graduated.

III.OBJECTIVES OF THE STS MODULES

Bybee (1987) put forth a conceptual framework for knowledge, skills and values of scientific & technological literacy in his article on science education and STS theme. The primary areas of emphasis in any STS module are science and technology concepts, the processes of inquiry and science-technology-society interactions. The three aforesaid modules were also designed with similar aims in mind :

(i) Acquisition of knowledge related to science and technology.

(ii) Utilization of learning skills based on scientific and technologic inquiry.

(iii) Development of values and ideas about science and technology in society.

The following are the module objectives listed in the HKIED Primary Course Science Syllabus :

(A)Module Objectives of "Science, Technology and Society"

Students should be able to :

1. identify the nature of science and technology.
2. develop basic understanding and knowledge in science and technology.
3. evaluate the pros and cons of applying science and technological knowledge to our society.
4. analyse the ethical issues associated with the development in science and technology.

(B)Common Module Objectives of "Science and Everyday Life I & II"

Students should be able to :

1. acquire knowledge and understanding of relevant applications of science in society and in everyday life.
2. develop an awareness of and concern for issues discussed in personal, social, environmental and technological contexts.
3. maintain a balanced view towards controversial issues.
4. acquire a critical and inquiring mind.
5. locate , select and organize information from various sources, present them in a clear logical manner and apply to solve problems.

While "Science, Technology and Society" serves to introduce students to the concepts of STS and the nature of the relationship between science, technology and society, the two modules of "Science and Everyday Life" aim to advance students' understanding of such relationship by providing more relevant examples of scientific and technological applications and their implications for society.

IV.MODULE CONTENT

(A)Module content of Science, Technology and Society

In order to engage students' participation in understanding the relationship between science technology and society as argued in the earlier part of this paper, apart from the lecturer presentation on the conceptual framework of STS and some exemplary topics, students are required to study a topical issue of their own choice (for example, DNA fingerprinting), gather relevant information on its state of art and its implications, and present their findings in the latter

part of the module. Some of the topics presented by the lecturers and students are provided as follows:

Part I. Selected Topics Taught By Lecturers

1. Introduction to science, technology and society
2. Ozone and chlorofluorocarbons
3. Bioethical issues
4. Information technology and internet
5. Space exploration
6. Fibre optics and its applications
7. Food Additives

Part II. Suggested Topics For Student Presentation

1. High-technology birth
2. Soaps, detergents and pollution problems
3. Living with kidney failure
4. Power in the 21st century
5. Looking after our water
6. How safe is our car
7. Crop protection and starvation
8. DNA and forensic science

(B) (i) Module Content of "Science & Everyday Life I"

The emphasis is placed on the impact of science on the consumers. Materials in daily usage, food, medicine, household products and energy sources are chosen for discussion. Selected topics are: food, household products & appliances, our energy supply, materials, drugs and antibiotics.

(ii) Module Content of "Science & Everyday Life II"

The chosen theme is healthy and better living and it is hoped that students will be able to appreciate the daily, multifaceted, difficult decisions that affect our health and future of the world. The selected topics are: healthy body, food and health, keeping fit, better environments, ionizing radiation, biomedical measurement, biotechnological advances and the quality of life, sex and health.

V. MODE OF INSTRUCTION AND ASSESSMENT

As mentioned previously, one outstanding characteristic of STS instruction is that it is student-centred. Students are considered active contributors to instruction who work collaboratively on problems and issues. These elements of instruction are incorporated into the design of the STS modules of our programme. To engage students in investigating into science and technology issues, various teaching strategies and methods were employed which range from laboratory work to visits and debates.

Most of the laboratory work are designed to embrace scientific enquiry with everyday life experiences. One such example is found in the topic of biotechnology which involves students to devise a method to test whether certain brands of washing powder with bioactive agents are, as widely claimed by the manufacturers and advertisers, more effective than ordinary washing powder in removing dirt. In the topic of food where students discussed the effects of applying chemical fertilizers and pesticides to crops, a visit was arranged to one of the farms operated by Green Produce to give students some "hands-on" experiences in organic farming which has been introduced to students as a more environment-friendly alternative to the modern practices of agriculture and husbandry. Debates, perhaps, is one of the most powerful teaching strategies to be used in the classroom to invite active contribution by students as well as to highlight the pros and cons inherent to many technological innovations, e.g. in-vitro fertilization and frozen embryos. Videos were, expectedly, used very frequently as stimulation for discussion and enquiry and for presenting arguments from different perspectives. They have been proved to be very effective and convincing indeed. The value of inclusion of student presentation as a teaching or learning strategy has already been discussed in previous sections. In these modules, students were assessed mainly by project work, assignments, laboratory work as well as end-of-module examinations.

VI. MODULE EVALUATION

Method

Module evaluation was conducted mainly by specially designed questionnaires (see Appendix 1 and 2 for representative questions and student responses), and by interviews with lecturers and students. The questions for "Science, Technology and Society" (Appendix 1) Science and Everyday Life (Appendix 2) are slightly different to cater to their unique features.

1) Questionnaires: Students' feedback in many aspects of the module was collected, through specially designed questionnaires which include both fixed response and free response questions. For the fixed response questions, the feedback sought from students includes: i) whether aims and objectives were clearly specified and well achieved, ii) whether teaching strategies and learning activities were useful, iii) whether the taught materials were logically organized and useful, and iv) whether students' interest was aroused and whether they were actively involved in the lessons.

With respect to the free response section, there were 2 questions: i) What aspects of the module were most valuable and why? ii) What proposals for improvement would you like to recommend and why?

The questionnaire for "Science, Technology and Society" was administered to a group of Preparation Year students of 3-Year Course (112 respondents) after they had completed the module. The questionnaire for "Science and Everyday Life" was administered to a group of 2-Year Course students (25 respondents) on completion of the module "Science and Everyday Life II".

2) Interviews: For the Science, Technology and Society module, the opinions of 3 participating lecturers (including module coordinator) and 45 students of two different classes were collected by person to person and group interviews respectively. Each interview was tape-recorded for further analysis. Interviewees were encouraged to express their individual feelings and opinions on each of the following questions:

1. Why do you think HKIED offers this course to the students?
2. Which topics in the syllabus have already been gone through in secondary school training? Which topics are new even to science students?
3. Do you think the aims and objectives of the course have been achieved? Should this course be compulsory, elective, or exempted?
4. What are the different forms of learning activities in this course? Do you have any comments on the teaching methods?
5. Do you have problems finding reference materials for your assignments and projects?
6. After taking this course, do you think your attitude towards the effects of science/ technology to the society have been changed?

Analysis of Results

(A) Feedback on Science, Technology and Society (STS) Module

(i) Aims and Objectives of the module

From the results of the fixed response questions (Appendix 1), students in general considered the aims and objectives clearly specified (12% strongly agree & 67% agree)(Fig. 1) and well achieved (6% strongly agree & 53% agree) (Fig. 2). The interview also yielded the same results in that both lecturers and students agreed that the aims and objectives of the module were achieved. Both lecturers and students interviewed identified with the need for students to acquire sufficient STS knowledge to cope with the rapidly developing technological world. Furthermore, they all agreed that STS education would equip them better for their teaching career, especially for those who are going to teach General Studies. From the above results, it could be inferred that both lecturers and students of the course are able to identify with the goals of STS. Such identification of curriculum goals has always been argued to be an essential factor for the successful implementation of any innovated curriculum (Morris, 1995).

(ii) Learning activities and teaching strategies

The findings of the questionnaire reveal that the learning activities were in general well received by the students with 7% strongly agreed & 54% agreed that they were suitable and useful (Fig 2).Yet when asked whether they agreed that a variety of motivating teaching strategies were adopted, there was a mixed response: 3% strongly agree, 37% agree and 44% neither (Fig. 5). This discrepancy appears to reflect that students would like more varieties in teaching methods on top of the existing ones.

In order to obtain a clearer picture, student responses to the free response questions as well as the interview results with students and lecturers were analyzed. The two activities considered by students to be most useful are project work and student presentation. (see also Fig. 10 in Appendix 1). Students expressed that they greatly treasured the opportunities provided for self learning and collaboration with their peers in gathering, analyzing and presenting information. Furthermore, they enjoyed being active contributors to instruction. This renders support to the notion held widely by

contemporary science educators that students should be engaged more actively in their own learning and construction of knowledge. Besides presentation and project work, they felt that experiments, role play and video-show were also motivating and interesting. Some students even recommended a visit to Daya Bay Nuclear Plant, saying that site-visits would enrich their knowledge in the topic of nuclear energy.

Both students and lecturers in the interviews considered that the strategies employed by the students during their presentation could be more motivating and stimulating and of more varieties. They also felt that the atmosphere in presentation could be improved by having more interaction between the presenter and peers, for example, through class discussion and group discussion. As regards the accessibility of relevant references and resource materials to students for completing their projects, the lecturers suggested that students could explore a variety of sources, such as Internet, Environmental Protection Department, Central Health Education Unit...and so forth, though some students held that they were not familiar with these sources . However, all of them agreed that they had tried their best to obtain the necessary references and resources for the project and they found such an independent endeavour a useful experience. They also felt that helpful guidance provided by lecturers was indispensable for the success of project presentation.

(iii) Subject content and students' involvement

From the students' feedback to the free response questions and those collected from the interviews, a number of topics were identified to be popular among both lecturers and students. These include information technology and internet, high-technology birth, radiation and its impact on daily life, bioethical issues, anti-smoking campaign and space exploration.

Could students' interest be stimulated by the module? The feedback from the questionnaire was essentially positive (11% strongly agree; 43 % agree; 26% neither) (Fig 7). Regarding student participation (Fig. 6) and involvement (Fig. 8), the results are satisfactory but not outstanding. Students expressed in the interview that there were times when the student presentation was rather boring. On the contrary, the lecturers' presentation was felt to be more interesting, hence attracting a higher level of student participation and involvement. Understandably, the students' performance during their presentation is related to the quality of their work as well as their presentation techniques. Yet, this might also be an indication of students having been accustomed to the more traditional approach to learning where the teacher is considered to be the only source of knowledge and the best translator and presenter of it. This leads us to infer that the implementation of STS programmes not only necessitates a profound change in teaching approach but also calls for a radical shift of learning style on the part of the students. Learning has to take place through various means apart from teacher exposition such as self study and cooperative learning. Nevertheless, the results point to the dilemma that curriculum developers of STS programmes have to face when they try to incorporate group project work and cooperative learning strategies into their programmes.

(B) Feedback on "Science and Everyday Life" Module

The questionnaire was administered to a group of students (25 respondents) on completion of the module "Science and Everyday Life II", with slight modifications to cater for the difference in content compared to "Science, Technology and Society". No feedback was sought for the module "Science and Everyday Life I" since it was offered in the first semester before this study was initiated.

A rather similar pattern of results as that of the "Science, Technology and Society" was obtained (Appendix 2). The aims and objectives of the module were in general considered to be well achieved (12% strongly agree & 52 % agree) (Fig 15). Over 50% of students found the subject content helpful to their understanding of the relationship between science and everyday life (Fig. 12). Among the topics delivered, students found that "pollution" and "biotechnology" were the most interesting ones. As regards teaching strategies and activities, 44% of students agreed that a variety of useful and motivating teaching strategies were adopted and 32% neither agreed or disagreed (Fig. 16). The majority of respondents (62%) strongly agreed or agreed that the experiments and activities incorporated could enhance their understanding of the module content. The feedback as to whether students were encouraged to participate is also rather positive (12% strongly agreed and 48% agreed)(Fig. 17).

Yet, when asked whether their interest was stimulated, the responses are only barely positive, with 36% agreed or strongly agreed, 20% disagreed and 44% saying neither(Fig. 18). This compares rather unfavourably with the module of Science, Technology and Society where 54% of students expressed strong agreement or agreement that their interest was enhanced (Fig. 7). The result also seems to be at odds with the responses given by the same group of students to the previous questions. Although most of the students agreed that the module content was helpful to develop understanding, the taught materials and their delivery well organized, the activities being able to enhance learning and students being encouraged to participate, these positive characteristics are seemingly no guarantee for enhancement of student interest. While the difference in the level of interest generated between the two modules could have been due to student factors (the two groups being different cohorts), this might also be related to a notable difference in teaching approaches adopted by these two modules. As "Science, Technology and Society" has incorporated an open ended issue-based study by students, students were more actively engaged in their own learning, hence generating a greater interest in and commitment to their work than their counterparts in "Science and Everyday Life II". This inference is worthy of further exploration before a firm conclusion could be drawn.

DISCUSSION

The results of the evaluation are encouraging. From the students' feedback, the aims and objectives of the two STS modules were achieved to a satisfactory extent, and they found the content useful and relevant to their life experiences. They seem to be receptive to the STS approach which emphasizes more open-ended learning, more active contribution by students and cooperative learning. This approach marks a major divergence to the traditional approach which emphasizes didactic teaching and conceptual learning in a hierarchical manner detached from students' everyday experiences. The use of unconventional teaching techniques such as issue-based student projects, visits and debates, coupled with problem solving laboratory activities (e.g. by comparing the effects of different washing powders as mentioned earlier), are helpful to stimulate student interests and encourage more active participation. The present modules thus offer a viable alternative to traditional science modules, that are based purely on research disciplines, for teaching science to teacher trainees that are highly varied in their achievement in science.

Despite these benefits, the module evaluation has revealed a number of problems needed to be addressed before STS programmes could really make a significant contribution to teacher education. As issue-based study assumes an important role in STS programmes, careful design of such activity is essential and students should be fully aware of the objectives of these activities, the role they should play and the kind of work expected of them. Obviously, adequate guidance should be provided by lecturers/tutors for induction of students into such activities at the very beginning. Such induction is not only necessary for students to master the essential skills for carrying out investigation into science and society issues, but also important to engender the desirable attitudes such as open-mindedness, sensitivity, respect for and willingness to listen to different opinions, and appreciation of others' work. The possession of these attitudes is essential not only for students to derive maximum benefits from these collaborative open-ended investigations, but, more importantly, for them to educate their own students when they become school teachers. A corollary of this is that teacher educators should fully equip themselves before they are able to lead student-teachers through this challenging yet rewarding experience of learning as advocated by the STS approach. This would, undoubtedly, pose a great challenge to teacher educators which is no less difficult to surmount than that for their students.

CONCLUSION

The science lecturers at the Hong Kong Institute of Education feel that they have gained valuable experience in the development and implementation of the STS modules. Not only could these modules provide our teacher trainees with the opportunities to acquire a better understanding of the advances of science and technology and their impacts on society, it also help us acquire valuable insights into the principles, processes and constraints of curriculum planning and implementation. One of the advantages that the Institute of Education has with respect to implementation of modules

with STS features is that there is no pressure from public examinations. The luxury of having flexibility in the arrangement of learning activities facilitates the implementation of innovative STS features in the program. It is hoped that further improvement will take place by the introduction of new and better measures after further and more extensive review of the modules based on the outcomes of this evaluation exercise.

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Appendix 1: Science and Technology (STS) questionnaire results (total respondents = 112)

Fig.1 The aims and objectives of this module were clearly specified

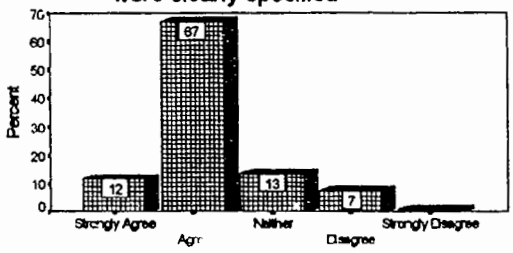


Fig. 2 The learning activities in this module were suitable and useful

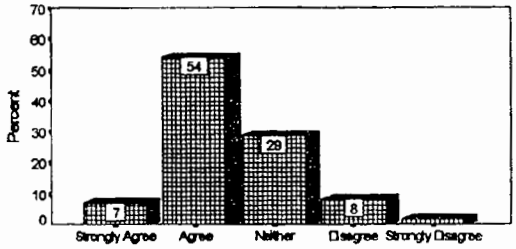


Fig. 3 The sequence of taught materials in this module was logically organized

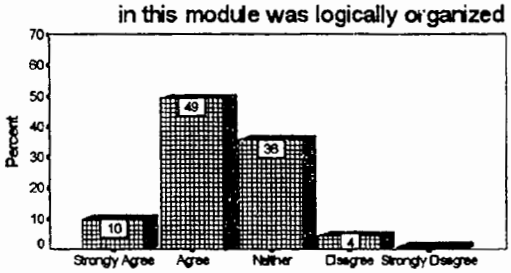


Fig. 4 The aims and objectives of this module were well achieved

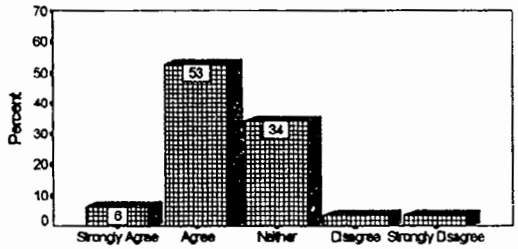


Fig. 5 A variety of useful and motivating teaching strategies was adopted

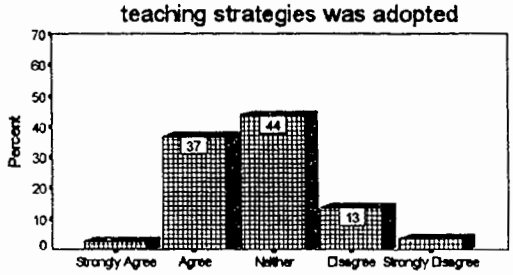


Fig. 6 Students were encouraged to participate

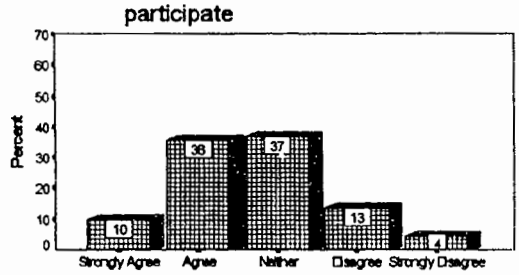


Fig. 7 Students' interest was stimulated

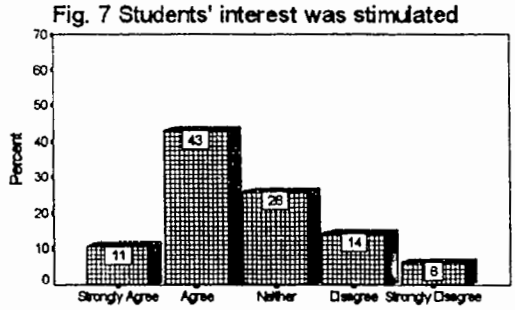


Fig. 8 Students were actively involved in the lectures

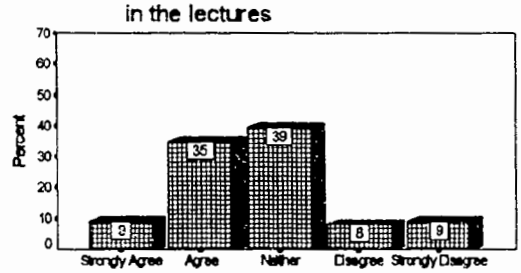


Fig. 9 Students were actively involved in their peers' presentation

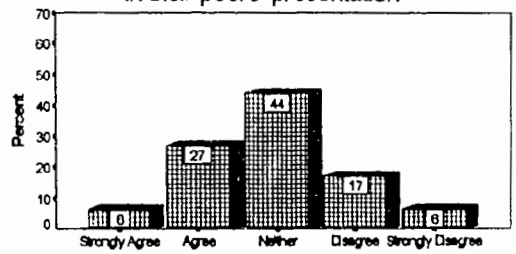
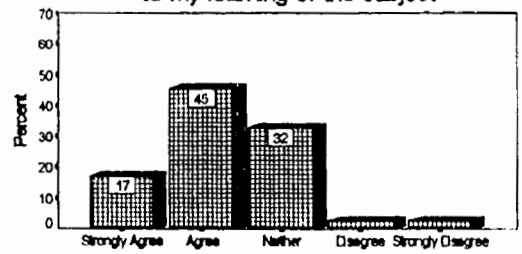


Fig. 10 The students presentation is helpful to my learning of the subject



Appendix 2: Science and Everyday Life questionnaire results (total respondents = 25)

Fig. 11 The aims and objectives of this module were clearly specified

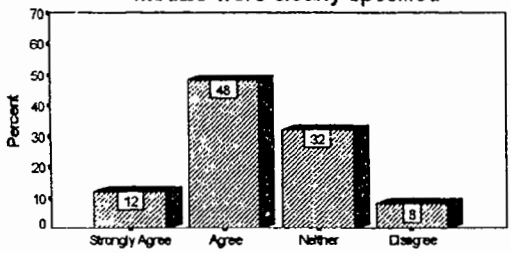


Fig. 12 Subject content was helpful to my understanding of the relationship between science & everyday life

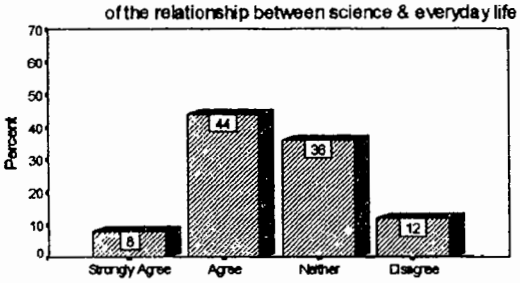


Fig. 13 In terms of the modes of delivery, this module was well organized

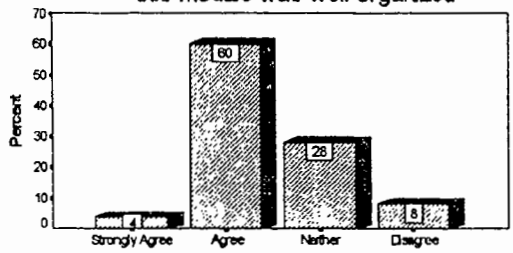


Fig. 14 The sequence of taught materials in this module was logically structured

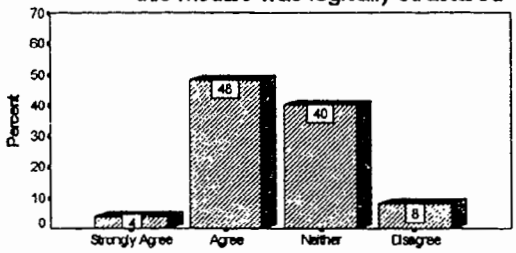


Fig. 15 The aims and objectives of this module were well achieved

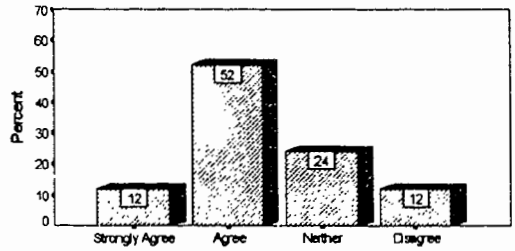


Fig. 16 A variety of useful and motivating teaching strategies was adopted

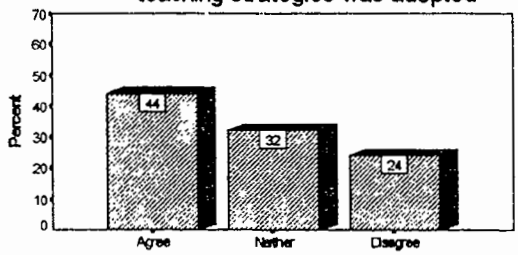


Fig. 17 Students were encouraged to participate

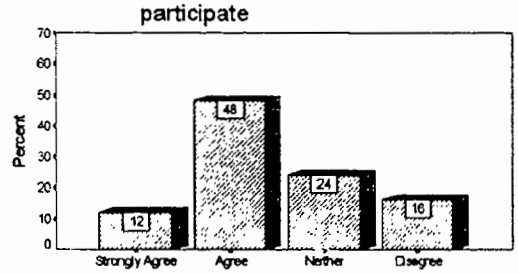


Fig. 18 Students' interest was stimulated

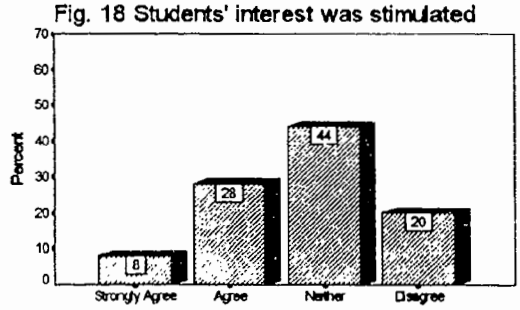


Fig. 19 Students were actively involved in lectures

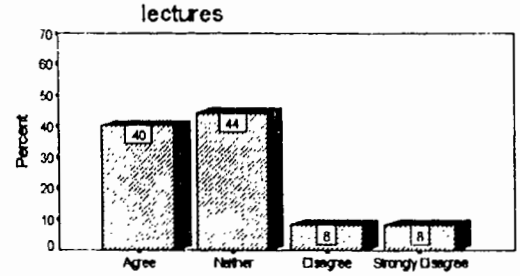
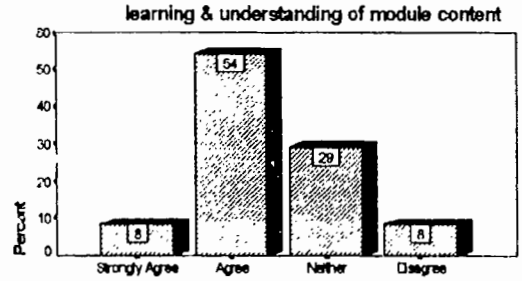


Fig. 20 Experiments & activities enhanced my learning & understanding of module content



加強學生中國語文能力的途徑

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加強學生的中國語文能力是近年香港教育界對中文教育要求。本文嘗試從課程與教材、教法、練習三方面探討這個問題。在課程與教材方面，指出教材系統化、序列化有利於語文能力的培養，而「文選」的編排方式有它的局限。在教法方面，提出要組織合理、有效率的教學過程和選擇有效的教學方法，如善用教材要點、用多角度、多層次的評估方法、善用討論與提問法等，都有利於加強學生的語文能力。在練習方面，要按不同的訓練目標，如（1）理解與分析、（2）揣摩與運用、及（3）記憶與聯想等不同的層次，安排相應的練習，對學生進行訓練。

Methods to Enhance the Chinese Language Ability of Students in Hong Kong

The mastery of language ability often affects a person's cognitive and reasoning ability. It also influences his or her affective development both directly and indirectly. Society has noticed a deterioration of language ability amongst the Hong Kong students since the introduction of the nine years' compulsory education system. This has aroused a lot of concern amongst educationists.

In July, 94, The Education Commission published the " Report of the Working Group on Language Proficiency". Its aim was to identify the factors that influence the development of language ability of Hong Kong students both in Chinese and English. It showed that the authorities were taking necessary steps to find methods to solve problem.

There are multiple reasons that caused the decline of the students' language ability, including political, social, economic reasons and the changes in the mode of communication. This essay discusses from the point of view of education, trying to look in areas such as.

1) arrangement of educational materials;
2) the focal point of the educational methods;
3) matching of consolidation exercises

These points will be assessed as to their importance in the enhancement of the students' language ability.

一 緒言

教育統籌委員會屬下語文能力工作小組於94年7月發表了語文能力工作小組報告書，指出該小組的工作範圍在於找出影響學生中英語文能力的因素，進一步在謀求解決培養學生語文能力的方法。

能力就是一個人能順利地完成某項活動的一種本領，是知識和智力的集中表現。能力有一般能力和特殊能力。觀察能力、思維能力、自學能力等屬於一般能力；聽、說、讀、寫的能力，是語文學科的特殊能力（戴寶芳，1988,3）。語文能力對於一個人的一般能力說來有很密切的關係，兩者會互相影響。語文能力對於一個人的認知、情感、意志的發展，也是息息相關的。因此，我們可以說：語文能力直接影響著一個人對世界的認識，甚至對於他的成長、情感意志的培養、人格的形成，都有直接或間接的關係。

從個人來說，語文能力的高低，決定了他在學業與事業上的發展潛能；在一個國家來看，國民語文能力的高低，決定了國民的教育水平與人才的質素，直接影響了一個國家的國力。可見語文能力的提高，對於個人與國家都有密切的關係。

對於一般中學生來說，語文能力包括以下四方面的成分：

聽的能力：包括語音的分辨力、語義的理解力、邏

輯的判斷力、聯想與想像力、內容的概括力、分析與批判力，乃至情感的感受力、迅速作出反應的響應力等。而這一切當反映在聽寫、聽記、聽辨、聽析、聽賞、聽評等能力之中。

說的能力：包括準確地運用語音、詞匯、語法的能力，以及生動、準確的表達能力、迅速、靈活的應變力、聯想、發現的創造力等等。這些能力當反映在朗讀能力、背誦能力、演講能力、辯論能力當中。

讀的能力：包括理解、分析、綜合、評價、鑒賞、發展與創造，乃至選擇書籍、讀書方法、使用工具書等能力。而這一切，則可反映在認讀、默讀、速讀、跳讀，以及翻查參考書、工具書等能力之中。

寫的能力：包括觀察、運用字、詞、句、篇的基礎能力、掌握文體特點的能力，以至迅速寫出觀點鮮明、選材恰當的文章的能力。而這一切，則反映在學生的審題、主意、選材、組材、語言運用及到主修改的能力（吳昌順，1988.1）。

如何培養學生的語文能力？近代認知心理學家有關學習動機、知識內化、教師功能與學科結構等方面的主張，對今日語文教師在教學方面，實有不少的啟發，值得我們重視。

就學生學習方面言，布魯納（J. S. Bruner）認為個人的行動都是有目的的，都是朝著解決環境中遭遇的問題而努力的。就此意義言，學生不僅是知識的接受者，而且是主動的探究者（Bruner, 1968）。按理，學生對學習語文，應有主動積極的態度，因為語文學習，對解決他們的問題，有所幫助。而平素我們看到學生有時缺乏這種主動的動機，很有可能是教材或教法未能引起他們解決問題的需要。因此，如何使學生深切地感到這種需要，便是語文教師要去思考和落實的問題。

就知識的獲得的過程言，皮亞杰（J. Piaget）與布魯納都認為真正的知識，應該是來自學習者內在產生的建構，而學習本身是一個主動的過程。明乎此，教師的教學，應盡可能提供學生創造和協調他們所能處理事物關係的機會，相機提供事物，供兒童自由研究、實驗及討論，以及不斷向兒童發問，或觀察他們的行動，隨時啟發，使他們有所發現。盡可能讓學生有重組知識結構，或因思索而得到解決問題的新途徑（歐用生，1991.6）。可是語文教學，若一味只是教師的講演，而不隨時留意學生的回饋，在本質上已違反了學生認知問題中的內化建構的過程。

至於教師的功能，布氏認為主要在於：提供協助和對話，以將經驗轉換為更有力的提示系統。，要讓學生發現，隱含在教材裡的重要結構（Structure）（Burner, 1968），而不是把知識硬綳綳地塞進他們的腦袋裡。在這方面，我國近代語文教育學者錢夢龍在他的語文導讀法中提出了「三主」理論：以訓練為主線，以學生為主體，教師為主導，都是突出了學生知識內化的重要性。

此外，就學科知識言，近代認知心理學家主張要教學科的基本結構，認為對知識基本概念的了解，是學生走向學習轉移的主要途徑。了解學科的基本概念，能為我們的經驗提供了知識性的工具力量。這種工具力量，就是「能力」的表現。因此，布魯納指出教育應該強調的重點，是知識的相通處，以及那些使某一概念緊隨著另一概念的知識的聯貫處，也就是「知識的結構」（Burner, 1962）。

根據上述認知心理學家的見解，中文教學宜在不同的環節，針對學生學習的不同情況，作出相應的對策：

學生學習所應了解的範疇	學生學習時可能出現的情況	教師應有的對策
1. 學習動機	‧[illegible] ‧[illegible]	[illegible]
[illegible]	‧[illegible] ‧[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

要提高學生的語文能力，也必須利用近代心理學家所提出的教學方法，把上述聽、說、讀、寫四種能力的培養，變為系統性的有機活動，使教有中心，學有重點。必須從課程、教材、教法和練習幾方面，整體入手，環環相扣，方能奏效。以下就這幾方面予以闡述。

二　課程與教材方面

香港中學的語文，長期以來都是採用「文選型」的教材，這類教材的基本特徵，是以文選為主要內容，以講讀為主要方法，要求在講讀各篇文章的過程中，學習時有所得，日積月累，學生的各項語文能力得以逐步加強。這種教材的編法簡易便行，能收到一定的效果，有它的好處。但由於缺乏嚴密的科學性，從總體看來，效率不高，質量亦很難獲得保証，是它的不足處（胡世達，1988.5）

從課程的觀點來看，一個學科的結構愈完整，系統愈嚴謹，科學的序列愈明確，學習的階梯性就愈強，學生掌握的東西就愈具體。由於學習的目標明確，學習的成效也就愈高。

語文教學以「文選」作為教材的主體，在中國有很長久的歷史。多年以來這種教材和相應的教學方法，的確訓練了不少在語文方面極有成就的人物。這是因為以前要學習的科目沒有現在的繁多，生活的內容也沒有今日的豐富，學生用在研習中文方面的時間也比較充裕。但在知識爆炸的今日，要學生像前人一般學習語文，恐怕比較困難。如要有效率地培養學生的語文能力，就必須把教材按學生的能力，訂定科學的序列，予以施教，才易成功。若純以「文選」方式作為教材的主體，要將教材組成科學的序列，是比較困難。困難的原因是基於：

1. 被選的文章，都是作者在他生活時期有所作而寫作，並不是為了編教材書而寫的，在寫作目的上已有不同。
2. 不同時代、不同體裁的文學作品，內容豐富，形式多樣，風格各異，正與目前中學語文教材可教性的豐富多姿、文人腔高。但問題在於文人佳作的是：要從此豐富多姿的文章中，找出一個序列，是非常困難的。
3. 編輯教材要按照循序漸進的原則，要由淺入深，由易到難。簡簡單單這一條，在文章的編排上，便無一定的嚴格標準。同一篇文章，可以放在中一去教，也可以放在中三去教，是常有的事。
4. 各篇課文或各個單元的排列，一靠編輯意圖，二靠編輯經驗，要說甚麼科學的根據是沒有的。
5. 對於語文知識，歷來的處理方法，是編寫一些知識短文，穿插在單元與單元之間，或附在練習中，或依托在題解或注釋裡。這樣的做法，最大的問題，是語文能力訓練的項目，仍居於附屬的地位。
6. 「文選型」的教材，使教師易於陷入只注重內容而忽略語文訓練的圈套。
7. 就學生的學習過程言，文選式的語文學習，是通過閱讀一篇一篇的文章來積累一點一滴的知識，不是學習運用知識去理解文章。這種學習模式，學生要「讀書破萬卷」，才能「下筆如有神」（程力夫，1988.11）

要突破教材的這種困境，怎樣使教材更切實地有助培養學生的語文能力，是值得從事中文教育的人士探思的。

黃蘇先生提出一種新教材體系的精神，內容大略是：「教材的主體按照擬定的規劃有系統地進行編寫，也不必完全排斥名家的範文，但有關的範文在教材中只處於從屬的地位，作用只是用來說明、印証有關的知識，或作為進行練習的材料，有一部份可作為提供觀摩的示範樣本。」（黃蘇，1989.25-26）

他所設想的初中語文教材，由基本教材、輔助教材、參考資料和應用練習四部分組成，以下是他的意見：

1. 基本教材：是教材的主體，居於相當於教材中課文主導的地位，是傳授知能的主要根據。包括現代漢語語法、一般文章（包括應用文）、各種體裁的特點及作法兩部分。
2. 輔助教材：是配合基本教材進度所提供的，是旨說明相關語言知能的資料。形式多樣，可以是語段、語句、短文，可以由編者按需要而編寫，也可以選用部分適當的範文充當。
3. 參考資料：是配合基本教材的進度，供學生自行閱讀、揣摩之用的有關知能的資料或可供觀摩的範文，一般時要附有輔導說明。
4. 應用練習：是配合學習用具體知能進行訓練和鞏固的作業，要求有足夠的分量和多種多樣的練習方式（黃蘇，1989，26-27）

黃氏這種設想，突破了「文選」為主體的框框，以培養語文能力及知識為主體，可以編得比較系統化和序列化。在這樣的構思下的課程與教材，選文仍可發揮它的功用，作為知識課文的例証。程力夫提出語文教材的新效用，可以用下面的表解了說明

掌握知識→理解例証→進行自學→加強練習→發展能力（程力夫，1988.11）

這個方向，是值得我們考慮的。

當然，除了上述教材的編排法之外，高中中文教材的內容能符合 1. 能針對學生的學習動機（現代性與實用）；2. 能使其產生內在建構（教材的系統性與新舊知識的聯繫）；3. 使語文知識轉化為語文能力（複習與練習的布置）

三 教法方面

以往中文教學最為人詬病的有兩種現象：一是呆滯死板的教學模式，窒息了學生活潑思維的火花；二是灌輸式的教學方法，壓抑了學生的主動性。因為老師在台上不停地講，學生只能默默地聆聽，用功的只能被動的把老師講授的要點，不斷地抄錄下來，或做出些搗亂課堂秩序的行為，對教學目的的達成，沒有了幫助。基於中學教育的使命，在給予學生必須的語文基礎知識與語文基礎能力，使他們能發揮個人的潛能將來服務社會，語文教師實應以上述的兩種現象為鑑戒，努力於改革課堂結構和更新教學方法。

在教學方法方面，要顧及學生的學習動機、知識內化及中文知識結構之建立，同時有必要進行下列四方面的工作：

1. 確立合當而明確的教學目的
明確的學習目標可以加強學生的學習動機。當然，學習目標須符合語文基礎知識與語文基礎能力的系統化與序列化的要求，以訓練學生的語文能力為重點。

2. 安排精要的教學內容
在培養學生的語文能力的過程中，作為教學設計，掌握每個單元或每篇篇章的訓練重點，組織教學，並有練習，注意新舊知識的銜接，力求使教學內容符合學生認知發展的規律。

3. 組織合理、有效率的教學過程
   a. 掌握教材本身的特點與適應學生的需要，設計以訓練學生語文能力為首要的教學過程
   b. 多利用啟發式的方法進行教學，提高學生學習的積極性與主動性
   c. 教學過程力求清晰，以簡馭繁，而有程式，而又不致程式化

4. 選擇有效的教學方法
這裡試就閱讀、寫作與聽說三方面予以說明：

甲、閱讀能力方面

a. 講述要突出教材的要點
教師對教材先有整體性的把握，教學時才能針對每一單元的訓練重點。這樣對學生的學習動機、知識內化都很有幫助；若教師在上課中不時以教學生把知識轉化為能力為教學重點，對加強學生語文能力的培養，肯定有很大的裨益。

b. 用多角度、多層次的評析方法
訓練學生對閱讀材料能從字詞的運用、語法、修辭、篇章要點與主題等不同角度去分析；使學生對字詞的前後關係與邏輯因素、句與句間的內在聯繫、章節與整篇內容與形式的關係，能從不同的層次予以評析。這些都是語文能力訓練的重點，教學時不宜錯過（楊奇龍，1988）。有關這方面的處理方法不一而足，可先由教師舉例示範，然後讓學生摹仿；也可以由三、五個學生組成小組，從不同角度、不同的層次對課程進行闡釋及評析，並由此而過渡到獨立評論。這樣，對提高學生的學習動機，以及幫助學生知識內化，都有作用。

c. 運用課堂討論來提高學生的閱讀與分析能力
課堂討論有利於學生之間的思想交流，對促進個人思維與分析能力有很大的幫助。在閱讀的過程中，學生常遇到難於理解或有疑問的地方，組織學生討論，可以提高他們的分析、理解以及評估能力。

d. 善用提問來培養學生的思維能力
提問的藝術運用能引起學生的學習動機，幫助學生解決問題，使其知識內化，也可以加強學

生中文科的知識建構。不同類別的提問，對學生的思維起著不同的刺激作用。鄭晶安先生在課堂教學方面，提出九種類型的提問方式，值得本港中文科的教師參考：

「思考型」的提問，如教王安石的〈傷仲永〉一文，教師提出：文中主要寫了些甚麼內容？作者在文中抒發了甚麼感慨？這類問題可令學生對課文有概括的認識，並能把握文中的結構層次。

「引導型」的提問，如教〈項脊軒志〉一文時，問學生文中寫了敘軒的舊製、年期、缺失、修葺與情趣各項，主要在表達作者甚麼情懷？在追敘諸父異爨、先妣一章、祖母期許及遭火不焚等事時，作者又在表達些甚麼情懷？文中「然余居於此，多可喜，亦多可悲」二句在內容與寫作技巧方面有甚麼作用？類此都是一些引導型的例子，可引發學生作連貫性的思維。

「比較型」的提問，如教魯迅〈祝福〉一文時，問學生：「作者對祥林嫂三次外貌描寫有何不同？她的外貌變化，說明了甚麼？」又如問學生：「〈背影〉與〈媽媽的手〉同樣抒發了子女對父母的愛，究竟兩者表達的內容與手法，有甚麼不同？各產生了甚麼的效果？」這類比較性的提問，可以幫助學生理解，增進分析、辨別的能力。

「探討型」的提問，如教〈桃花源記〉時問學生：「如果文中的主人翁能從他所作的標記中，尋回桃花源，則可能有甚麼後果？作者讓他尋回桃花源嗎？為甚麼？」「作者此文的佈局，有些甚麼寓意？」這類提問能引發學生作輻射性的思維，並引起學習的興趣。

「突破型」的提問，在於指出一個帶有局限性的問題來揭示中心思想。如教魯迅的〈一件小事〉，教師問：「為甚麼作者覺得車夫的背影越來越大，而自己的則越來越小呢？」回答這個問題，學生會從課文作全面的分析，把握文中的底蘊。

「中介型」的提問，目的在幫助學生從「不知」過渡到「知」的境界。如教〈鄒忌諷齊王納諫〉一文，若要了解鄒忌諷在答應前之後出閨房說美各有前後心理的不同，可提問學生在文中鄒忌諷內心的獨白語中，有抒發了甚麼意見，讓學生從這些意見中推測鄒忌諷的心理變化，從而了解他們的性格，有助於學生對戰國中人物的認識。

「激疑型」的提問，如教莊子的〈庖丁解牛〉時，問學生文末文惠君「吾得養生之道焉」與上文有沒有聯繫？教〈項脊軒志〉時，問學生作者在記敘母親的事時，為甚麼不直寫，而要借老嫗轉述等，都有激起學生思考的作用。

「強化型」的提問，如中一教李廣田的〈悲哀的玩具〉時，教過排比的意義及用法；在同一冊的課文中教傅代的〈早晨，好大的霧〉時，可提問學生：「甚麼是排比的寫法？」「有甚麼寫作效果？」「可以從文中找出排比的句子嗎？」等等，都可引起學生溫故知新、強化記憶的作用。

「歸結型」的提問，如學生在中一上學期同時學習了傅雷的〈傅雷家書〉及冰心的〈紙船——寄母親〉，前者寫父親對兒子的關懷與愛護；後者寫對母親的愛，一文一詩，都寫得感人肺腑。可提問學生：「一篇文學作品，要具備一些甚麼因素，才可以感動讀者？」從而使學生體認到文章的感情真摯、描寫細膩的重要。

上述九種提問技巧，都是緊扣著中文科學科基本結構的知識與思維方式，值得我們參詳應用。

e. 用比較的方法去增進學生的理解能力

學生對事物的認識往往是通過比較來鑒別的。比較事物的異同，能幫助學生發現問題，認識語文的規律，掌握語文的能力。善用比較教學，對提高學生語文能力有下列的效果：

(1) 增加學習的新意，培養學生學習語文的興趣；
(2) 可以使學生的概念更明確，知識更有系統；
(3) 有助於學生對知識的融會貫通，培養學生的分析、綜合、歸納、判斷與舉一反三的能力。

比較教學可分橫的比較及縱的比較兩種

(a). 橫的比較

指對同一層次上的語文知識與語文技能進行多角度的比較，理解其中的異同，從而使學生的概念更清晰、知識更牢固。而橫的比較的內容，可從下列方面考慮：

(1) 相似題目、不同體裁的比較

這種比較，令學生認識到在各自的題目，運用的表達方式就不同，隨著文章的體裁的不同，從這種認識出發，再進一步訓練學

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生對於同一題材運用不同體裁去寫作的能力（如同寫荷花，〈荷塘月色〉為抒情散文，〈愛蓮說〉為議論性散文。）

（2）不同題材，同一體裁的比較
這種比較可加深學生對同一題材，利用不同體裁寫成的結果，從而培養學生的鑑賞能力和寫作能力。（〈春〉與〈濟南的冬天〉分別描寫春、冬的景色，題材不同，氣氛各異，但同為散文，有「形散而神不散」的特色。）

（3）同一體裁，不同類型和寫法的比較
如同為狀物性散文，但因作者的寫作意圖不同而寫法亦不同。從不同類型與寫法的比較，可具體地提高學生對「記敘性散文」、「抒情性散文」和「哲理性散文」的理解。
又如對議論文的各種論證方法和論證結構；對說明文不同順序和說明方法等，都可以進行如此的比較，以增進學生學習語文的能力。

（4）同一體裁、不同風格的比較
如從詩的內容與風格，比較李白和杜甫作品的不同；同是散文，比較朱自清與魯迅風格的不同。其他如蘇軾與柳永的詞、辛棄疾與姜夔的詞的風格比較等，都可提高學生的鑒賞能力。

（5）同一作品中不同人物的比較
如〈曹劌論戰〉中曹劌與魯莊公的比較（言行與思想）；〈范進中舉〉中范進與胡屠戶的比較（外貌、言行、思想、心理等）。這種比較，對理解課文的內容與思想，以及作者刻劃人物手法的運用，都有幫助。

(b). 縱向比較
把有關的語文知識（如作品或語言）從時間上比較其異同，理解其發展變化的脈絡，從而使學生認識得更有系統，掌握得更牢固。例如先秦詩歌中的「詩經」與「楚辭」的比較；史書中的「左傳」與「國語」的比較等等。又把不同時代的語言、詞彙、語法等作比較，使學生了解古今詞義和用法的不同，更有助於學生古漢語知識（任宜平，1989）。

乙、寫作能力方面

主要在於培養學生觀察與思維能力。讀寫教學向來都是結合起來的。學生從閱讀教學中學識了不少寫作的知識與技能，在閱讀教學中多利用應用練習使學生充分得到寫作的機會。閱讀教學愈能聯繫學生的寫作練習，愈能使學生的知識化為能力，學生的寫作能力會愈佳。

作文課的任務，視乎學生的情況，教師有時須對學生作出全程的指導。如寫作前，激發學生的寫作興趣，注重審題、立意、選材的訓練；寫作時，注意構思謀篇，引導修改；寫作後，教師作全面講評，突出重點，加以獎勵。把握訓練的基本規律，引導學生積累、模仿和創造。積累方面，指導學生觀察生活，累積素材。模仿方面，要充分發揮範文的模範作用，使學生從閱讀教學中學習寫作。創作方面，引導學生去聯想和想像，可進行寫作思路訓練。比較常用的有下列兩種：

1. 模仿範文思路，如：

a. 學完議論文後，按文中的論點、論據和論證的結構，要求學生運用同一文體作文。如教完〈最苦與最樂〉一文，要求學生仿用〈最苦與最樂〉題目作文，但不從「是否盡了責任」的論點去立論，讓學生從正反方面，自由發揮。
b. 仿效文中的寫作手法寫作另一篇主題不同的文章。如學了〈最苦與最樂〉文中不同的論據，著學生試寫〈吸煙危害健康〉這個論點，提出不同的論據。
c. 就精選課材的故事或寓言去仿寫或續寫。如學生學了〈吉普賽的時……中的希望〉後，著學生以……實的自選寫題，仿作一個寓言故事。
d. 提供一個觀點讓學生學寫駁論文。如學生學了〈古人讀書不易〉，著學生寫一篇駁倒〈讀書可以明理〉的文章。
e. 模仿範文的記敘、描寫手法作文；
f. 模仿範文作一篇抒情描寫兼具的記敘文；
g. 模仿範文的人物描寫手法寫一篇側重人物心理描寫的短文等等。

2. 結合各種寫作方式去指導學生的訓練，包括了文章寫作的單項訓練和綜合訓練，如：

a. 各種文體訓練；
b. 各種論證方式訓練；
c. 由景抒情的訓練；
d. 借物喻意的訓練等等。

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丙、聽說能力方面

聽話與說話能力的重要性近年來愈來愈受到重視聽話能力的培養包括下面的基本要素：

1. 辨音釋義的能力；
2. 理解語意的能力；
3. 品評話語的能力（鑒別語義內容的是非、品評語言表現技巧的優劣）

說話能力的培養應包括下面的基本要素：

1. 熟練地運用口語的語言方式，如
   a. 短句多、自然句多（句子結構比較鬆散自由）；
   b. 省略句多（因口語的對象確定、又常有特定的語言環境）；
   c. 易位現象多（主謂、狀者、狀語與中心語，常常把要強調的部分前置，先傳遞給讀者）等等

2. 定向表達的能力
   定向表達，指說話人有確定、具體的對象。定向表達，要求說話要得體，要合乎對象的社會地位、身份、知識修養程度，以及所處的心理狀態，措辭要求恰當，注意說話的聲音技巧

3. 正確運用語音表情達意的能力
   語音的能力包括說話時的音質、音律和音力
   音質，就是發音的質地，說話時要音質純潔，沒有雜質；音律，指說話的節奏、快慢要適度；音力，指說話聲音的力度，說話聲音的強弱，大小要適度，要抑揚頓挫

4. 借助「大體語言」和「副語言」的能力
   大體語言，的說話時的手勢、姿勢動作；副語言，指說話時的表情與神態（笑、歎氣、端莊、儼肅等），這些都可以補充表達的意思和情緒；增強表達的效果（鍾相誠，1988.1）

在聽說能力訓練方面，我們比較落後，實有急起直追的必要。教育當局宜對聽說能力訓練安排好訓練的序列，並進行編寫和製作教材，訂定評估的標準與方法，使聽說訓練早日推行，以增學生日常生活的互

四、練習方面

學生必須經過一定量的語言實踐，才可以獲得一定水平的語言能力，光靠有限的十多篇課文，即使內容再精要，也難以培養起語言能力，因為學習過程包括了記憶熟悉的過程，而記憶熟悉需要大量的重複運作，如生字生詞的掌握、語言知識的複習，這些重複運作，都需要足夠的練習才行

練習除了講求量方面，也要注重質方面

練習的形式可有多種，但從訓練的目的來看，可有三個層次：

1. 理解、分析：著重理解課文的思想內容、篇章結構和語言運用；
2. 模擬、運用：在理解的基礎上，推敲遣詞造句，佈局謀篇的巧妙所在，並進行聽說讀寫的練習
3. 記憶、聯想：進行熟讀和背誦，抄錄詞語警句，選取與課文有關的文字材料與課文比較，以鞏固、擴展學習成果（劉國正、顧振彪，1990.2）

教師須了解課材的教學目標，佈置課業練習時，也按著這些教學目標去擬定，以便加強與強化學生這些語文能力的培養，擬定時更須考慮上述不同訓練的目的，相應地擬題練習

五、結語

要提高學生中國語文的能力，必須在教學過程中，變傳授知識的時時，力求將知識向技能轉化，不可只是熟著教材的內容不放，而忽略了對學生語文能力的培養這個重要的任務，這種知識的轉化要分層次進行，一方面關顧到語文能力結構的「序」，同時也須因應學生基礎、認識水平的「序」，這種能力「序列」結構的擬定，是一項很大的工程，若能在教材、教法與練習方面，三管齊下，整理出一套適當的「序列」來教學生，並以此評鑑學生，相信學生的語文能力，必會有很大的提升

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「九儒十丐」：一個至今仍被香港中學中史教科書廣泛引用的神話

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香港中學中國歷史教科書普遍引用「九儒十丐」來形容元代儒人的地位。本文就「九儒十丐」說法的來源及其提出人的生平和著述、元代儒戶的權利和義務，以及元代儒士的仕進機會等問題加以分析，對「九儒十丐」說法的歷史真實性提出質疑。

"Scholars the Ninth and Beggars the Tenth:" A Myth That Is Still Prevalent in Hong Kong's Secondary School Textbooks on Chinese History

Virtually all of the Hong Kong's secondary school textbooks on Chinese history adopt the phrase "scholars the ninth and beggars the tenth" to describe the "lowly" status of Confucian scholars in the Mongol Yuan dynasty (1260-1368). This paper analyses the popular saying by looking at the lives and works of the two Song loyalists who created the expression, the obligations and privileges of Confucian households in the Yuan , as well as the chances of Yuan scholars in joining the officialdom. It concludes that the phrase "scholars the ninth and beggars the tenth" is an anti-Mongol exaggeration rather than a true reflection of the Yuan reality, and it's time for Hong Kong's secondary school textbooks to discard the old myth .

前言

香港的中學中史教科書，在談到元代的儒士時，幾乎毫無分別地一致用「九儒十丐」來形容他們在蒙古統治下的社會地位。其實，中外史學界已有學者對元代儒士的地位問題進行過詳盡的研究，令人信服地否定了元代儒人地位低落的說法。一些香港的中學中史教科書編者，對這些研究成果似乎並不知悉，仍然沿襲舊說。本文擬在綜合他人研究成果的基礎上，輔以自己的一得之見，對「九儒十丐」這一至今仍在流行的說法作一詳細剖析，以供香港中學中史教科書編者參考。

（一）「九儒十丐」的來源及這一說法提出人的生平和著述

「九儒十丐」一詞，是宋、元之際宋遺民的著作[illegible]。一是鄭思肖的《心史》，另一是謝枋得的《疊山集》[illegible]。《心史》的〈大義略敘〉有一段關於元朝各階層人士高低等級的記載：「一官、二吏、三僧、四道、五醫、六工、七獵、八民、九儒、十丐」（鄭，1991，186）。謝枋得《疊山集》卷二〈送方伯載歸三山序〉，則在論元人等級時，提及「一官二吏」、「七匠八娼」、「九儒十丐」等人，而儒介乎娼和丐之間[illegible]。謝枋得明確指出，他只是在提到儒人地位低下、被欺凌時的[illegible]：「儒不勝其苦，或謂天下賤丈夫，有九[illegible]」，按照謝的記載，介於娼和丐之間的便是儒，[illegible]有者最賤的人[illegible]。

謝枋得（1226-1289），南宋末信州人，字君直，號疊山，信州弋陽人。寶祐進士，德祐元年（1275）以江東提刑、江西招諭使知信州，抗擊元軍。城陷，亡命建寧，以賣卜教書為生。至元二十三年（1286），集賢學士程鉅夫薦舉[illegible]，但他堅辭不就。第二年他再被福建行省參知政事[illegible]，至元二十五年（1288），尚書留夢炎亦薦，又有[illegible]

就。福建行省參政魏天祐強迫他北行，至京師大都絕食，留夢炎遣使送藥米，終不食而死（脫脫，1977，12681-12690）。不過，死於元初的謝枋得並沒有明說「九儒十丐」是元朝的定制。相反，他說「七匠八娼、九儒十丐」乃是「滑稽之雄以儒為戲者」的戲謔之語。

鄭思肖（1241-1318，或作1238-1315）對亡宋的忠誠和對蒙元的敵視，並不比謝枋得遜色。鄭，連江人，南宋末太學生。宋亡後，因思趙（宋王朝），遂改名為思肖。他「坐必南向，歲時伏臘，望南野哭，再拜而返，人莫識焉。誓不與朔客交往」（陶，1959，247）。歸於其名下的《心史》，自發現以來，其真偽就一直是史學界爭論紛紜的對象。據記載，該書於一二八三年（元至元二十年）沉於吳中承天寺井中。一六三八年（明崇禎十一年）吳中久旱，仲冬八日，人們在承天寺狼山房挖井打水時，發得一個錮以堊灰的鐵函，「啟之則宋鄭所南先生所藏心史也。外書『大宋鐵函經』五字，內書『大宋孤臣鄭思肖百拜封』十字。自勝國癸未迄今戊寅，閱歲三百五十六載，楮墨猶新，古香觸手，當有神護」（鄭，1975，141）。主《心史》為偽者包括[illegible]、徐乾學、閻若璩、袁枚以及《四庫全書總目提要》的作者。在他們看來，無論如何密封，一本書放在水中幾百年而完好如新，是極違常理的。更重要的，該書有許多事理荒唐和明顯違背史實的地方，不可能是生活在宋元之際的鄭思肖所作。例如袁枚指出：《心史》「所載元世祖剖割文天祥，食其心肺，又好食孕婦腹中小兒，語太荒悖，殊不足信」（袁，1960，108）。另外，《四庫全書總目提要》指《心史》「文詞皆蹇澀難通，紀事亦多與史不合。如雜文卷中[illegible]作論，而[illegible]高宗諱。[illegible]……此必明末好異之徒，作此以欺世盜名，故為眩亂其詞者」（《總目提要》卷174《心史》）。

從鄭謝兩人的經歷來看，他們都有明顯的反元情緒，其著述（姑且不說《心史》有明人偽作的可能）亦因此有醜化元朝的傾向。而且，由於謝枋得和鄭思肖分別於一二八九和一三一八年作古，他們無法知道元代中後期的社會發展情況。當然，即使《心史》確係偽作，我們也不能因此斷然排除它有反映元代社會真實情況的可能性，且不說有不少學者視此書為真作。同樣，鄭謝兩人敵視蒙元的事實並不能導出他們對元初社會的所寫所說完全不符合史實的結論。最重要的還是要看元代的實際情況如何。

（二）元代儒戶的權利和義務

元代儒士的地位，可以從儒戶所承擔義務和享有的權利看出端倪。在元代，政府將全國居民按照職業及社會職能的不同，劃分為若干種戶計，統稱諸色戶計。在元代文獻中經常提到的大致有二十種左右的戶計：軍、站、民、匠、儒、醫、卜、陰陽、僧、道、也里可溫（基督教士）、答失蠻（伊斯蘭教徒）、斡脫（蒙元時經營高利貸商業的官商）、商賈、灶、獵、弓手、急遞鋪、打捕鷹房等。這之中，軍、站、民、匠是元代的四種基本戶計。所有諸色戶計都是世襲性的。他們承擔一定義務，同時也享有某些權利。

在承擔義務方面，軍戶的職能是出軍當役，為國家提供兵力和軍需。站戶的職能是維持驛站交通，向使用驛站的人提供交通工具和飲食。匠戶則為國家從事各種工藝造作。至於數量最大的民戶則是農耕戶，是元廷賦役的主要負擔者。相比之下，儒、僧、道、也里可溫、答失蠻等戶則主要從事精神上的工作，要輕鬆的多。各宗教戶計的主要義務是告天祝福，而儒戶唯一要做的事就是學習，以便在國家考選吏員時參加考試（蕭，1984，18）。

在權利方面，儒戶享有許多經濟上的優待。第一，所有在籍儒人可以得到相當於學正性質的贍給，在學的生員，每日兩餐皆有學校供給（《廟學典禮》，1.15b）。第二，儒戶享有蠲免部分賦役義務的優待。元代的賦役，因承襲宋制，南北不同。大體上是北方人民負擔的義務有三大項：一為稅糧，分丁稅和地稅；二為科差，有包銀、絲料、俸鈔等；三為雜泛差役，主要包括政府為興役造作、治河、運輸等需要而征發車牛人夫，以及里正、主首（農村基層行政設施的職事人員）、坊正（城鎮基層行政設施的職事人員）、倉官、庫子（為官府保管財物的職事人員）等職役。江南的稅制則大體上沿襲南宋舊例，征收夏、秋兩稅。另外，對江北方科差項目下的戶鈔和包銀，雜泛差役的項目則與北方大體相似（韓，1985，31-31；蕭，1984，19-20）。諸色戶納稅的大致情況是：官中，[illegible]：儒、匠、僧、道、也里可溫、答失蠻等戶驗地交地稅；軍、站戶占地四頃以內者免稅，而此數者須納地稅[illegible]。其儒戶與軍、站、僧、道等戶[illegible]（脫脫，1976，2362）。雜泛差役方面，儒戶與民戶以外的其他戶計一樣，一般都被免除[illegible]

大部分的民戶，是主要的納稅人，各種賦役在所難免（《廟學典禮》，2:20b；《元典章》，31.7）。軍、站、匠、灶等戶，表面上看，他們所享受的優待，不少於儒戶，但他們負擔的遠超過儒戶。只有僧、道、也里可溫、答失蠻等宗教戶所享有的經濟優待與儒戶相近。

（三）儒人可為官作吏

由於元代前期的官[illegible]的出身自[illegible]，把儒和官、吏斷然分開，是不必的。元代做官的途徑基本上有三條：第一是宿衛，第二是科舉，第三是吏進（姚，1987，1.11b）。元代的宿衛包括怯薛（禁衛軍）和侍衛軍兩部分。其中，怯薛出身是「大根腳」，這些有「大根腳」的人，基本上是蒙古人和色目人（韓，1985，102）。他們占元代官員總數的十分之一左右（姚，1987，1.11b）。

元代做官的第二條途徑是科舉。元朝在從元世祖中統元年（1260）到元順帝至正二十八年（1368）的一百零九年裡，前五十六年（1260-1314）未行科舉。自元仁宗延祐二年（1315）第一次開科至元順帝至正二十六年（1366）最後一次取士，共五十一年。其間曾有六年（1336-1342）中斷，科舉制度實施了四十五年。元朝三年一科，實際上在這期間共開科十六次。最多的一次取士一百零一人（至正十一年，1351），最少的一次有三十五人（至正二十年，1360年）。共取士一千二百人左右（許，1984，41）。元代開科取進士，蒙古、色目、漢人、南人各佔四分之一（姚，1976，2021）。[illegible]整個元朝由科舉而登仕的漢族儒人不足[illegible]，通過這條途徑做官的儒人不多。

另外，元朝做官的第三條途徑吏進是元儒人做官的[illegible]。在元建國之前，中國傳統社會在官吏制度方面，等級森嚴。「官」與「吏」有明顯的區別：「官者，治也；吏者，事也」（王，1987，46.10b）。尤其是在科舉制度誕生之後，[illegible]。但入元以後，由於[illegible]，蒙古本身缺乏嚴格的「官」、「吏」區分，[illegible]科舉選官之[illegible]，官、吏界限被打破，出現了官、吏共同執政的局面。[illegible]往往透過補用為吏，然後不斷升遷，由吏而官。[illegible]他們的[illegible]有儒學教授、山長、學正等[illegible]，[illegible]書吏[illegible]

官。」[illegible]（韓，1985，29-30）。據元人自己的估計，由吏入仕者佔元朝官員總數的百分之八十以上（姚，1987，1.11b）。

因為元代科舉之路不暢，儒士多以入吏的方式，他們成了元朝吏員的一個主要來源。儒者文化，所以元朝政府一開始就把任儒為吏作為國策：「詔到，省令儒生習試吏部縣吾寮屬之」（傅，1988，5.12a）。仁宗（1312-1319）時，「有省、省掾用儒士擢之」（袁，1966，18.4b），「仁宗設吏，首可令吏聘儒生為」（許，1978，72.2a）。元人陶宗儀有一段話概括地說明了當時儒人入吏的情形：「國朝以吏術治天下，中土之才積功簿書有致位宰相者，[illegible]雖門第之高華，儒流之[illegible]，皆[illegible]」（陶，1978，15.5b）。

據統計，在《元史》、《新元史》和《蒙兀兒史記》所作傳的八百四十名[illegible]以上的官員中，漢族人占了四百零七人，約為總數的百分之四十七。而這些漢族大官，出身科舉和學校的占百分之十，吏進的占百分之三十（孫，1992，97-97）。雖然元吏並非全由儒擔任，但是我們按元儒占元吏人數的一半來計算，《元史》等書所載的四百零七名[illegible]以上的漢族官員中，也有至少四分之一出身儒士。相比之下，享有與儒戶相同經濟待遇的僧、道、也里可溫、答失蠻等宗教人戶，除了某些人可以擔任宗教官員外，不可能去做一般的行政官和吏（蕭，1985，38）。

結論

[illegible]，我們[illegible]，[illegible]元代[illegible]包括元朝[illegible]儒士[illegible]，在蒙古統治之下[illegible]享有[illegible]優待的。[illegible]，也[illegible]賦役的民戶以及軍、站、匠等戶[illegible]。更主要的是他們有[illegible]的機會。[illegible]元朝[illegible]。由於[illegible]根腳[illegible]蒙古人和色目人的[illegible]，科舉[illegible]，[illegible]。[illegible]人在仕進方面[illegible]。[illegible]，元代儒人的社會地位[illegible]、[illegible]、[illegible]，[illegible]有

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A Case Study on Preschool Physical Education Curriculum in Zhuhai, China : Implications for Preschool Physical Education Reform in Hong Kong and Macau

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The purpose of this study was to examine the existing preschool physical education curriculum as implemented in a government nursery in Zhuhai, China through an ethnographic case study involving the use of participant observation, unstructured interviews, questionnaires and study of documents and records.

The results revealed that strictly based on the National Education Guidelines (Nursery), one structured physical education lesson of about 30 minutes per week was organized by two certified preschool teachers in the nursery. Also, a nation-wide preschool physical education syllabus was provided to all teachers for reference. Everyday, a 15 minute morning physical exercise session and a 60 minute physical activity session were arranged for children the nursery.The spacious indoor games room and outdoor playground with water pool and sand pool and the well-equipped large physical apparatus all contributed to a successful preschool physical education curriculum .

The study's findings have provided systematic and illuminative information as well as elements useful for the preschool physical education curriculum form in Hong Kong and Macau. These vital elements consist of : full government subsidy for early childhood education; the compilation of preschool education guidelines and syllabus; the provision of adequate facilities and equipment; and the offer of well-trained preschool teachers. Finally constructive recommendations on these aspects for Hong Kong and Macau are suggested.

幼兒體育課程的中國珠海個案研究：對香港和澳門幼兒體育課程改革之啟示

[illegible]

Introduction

The early childhood period can be defined from as " birth through age eight" (NAECY, 1982).The preschool years (3 to 6 years old) are crucial for learning development (Skinner, 1979; Kelly & Kelly, 1985; Opper, 1992) since this is the time when young children acquire many of the basic skills and abilities which serve as the foundation for subsequent development (Bloom, 1965; White & Watts, 1973; Opper, 1992). In early childhood education (ECE), movement has been viewed as the course of all learning and it is the essence of life through which young children learn (Vannier & Gallahue, 1978). Therefore, motor learning and development through spontaneous physical play and time-tabled physical education (P.E.) are essential parts of the ECE curriculum. Therefore, structured P.E. is highly recommended in preschool programs by the Council of Physical Education for Children (COPEC, 1994), National Association for the Education of Young Children (Bredekamp, 1987) and the U.S. Department of Health and Human Service (1992).

The contents of physical education in preschool programs consists of both fundamental motor skills and movement concepts. Children are ready to begin learning these skills and concepts by age 3 or 4 (Gallahue, 1989; Sanders, 1992). Evidence shows that learning fundamental motor skills may have a positive effect on self concept and social skill development (Gallahue, 1989; Williams, 1983). According to Lever (1976, 1978), children develop many social skills through their play experience. Consequently, participation in sports and games promotes the development of leadership skills, independence, assertiveness, and confidence (Lever, 1978). Participation in sports may also contribute substantially to cognitive development (Emmot, 1985).More convincing is the evidence that preschool P.E. programs can have a significant, positive effect on children's fundamental motor skill performance (Ignico, 1992, a; 1992, b) and health-related fitness (Ignico, 1990). In a word, the physical, social, mental, moral and intellectual values of early childhood P.E. have been scientifically and socially proven.

Zhuhai, Macau and Hong Kong are situated in the Pearl River Delta region and are modern cities forming a geographical triangle. Preprimary education (from age 3 to 6) is an accepted part of all the cities' culture. In Zhuhai, young children receive preschool education in nurseries which are regulated by the Zhuhai Education Committee (ECE section). In Macau, about 99% of young children between the ages of 3 to 6 years go to a kindergarten which is registered with the Macau Education and Youth Department. However, in Hong Kong, preschool consists of kindergartens regulated by the Education Department for 82% of the children, or of day nurseries regulated by the Social Welfare Department for 17%.

Preschool P.E. including both structured P.E. and free physical play is a compulsory unit in Zhuhai's ECE program. However, structured P.E. has been considered as a supplementary unit in the kindergarten curriculum of Hong Kong and Macau. In Hong Kong, according to the Child Care Centers Ordinance, Chapter 243, (1990), free play activities consisting of indoor and outdoor play should be arranged daily.

Evidence shows that it is a difficult task to conduct preschool P.E. programs in Hong Kong due to the major obstacles in non-unified preschool staff training systems (Opper, 1992, a); inadequate content and contact hours in P.E. (Wong, 1993, b); insufficient P.E. facilities and equipment (Wong, 1992); and an over-emphasis on academic performance from parents (Opper, 1994). In Macau, the extreme non-interventionist philosophy of the Macau government (Bray & Tang, 1994); insufficient P.E. facilities and equipment (Low 1994; Wong, 1994, 1995, b); and inadequate teaching resources (Wong, 1993, a; 1995, a; 1995, b) are the major difficulties. Consequently; preschool P.E. has been viewed as a dessert on the menu of early childhood curriculum in Hong Kong and Macau.

In Macau, usually time-tabled free play and P.E. lessons are scheduled twice a week and for 20-30 minutes a period in private kindergartens. Morning exercises are not compulsory. In Hong Kong , time-tabled 30 minutes free play and P.E. lessons are conducted in kindergartens five times and two times a week respectively; while compulsory 30-50 minutes free play and P.E. are usually conducted twice every day and twice a week respectively in nurseries. However, due to the shortage of outdoor playgrounds, insufficient play equipment and large P.E. apparatus, simple fundamental movement skills and manipulative skills dominate the P.E. curriculum in Macau and Hong Kong. As well as this, the lack of centralized kindergarten guidelines and syllabus and inadequate teaching

resources have hindered the development of preschool P.E in Macau. More than 46% of kindergarten teachers in Hong Kong (Education Department, 1994) and 36% of kindergarten teachers in Macau (Macau Education Department,1994) have not received any training in early Childhood education.

With an understanding of the major deficiencies in the P.E. curriculum in Macau and Hong Kong, the present study seeks to investigate the features and examine the characteristics of the existing preschool physical education curriculum of a typical government nursery in Zhuhai, the People's Republic of China. Afterwards, recommendations on preschool P.E. curriculum reform in Macau and Hong Kong are discussed .

Method

An ethnographic case study research was adopted for the study. Techniques used included participant observation, unstructured interviews, study of documents and records and questionnaire. A typical government nursery was selected in Zhuhai, China, in order to investigate and understand the program context from a holistic perspective. The underlying reasons for selecting the nursery included : it was a newly established government nursery (November, 1993); was typically well-equipped and spacious ; was famous for effective administration and management; the principal and staff were friendly cooperative; and the geographical site was convenient.

To obtain sufficient illuminative information a self-devised questionnaire was employed. (Appendix I). There were six sections in the questionnaire: the background, P.E. curriculum, P.E. facilities and equipment, teaching resource, safety precaution and teachers of the nursery.

Unstructured interviews were conducted with the principal of in order to obtain a thorough understanding of the implementation of the adopted P.E. curriculum in the nursery. The main focus of the interview was on the actual situation of implementation of the P.E. curriculum. It increased the reliance and relevance of questions. Interviews were built on and emerged from observations. The interviews could be matched to individuals and circumstances.

Participant observation was employed in the study by observing directly program implementation and other activities. By doing so, the researcher was better able to understand the context within which the program operated and to understand and interpret the program being evaluated through his personal knowledge and direct experience.

In the study of documents and records, the researcher had developed an in-depth knowledge of the nationally centralized P.E. guidelines and curriculum as well as school-based curriculum and syllabus in P.E. so as to grasp more direct and relevant program context. The information gathered could be used to increase knowledge and understanding about the implications being studied.

The study was conducted from January to May, 1995. Five steps were involved : approaching the nursery principal, conducting participant observation, conducting interviews, sending out and collecting the questionnaire and follow-up.

Two alternative approaches were employed in the study for data analysis : by 'instinct', and by 'qualitative analysis'. Analysis by instinct was adopted for the rich data collected by participant observation. Information collected from interviews was recorded and analyzed under the six sections as categorize in the questionnaire. Also, the data gathered from the questionnaire were analyzed directly by description.

Results

The integrated results of the study from the questionnaire, unstructured interviews and participant observation are noted below according to the five categories.

I.Background

The nursery was established on 15th November 1993, and was the 4th government nursery in Zhuhai, China. The nursery was situated in the Xiangzhou district of Zhuhai. The number of teaching staff and non-teaching staff were 25 and 17 respectively. Coming from other provinces of China, teachers were well-qualified, preschool diploma holders of an average age of 23.6. Figures showed that the teacher to pupils ratio was very low: K1-1:12; K2-1:13; K3-1:13. In practice, there were 2 teachers and 1 health helper for each class. There were 4 K1 (Aged 3-4) classes, 3 K2 (Aged 4-5) classes and 3 K3 (Aged 5-6) classes and with a total number

of pupils 152, 135 and 120 respectively.

In teaching, the activity approach was adopted. Teachers prepared work sheets and learning materials for pupils. No writing was allowed for pupils. Every day after the morning physical exercise, lessons started at 8:30 a.m. and ended at 4:30 p.m. intersected with breakfast, tea and lunch, afternoon nap and outdoor activities.

II.Physical Education Curriculum

Preschool physical education programs are strongly emphasized in China. In accordance with the ECE guidelines set by the National Education Committee, the nursery had arranged at least two hours' outdoor activity which including at least one hour's P.E. exercise for pupils. One structured P.E. class was conducted weekly for pupils. The duration of one P.E. lesson for each level was: 10-15 min. (K1), 20-25 min. (K2) and 30-35 min. (K3) accordingly. Both the Yearly Plan and Scheme of Work for each class were prepared well before the commencement of the semester. Teachers always followed the suggested ECE P.E. guideline and syllabus in teaching. However, they sometimes modified the activities with regard to the needs, abilities and interest of pupils. In structured P.E. lessons, the teaching units included: gymnastics, rhythmic exercises, games with/without small apparatus, outdoor activities, water activities, sand activities, basic sports and health knowledge lesson. Apart from time-tabled P.E. lessons, games day, children sports day and children gymnastic performance shows were launched yearly. Furthermore, every morning children gathered at the spacious playground and performed the 'Children Morning Exercise' for at least 15 minutes.

As far as teaching method was concerned, the 'direct method' with emphasis on games was employed.Teachers carried out systematic and specified formative evaluation in P.E. After school, they filled in the daily teaching log book and evaluated their own teaching.

III.Physical Education Facilities and Equipment

The nursery comprised of the following P.E. facilities: 3 outdoor playgrounds (2620 m2), 1 indoor games room (120 m2), 1 dance studio (120 m2), 1 outdoor sand pool (50 m2) and 1 outdoor water pool (100 m2). P.E. equipment consisted of large amount of small apparatus (Table 1) and large apparatus (Table 2).

IV.Physical Education Teaching Resources

Five ECE journals and magazines had been subscribed periodically in the nursery. There were 40 cassettes (Music), and 60 cassettes (Song) ECE P.E. teaching materials were stored in the teaching resource room of the nursery for reference and use.

V.Safety Precautions

Table 1: Outdoor Large P.E. Apparatus

Items	Number(s)
Plastic Combined Box	2
Plastic Climber	2
Iron Climber	1
Rope Climbr	1
Swing	1
Plastic Slide	5
Iron Slide	1
See-saws	2
Swinging Boat	2
Basketball Post	2
Large Box	7
Boxing Stand	1

Table 2: Small P.E. Apparatus

Items	Number(s)
Plastic Ball (small)	200
Rice Bag (Small)	100
Hoop	100
Rope (small)	100
Mini Stilts	100
Sand Play Materials	100
Bouncing Net	80
Bean-Bag	70
Touching Bag	50
Colored Band	50
Water Play Materials	50
Chest Stretcher	60
Wooden Dumbbe	50 pairs
Throwing Block	20
Rubber Quoit	10
Mattress	10
Tricycles	10
Rolling Ball (large)	6
Balance Beam	8
Used Tire	5

There was a well-equipped medical room in the nursery. During school hours, a registered medical doctor and nurse were on duty. Daily medical check-ups were conducted for pupils during the morning and afternoon sessions. In the beginning of academic year, parents were asked to fill in a "Form on Pupil's Health Condition". Moreover, teachers were assigned to check the P.E. facilities and equipment twice a week.

In sum, the government of China supported the preschool education sector fully in terms of teacher training cost; teachers salaries and fringe benefits; provision of facilities and equipment; provision of teaching resources and guidelines as well as running expenses for the nursery.

RECOMMENDATIONS

Based on the findings, sufficient and illuminative information has been collected from this case study. It provides important implications for the preschool P.E. curriculum reform in Hong Kong and Macau . Listed below are the six major recommendations: government's role and support, P.E. curriculum reform, P.E. facilities and equipment, P.E. teaching resource, P.E. promotion and Teachers.

1. Government's Role & Support

The degree of the government's willingness of the acceptance of early childhood education as a fully-aided sector has greatly influenced the quality of education. The recommendations consist of:

- playing a more active and initiative role in ECE in Hong Kong and Macau;
- strengthening the existing in-service training for early childhood educators in Hong Kong and Macau;
- supplying extra professional staff in the Education Department (ECE Section) in Hong Kong and Macau;
- accepting early childhood education as the fully-aided sector in Hong Kong;
- unifying and articulating the training structure for both kindergarten and child care sectors in Hong Kong;
- offering extra funds to private kindergartens for the purchase of teaching materials in Macau;
- providing professional support and advice to private kindergartens in Macau.

2. Preschool Physical Education Curriculum Reform

Structured P.E. lessons are crucial to total education for children. There is an urgent need for preschool P.E. curriculum reform in Hong Kong and Macau. Listed below are the recommendations:

- establishing a P.E. Curriculum Reform Committee to be responsible for reform work;
- setting education ordinance on the implementation of Structured P.E. lessons and Free Physical Play in kindergartens; such as the frequency, intensity, time and type of exercises (FITT) of P.E. lessons; and
- compiling the ECE P.E. teaching guide and syllabus for teachers.

3. Physical Education Facilities & Equipment

Adequate P.E. facilities and equipment are vital components of a successful ECE P.E. program. Therefore, the recommendations are as follows:

- constructing multi-purpose playgrounds in different districts;
- renovating the out-dated recreational playgrounds and parks;
- exploring the indoor playgrounds and games rooms in kindergartens;
- recommending a standardized P.E. equipment list to kindergartens;
- providing extra funds to kindergartens to purchase P.E. equipment; and
- strengthening the practice in the examination and maintenance of P.E. facilities and equipment.

4. Physical Education Teaching Resources

Sufficient teaching resources may facilitate teaching processes and up-date teachers' knowledge. Therefore, the availability of adequate teaching resources is crucial to teachers. The recommendations consist of:

- setting up a particular ECE Unit in the existing Teaching Resources Center;
- recommending a ECE P.E. teaching resources list including audio-visual materials, periodicals and references etc. to kindergartens;

- producing localized P.E. teaching kits, teacher aids and materials;
- circulating up-dated teaching materials to kindergartens; and
- increasing education funds for teaching resources centers.

5. Preschool Physical Education Promotion

The Education Department of Hong Kong and Macau should raise the profile of ECE Physical Education through collaborative and cooperative effort among departments concerned and kindergartens. The recommendations include:

- organizing ongoing preschool physical education campaigns, e.g. sports carnival, sports festival, and games day etc.;
- launching ongoing parent education programs, e.g. parent day, parent education seminars and parent-children sports day etc.;
- launching preschool physical fitness award schemes and the outstanding healthy children award campaign; and
- publicizing sports and health newsletters periodically.

6. Teachers

The status of preschool teachers in Hong Kong and Macau has always been low. However, preschool teachers' roles are important in children's' education. Listed below are the recommendations:

- standardizing the pay scale of all kindergarten teachers according to their qualifications, teaching experience and special duties assigned;
- confining the basic minimum preschool teacher qualification to diploma/certificate in ECE;
- offering adequate INSET (In-service Education for Teacher) programs for kindergarten teachers during long holidays, and weekend;
- providing post-graduate ECE programs for teachers who are B.Ed. holders;
- encouraging kindergarten exchange program on a short term basis; and
- limiting the class size to not more than 20 in Hong Kong kindergartens; and not more than 35 in Macau private kindergartens.

To summarize, information acquired from the study makes practical and constructive recommendations for ECE P.E., particularly in Hong Kong and Macau, namely: government's role & support, curriculum reform, facilities & equipment, teaching resources, promotion and teachers.

Conclusion

Numerous research studies have shown the educational value of preschool physical education to young children's all-rounded development in the preschool years from 3 to 6 are important. These formative years are important ones in the life of a person because young children acquire the basic knowledge, skills, dispositions and attitudes that will determine their future learning and establish the foundations for their subsequent development. In ECE programs, through the participation of structured P.E. lessons and free physical play, young children's fundamental movements, and physical fitness will be developed and enhanced. Simultaneously, physical education and play provides opportunities for children in the acquisition of social and ethical manners, sportsmanship and friendship. Therefore, the carry-over value of preschool P.E. is life-long. In kindergartens, frequent and meaningful age appropriate instruction and practice opportunities should be provided by preschool teachers (COPEC, 1994). They should also recognize the importance of purposeful movement for young children. According to Bredekamp (1987):

> *"Children have daily opportunities to use large muscles by running, jumping, and balancing. Outdoor activity is planned daily so children can develop large muscle skins, learn about outdoor environments, and express themselves freely and loudly." (P.56)*

This study has generated illuminative data on the early childhood P.E. curriculum in Zhuhai, China, based on an ethnographic case study approach. The findings have provided crucial guidelines useful for the preschool P.E. curriculum reform in Hong Kong and Macau. Despite the social and cultural differences, Zhuhai's experience in the successful implementation of preschool P.E. curriculum may already set a good example for Hong Kong and Macau. As a matter of fact, during the post-transition period, Hong Kong and Macau should consider the improve the quality of early childhood

education particularly in physical education which has been neglected by preschool educators and parents. The strategic actions for recommendation on early childhood P.E. consist of government's role and support, P.E. curriculum reform, P.E. facilities and equipment, P.E. teaching resources, P.E. promotion and the teachers.

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珠海市政府幼兒園體育課程

- 請將合適答案編號塡寫於右面空格內。
- 如果答案是「其他」請塡上資料於「其他」項目之空位上；也「✓」上合適之項目。一切資料定必保密，多謝合作。

I. 體育課程

1.1 每一班級每星期有多少節體育課？
1.一節 2.二節 3.三節 4.四節 1.1___
5.其他________________(請詳列)

1.2 每節體育課有幾多分鐘？
1.二十分鐘 2.二十五分鐘 3.三十分鐘 4.三十五分鐘 1.2___
5.其他__________(請詳列)

1.3 體育課是否安排運動常來任教？ 1.是 2.否 1.3___

1.4 貴園有否制定各級全年之體育課程分配（以單元形式編訂）？ 1.有 2.否 1.4___

1.5 貴園有否制定各班全年之體育教學工作計劃（教學進度）？ 1.有 2.否 1.5

1.6 貴園有否制定每個體育單元計劃？ 1.有 2.否 1.6___

1.7 貴園有否設立體育科小組？（如「有」請繼續答1.8和1.9題） 1.有 2.否 1.7

1.8 貴園有否定期召開體育科會議？ 1.有 2.否 1.8

1.9 貴園平均每學期召開多少次體育科會議？
1.一次 2.二次 3.三次 4.四次 5.其他____________________(請詳列) 1.9___

1.10 貴園教師有否依據園方訂定之體育課程來教學？ 1.10___
1.有 2.否 3.不合用（如果貴園沒有編訂體育課程）

1.11 貴園是否有體育課程指引作依歸去制定體育課程？ 1.是 2.否 1.11

1.12 貴園之體育課程內容包括哪幾項？（請 ✓ 出合適的答案） 1.12
1.體操課________2.韻律課________3.徒手遊戲課__________
4.用具操作遊戲課_________5.戶外活動課（大器械）___________
6.評核課（基本能力之測試）_________7.體育健康常識課________
8.沙池活動課_____9.水池活動課_____
10.其他________________(請詳列)

1.13 貴園每年舉辦甚麼體育性活動？ （請 ✓ 出合適的答案） 1.3
1.遊戲日________2.親子體育活動___3.運動會________
4.體育性參觀____________
5.其他________________(請詳列)

1.14 貴園有否定立體育課之評核？ 1.有 2.否 1.4___
（如「有」請繼續答1.15和1.16題）

1.15 每學期有多少次評核？ 1.5
1.一次 2.二次 3.三次 4.四次 5.其他____________________(請詳列)

1.16 體育課之評核內容是甚麼？ （請 ✓ 出合適的答案）
1.6___
1.技能__2.態度__3.體能__4.常識__5.其他_______(請詳列)

1.17 貴園教師是否配合活動教學之主題來教授體育課？ 1.是 2.否 1.7

1.18 貴園教師採用哪種教學方法來教授體育課？ 1.8
1.直接教學法 2.間接教學法 3.混合教學法 4.其他_______(請詳列)

II. 體育設施和器材

2.1 貴園有甚麼體育場地？ （請詳述合適之項目數目）
1.體育活動室____個，總面積____________平方米
2.沙池________個，總面積____________平方米
3.水池________個，總面積____________平方米
4.游泳池______個，總面積____________平方米
5.戶外體育場地___個，總面積____________平方米
6.韻律室______個，總面積____________平方米
7.其他________(請詳列)

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2.2 貴園有甚麼大型體育器械？

1. 組合架(膠製式)______件　2. 攀爬架(鐵製式)______件
3. 攀爬架(鐵製式)______件　4. 攀爬架(膠製式)______件
5. 鞦韆______件　6. 蹺蹺板______件
7. 滑梯(膠製式)______件　8. 滑梯(鐵製式)______件
9. [illegible]轉______件　10. 籃球架______件
11. 木船(搖盪式)______件　12. 大積木______件
13. 單人之動物跳跳______件
14. 其他 ________________________________
________________________________(請註明)

2.3 貴園有哪些體育用具？　(請選擇合適之項目填寫)

1. 豆袋______個　2. 藤圈______個　3. 膠圈______個
4. 小膠球______個　5. 大膠球______個　6. 布球______個
7. 小汽車______輛　8. [illegible]輪車______輛　9. 滑行車______輛
10. 大跳繩______條　11. 短繩______條　12. 長繩______條
13. 充氣棒______條　14. 軟墊______張　15. 快樂傘______張
16. [illegible]______張　17. 膠墻______件　18. 紙磚______件
19. [illegible]______與　20. 膠路[illegible]______件　21. [illegible]______件
22. 玩沙用具______件　23. 玩水用具______件　24. 膠墊______塊
25. [illegible]______條
26. 其他 ________________________________
________________________________(請註明)

2.4 [illegible]貴園體育設施有何意見？
1. 非常滿意　2. 滿意　3. 無意見　4. 不滿意　5. 非常不滿意

2.5 [illegible]貴園之體育器材有何意見？
1. 非常滿意　2. 滿意　3. 無意見　4. 不滿意　5. 非常不滿意

2.6 貴園有[illegible]體育設施？　1. 有　2. 否
[illegible]有，請[illegible]學校[illegible]

2.7 貴園有[illegible]體育器材？　1. 有　2. 否
[illegible]有，請[illegible]學校[illegible]

2.8 貴園有[illegible]體育設施？　1. 有　2. 否
[illegible]有，請[illegible]學校[illegible]

III. 體育教學資源

3.1 貴園有[illegible]體育教學參考資料？　1. 有　2. 否
[illegible]有，請[illegible]數量：
[illegible]

3.2 貴園有[illegible]體育[illegible]？　1. 有　2. 否

3.3 貴園有[illegible]體育[illegible]？　1. 有　2. 否

IV. 體育安全措施

4.1 貴園有[illegible]醫療室？　1. 有　2. 否

4.2 貴園有[illegible]醫護人員？　1. 有　2. 否
[illegible]有，請[illegible]

4.3 貴園有[illegible]急救用品？　1. 有　2. 否
[illegible]

4.4 [illegible]數量
[illegible]

4.5 貴園有[illegible]？　1. 有　2. 否

4.6 貴園有[illegible]體育[illegible]？　1. 有　2. 否

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4.7 貴園有否訂立「處理意外」的行動程序 ? 1.有 2.否 4.7.__

4.8 貴園有多少位教師持有「有效急救證書」? 1.有 2.沒有 4.8.____
(如「有」請詳列人數_____)

4.9 貴園有否安排「學生健康檢查」? 1.有 2.否 4.9.____
(如「有」請詳列每星期多少次:_____)

4.10 貴園之設施如牆角、柱等有否蓋上軟墊? 1.有 2.否 4.10.____

4.11 貴園近體育場區之窗有否蓋上軟鐵網? 1.有 2.否 4.11.__

4.12 貴園體育室/遊戲室內之窗有否蓋上鐵網? 1.有 2.否 4.12.____

4.13 貴園有否安排教師/員工定期檢查體育設施? 1.有 2.否 4.13.____
(如「有」請詳列每星期多少次:_____)

4.14 貴園有否安排教師/員工定期檢查體器材? 1.有 2.否 4.14.____
(如「有」請詳列每星期多少次:_____)

V. 教師資料

5.1 貴園有多少位全職幼兒教師? _____位

5.2 貴園全職幼兒教師的年歲為何?
1. 19 歲或以下___位 2. 20-24歲___位 3. 25-29歲___位
4. 30-34歲_____位 5. 35-39歲___位 6. 40歲以上___位

5.3 貴園每位教師與學生的平均比例為何?
1. 幼低 (K1)_____比_____ 2. 幼中 (K2)____比_____
3. 幼高 (K3) ____比_____

5.4 請列明貴園全職幼兒教師的最高資歷及人數。
(珠海市園長請說明貴園各職級之教師數目,如:高級、一級、二級、和三級教師)

5.5 貴園全職幼兒教師是否全都來自本地? 1.是 2.否 5.5.
(如「否」請列明她們的來處及數目_____
_____)

VI. 其他

6.1 請列明貴園各級的學生人數。
1.幼低級(K1)共___位 2.幼中級(K2)共_____位 3.幼高級(K3)共_____位

6.2 請列明貴園各級之班數。
1.幼低級(K1)共___位 2.幼中級(K2)共_____位 3.幼高級(K3)共_____位

6.3 請列明貴園的創校年份和日期。 19_____年_____月_____日

6.4 請列明貴共有多少位非教學員工。 共_____位

6.5 請分享貴園現在於推動體育課程時遇到之困難/問題。

6.6 請提出可以改善貴園體育課程的有效建議。

(全卷完,多謝寫忙)

'Statement Of Aims' and Preparation for Working Life: Challenge and Opportunity.

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In September, 1993 the Hong Kong Government published 'School Education in Hong Kong: A Statement of Aims'. It was both an attempt to set out for the first time a formal expression of aims for education in Hong Kong and a reply to criticism from academics over a period of time. The document set out a framework of aims supported by reasons and backed up by principles. It was published after consultation with interested bodies.

This paper examines what 'Statement of Aims' intends in terms of preparing pupils for the transition from school to working life; compares the experience of other countries in this respect; discusses the nature of the provision made in Hong Kong; and the implication of these aims in terms of changing conditions and expectations.

「課程指引」與職業培訓：挑戰與機會

在一九九三年九月，香港政府出版了《香港的教育：課程指引》，這是香港政府第一次正式列出香港的教學目標；也是對學界批評批評的回應。這份文件列出了教學目標的架構，並說明了背後的原則和理由，經過諮詢後，公開發表。

本文試從「準備學生從學校到工作」的角度，探討「課程指引」的原意，同時比較其他國家在這方面的經驗。本文亦討論香港的情況；香港的環境和期望正不斷改變，本文探討這些改變對「課程目標」的影響。

Introduction

Any attempt at establishing a set of aims for education can be broken down into two main elements - those concerning the personal development of pupils and those relating to their economic significance. The first goal reflects liberal-humanist values dating from the Aristotelian concept of education as being for the 'whole person' which have a long tradition of acceptance by the educational community. Education is generally less comfortable with the second category, representing a market-determined view of education for which most societies have been content to establish a segregated sector of vocational education in which 'training' is distinct from 'education'. In many countries, however, a vocationalisation of the school curriculum is now taking place as countries seek to establish a relationship between their economic performance and the effectiveness and relevance of their educational provision. It is the nature of the provision that is made for this end that is of debate at present as the merits of specific vocational preparation for jobs is argued against the claims of general education within which the significance of a work-oriented future is recognised.

'Statement of Aims' is clear in its intention that Hong Kong schools should achieve both sets of aims. The 'Fundamental Aim' notes that schools should equip pupils to 'play a positive role in the life of the community', and Aim 7 more specifically requires that 'school education should aim to meet the community's need for people who can contribute to Hong Kong's social and economic development'. The interdependence between the world of education and the world of work has long been recognised. Banks (1968) noted 'that in any society the educational system will be linked to the economy' and saw changes in education as often a response to economic needs. More recently, the 'National Goals for Education' produced by the U.S. Department of Education (1990) included the statement "every school in America will ensure that all students learn to use their minds well, so that they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy".

'Statement of Aims' sets an agenda for enhancing the quality of education provision in Hong Kong, and attempts to define the roles of those contributing to it. It could also be seen as an opportunity for a re-examination of the role of education in terms of its implications for the investment made in the young people who will be contributing to the forttines of Hong Kong in the future. The question of how Hong Kong views the responsibility of preparing its young people for their working lives and for the task of satisfying the demands of society is therefore a pertinent one in the present context of economic and social change.

What is work?

What do we understand as 'work'? The term is widely used and accepted generally without question but precise definition is difficult. Initially, the word implied suffering, as in the French 'travail' and the definition accorded it by the French encyclopaedists - "Work is an everyday occupation to which man is condemned by his needs". A number of points are raised in this which may help in moving some way towards a working definition. As an 'everyday occupation' the assumption is clearly made that work is usually of a regular and long-term nature, specifically in one form of employment. To be 'condemned' by 'needs' raises the issue of work as necessity, not only for oneself but as a form of service within a wider society, certainly with implications of hardship. We are left with at least a basic understanding of work as a commitment of a substantial nature in all our lives. It may also be relevant to think of work in terms of effort and achievement as in the great 'works' of musical composers or literary figures.

Work has also been seen as a form of discipline and social control, often with religious backing as in the development of the 'Protestant work ethic'. Adam Smith and Karl Marx later produced economic views of work in terms of productive capacity and wealth creation, changing the concept from one based upon necessity to one in which value was created.

Today, a consideration of the place of work in society prompts a complex mixture of emotions and is variously thought of as something which provides one with a social identity and status, a measure of achievement, and as something largely responsible for one's values, attitudes, and beliefs. Watts (1987) has suggested that a wider definition of work is now needed as many societies find it impossible to achieve full employment. The traditional concept of 'work' with its attendant understandings and emotions may need to be replaced by a wider concept which includes non-paid and non-structured work and earnings paid as benefits from the state. This wider definition will have to provide a context within which individuals will have to establish their personal identity, their contribution to society, and their economic survival.

Education and Work

Although we have noted the inter-dependence between work and education, we also have to accept that traditionally both sectors have operated quite separately and seem to represent very different cultures. Apart from clearly-defined schemes of vocational education, often at post-compulsory school age, education generally has made little attempt to meet the demands of work which in most cases provides for its own training needs.

What, therefore do we consider to be the responsibility of the education sector to the world of work? Watts, (1978) distinguishes 4 major functions:-

(a) the 'selection' function of providing qualifications which can form a basis for selection for training and for opportunities in employment;

(b) the 'socialisation' function of developing pupils' attitudes to work;

(c) the 'orientation' function of helping pupils to understand the world of work and their place in it; and

(d) the 'preparation' function of developing specific skills and knowledge (4).

The question of how these functions can best be served in our schools can then be put. A traditional connection seems to be made between the needs of the workplace and a

vocational form of education. The changing nature of the employment scenario outlined above may have different implications for educational provision however, and the value of general, as opposed to vocational, education is now being appreciated.

The four functions noted by Watts are surely capable of interpretation in a wider 'general' sense as well as in a more narrow 'vocational' sense. 'Qualification' in (a) for example can be very wide ranging and equally the 'specific skills and knowledge' in (d) need not necessarily refer to specific vocational activities. Whilst general education can meet the demands for the 'orientation' called for in (c) and the 'socialisation' in (b) it can also meet the requirements for equipping pupils with the skills, qualifications and knowledge. The assumption that 'preparation for working life' is exclusive to vocational education is often made and should be avoided.

A comparative viewpoint

Most advanced industrial countries in recent years have witnessed a change of emphasis in their educational systems from the more liberal model to a more vocationalised one. In Australia, the Finn Committee in 1991 and the Mayer Committee in 1992 both highlighted the importance of employment related 'competencies'. The nature of the conclusions of the Mayer Committee are highlighted in the title of one of its publications - 'Putting General Education to Work', which emphasises competence as being the ability to 'do' something instead of simply 'knowing'. Knowledge is assumed but cannot itself be a competence.

It is in the U.K. however, that the most dramatic developments can be seen. British education has traditionally been of a classical 'liberal-humanist' mode with industry and business providing for its own training needs by the apprenticeship system. The late 70s witnessed an abrupt change of direction as what has been termed the 'Great Debate' focused attention upon the accusation that 'education is not meeting the needs of industry' and took the form of an ideological attack upon the perceived limitations of a liberal education. Development in education since that time has almost exclusively dealt with attempts to make schooling more relevant to the needs of employment by the 'new vocationalism' intended for all pupils.

The government showed its commitment to educational change in this direction in a succession of documents. The 1977 Green Paper noted as one of its aims that education should "help children appreciate how the nation earns and maintains its standard of living and properly to esteem the essential role of industry and commerce in this process". In 1981 'The School Curriculum' echoed similar sentiments, stating that education should "be related to what happens outside school and give pupils a better understanding of the economic base of our society".

Changes in the structure and organisation of education and training followed rapidly. The links between education and work became more visible as the Manpower Services Commission (MSC), formerly with functions relating only to employment, acquired responsibilities within the education sector. It was responsible for financing the TVEI (Technical Vocational Education Initiative) which was set up in 1982 to provide a technical and vocational bias to the curriculum for pupils in the 14-18 age-group. Later developments confirm the consistency of government intention to change the nature of British education to a more relevant and vocational provision. The theme has been continued with the advent of the National Curriculum and the introduction of GNVQ (General National Vocational Qualifications) into secondary schools in 1992/93.

Education in the UK is now significantly oriented towards links with working life. But what is the nature of it? Much has been stated of specific vocational provision but the main theme has been to change the nature of general education. Official documents have been generally concerned with defining the role of industry and its importance in society, e.g. the comment made in discussion papers issued by Her Majesty's Inspectorate (1978) that schools had the responsibility of ensuring the 'development of flexible and responsible attitudes to work.' Whilst many of the initiatives have had a strong vocational thrust it is clear that the effects have been intended to impact upon the curriculum as a whole. If the perceived need has been that of greater relevance of studies to the world of work then this would imply the involvement of all school pupils and thus be a part of general education.

Educational provision in Hong Kong

Societies differ in the way educational provision is made, e.g. as we have seen, the UK now includes work-oriented studies within the school curriculum while the USA and Japan continue with general studies into higher education. In Hong Kong, a clear distinction is made at secondary level between grammar schools which offer an academic education and technical and prevocational schools in which the curriculum is oriented towards practical and technical subjects. This distinction is visible as long ago as 1953 with the publication of 'A Report on Technical Education and Vocational Training in Hong Kong'. The Report notes that the system of education "has always been formal, academic and over-dependent upon learning by rote", and that "The earliest schools in Hong Kong were undoubtedly influenced by this tradition". The Report concludes that "As a consequence, education in Hong Kong has tended to be academic at all levels and it is only in recent years that handicrafts, practical work and technical education have received the attention that they receive in other parts of the world'. The need to ensure that the educational system serves the needs of the economy is explicit in most official documents since this time and Lee (1991) has concluded that 'the government has increasingly geared education towards the economic and industrial development of Hong Kong'.

At junior secondary level however, the aim is to provide a common course of general education as part of a common-core curriculum continued from the primary stage during the period of free and compulsory education. 'Statement of Aims' echoes previous intentions regarding the purposes of education, e.g. the Green Paper of 1973 'Report of the Board of Education on the Proper Expansion of Secondary School Education over the Next Decade' noted "As we see it, education should strive to develop individuals who are curious, imaginative and creative....." and continued "Inherent therefore in our overall aim of education is the efficient development of intellectual, vocational, and interpersonal skills relevant to the individual as he takes his place in Hong Kong.". Educational developments consequent upon this seem to have resulted in separate provision to satisfy 'intellectual, vocational, and interpersonal' objectives, resulting in a rather more rigid distinction between them than may have been originally intended.

This distinction between education for general and vocational ends is clearly evident in 'Statement of Aims'. Aim 11, dealing with practical and technical skills, states unequivocally that 'developing job-specific skills is the task of the separate vocational training service'. Unfortunately, this follows a reasoned argument for the importance of fostering creativity by allowing pupils experience in dealing with practical problems, experience which, it is nevertheless felt, 'can also help the student develop attitudes which will be useful in later study, work and life'. The experience of other societies, notably the U.K. in this respect, suggests that a 'new vocationalism' embodies a healthy incorporation of work-oriented elements within general education, made available to all pupils, and having as its aim an understanding of the role and importance of work in people's lives. 'Statement of Aims' would not seem to be giving a lead to possible developments of this kind, developments which seek to establish vocational and general education as having mutual needs and compatible objectives.

Statement of Aims and interpretation

In seeking to ensure these functions are met in schools in Hong Kong a few implications immediately arise.

a. Whilst we have looked at work in its social implications, we can also accept that the world of work into which our present pupils will emerge will be a rapidly changing one in many respects. Recent years have seen the graduation of Hong Kong from a primarily manufacturing economy to today's sophisticated service economy. The pace of change here is so fast that the territory is periodically called upon to reinvent itself, something it may currently be doing as many of the service-related jobs in the territory move over the border into Guangdong. This has brought with it considerable change in the pattern of employment and the qualifications and skills required to meet challenges. It is certain that employment will continue to respond to the technological imperative which is conditioning the nature of work at the end of the twentieth century. What is also certain is that education has also to respond by ensuring its products have the adaptive skills to cope with a working environment constantly undergoing change. Hirsch (1992) notes "Both the growth in the service sector and the technological transformation of manufacturing have created the need for

more workers capable of initiative, thought, and group co-operation, and fewer mere order-takers'. 'Statement of Aims' is consistent in echoing similar sentiments.

b. The most usual response to the publication of a set of aims for education is often reform of educational structures. A more positive and relevant reaction could be to pursue changes in teaching methodology. Among the more challenging aims in 'Statement of Aims' are those which include education to cultivate 'independent-minded' and 'creative' qualities. It is difficult to envisage any assault upon such aims which do not embody commensurate changes in teaching methodologies. Surely 'relevance to work' implies 'working practices' in the classroom? Any form of activity-based learning inculcates learning in the form of both knowledge and skills which can be put to use in working life. Pupils engaged in activity-learning with their peers develop the all-important skills such as analytical ability, judgement, and higher-order thinking skills. It is by more pupil-centred and participative learning activities that pupils develop in their formative years an awareness of their role in society and begin to develop the attitudes and values necessary to fulfil that role.

c. Finally, the thought that the ideal preparation for working life is to accept work as an experience which can enhance education has to be given consideration. Education is justly proud of a traditional adherence to 'pure' theoretical approaches but many societies are now accepting that the 'applied' dimension has been neglected. Dewey propounded a view of education starting with real experiences - all experiences, including working occupations - and basing educational approaches upon this. The incorporation of the concept of work in this way ensures that education becomes 'about' work and not 'for' work as the knowledge gained from the study of occupations is simply part of a pupil's general education. In such ways may lie the possibility that pupils enjoy learning experiences which provide opportunities for them to make the relationships between a present existence at school and a future at work and at the same time achieve agreement between the previously distinct and separate aims of a liberal and vocational education. The 'independence', 'creativity', and 'originality' sought by 'Statement of Aims' throw out a challenge to the educational community which can only be met by a general education incorporating work as part of the curriculum and ensuring that graduates of Hong Kong schools are both educated and employable in a changing world.

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Reflections of a New Teacher - Peer Supervision in Teacher Development

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Peer supervision developed as a structured system for observing and conferring with teachers can be an important and useful tool for new teachers' professional development. This paper, written in the form of a journal, uses narrative to trace a novice teacher's personal and professional growth as she reflects on her experience of being observed and supervised by more experienced peers. The integration of "context-based", "people-based" and "process-based" factors in her experience serves to illustrate some of the basic principles of structured and successful peer supervision.

一名新教師的反思同儕視導與教師發展

[illegible]

Note on the Artiele:

This paper differs from other academic articles in this volume in both style and format. First, it uses a narrative approach. Narrative inquiry is founded on the belief that human experience is basically storied experience. In narrative inquiry, researchers come to grips with the storied quality of human experience and record stories of educational experience. These stories directly represent human experience and are educationally meaningful for participants and readers.

The narrative is written in the first person, in keeping with other methods such as diary and journal writing in teacher development. This acknowledges that the practitioner utilizes his or her personal experience in making decisions. He or she draws on experience both in rational planning and in intuitive actions, resulting in what Connelly and elaudinin (1985,1988,1990) refers to as 'personal practical knowledge'. It recognizes that knowledge is shaped and reshaped during experience and leads to a personal reconstruction of meaning. Reading other people's stories is also an important form of experience.

In this presentation is such that narration on the left side of the page is complemented by comments and questions on the right. The narration on the left not only reflects personal attitudes and beliefs, but also incorporates some objective explanations and academic references. The right 'Comments' column highlights relevant points and raises questions at suitable points of the narrative to help readers think about issues. 'Reflection' as an increasingly important theme in teacher development is illustrated in this integration of content, style and format as a new teacher traces her private journey of personal and professional development.

Evelyn Yee-fun Man

Introduction to Peer Supervision

I am a new English teacher at XXX School, having just completed some brief pre-service teacher training. I slept very badly last night because I was very nervous about being observed in class today. The panel chairperson of the school will observe my classes later on for the first time.

The principal, Mr. T. Chan, is a progressive and open-minded educational administrator. He was educated abroad and has introduced the concept of "peer supervision" in the school to help new teachers develop professionally. The idea is to make use of peers as supervisors and important resources that can offer assistance, guidance and insight to fellow teachers (Showers, 1985), a scheme which I find very useful as a novice teacher. Many of my friends who are new teachers in Hong Kong, once they start teaching, are thrown at the deep end with little professional support. Even when there is support, it tends to be informal and haphazard.

The principal introduced peer supervision "as a structured system for observing and conferring with teachers to help them improve instructional practices and teach more effectively" (Cogan, 1973; Acheson & Gall, 1981). Instead of the occasional observation of a teacher in action, the principal suggested that peer supervision should take on a "clinical" approach in which 1) the whole process is systematic, structured and organized; 2) there is a planned and deliberate focus on problem-solving, data-collecting and pattern-detecting, providing opportunities for both the observer and the observed to gain awareness of their professional practice (Glatthorn, 1984); 3) there is a 'diagnostic' as well as a 'nurturing' aspect on the part of the supervisor; 4) the supervision is on-going and cyclical in nature.

In fact, the kind of supervision proposed is related more to 'coaching' than to 'inspection' (Goldsberry 1984), i.e. it is more concerned with peer assistance than with formal assessment. This form of co-operative professional support taking place in a collaborative and collegial working environment can be a very useful means to reducing the discrepancy between actual teaching behaviour and ideal teaching behaviour, benefitting both the observer and the observee. To have the opportunity to observe as well as be observed by other teachers, and discuss with them what good professional practices are, will help me apply theory to practice. My pre-service teaching training only involved being observed in class twice throughout the entire programme, which was by no means adequate. Research has consistently shown that teachers depend informally more on their peers rather than principals or trainers for sustained support and instructional help in school.

Comments

- teachers, even experienced ones, worry about being observed - a common phenomenon. Why is that? What exactly are they worried about? What can be done to minimize worry?

- to be observed by teacher trainers is common, but to have peers as supervisors to help teachers grow is as yet not too common in HK - a feature worth thinking about and a possible direction for principals and teachers as we explore different avenues for teacher development

- lack of systematic support for new teachers - in what way can the novice benefit from the professional expertise of the experienced teacher? How can the school help in this?

- the importance of sharing - not just skills, but also ideas, beliefs, experiences etc. to maximise benefits of supervision

why depend on peers more? Are they just more easily available, with fewer status and power considerations?

The Context

Mrs. Yeung, the English panel chairperson of the school, is a very experienced teacher, highly responsible, committed to her job, popular among staff and in many respects my mentor. I get along well with her. The principal has designated her as my 'supervisor' in school who will observe my classes and help me improve my teaching.

- panel chairperson is usually in a position of authority; it also acts as a supervisor - what implications? Experienced teachers often assume a sense of authority and superiority. Also, Chinese society reveres authority - can equality among peers be achieved in school? If so, how?

Ever since I joined the school, Mrs. Yeung has made it clear that she would only observe my classes when I felt I was ready. I was glad that she respected my feelings and let me decide when to invite her for observation. The fact that right from the start, she made it plain that supervision would be conducted in a non-threatening atmosphere was very reassuring. For me, observation and supervision have been associated too much with evaluation, and though formal evaluation does have its place in teacher development, it can be intimidating to an inexperienced teacher. New teachers are often seen in a "defective" light (Fraut, 1987), lacking awareness and perception of how change can be brought about, of how improvements can be made, of not willing or able to take up responsibility for change. Such a view inevitably places great strain on the relationship between the supervisor and the novice teacher.

- some teachers/trainers prefer knowing in advance when observation will take place, but others prefer not knowing. What are the merits and demerits of the different approaches?

- importance of a non-threatening atmosphere for professional growth - what advantages/ disadvantages for the observee?

- what should be the relationship between "observation", "supervision" and "evaluation"? How are they different? What is the difference in nature and emphases between peer assistance and formal evaluation?

I am glad that no such strain exists between Mrs. Yeung and me. She explained to me that the supervisor's task is threefold: 'diagnostic' to find out the teacher's level of professionalism and identify areas for improvement, 'tactical' in adopting a directive, collaborative or non-directive approach to solve problems, and 'strategic' to help accelerate the teacher's level of abstraction and commitment (Blumberg & Stevan Jonas, 1987). Ideally, she said, the supervisor should help the new teacher become a reflective, self-directed, autonomous individual with the ultimate goal of making the novice less and less reliant on the supervisor and finally taking charge of his or her own improvement.

- what autonomy and professional expertise does the observer and the observee have? What initiative lies with each of them?

- what should be the relationship between the supervisor and the teacher being supervised - issues of power, status and interaction relationships affect peer assistance and supervision programmes

The Lesson to be Observed

Today, I shall try out a new unit that May and Lisa, two of my colleagues, had adapted from the textbook. Mrs. Yeung had been invited to observe the class.

May, Lisa and I had planned a unit of speaking activities in English for a Primary 4 class. The students would use English to buy and sell items of their choice. The items ranged from clothing and toys to food and stationery, and would be brought into the classroom by students and teacher. Paper money and paper coins would be used in transactions which would involve the language of numbers, of buying and selling, and certain English vocabulary items.

- value of collaborating with colleagues on curriculum and materials development, much potential for peer assistance exists

Grammatical structures such as question patterns beginning with "which" would be practised. Students would have the freedom to choose what they wanted to buy and sell and would be involved in various role-play activities. "Comprehensible output" in English by students would be examined.

- what traditional peer interaction patterns were in effect among the teachers in the school - how do they affect teacher development ?

Because May and Lisa were more experienced teachers than I was and had attended in-service retraining courses, they were much better at gauging students' second language competence and anticipating their reactions. They knew how well the students could cope with the complexity of certain vocabulary or grammatical structures, something which I was unsure of. We worked together as a team and there was a genuine spirit of co-operation and collaboration as we refined our concepts regarding the latest trends and developments in language teaching and the needs of our students. I soon realized that a lot of modifications had to be made to our original lesson plan in order to make it workable in the classroom.

- politics and personnel differences often found in school What is necessary to give staff freedom and encouragement to take up development for themselves, with assistance from school administration ?

- modification and compromise necessary in collaborative effort

To work in a school in which staff are willing to try out new ideas and share experiences with one another means a lot to me. Such a school climate has much to do with the attitude of the principal, who is dedicated to the improvement of professional practice and encourages mutual support. Recognizing that our work load is heavy, he makes sure that administrative staff give us a lot of support, allowing us time to participate in peer assistance programs. Staff are given freedom as well as opportunity to start co-operative projects of our own. He believes that developing peer assistance relationships should not be seen as "time added" to what we are already doing, but rather "time that added to the quality of what we are doing" (Goldsberry, 1986).

importance of teachers defining and shaping their own peer assistance programmes - should ideally be voluntary i.e. those who participate truly want to do so; programmes must receive administrative support, and should be allowed to evolve slowly and naturally

- what kind of conditions in the school environment and school culture would allow for peer assistance programmes and peer clinical supervision to take place?

- what kind of leadership is necessary for teachers to develop? What should be the attitude of the principal and other colleagues towards teacher development ? Administrative support is crucial for successful peer assistance [rammes how can administration contribute to peer assistance and peer clinical supervision"

Pre-observation

- perception of staff regarding difference between time added and "time added to quality of work" is often different - how to change the perception of teachers who do not support development"

I had a pre-observation conference with Mrs. Yeung last week and explained to her the purpose and content of the lesson I would teach today. I told her how I thought the lesson should best proceed, what resources I would be bringing into the classroom, what materials I would be using, how I would adapt the content to suit the level of the class etc. She was very attentive and gave me a number of constructive suggestions as we discussed appropriate teaching styles, methods and the role the supervisor or observer would play.

- importance of pre-observation conference, need for clearly defined goals and observation that is structured

how to establish trust and rapport between supervisor and observee ?

I felt less nervous after talking to her, secure in the knowledge that she would at least understand my reasons for doing things in a particular way. For example, I explained to her that even though group work was important in encouraging peer interaction among students, I would nevertheless be limiting its use in this instance. Although she was not in full agreement with me, she respected my professional judgment. It was apparent that we did not always agree on everything, but I remember Kilbourn's (1988) point about the

what kind of attitude should the supervisor and the supervisee have ? Respect for professional judgment necessary What makes people feel comfortable about the way they do things ?

importance of "giving reasons for things", and so I explained my reasons for doing things as much as possible. She also gave me her reasons for disagreeing. We would discuss and often compromise. She would generally respect my decision on how to conduct the lesson in a way I felt comfortable and appropriate to my teaching style. I would also reflect on some of her constructive suggestions and adapt accordingly. The pre-observation conference clarified to both of us what was intended and why certain things were important, and showed me how professional development can be a two-way process in which the supervisor who takes the initial lead also benefits (Glickman & Gordon, 1987).

- new teacher needs to develop confidence in doing things - what teacher beliefs, what decisions are relevant?

Mrs. Yeung had asked whether I would like to be videotaped. As I felt a little uncomfortable with this first observation, I suggested that videotaping could be done later. I was relieved that she agreed. I like her supervision style because, in respecting my autonomy in decision-making, she made me feel that I had some part to play in the supervision process.

- attitude towards videotaping - many do not like it. Should choice be given? In what way is videotaping helpful?

- what kind of supervision style best suits you? How are various styles different? What role does the observer and observee play in the process?

We also discussed, defined and operationalised what would be observed, e.g. I suggested examining "student talk" in a second language speaking activity to monitor carefully how much peer interaction took place, how much English each student actually used and what kind of English was actually spoken. We worked out appropriate observation strategies for fulfilling this objective, and a chart with headings and categories was developed for the observation, data-collection and pattern detection. This joint decision-making regarding what to observe helped clarify to both of us what our purposes, intentions and desired outcomes were.

- importance of joint decision-making regarding what to observe, what is intended, what things are important etc.

- relevance of well-developed observation checklists for systematic and structured observation

Having some control over the purpose, content and procedure of observation meant a lot to me. I remember being observed at other times and feeling quite powerless, feeling that I was merely an object to be judged and not a person capable of developing and doing better. Mrs.Yeung's attitude was one of frankness and open-mindedness. Despite her years of experience and seniority, she did not assume an air of superiority; I felt I could talk to her on an equal footing. She was genuinely concerned about my personal and professional growth, about seeking ways to improve my teaching. She cared how comfortable I was handling a lesson and how much student learning took place. Because her attitude to supervision was more developmental than judgmental, I felt I could trust, discuss and negotiate matters with her (Glickman & Gordon, 1987). Not only is she convinced that teachers are capable of growth, she believes that they themselves have the power and control to do so, and can always move to higher levels of abstraction and commitment. Through the supervision process, we became more than just working colleagues; we grew to be trusting friends.

how to deal with the issue of 'control' for the personal and professional development of the individual?

personality of supervisor - takes active interest in the person. Relationship between supervisor and trainee - basis of co-operation

Observation

During the lesson, most things went according to plan, but certain things did not. For example, though students were actively engaged in all the tasks we planned, the excitement generated was sometimes so overwhelming that the 'English language' element was lost. Also, there were clearly occasions when the discipline could have been tighter for certain activities to proceed more smoothly.

- not all things always go as planned. Why? Is this a fault of inadequate planning? What conditions or factors need to be taken into account?

My greatest achievement was in motivating the entire class to speak up, not be afraid of making mistakes and participate enthusiastically in the activities. Clearly the students liked the materials we designed. Even Jenny, the quietest girl in class became so involved in the activities that she forgot her shyness. The students were in fact so intensely involved in buying their favourite items and selling undesirable ones that they communicated naturally and easily in English with their peers. The classroom buzzed with excitement as they acted out their roles with enthusiasm and conviction. Our curriculum objectives were attained -- the lesson went well and students did learn and practise grammatical structures, paying attention to 'meaning' as well as 'form' in a communicative context.

- what was good about the lesson? What are the teacher's strengths and weaknesses? What can be improved?

- what brings about student interaction?

- did the teacher achieve her lesson objective? How did the students react to the lesson?

- teacher needs to be involved in the lesson. Preferable if the personality and role of observer and supervisor not seen as a threat

In the midst of the excitement I sometimes forgot the presence of Mrs. Yeung at the back of the room. Sometimes she seemed to be busy making notes, or was she completing the checklist we had worked out together? A lot of "student talk" and peer interaction was evident, an area that Mrs. Yeung and I agreed to examine closely, and I was happy to see the rewards of my efforts. Much of the students' interaction centred around agreement on the price of items, using the language of questioning and expressing preference. Not only was there a lot of talk among the various 'buyers', there was plenty of negotiation with the 'sellers'. It was, I felt, a successful lesson satisfying to both teacher and students.

Post-observation

It was the post-observation conference with Mrs. Yeung that was most rewarding. In my long session with her, she helped me look at the match as well as the mismatch between my impression of what happened in class with her carefully going through each category in the observation checklist we developed together. For example, in examining how to maintain a balance between controlling discipline and encouraging students to speak as much English as possible, it was interesting to note our different responses. I was nervous about the students getting out of control, but she taught me how control could be achieved through students knowing exactly what to do at a particular

- post observation conference - time consuming but of utmost importance. Shared views - did the view of the observer's progress of the lesson match that of the observee's? What are the differences, if any, and why do they exist?

- how should one handle situations like discipline e.g. especially when it interferes with progress of the lesson? What differences in approach are there?

stage of the activity, what language items to use, and knowing what follows. Her class management techniques suggested alternatives which I had not thought of before.

We also shared different perspectives on the quantity and quality of "student talk" generated by the class as a whole and by individual students in particular. A 'clinical' approach was adopted whereby we carefully gathered data and detected patterns. I was soon made aware of my own inconsistencies in behaviour, which showed how I sometimes encouraged students to speak but other times did not. I soon realized how crucial my response was in generating English speech and extended English discourse from them. Without this scrutiny, I probably would have relied merely on intuition and speculation rather than an analytical and scientific approach to an understanding of my own teaching.

- point out inconsistencies in behaviour, relevance of alternatives

- relevance of a clinical approach and the need for examining things in detail . What are some of the things that make the supervision 'clinical' ?

When Mrs. Yeung asked me how accurate the language produced by the students was, I must admit that in my concern to motivate them to speak, I did not pay sufficient attention to the accuracy of their language. Perhaps I thought making mistakes was not as important as speaking up. But then Mrs. Yeung inquired, why did I, when correcting the students' language, only did so sometimes and not at other times? Why did I correct only some students and not others? How aware was I regarding the 'quality' of the 'student talk'? These and other questions raised in our discussion enabled me to become aware of things I had not noticed before, and to reflect on my teaching as I had never done before. I remember having fleeting thoughts and instinctive reactions about some of the issues as I was teaching, but it was Mrs. Yeung who helped bring out what I did to a conscious level, enabling me to strive towards the kind of "reflection-in-action" and "reflection-on-action" that Schon (1983, 1987) advocates in professional practice. I look forward to my next observation in two weeks, a regular feature with Mrs. Yeung now, which I know will be another illuminating experience.

- communicative language teaching - what are the implications of fluency vs accuracy ?

- improved awareness and consciousness- raising through observation and supervision

- how are lived experiences different from the kind of supervision found in college's pre service training program ?

Factors Affecting Peer Supervision

Reflecting on my observation and supervision experience, conditions necessary for new teachers' personal and professional growth became clearer to me. Peer assistance has indeed made me a better teacher as I now become more conscious of what I do, of what others do, of alternatives and possibilities - the effect is cumulative. Indeed, the more one observes and is observed by others, the more conscious one becomes of one's decisions and actions, the better one gets at instructional practice and the more effectively one teaches. Peer supervision motivated me to examine my teaching in depth and detail. The benefits of communication, rehearsal, and awareness in a congenial environment helped alleviate my isolation as a new teacher, developed my respect and affection for my colleagues, and enhanced my self-esteem.

One of the greatest benefits of the exercise has been the initiating of dialogue with other professionals about teaching and education. Even the content of my conversations with peers has changed.

In particular, I am aware of the absolute need for at least three factors to co-exist in order that optimum contribution to teacher development can be made. While my observations may seem to be generalizations based on limited experience, my journey as a new teacher plus extensive reading has convinced me that the following conditions when compatible would be very favourable to teacher development.

1. Environmental/School-Based Factors

The possibilities and limits of the environmental context is a crucial factor in assisting or hindering development (McFaul & Cooper, 1984). I am fortunate to be in a school that has a strong tradition of professional support - those in authority are genuinely concerned with teacher development, the sharing of ideas and resources is encouraged, and assistance and guidance from peers is seen as a valuable commodity. This results in a collegial and collaborative atmosphere among staff who collectively view supervision as a growth process, with teachers being given the opportunity, time and space to do so. It is often the organizational set-up that determines how favourable or otherwise school and staff development is (Little, 1981).

Four undesirable contextual patterns are often found: 1. isolation and fragmentation, 2. stratification, 3. standardization and 4. reactionism. They can be reflected in teachers, procedures, systems, and administration (McFaul & Cooper, 1984). If inappropriately manifested, such elements can easily lead to organizational inertia which leave teachers with little room for growth. The environment needs to recognize teachers as critical agents of change, and entrust them with a degree of power and control over their own development. Goldsberry (1986) points to the following favourable conditions for development - the importance of organizational consistency, readiness and introspection. These, present in the environment, would hold tremendous possibilities for teacher development, especially if meaningful organizational development is in harmony with other aspects such as curriculum development, staff development and teacher evaluation (Acheson & Gall, 1980).

2. Leadership and People-Based Factors

Key players in the environment play a crucial role. My relationship with my supervisor is one of sharing and trust, collaboration and collegiality, as is also the relationship I have with the principal, and other colleagues like May and Lisa, who have as our aim what is best for our students. Although my principal and supervisor are far superior to me in rank and experience, they are largely non-judgmental in style, particularly where supervision is concerned. More importantly, Mrs. Yeung is willing to give me a sense of power and control over the process of supervision and of my own development. Instead of viewing teachers as a homogenous group with shared common characteristics, she recognizes the wide diversity of teachers, the variation of needs, ability, experience and levels of professionalism, and focuses on the teacher as a distinct individual identity responsible for his/her own development (Glickman & Gordon, 1987). Her attitude and accommodating personal qualities clearly make a difference; her breadth of vision and depth of insight allow for mutual respect and joint problem-solving. In her I see a person who promotes equality while providing strong guidance. By being treated fairly as a colleague, I felt free to call upon her superior experience in ways which I never would have done otherwise.

My principal and supervisor help me see growth as more than just an improvement in methods and techniques, more than a mere focus on aspects of classroom management or the technical following of mechanics, but as something involving whole personal and professional growth as a teacher and as an individual (Gaies & Bowers, 1990). They help me see my peers as resources with great wealth of experience to be shared, help me recognize our responsibility for helping one another grow and improve. They show me that things do not always turn out according to plan in the classroom, and that even though plans may fail, there is value in experimentation and adaptation. Even though I have far less experience, they recognize that I still have a part to play and a contribution to make to the school (Blumberg & Stevan Jonas, 1987).

Effective leadership is a key to development. While contextual constraints sometimes inhibit leadership potential, effective leadership can influence the educational environment in a positive way and be a powerful influence on change and effectiveness. Effective leaders influence not just the environment, but also the performance of others. The "partnership in leadership" concept advocated by Goldsberry (1984) stresses a congruent and permeating spirit of personal commitment to growth through colleagueship and collaboration, under strong leadership. An all-important 'fit' should exist between the values and assumptions of the leader and those that are led for optimal peer interaction to occur and for peer supervision to be truly successful.

3. Content/Process-Based Factors

I was clear about the content of the supervision process. The supervision procedures were well-set and we were focused on what to observe, and what the desirable outcomes should be. Findings were quantified and data collected, motivating me to examine my teaching in considerable depth and detail. Each phase of the supervision process had a clarity of purpose which led me step by step to a greater awareness of what I was doing and in what direction I should develop. The entire process involved the observer and observee attempting to understand what each other valued in terms of educational goals and procedures, and embraced such characteristics as the cyclical nature of the supervision process, the need for a data-based foundation and hypothesis generation and testing. Recognizing that the amount of attention paid to the design and implementation of a 'peer clinical supervision model' is crucial in determining the success or otherwise of such a programme (Goldsberry, 1984b; Krajewski, 1984), supervisors need to be amply prepared for the task, with emphasis on process as well as product goals, i.e. stressing those aims for establishing clear communication and collaboration with teachers, as well as those for changing classroom behaviour and practices (Goldsberry, 1984).

There is little doubt in my mind that the observation and supervision experience has been a most valuable one for me. Unless all three 'school-based', 'people-based' and 'content/process-based' factors are compatible with one another, a clinical supervision or growth development model would not be complete. The three factors are like three legs of a stool; they should all be there to maintain some kind of balance. Clearly there would be different emphases or focuses on one or the other aspects in different situations. Different contexts may also mean certain areas being more important than others. But for maximum impact, all three factors will have to be present to complement one another. Many examples of failed teacher development programs occur when either one or other element(s) is missing (Krajewski, 1984).

Conclusion

One must of course acknowledge the gap that exists between some of the assumptions made of peer clinical supervision and the reality of what happens in some school settings (Sullivan, 1982, McFaul & Cooper, 1984). The fundamental factor is whether what a teacher is expected to do is something that the teacher is willing and has been prepared to do, and whether the ideal and the real are not too far apart for bridges to be built. The challenge is for teachers to be more aware of conditions necessary and conducive to development, and to act upon processes of change that would bring about the knowledge, power and responsibility for teachers themselves to take charge of their own development. As Gaies & Bowers (1990) point out, supervision is more than just a training process, it is an educational one related to total development. Reflecting on my own experience, I believe peer clinical supervision has a place in teacher development, and if done properly, will have lasting benefits for both experienced and new teachers.

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How do Secondary Students Perceive their English Learning Experience ?
--Report on a "Young Post" readers survey

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In the course of learning, students develop complex networks of mental schemata which influence how they perceive their learning. It is therefore important to explore their perceptions and preferences, as a prerequisite to understanding their needs and providing an appropriate learning environment. This paper reports on the findings of a survey of "Young Post" readers' English learning experiences and perceptions. Pedagogical implications are then drawn in light of these findings with the aim to arouse upper secondary school English teachers' interest in the assumptions, knowledge and experience that students bring to their learning and how these may impact on teaching practice

中學生如何看英語學習？--〈青年報〉問卷調查報告

[illegible]

Introduction

The "Young Post" readers survey was carried out through a questionnaire (Appendix) that was published in the "Young Post" in January this year. This survey was done as part of a UGC-funded project known as LEAP (Learning Experiences And Proficiency), which seeks to gather information about the English language ability and experiences of students who enter tertiary education in Hong Kong. This information will help institutions to develop students' English competence in ways appropriate to their needs.

At the start of the LEAP project in October, 1994, a series of unstructured interviews was conducted with freshmen in various faculties at the University of Hong Kong to obtain a general picture of the salient aspects of their English learning experiences and perceptions. In addition to this interview data, the preliminary search for data was extended to students in Forms 6 and 7 when we were offered space in the "Young Post" for a reader questionnaire

Purpose of Survey

Decades of research into second language (L2) development have made us more aware of L2 learning as a subconscious activity that is very much learner-based, although it is far from certain what learner strategies and learning processes influence the final learning outcome. Because of this awareness, there is an increasing attempt to relate L2 pedagogy to what we know about L2 learning. As teachers begin to learn more about learners and how they learn, they are in a better position to design a more learner-based curriculum and adopt learner-based approaches as advocated by Nunan (1988), Richards and Nunan (1990) and Richards and Lockhart (1994). What is more, they are in a better position to anticipate potential mismatches between teaching approaches and learner needs, expectations and preferences and therefore to narrow the gaps and increase the chances of achieving desired learning outcomes.

The main purpose of the "Young Post" survey was to gain a better understanding of secondary students' English learning experiences and perceptions so that practical ways can be adopted to improving their English competence. In other words, this survey aimed at helping teachers learn from their learners and, in the process, become more effective teachers. The findings presented here are thus of interest to the reflective teacher and useful for teacher education in general.

Although some local studies (e.g., Pierson et al., 1980) have successfully looked into secondary students' attitudes to English, they have fallen short of examining how this aspect of learner perceptions could impact on teaching. What is more, they may have become rather outdated. The "Young Post" survey, though not solely an attitude study, should shed light on secondary students' attitudes at present. Lai (1990) uses questionnaires to explore the causes of communication breakdown in Form 4 English classrooms and documents many aspects of students' learning experience. The "Young Post" survey attempts to further our understanding of students' learning experience and perceptions by examining not so much patterns of classroom interaction as how students perceive and evaluate various classroom activities.

The other purpose was to gather preliminary data for the design of the LEAP project questionnaire for first-year university students in Hong Kong. This aspect will not be discussed as it lies outside the scope of this paper.

Method

The questionnaire

The "Young Post" questionnaire design was based on information obtained from the series of interviews with university first-year students mentioned earlier.

As shown in the Appendix, the questionnaire comprises three main sections: A) personal particulars; B) English learning experience in and out of class, and C) perceptions of English and English learning. Some questions require students to choose from a list of given options and then rank their choices. Open-ended questions were used when it was not possible to list all possible options (e.g., when various reasons are expected for one answer). The Likert scale was also used to measure the strength of students' attitudes.

In Section B, students were asked to choose and rank four options that best reflect their English learning experiences. The "most" frequent, useful, enjoyable and the "least" useful activities are therefore the top four chosen ones. More emphasis was put on questions 2 and 3 concerning the usefulness (in terms of improving English) of activities because of the particular insights which can be drawn for pedagogical purposes. Students were asked to rank both "most useful" and "least useful" activities because their choice of the most useful ones may not necessarily shed light on which are the least useful ones.

The sample and data collection

The questionnaire was tried by a few secondary students and then published twice in the "Young Post" on January 10 and 17, 1995. Its readers responded by filling it out and sending it back to the "Young Post", who then forwarded the responses to the LEAP project office. The response rate was better than expected - 355 secondary students responded, 117 individually and 238 through one mixed medium school.

In order to ensure a balanced sample which represents students with different English education backgrounds, 33 (13.8%) were selected randomly from the 238 responses of that mixed medium school. This created a final sample of 150 students and a rather balanced distribution of students who have received mostly English (40%), mostly Cantonese (23%), or a mix of both (37%) as mediums of instruction at school.

The most obvious feature of this sample is that it represents a self-selected group of upper secondary school students who presumably read the "Young Post" quite regularly and who were keen enough to respond to a questionnaire in it. This means that the findings reported here are bound to have a high degree of self-selection bias towards motivated students. This bias should not necessarily be perceived negatively however, since these students are

representative of an important group of more motivated students in Hong Kong.

Of the 150 questionnaires we analyzed, most respondents are from F5 and F6 with an average age of 17. The majority are female and 64% are studying Arts, 33% Science and only 3% Commerce and Social Science. As indicated earlier, the percentages of those who receive English medium instruction and those who have mixed medium of instruction are roughly the same, 40% and 37% respectively. A smaller 23% of students have Chinese as medium of instruction.

Among the 88 Forms 6 and 7 students, 35% and 18% got grades 'D' and 'E' respectively in their HKCEE, and 12% and 9% got grades 'A' and 'B' respectively. Table 1 shows a comparison of the English (Syllabus B) grade distribution of the "Young Post" respondents with that of the 107,060 students who took the HKCEE English examination in 1994.

Table 1: *Grade distribution of "Young Post" respondents and all HKCEE candidates - A comparison*

HKCEE English Grades (Syllabus B)	"Young Post" respondents	All HKCEE English Candidates, 1994 (Figures supplied by the Hong Kong Examinations Authority)
A	12%	1.3%
B	9%	1.6%
C	10%	3.9%
D	35%	21.2%
E	18%	28%
F&U	0%	44%

Data analysis

The purpose of the analysis is to describe the data as a basis for pedagogical decision-making rather than to measure associations or relationships among survey items. The distribution of students' choices or answers were therefore analyzed using simple frequency counts.

Results

1. English Learning Experiences in Class

The comprehensiveness of the options given in the questionnaire inevitably reduces the chance of each option being chosen. Any one option being chosen by say, 30% of the students out of 17 options, should be considered a very popular one. As students could choose three or four answers that best describe their situations, the percentages to each question do not add up to 100%.

Most frequent class activities

Figure 1: *Number of times each of the following was chosen as one of the four MOST FREQUENT class activities*

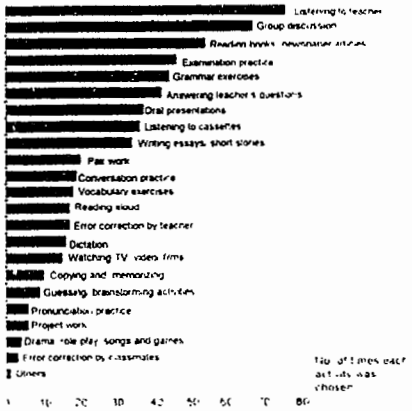
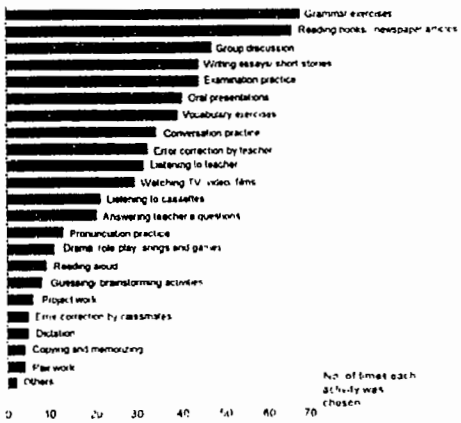


Figure 1 shows that the four most frequent class activities experienced by upper secondary students are listening to teacher; group discussion; reading books and newspaper articles; and examination practice. Peer correction; drama, role-play, songs and games; project work; and pronunciation practice rank lowest in the four most frequent activities category.

Most useful class activities

Figure 2: *Number of times each of the following was chosen as one of the four MOST USEFUL class activities*



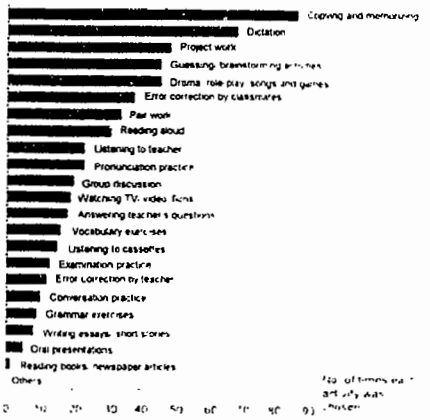
What is done most frequently is also seen as the most useful except in the case of listening to teacher, which ranks tenth in the most useful category (Figure 2). Grammar exercises come top as the most useful although it comes only fifth in the most frequent category.

Reasons for choosing the four most useful activities

Different reasons were given for choosing grammar exercises as the most useful class activity. 36% of those who gave a reason stated that by doing such exercises, their English (both written and spoken) can be improved significantly since "practice makes perfect". 20% think that grammar is the most fundamental or important aspect of language learning. They expressed the view that learning the structure of a language is a prerequisite to mastering that language. 16% said that grammar is difficult and their English standard is low. They believe that grammar exercises are useful for improving their English. Another 16% pointed out that grammar is useful for examinations, and 12% said that they are interested in grammar or they want to learn formal English.

Least useful class activities

Figure 3: *Number of times each of the following was chosen as one of the four LEAST USEFUL useful class activities*



As illustrated in Figure 3, the four least useful class activities are copying and memorizing; dictation; project work; guessing/brainstorming; and drama, role-play, songs and games.

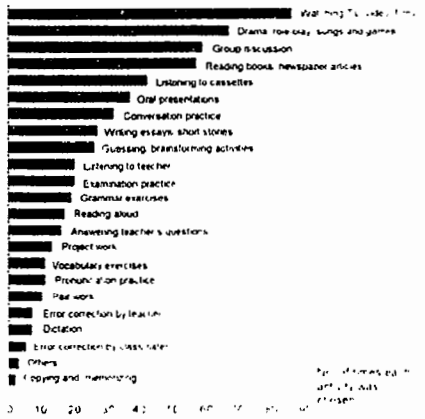
Since students had more than 20 options to choose from in each of the most and least useful activities sections, the two sets of results were not likely to be reversibly identical. However, the two turned out to be remarkably similar in that the least useful activities were down at the bottom of the most useful list. This further supports the reliability of the questionnaire and the results of the survey.

Reasons for choosing the four least useful activities

Of those who gave a reason for the least useful activities, 69% doubt the usefulness of copying and memorizing as a way to learn English because they believe that without the processes of understanding and practising, their English cannot be improved. Some 21% feel that memorizing or copying is boring. Others think it is only suitable for lower form students.

Most enjoyable class activities

Figure 4: *Number of times each of the following was chosen as one of the four MOST FREQUENT useful class activities*



Watching TV/video/films is the most enjoyable class activity, followed by drama, role-play, songs and games; group discussion; and reading books/newspaper articles, as illustrated in Figure 4.

Reasons for choosing the four most enjoyable activities

Of those who cited watching TV/video/films as the most enjoyable class activity, 66% said this is because it is interesting, relaxing, lively and easy to do. Another 34% think learning is effective when they are being entertained at the

same time. One other reason given is that by listening to native or near-native pronunciation and styles of speaking, they can improve their oral proficiency and learn everyday English.

To sum up, it can be seen from Figures 1-4 that group discussion and reading books/newspapers are among the four most frequently experienced, useful as well as enjoyable activities; whereas pair work, project work, peer correction, dictation and memorizing are among the four least frequent, least useful as well as least enjoyable activities.

Other class activities preferred

Students were asked to list other activities (i.e., those not in the given options) that they would like to do or their English teacher could do with them to help improve their English. Table 2 shows their suggestions.

Table 2: *Other perferred activities*

Written	Oral
Writing book reports	Interviewing foreigners
Writing news commentaries	Getting to know foreign friends
Writing journals	Visiting foreign families
Making pen-pals with people from other countries	Visiting international schools
Playing computer games	Learning English through songs
Having classmates' essays read out	Listening to recorded radio programs
Learning useful English expressions not found in textbooks	Debate
Newspaper quizzes	Singing, story-telling, essay-writing or project competition
Analyzing passages from magazines	Speaking more in class
	Talking more with the teacher
	Attending seminars
	English Speaking Day
	English Fun Fair

None of these activities appeared frequently in students' suggestions. But a recurring theme can be discerned: Students on the whole relish the chance to interact with foreigners and with other students as a way to improve their oral English.

2. English Learning Experiences out of Class

Most frequent out-of-class activities

An average of 8 hours per week was reportedly spent by students on learning/using English out of class. Our results show that reading English newspapers; watching English movies and TV programmes; and listening to English songs are the four most frequent out-of-class activities.

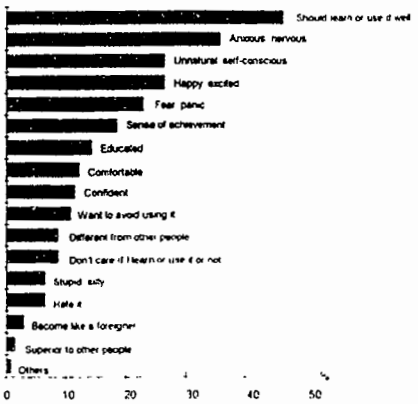
Most useful out-of-class activities

Not only are reading English newspapers and watching English TV programmes the most frequent out-of-class activities, they are also among the four most useful. Others include reading English books and keeping a vocabulary notebook, which are not done frequently but are nevertheless found very useful.

3. Perceptions of English and English Learning

Feelings about using/learning English

Figure 5: *Percentage of students who included the following in the top three FEELINGS which best describe them when they use English*



From a list of different feelings, students were asked, in Section C of the questionnaire, to indicate which three best describe their feelings when they use English in class or outside class. Figure 5 shows that 46% of the students feel the obligation to learn English well. Although 36% feel anxious and nervous, and 25% feel unnatural and self-conscious when using English, there are still 25% of students who are happy and excited to use it.

Reasons for feelings

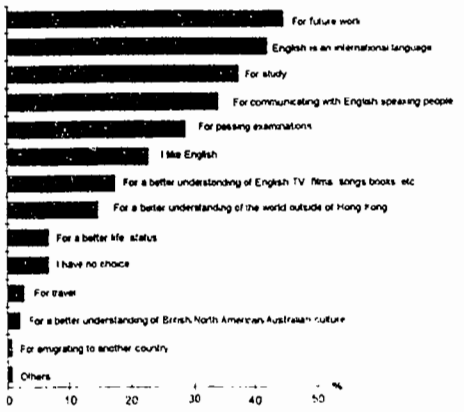
15% of those who gave a reason said English is an important international language. They have to use it for study, future work and communicating with foreigners.

32% indicated that they feel anxious because they feel their English, especially oral English, is poor and that they are not confident about it. Some 9% are very afraid of making mistakes, not being able to answer teachers' questions well, not being understood or being laughed at. 11% pointed out that the underlying reason for their weakness in English is lack of practice.

For those who feel happy and excited when using English, they cited reasons such as they like English, enjoy learning English, or find English an interesting subject (13%). Some of them like languages in general and think that it is a good idea to learn at least one foreign language. Others are happy because they like using what they have learnt.

Motivation for learning English

Figure 6: *Percentage of students who included the following in the top three REASONS for learning English*



Students were asked, in Section C of the questionnaire, to choose no more than three reasons for learning English. As Figure 6 illustrates, the majority of motivating factors for learning English are very practical, e.g., 45% for future work and 37% for study. These reasons are generally associated with the instrumental type of motivation. Almost half (42%) of the students said they feel motivated to learn English because it is an international language.

The items which may denote integrative motivation1 are "For a better understanding of British/North American/ Australian culture" and "For communicating with English-speaking people". But only 3% of the students are interested in understanding English-speaking cultures, whereas 34% learn English to communicate with English-speaking people.

Attitudes towards English and English language ability

In the Likert scales at the end of the questionnaire, students were asked to rate four attitude statements on a 6-point scale from 1 (strongly disagree) to 6 (strongly agree). They also rated their overall English language ability. Table 3 is a summary of the results.

Table 3: *Perceptions of English ability and learing*

Statement of perceptions	Mean of self-rating	SD
1) I learn English only for better career prospects	3.6 (strongly disagree 1 — strongly agree 6)	1.4
2) I like English-speaking people their culture and their way of life	3.6 (strongly disagree 1 — strongly agree 6)	1.1
3) I do many things to learn improve my English	3.9 (strongly disagree 1 — strongly agree 6)	1.3
4) I think English should have a strong role in HK now and in the future	4.4 (strongly disagree 1 — strongly agree 6)	1.2
5) My overall English language ability	3.2 (very poor 1 — excellent 6)	1

Table 3 shows that students' attitudes to English-speaking people, their culture and way of life are neutral or fairly positive on the whole. Students gave a fairly high rating (4.4) on the role of English in Hong Kong. In fact, the statement, "English should have a strong role in Hong Kong now and in the future" is the one they most agreed with out of all the four statements that they were asked to rate.

Students were also asked to give reasons for their attitudes to English-speaking peoples and the role of English in Hong Kong, since these two are expected to generate interesting results considering that students might have attitudinal change towards English as 1997 approaches.

Reasons for students' attitudes towards English-speaking people, their culture and way of life

It can be inferred from the reasons students gave that the English-speaking people they referred to are Westerners rather than Asians who speak English.

37% of the reasons show a high regard for English-speaking people and their way of life. English-speaking people were mostly described as "nice", "polite", "frank" and "friendly". Their life is seen as "better" since they enjoy more freedom, leisure time, and comfort in life. Another 24% indicate an interest to know more about English-speaking people and their culture because students want to broaden their knowledge or communicate with other peoples.

10% of the reasons or comments are negative, exhibiting ethnocentric feelings or perhaps a sense of dissatisfaction with Westerners in Hong Kong, who have often been seen, especially in the past, as a privileged group in Hong Kong society.

8% of the reasons given are neutral. These students have no special feelings for English-speaking people. They said they regard English as just a kind of language and English culture just another culture and English-speaking people as neither superior nor inferior to other peoples.

There is a small portion (3%) of students who distinguish between English, English-speaking people and their culture. They said they like English but not English-speaking people and their way of life, or they like the people but not their culture. Others think that knowing English-speaking people is a good chance to practise and thus improve their English.

Reasons for students' attitudes towards the role of English in Hong Kong

72% of those who gave a reason said that English should have a strong role now and in the future because English is an international language and Hong Kong is an international financial centre which needs to do business and communicate with foreigners. But another 17% said that Chinese - Cantonese and especially Mandarin -should have at least an equal role with, if not a more important role than, English in the near future. They think Mandarin will take the place of English after 1997 and the importance of the latter will diminish gradually. Other students are either not certain about the future role of English in Hong Kong or they consider a balanced role for all three languages beneficial for Hong Kong.

Discussion and Teaching Implications

1. Students' English Learning Experiences in and out of Class

Listening to the teacher

The "Young Post" survey indicates that students find the most frequent class activities also the most useful ones, except for listening to teacher, which is the most frequent class activity and yet only moderately useful. This is in part similar to Lai (1990)'s finding which indicates that many English teachers are reported to rely heavily on the traditional, up-front lecturing mode in teaching. The high frequency of lecturing contrasts very sharply with its poor reception by students. This may indicate that teachers need to reconsider what proportion of class time is to be allocated to teacher talk and student talk and think more carefully about why they talk. In view of students' desire to speak more, teacher talk may need to be cut down to give students more opportunity to participate. Communication games (see Hadfield, 1990) and small group discussions are ways of bringing about more interaction among students.

Peer correction; drama, role-play, songs and games; project work; and pronunciation practice

The above activities rank lowest in the four most frequent activities category. What is interesting is that these activities are also considered as the least useful ones. This seems to suggest that there is a relationship between the frequency of an activity and its perceived usefulness, or that teachers simply spend more time on activities that they know are perceived as useful.

Although respondents reported that drama, role-play, songs and games are among the four least useful class activities, they ranked them as the second most enjoyable. Perhaps there is a need for teachers to communicate the learning purposes (e.g., confidence building, improvement of diction, awareness of how sounds are connected in English, etc.) of such activities to their students so that they can be perceived as more than just fun.

Pronunciation practice is one bridge to fluency and confidence that should not be neglected even in upper forms. Pronunciation activities (e.g., Gore, forthcoming & Sheeler & Markley, 1993) and drama activities (e.g., Maley & Duff, 1982) can be integrated constructively into regular English classes to build fluency and confidence.

Grammar exercises

Grammar exercises are viewed as the most useful for improving English but reportedly not a very frequent class activity. If we could capitalize on students' high evaluation of grammar learning and teach grammar more interestingly, e.g., by means of games and small group discussions (Batstone, 1994; Rinvolucri, 1984; Devitiis et al., 1989), they may welcome more frequent grammar work.

Writing essays/short stories

Writing essays/short stories is another activity which is perceived to be one of the most useful but does not take place frequently. Teachers could draw on this perception to introduce more frequent writing games or exercises which are enjoyable and yet do not take up a lot of class time, e.g., see Hadfield & Hadfield (1990).

Copying, memorizing and dictation

Copying, memorizing and dictation are not seen as useful or enjoyable by most of the students in this survey. If memorization and dictation are necessary for upper form students, we should give them good reasons for them. More importantly, we should conduct these activities in more "fun" ways, some of which are illustrated in Davis & Rinvolucri (1988).

Watching TV/video/films

The most enjoyable activity - watching TV/video/films - is neither very frequently experienced nor perceived as very useful. However, what is interesting is that when students watch English TV outside class (the most frequent out-of-class activity), they find it most useful. Is that because they select their own material outside class? Or is there something that students do that is not done by the teacher in class? Or have students not done it enough in class to find it useful?

There may be a case for making explicit the pedagogical purposes of such activities for students so that they feel they have learned something at the end of them. Again, TV programmes or other audio-visual materials can be extended beyond mere listening comprehension exercises and used as a positive teaching/learning resource (e.g., see Lonergan, 1984 & Cooper et al., 1991).

Audio-visual materials are especially useful for the study of cross-cultural similarities and differences and non-verbal aspects of communication (e.g., body language, contexts, knowledge and experiences). Various techniques such as silent viewing, viewing with or without subtitles, freeze frame and listening without pictures can be used to achieve different learning aims.

Group discussion and reading books/newspapers

Group discussion and reading books/newspapers could be regarded as the most popular activities as they are among the top four frequent, useful and enjoyable activities in class. (Reading books/newspapers is popular both in and outside class.) The self-selection bias in this sample is most evident here because the questionnaire was answered by a group of "Young Post" readers who obviously read newspapers for pleasure and for learning English.

Given the popularity of these activities, we should fully utilize them as better teaching resources. Apart from using newspaper articles as reading comprehension exercises, they can be used for other types of language activities as illustrated in Grundy (1993). Teachers can make group discussions a more effective learning tool (see, e.g., Ur, 1981 & Klippel, 1984) and give students different language focus and feedback each time.

2. *Students' Perceptions of English and English Learning Confidence*

Students rated themselves rather low (3.2 out of a maximum of 6, as shown in Table 3) in their self-assessment of English language ability. This is consistent with their feelings of anxiety when learning/using English and their stated reason for such anxiety, i.e., perceived weakness in ability. Similar to Lai (1990), this survey shows that students lack confidence and feel anxiety particularly when speaking English. Teachers can build up students' confidence through regular pronunciation practice and fluency-based activities such as group discussion and communication games. These present less "risk" to students than the usual question-answer-feedback pattern found in most classes, and they make classes more enjoyable and speaking not a source of stress.

Learning motivation

Although many students lack confidence and feel anxious when they use English, many of them are however very resourceful and are motivated to create opportunities for using English. They would like to have more interaction with native speakers and are rather positive towards novel activities. This positive attitude can be encouraged among students and turned into concrete activities or projects in and outside class, e.g., watching TV programmes, listening to the radio, presenting a radio program in English (e.g., RTHK 3's 'Teen Time') and talking to native speakers. More suggestions on how project work can be used to enhance learning can be found in Legutke & Thomas (1991) and Haines (1989).

Our results on motivation echo those found in other parts of Asia (e.g., Shaw, 1981; Richards, 1993), i.e., strong instrumental but weak integrative motivation. At first glance, learning English for communicating with English-speaking people may point to integrative motivation, but some students commented on the need to grasp every chance to communicate with English-speaking people because there are so few practice opportunities in predominantly Cantonese-speaking Hong Kong. In other words, students communicate with English-speaking people to learn English rather than the other way round.

Integrative motivation has often been said to be essential for facilitating second language learning (Gardner & Lambert, 1959; Gardner, 1985). However, many people now question the reality of the whole integrative/instrumental dichotomy, especially its applicability in the Asian context. Morgan (1993), for example, raises doubt about the significance of integrative orientations in second or foreign language learning contexts where the amount of contact with English-speaking people and culture is by and large minimal, as is the case in Hong Kong. Markus and Kitayama (1991), in a broader context, suggest that because Asians and Westerners tend to differ in the way they perceive themselves in relation to other individuals and to society in general, the self-constructs often assumed in motivation research conducted by Western scholars may not be relevant to many Asians.

Attitudes towards English

The findings of the attitude questions in the questionnaire (Section C - 16, 17, 19 and 20) indicate that students in this survey have fairly positive attitudes towards English-speaking people, their culture and their way of life. They are certain about the importance of the role of English in Hong Kong. An overwhelming majority gave the reason that they see English as an international language, which is important for Hong Kong's continuing prosperity.

These results are not consistent with those found by Pierson et al. (1980), which suggest negative attitudes to English such as believing that learning English poses a threat to cultural identity. This may indicate that Hong Kong has moved on since these studies in the 70's and that broad socio-political changes may have affected students' attitudes to English. As Hong Kong acquires an increasingly strong cultural identity, English becomes less a threat. In fact, students' frequent reference to English as an international language reflects the fact that English has acquired a less culture-specific status. What these students may be saying is that English is no longer the property of the English and that they like the language because of its practical value - they can communicate with people from other parts of the world and understand the world outside Hong Kong through English. Perhaps they are also saying that they can like a language without liking the people or culture.

Students' fairly positive attitudes towards English-speaking people, their culture and their way of life can be harnessed for examining the cultural dimension of language learning when appropriate. For instance, the cultures of English-speaking countries and the cultural and contextual factors which govern the choice and interpretation of linguistic forms can be discussed, particularly when using authentic audio-visual/written materials or when teaching BICS - basic interpersonal communication skills (Cummins, 1980). Highly motivated teachers and students may adopt what Kramsch (1993) calls a "dialogic pedagogy" of language teaching and learning which focuses on cross-cultural understanding through constant exploration and observation of both the learner's cultural context and the cultural context of the second/foreign language. Instead of learning facts about a target language and culture, a new attitude is called for. In Byram (1989)'s words, the teacher/learner's aim "must be to participate in the foreign culture and experience it from within, as well as observe it and understand it from without" (p. 49).

Conclusion

To conclude, students' overall strong motivation and positive attitudes towards English and interacting with English-speaking people indicate a set of schemata favourable to learning. Teachers can make use of it and further facilitate learning if they understand students' preferences and needs in English classes.

The results of this survey help teachers explore students' perceptions and experiences in English learning and identify possible mismatches between teaching approaches and learners' needs and inclinations. Of course, our findings are to some extent constrained by the possibly more motivated sample of students we had. However, the teaching implications discussed are also of general relevance to students who want to learn English well but perhaps have not been given the appropriate support. By knowing more about these students' perceptions, teachers can provide for them a more suitable learning environment that helps to develop their English competence in appropriate ways.

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Appendix

Questionnaire published through the "Young Post" on January 10 & 17, 1995.

THE University of Hong Kong is carrying out a survey named LEAP (Learning Experience and Proficiency), a research conducted by the English Centre of the HKU, which aims at finding out the learning experience and proficiency of secondary students.

We would like students (from Form 4 to Form 7) to answer the questions below and send them back to us as soon as possible. Please address your reply to LEAP Survey, Young Post, 5/F Morning Post Building, Tong Chong Street, Quarry Bay, Hong Kong.

Questions for Young Post readers

A) Name: Age:

Sex: Name of school:

Form(Circle an answer): 4 5 6 7

Stream(Circle an answer): Arts Social Science Science Technical Commercial

Medium of instruction at school(Circle an answer):

Mostly English Mostly Cantonese Mix of Cantonese & English

How many years have you studied English at school? _____ years

Approximately how many hours do you spend on learning/using English out of class per week? _____ hours

I am a holder of (you can circle more than one): Overall grade obtained in English:

HKCEE _____
HKHLE _____
HKALE _____
Others(Please specify) _____ _____

Would you like to be interviewed about your English learning experience? If yes, leave your telephone number and address:

Tel: _____ Address: _____

B) Take a look at the following class activities. For questions 1 to 4, choose from the numbered activities below and rank your answers. For example, in question one, if you put down 3 2 11 16, 3 will be the most frequent followed by 2, 11 and 16.

1 Pronunciation practice
2 Dictation
3 Reading aloud
4 Vocabulary exercises
5 Grammar exercises
6 Conversation practice
7 Error correction by teacher
8 Error correction by classmates
9 Answering teacher's questions
10 Copying and memorizing
11 Examination practice
12 Pair work
13 Group discussion
14 Project work
15 Drama, role-play, songs and games
16 Reading books/newspaper articles
17 Writing essays/short stories
18 Watching TV/video/films
19 Listening to cassettes
20 Listening to teacher
21 Oral presentations
22 Guessing/brainstorming activities
23 Others(Please specify) _____

1. Rank the 4 class activities that you have most often. ____ ____ ____ ____
2. Rank the 4 class activities that help you improve your English most. ____ ____ ____ ____
3. Rank the 4 class activities that help you improve your English least. ____ ____ ____ ____
4. Rank the 4 class activities that you enjoy most. ____ ____ ____ ____

5. Please give a reason for your answers in question number 2.

6. Please give a reason for your answers in question number 3

7. Please give a reason for your answers in question number 4.

8. What other activities would you like to do or what more could your English teacher do to help you improve your English? Why?

9. Which of the following out-of-class experiences with English do you have? (Circle as many as you have.)

1 Watching English TV programs
2 Watching English movies
3 Listening to English radio
4 Listening to English songs
5 Writing to pen friends
6 Writing diaries in English
7 Writing to English newspapers
8 Reading English newspapers
9 Reading English magazines
10 Reading English menus, notices,etc.
11 Reading English books
12 Reading English dictionaries(print or electronic)
13 Keeping a vocabulary notebook
14 Speaking English with teachers
15 Speaking English with tourists
16 Speaking English with native speakers
17 Going to English tutorial schools
18 Doing part-time jobs, e.g., tutoring
19 Travelling or holidays abroad
20 Joining clubs or societies
21 Using computer software or games
22 Others(Please specify) _____

10. Rank the 4 most frequent experiences. ____ ____ ____ ____
11. Rank the 4 experiences that help you improve your English most. ____ ____ ____ ____

C) 12. How do you feel when you use/learn English in class or outside class? (Circle no more than 3 numbers.)

1 Unnatural, self-conscious
2 Stupid, silly
3 Anxious, nervous
4 Fear, panic
5 Hate it
6 Want to avoid using it
7 Different from other people
8 Superior to other people
9 Become like a foreigner
10 Don't care if I learn or use it or not
11 Should learn or use it well
12 Comfortable
13 Educated
14 Confident
15 Happy, excited
16 Sense of achievement
17 Others(Please specify) _____

13. Please give a reason for your answers in question number 12.

14. What are your main reasons for learning English? (Circle no more than 3 numbers.)

1 For study
2 For passing examinations
3 For future work
4 For travel
5 For emigrating to another country
6 For a better life, status
7 I like English
8 I am good at English
9 English is an international language
10 I have no choice
11 For a better understanding of the world outside of Hong Kong
12 For a better understanding of British/North American/Australian culture
13 For a better understanding of English TV, films, songs, books, etc.
14 For communicating with English-speaking people
15 Others(Please specify) _____

Circle a number for questions 15 to 18 & 21.

	Strongly disagree ←					→ Strongly agree
15. I do many things, e.g., watch English TV, learn and revise vocabulary often, to learn/improve my English.	1	2	3	4	5	6
16. I like English-speaking people, their culture and their way of life.	1	2	3	4	5	6
17 I think English should have a strong role in HK now and in the future.	1	2	3	4	5	6
18. I learn English only for better career prospects.	1	2	3	4	5	6

19. Please give a reason for your answer in question number 16

20. Please give a reason for your answer in question number 17

	Very poor ←					→ Excellent
21 Rate your overall English language ability	1	2	3	4	5	6

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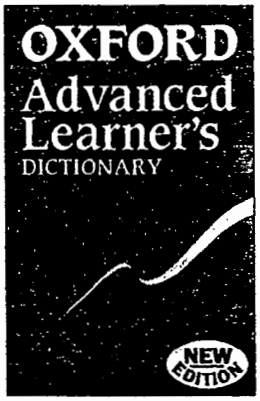

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徵稿

教育曙光整年徵稿。歡迎教師、學校行政人員、輔導工作者、教育學者及研究人員投稿，發表他們從研究和實踐所得的新思維和新啟示。每年六月前投稿，如經採用，將於同年十一月刊登。

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