

# 行政院國家科學委員會專題研究計畫 成果報告

## 高中教師的性別論述與觀點對資優女生科學學習與生涯發展之影響探究 研究成果報告(精簡版)

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 期中進度報告

高中教師的性別論述與觀點對資優女生科學學習  
與生涯發展之影響探究

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## 壹、前言

### 一、研究背景及重要性

從70年代開始，科學的中立性開始被學界廣泛討論，尤以性別與科學研究者更是關注這方面的話題。學者 Keller (1990) 從社會邏輯與心理分析的觀點探討科學與性別的關聯指出，科學界長期被男性所主宰、佔據，形成大多數的科學家都為男性，而其所強調的科學思維也是很男性化、強調客觀理性的，過去科學家、教師甚至父母都認為女性無法成為科學家，因為她們缺少男性職業所需的勇氣、野心與清晰的腦筋，從早期性別角色典範，孩童就認同數學家或科學家是男性，使科學被標上了性別。因此，即使現今不少女性在科學領域嶄露頭角，「男理工、女人文」、「重科學而輕人文」仍深植人心，而科學知識生產或科技的性別政治對人經驗的影響以及科學知識內容的性別偏見仍不斷存在。因而，科學知識的內容、應用、以及其所傳遞的價值，受整個文化建構與心理層面的影響，而產生密不可分的關聯。

王秀雲 (2004) 指出，國外學者 Martin 檢視1980年代以來生物及醫學教科書發現，其中充滿了既有的性別刻板印象，將精子描繪成勇往直前的戰士，卵子則是笨重而被動地等待勇猛精子的她，其採取一種描述自然界現象的姿態，使讀者沒有警覺到其所隱含的性別意涵，進而強化生物決定論，讓性別刻板印象被深化。Scott 與 Schau (1984) 亦分析超過四十種探討性別相關的教學教材，其中多數的教材也存有男性主義的色彩，嚴重影響學生的性別角色態度。而在課堂引用教科書而進行教學的教師又是如何看待與解釋這些現象？值得關注。

教師在進行傳道、授業、解惑的過程中，又傳遞著什麼樣的性別觀念？繼而影響學生對科學的學習以及日後的生涯發展？對資優生又如何？部分研究發現教師存在對兩性不同對待的性別刻板印象，Siegle 與 Reis (1998) 的研究指出，教師雖然認為資優女生比較努力，做出的作品品質也比資優男生要高，但仍然給男生比較高的成績，而女生往往也接受這樣的結果，也認為自己的數學和科學不如男生。而 Cooley, Chauvin, 和 Karnes (1984) 發現，資優班老師往往會認為男生比較有傑出的批判思考與問題解決能力，而女生比較有突出的創作能力，而 Sadker 與 Sadker (1985) 也發現，教師對男生比女生投注較多的注意力，男生常被叫起回答問題，尤其是一些比較複雜有難度的問題；甚至在學生進行同一份作業時，會不經意地鼓勵男生的創意表現，對女生卻是強調寫得十分整潔 (Sadker & Sadker, 1994)。因此，教師的這些反應又如何影響女生的科學學習與發展呢？

在教師對學生生涯發展的影響部分，于曉平 (2005) 曾針對數理資優女生進入基礎科學科系因素之探討發現，教師影響被視為高三學生選擇基礎科學科系與否的決定性因素之一。然而，教師對性別的論述與觀點是如何影響學生的？目前國內外研究較少探討教師的性別觀點對學生科學學習與生涯發展的影響，再加上不同性別之普通生與資優生，以及不同學科教師等因素的探究，具有研究價值。此外，從哈佛大學校長提及女性不如男性乃源自於男女天生固有的性別差異，加上提及男女大腦有別的生物決定論看法，對學生造成什麼樣的影響？亟需加以探討與研究。

而由於蔡麗玲 (2004) 引用部份學者的看法，提及藉由男女分校可減少學生對科學的性別偏差，也發現女校女生選讀科學領域的比男女合校的女生比例要高，不過一旦進入男

女融合的環境，仍會受到性別刻板印象的挑戰，性別角色與期待的問題只是延後發生，甚至可能強化女學生學習傳統的女性角色 (Guzzetti, 2001)。為探討此一情境，研究將持續進行兩年，第一年了解男女分校學生在高三時對科學學習與生涯發展的想法，待學生進入大學後，持續追蹤調查其想法是否改變，以驗證學者的看法。

## 二、研究目的與問題

根據以上研究的背景與其重要性，本研究以資優女生為對象，探究其不同學科的教師之性別論述與觀點，對其科學學習與生涯發展的可能影響，其所包含的研究目的如下：

- (一) 探究資優女生的性別角色、科學學習與生涯發展的情況。
- (二) 比較不同性別與班別的學生其性別角色、科學學習與生涯發展的差異。
- (三) 探討不同領域教師性別論述與觀點對資優女生性別角色、科學學習與生涯發展的可能影響。

根據以上研究目的，其所包含的研究問題如下：

- (一) 資優女生的性別角色、科學學習與生涯發展的情況為何？
- (二) 資優女生的性別角色、科學學習與生涯發展間的關聯為何？
- (三) 不同性別之資優生與普通生其性別角色、科學學習與生涯發展的差異為何？
- (四) 不同領域教師的性別論述與觀點為何？
- (五) 不同領域教師的性別論述與觀點對資優女生性別角色、科學學習與生涯發展的可能影響為何？

## 貳、文獻探討

本研究以了解教師之性別論述與觀點對資優女生科學學習與生涯發展的影響探究為主，進而了解不同性別之資優生與普通生其性別角色、科學學習與生涯發展的差異，並探討不同學科教師的性別論述與觀點，以及其對學生科學學習與生涯發展的影響，因此針對性別與科學之議題發展、資優女生的科學學習與生涯發展、資優女生的性別角色與教師的影響，以及國內外相關研究等四部分進行文獻探討。

## 參、研究方法

### 一、研究架構

本計畫先針對資優女生的性別特質與角色態度、科學學習興趣、動機、困難以及生涯發展進行調查，並比較不同班級（資優班與普通班）與性別（男、女）是否有差異存在。其次，從學生的感受，了解不同學科領域的教師在課堂上所進行的性別論述與觀點為何，並針對教師本身的性別、性別特質與性別角色態度進行調查，以進行後續的分析比較，其中性別論述過程是否有偏差或對學生的激勵皆納入考量中，進而探討教師性別論述與觀點對學生性別角色、科學學習與生涯發展的影響。

### 二、研究對象

本研究以四所高中高三學生共 420 人（6 班為數理資優班，6 班為普通班）與教師各

36 人（數理與非數理領域老師各半）為研究對象，探討高中教師的性別論述與觀點，對學生性別角色、科學學習與生涯發展的影響。正式問卷回收 372 份，回收率為 88.6%，詳細研究對象如下表。

表 1 本研究之研究對象人數統計

組別	預試		資優班女生		資優班男生		普通班女生		普通班男生	
	教師	學生	教師	學生	教師	學生	教師	學生	教師	學生
北一女中	6 人	40 人	6 人	60 人			6 人	80 人		
建國中學	6 人	40 人			6 人	60 人			6 人	80 人
成功中學	3 人	40 人			3 人	30 人			3 人	40 人
中山女中	3 人	40 人	3 人	30 人			3 人	40 人		

### 三、研究工具

#### （一）測驗工具

1. 性別角色與生涯發展量表：針對於曉平（2007）設計之「高中女生特質與發展量表」進行修正，保留原量表內容包括：學生基本資料、性別特質、性別角色態度、生涯自我效能與生涯發展等五部分進行施測，為六點量表，符合程度愈高，得分愈高。
2. 教師性別論述與觀點調查：由學生覺知教師在課堂與平時的性別論述與觀點設計問卷進行調查，透過專家審查與內容一致性進行信效度檢核，為五點量表，符合程度愈高，得分愈高，最後計算平均得分。
3. 科學學習興趣、動機與困難調查表：針對學生的科學學習興趣、動機與科學學習中常感困難的部分進行調查，並透過預試與專家審查進行信效度檢核。為五點量表，符合程度愈高，得分愈高，最後計算平均得分。
4. 教師自評之性別角色量表：抽取于曉平（2007）設計之「高中女生特質與發展量表」中之性別特質與性別角色態度針對教師進行施測，由於內容不涉及年齡等因素，適合不同年齡、性別階段者施測，另加入不同學科等基本資料的調查。

### 四、研究步驟

#### （一）學生性別角色、科學學習與生涯發展調查

1. 科學學習興趣、動機與困難調查表設計：設計科學學習興趣、動機與困難調查表，針對高二的科學學習興趣、動機與困難進行預試，並進行內容一致性與專家效度進行檢核。
2. 教師性別論述與觀點調查表設計：設計教師性別論述與觀點調查表，並請部分教師先行檢核，與科學學習興趣、動機與困難調查表同時進行預試，並進一步進行內容一致性與專家效度檢核。
3. 調整與修正性別角色與生涯發展量表：針對原始量表加以調整修正，並針對原量表預試缺乏的男生部分進行施測，以確認最後的量表。
4. 正式調查與資料蒐集：針對高三不同性別之資優生與普通生同時科學學習興趣、動機與困難調查、教師性別論述與觀點調查，以及性別角色與生涯發展量表施測，以了解學生在性別角色、科學學習與生涯發展的情形，以作為後續比較與探究之參考。

5. 資料彙整與分析：將資料加以整理，以解答資優女生的性別角色、科學學習與生涯發展的情況與關聯，以及比較不同性別與班別的學生其性別角色、科學學習與生涯發展的差異之發現。

(二) 教師性別角色調查：了解教師之性別、性別特質與性別角色態度：透過改編之教師評性別角色量表，針對不同學科領域之教師填寫，以蒐集教師相關的資訊。

## 五、資料的蒐集與分析

本研究透過「性別角色與生涯發展量表」、「科學學習興趣、動機與困難調查」、「教師性別論述與觀點調查」與「教師性別角色調查」等結果進行統計，並透過描述性統計、迴歸與雙因子變異數分析進行分析，以回答研究問題。

### 肆、研究成果

(一) 資優女生的性別角色、科學學習與生涯發展的情況

在性別特質部分（見表 2），資優女生在男性特質（平均數為 4.24）與女性特質（平均數為 3.93）的平均得分皆高於量表平均值 3.5，就人數部分，60.7% 的高中資優女生屬於中性特質（男性特質與女性特質皆高），顯示其同時兼具獨立、有主見、喜歡冒險競爭等男性特質與溫暖、細心、善感的女性特質，與于曉平（2007）研究結果相仿。

表 2 高中資優男女性別特質分類人數統計

		Gender Characteristics				Total
		Non-classification	Feminine	Masculine	Neutral	
SEX	Male	14	23	29	105	171
	Female	12	38	27	119	196
Total		26	61	56	224	367

在性別角色態度部分，資優女生不認同傳統性別角色（平均數為 2.77，低於量表平均值 3.5），而對非傳統如強調兩性平權的性別角色則十分認同（平均數為 5.39，高於量表平均值 3.5），至於社會性別角色覺知部分，資優女生略低於量表平均值 3.5（平均數為 3.35），顯示其性別角色覺知仍需加強。

在科學學習部分，資優女生對於科學在生活應用、如何解決生活問題上較感興趣，對科學理論的論述興趣較低；在學習動機上，資優女生傾向於內在動機，喜歡科學是因為它能激發或滿足其好奇心，也可以了解自然界中許多現象的科學原理等。至於科學學習的困難部分，這群數理資優女生在科學學習上感到困難的部分不高，無論是理論與計算、理解與閱讀、轉換與練習等，唯有時間管理是資優女生略感困難之處（平均值為 3.02，高於平均數 3 以上），顯示資優女生常感到沒有足夠的時間思考，以及考試作答時間不足等。

至於資優女生在生涯自我效能上得分頗高（平均數為 4.63，高於量表平均值 3.5），顯示其對自己能力、興趣，以及對升學、就業等資訊上的掌握頗具信心，在生涯態度與信念、生涯探索與計畫等生涯發展（平均數為 4.28 與 4.41，高於量表平均值 3.5）上也是相當的肯定，對未來有清楚的發展方向與目標，也會了解自己的能力、興趣以選擇適合的科系。

## (二) 資優女生的性別角色、科學學習與生涯發展間的關聯

研究透過相關分析，探討資優女生性別角色、科學學習與生涯發展間的關聯，分析結果發現（如表 8）：

1. 男性特質與生涯自我效能 ( $r=.499$ )、生涯發展、科學學習興趣高低、科學學習動機高低等在統計上有顯著的相關 ( $p<.05$ )。
2. 性別角色態度與生涯自我效能 ( $r=.360$ )、生涯發展、科學學習興趣高低、科學學習動機高低等在統計上有顯著的相關 ( $p<.05$ )。
3. 生涯自我效能與生涯發展( $r=.814$ )、科學學習興趣高低、科學學習動機高低等在統計上有顯著的相關 ( $p<.05$ )。
4. 生涯發展與科學學習動機高低在統計上有顯著的相關 ( $p<.05$ )。
5. 科學學習興趣高低與科學學習動機高低 ( $r=.692$ )、科學學習困難等在統計上有顯著的相關 ( $p<.05$ )。
6. 科學學習動機高低與科學學習困難在統計上亦有顯著的相關 ( $p<.05$ )。

較為獨特的是，科學學習困難之高低何以與科學學習興趣與科學學習動機之高低呈現正相關，是否資優女生即使在科學學習上某些部分感到困難，但仍對科學學習抱有相當的興趣，也願意持續學習科學、不斷挑戰？值得進一步探究。

## (三) 不同性別之資優生與普通生其性別角色、科學學習與生涯發展的差異

針對不同性別之資優生在性別角色、科學學習與生涯發展的差異上，在性別特質部分，資優男女生在男性特質與女性特質的平均得分皆高於平均數 3.5，就人數部分，61.0%的高資優生屬於中性特質（男性特質與女性特質皆高）。在性別角色態度部分，資優學生無論男女，都不認同傳統性別角色，且女生的不認同感比男生強烈一些。而對非傳統性別角色則十分認同，至於社會性別角色覺知部分，資優男女生皆略低於平均數 3.5，顯示其性別角色覺知皆需加強。

在科學學習部分，資優男生在科學學習興趣上較為平均，無論是理論、驗證假設或生活應用都感到興趣，皆高於平均數 3，尤其喜歡假設驗證、科學探究等學習；女生則對於科學在生活應用、如何解決生活問題上較感興趣，對理論的興趣較低；在學習動機上，資優男女生都傾向於內在動機。至於科學學習的困難部分，這群數理資優男女普遍在科學學習上感到困難的部分並不高，無論是理論與計算、理解與閱讀、轉換與練習，以及時間管理部分，唯時間管理是資優男女生略感困難之處，尤其對資優女生更甚。

至於資優生與普通生在性別角色、科學學習與生涯發展的差異部分，在性別特質、性別角色態度、生涯自我效能與生涯發展上呈現一致的情形。至於科學學習上，就讀普通班且選擇理組的女生顯示在科學學習興趣上較低，在理論與應用等科學學習興趣皆低於平均值 3，科學學習動機也偏低，在科學學困難上則較其他幾組高，此外，普通班的男女生在時間上的困難亦比資優生高。

透過二因子（性別與班別）變異數分析結果顯示（見表 3），性別角色態度、科學學習興趣、科學學習動機與科學學習困難在性別上有顯著差異，其中女生對傳統性別角色較不認同，在科學學習上，男生比女生有興趣、動機強、較不感到學習困難；至於資優班與普通班學生則在科學學習興趣、科學學習動機與科學學習困難有顯著差異，顯示資優生在

科學學習上比普通班學生有興趣、動機強、較不感到學習困難。

表 3 二因子變異數分析結果

Dependent Variable	Sex	Class	Sex*Class
Feminine characteristics	1.377	.476	.006
Masculine characteristics	.099	5.049*	.470
Gender attitude	52.290***	.631	1.811
Career self-efficacy	.001	2.677	.037
Career development	.687	1.800	.303
Science interest	28.558***	25.330***	5.852*
Learning motivation	13.602***	13.890***	2.315
Science difficulty	7.960**	18.846***	.812

#### (四) 不同領域教師的性別論述與觀點

從學生覺知不同領域教師的性別論述與觀點進行統計分析發現，資優學生對教師的論述與教師對性別上的鼓勵上，除了資優班與普通班男生認為數理類教師對男女平權等性別論述上較不符合外（平均數為 2.69 與 2.41，低於平均值 3），其餘教師在性別的論述與觀點上皆符合兩性平權的觀點（皆達平均值 3 以上），顯示教師關心兩性的議題，也會鼓勵其突破傳統性別的限制。此外，學生普遍覺得非數理類教師談論與關心性別相關的議題較數理類老師要高，且面對女學生教師會談論相關的議題較多。

此外，針對 14 位男性與 22 位女性分別任教於資優班與普通班的教師，比較不同性別的教師在性別特質與性別角色態度上的差異，男女教師在性別特質上亦呈現中性特質（男女性特質皆高），不過男老師的男性特質高於女老師，女老師的女性特質高於男老師，男女教師略不認同傳統性別角色（略低於平均值 3.5），且肯定非傳統性別角色，對社會性別角色覺知亦達平均值以上，顯示國內在性別教育的推動下，高中教師對於性別態度的覺知有相對的敏感性。另透過獨立樣本的 T 考驗檢定發現，女老師在非傳統性別角色態度上的認同度顯著高於男老師 ( $p < .01$ )。

#### (五) 不同領域教師的性別論述與觀點對資優女生性別角色、科學學習與生涯發展的可能影響

研究透過迴歸分析，分別探討不同領域教師的性別論述與觀點對資優女生之性別角色、科學學習與生涯發展的可能影響，結果發現，教師性別論述對學生的性別特質、科學學習等無顯著預測性，僅在性別角色態度、生涯自我效能與生涯發展上有顯著，但解釋量僅 9.4%、12.2% 與 15.4% ( $p < .05$ )，其中又以非數理類老師的性別論述在學生生涯自我效能與生涯發展上有顯著的預測性。

此外，透過迴歸分析，以生涯發展作為依變項，學生的性別、焦慮與否、得到支持與否、性別特質、性別角色態度、生涯自我效能、數理教師性別論述、非數理教師性別論述、科學學習興趣、學習動機與科學學習困難等為預測變項進行分析，可解釋量為 72.9% ( $p < .05$ )，結果發現（見表 4），資優女生在學習上越不感到焦慮、生涯自我效能越有自信，其生涯發展越好。



表 4 性別角色、科學學習、教師性別論述對生涯發展影響之統計

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.762	.590		1.290	.202
	Anxious	.167	.062	.197	2.700	.009
	Support	.051	.077	.055	.658	.513
	Gender characteristics	.077	.046	.123	1.648	.105
	Gender attitude	-.145	.135	-.089	-1.079	.285
	Career self-efficacy	.630	.072	.722	8.780	.000
	M/s teacher discourse	.032	.082	.038	.392	.697
	Non-m/s teacher discourse	.130	.120	.121	1.079	.285
	Science interest	-.069	.078	-.086	-.893	.376
	Learning motivation	.043	.094	.046	.459	.648
	Science learning difficulty	-.004	.086	-.004	-.050	.960

a. Dependent Variable: CADEVELO

## 伍、結論與建議

### 一、結論

#### (一) 資優女生的性別角色、科學學習與生涯發展的情況

在性別特質部分，60.7%的高中資優女生屬於中性特質（男性特質與女性特質皆高），顯示其同時兼具獨立、有主見、喜歡冒險競爭等男性特質與溫暖、細心、善感的女性特質。在性別角色態度部分，資優女生不認同傳統性別角色，而對非傳統如強調兩性平權的性別角色則十分認同，至於社會性別角色覺知部分，資優女生略低於量表平均值 3.5，顯示其性別角色覺知仍需加強。

在科學學習部分，資優女生對於科學在生活應用、如何解決生活問題上較感興趣，對科學理論的論述興趣較低；在學習動機上，資優女生傾向於內在動機。至於科學學習的困難部分，這群數理資優女生在科學學習上感到困難的部分不高，唯有時間是資優女生略感困難之處，資優女生常感到沒有足夠的時間思考，以及考試作答時間不足等。

至於資優女生在生涯自我效能上得分頗高，在生涯態度與信念、生涯探索與計畫等生涯發展上也是相當的肯定，對未來有清楚的發展方向與目標。

#### (二) 資優女生的性別角色、科學學習與生涯發展間的關聯

研究透過相關分析，探討資優女生性別角色、科學學習與生涯發展間的關聯，分析結果發現，男性特質與生涯自我效能、生涯發展、科學學習興趣高低、科學學習動機高低等在統計上有顯著的相關；而性別角色態度亦與生涯自我效能、生涯發展、科學學習興趣高低、科學學習動機高低等有顯著的相關；而生涯自我效能與生涯發展、科學學習興趣高低、科學學習動機高低等有顯著的相關；而生涯發展與科學學習動機高低有顯著的相關。較為獨特的是，科學學習困難之高低與科學學習興趣與科學學習動機之高低呈現正相關，值得進一步探究。

#### (三) 不同性別之資優生與普通生其性別角色、科學學習與生涯發展的差異

透過二因子（性別與班別）變異數分析結果顯示，性別角色態度、科學學習興趣、科學學習動機與科學學習困難在性別上有顯著差異，資優學生無論男女，都不認同傳統性別角色，但女生的不認同感比男生強烈一些。在科學學習上，資優男生在科學學習興趣上較為平均，但女生則對於科學在生活應用、如何解決生活問題上較感興趣，對理論的興趣較低；在學習動機上，資優男女生都傾向於內在動機。在科學學習的困難部分，資優男女普遍在科學學習上不感困難，唯時間是資優男女生略感困難之處，尤其對資優女生更甚。

至於資優班與普通班學生則在科學學習興趣、科學學習動機與科學學習困難有顯著差異。就讀普通班且選擇理組的女生顯示在科學學習興趣上較低，在理論與應用等科學學習興趣皆低於平均值3，科學學習動機也偏低，在科學學習困難上則較其他幾組高，此外，普通班的男女生在時間上的困難亦比資優生高。

#### （四）不同領域教師的性別論述與觀點

從學生覺知不同領域教師的性別論述與觀點進行統計分析發現，資優學生對教師的論述與教師對性別上的鼓勵上，除了男生認為數理類教師較少論述男女平權等觀念外，其餘教師在性別的論述與觀點上皆符合兩性平權的觀點。此外，學生普遍覺得非數理類教師談論與關心性別相關的議題較數理類老師要高，且面對女學生教師會較常談論相關的議題。

另比較不同性別的教師在性別特質與性別角色態度上的差異，男女教師在性別特質上亦呈現中性特質，男女教師略不認同傳統性別角色，且肯定非傳統性別角色，對社會性別角色覺知亦達平均值以上，顯示國內在性別教育的推動下，高中教師對於性別態度的覺知有相對的敏感性。另透過獨立樣本的 T 考驗檢定發現，女老師在非傳統性別角色態度上的認同度顯著高於男老師。

#### （五）不同領域教師的性別論述與觀點對資優女生性別角色、科學學習與生涯發展的可能影響

研究透過迴歸分析，分別探討不同領域教師的性別論述與觀點對資優女生之性別角色、科學學習與生涯發展的可能影響，結果發現，教師性別論述對學生的性別角色態度、生涯自我效能與生涯發展上有顯著，但解釋量偏低，其中又以非數理類老師的性別論述在學生生涯自我效能與生涯發展上有顯著的預測性。此外，透過迴歸分析，以生涯發展作為依變項，學生的性別、焦慮與否、得到支持與否、性別特質、性別角色態度、生涯自我效能、數理教師性別論述、非數理教師性別論述、科學學習興趣、學習動機與科學學習困難等為預測變項進行分析，可解釋量為 72.9% ( $p < .05$ )，結果發現，資優女生在學習上越不感到焦慮、生涯自我效能越有自信，其生涯發展越好。

## 二、建議

### （一）教育上的建議

1. 科學學習興趣的培養：對數理資優女性而言，科學學習興趣、動機與困難皆有相關，且科學學習困難之高低與科學學習興趣與科學學習動機之高低呈現正相關，顯示資優女生即使在科學學習上某些部分感到困難，但仍對科學學習抱有相當的興趣，也

願意持續學習科學、不斷挑戰，呈現資優生在科學學習上獨特的面貌。

2. 科學學習方式的調整：根據研究發現，資優女生對時間上感到困難，常感思考時間不足、考試時間不夠，因此老師在教學上，應注意資優女生的學習需求，給予較充分的時間思考與解答習題。
3. 不同領域教師的性別論述：研究發現，相較於非數理類老師，數理科老師教少與學生談到性別平權等觀念，對男生更是如此，未來社會中男女都必須具備平權的觀念，因此無論哪個學科的老師，都應灌輸學生性別平權的觀念。
4. 性別角色覺知的加強：研究發現，無論資優男女生，在性別角色的覺知仍不足，有時候會對社會上兩性不平權的狀態習慣性接受或認同，因此，加強兩性在性別平權上的觀念與覺知，將有助於兩性更健全的發展。
5. 生涯發展課程之規劃：為助於高中學生生涯發展之順遂，提升其生涯自我效能，建立其在科學學習上的信心且不感到焦慮，都能有效提升學生的生涯發展，值得教育單位重視。

## (二) 研究上的建議

1. 探討學生後續的科學學習與生涯發展：高中學生選填科系並進入大學後，之後的發展情形如何？過去科學學習的情形對其進入大學後又產生什麼樣的變化？是否仍對未來的發展深具信心？這些相關的議題，過去較少學者探究，然對於如何修正反省中學的教育極具意義，值得持續研究。
2. 教師的性別論述與反省：本研究雖由學生觀點探討教師的性別論述，並從教師的性別特質與性別角色進行分析，然實際教學現場的情形如何？值得透過實務觀察與訪談深入了解之。
3. 資優女生科學學習的歷程：本研究發現，資優女生即使在科學學習上某些部分感到困難，但仍對科學學習抱有高度興趣與動機，其原因為何？其科學學習上有何獨特的面貌？為有助於資優女生的數理教育，值得加以進一步探究。

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# 國科會補助專題研究計畫項下出席國際學術會議心得報告

日期：99年8月6日

計畫編號	NSC 98 - 2629 - S - 142 - 001 -		
計畫名稱	高中教師的性別論述與觀點對資優女生科學學習與生涯發展之影響探究		
出國人員姓名	于曉平	服務機構及職稱	台中教育大學特教系助理教授
會議時間	99年7月27日至 99年8月5日	會議地點	澳洲雪梨
會議名稱	(中文) 第11屆亞太資優教育會議 (英文) the 11th Asia-Pacific Conference on Giftedness 2010		
發表論文題目	(中文) 1.高中教師的性別論述與觀點對資優女生科學學習與生涯發展之影響 2.臺灣與中國大陸資優教育教師培育之介紹 (英文) 1.The effect of the gender discourse and views of high school's teachers on science learning and career development of gifted girls 2. The introduction of teacher cultivation for gifted education in Taiwan and China		

## 一、參加會議經過

第11屆亞太資優教育會議在澳洲雪梨舉辦，亞太地區資優教育的學者專家、教師以及學生們皆齊聚一堂，共有4場專題演講與200多場的論文發表在會議期間進行，此外，亦有來自各國的青少年參加大會舉辦的營隊。比較特別的是這次由中華資優教育學會組團，包含參與亞太資優教育會議青少年營的國內中小學資優班學生及少數家長一行共65人共同前往。除了參加會議，也更進一步了解學生參與營隊的過程與感想，另亞太資優教育協會之會員代表大會亦於會議期間舉辦，因此亦參加了會員大會票選代表的過程。

## 二、與會心得

此次國內共有10多位資優教育的學者專家參與發表，發表前大家都十分謹慎，不斷演練，因此都表現得可圈可點，大會在雪梨會議中心辦理，

場地與設備都很完善，前幾個場次也有安排學生計時與主持，讓人覺得十分細心，另外會場內亦邀請許多出版商，提供資優教育相關的書籍可供採購，唯一美中不足的是此次大會的專題演講者並非資優教育界中大師級的人物，吸引力稍顯薄弱。此外，資優學生青少年營也在同一場地辦理，雖然無法拍攝留影，但仍可以看到學生分組討論與互動的情形，私下問學生對於參加營隊的想法，學生都給予正面的肯定，包括可以跟國際學生互動，了解彼此的文化與習性，但大會對青少年營的規劃與帶領可再加強，可更有主題性與創造力。



### 三、建議

此次是個人第二次參加亞太資優會議的發表，宜積極鼓勵新進學者參與發表，除了可與各國參與人員交換意見與想法，也是自我磨練的機會。此外，部分亞太地區國家都參考了國內資優教育在政策與教學上的想法，讓人十分欣慰。另外，因就近觀察青少年營的活動，對參與的資優生是很好的挑戰，除了與世界各國的青年學子分享想法，也是擴展國際視野的好方法，許多學生參與後可以發現，英語的學習十分重要，表達能力與爭取表現的機會也是極為重要的訓練。此外，參與會員代表大會可以感受到，幾位國內資深資優教育學者的努力與艱辛，要能在國際上佔有一席之地，除了展現專業與積極參與國際活動，建立國際友伴是十分重要的，部分國家或地區十分積極爭取國際地位，甚至會排擠臺灣代表，建議國內能對學者專家參與國際會議持續支持，除增加國際曝光率，也宜思考增加國際友伴的對策（相片中為郭靜姿教授邀請泰國學者共進晚餐的留影）。



### 四、攜回資料名稱及內容

會議提供的資料包括大會議程、論文發表摘要，另外亦蒐集協會出版或贈送的刊物，以及明後年世界資優會議與亞太資優會議的相關資訊。

# The effect of the gender discourse and views of high school's teachers on science learning and career development of gifted girls

Presenter: Yu, Hsiao-ping  
National Taichung University, Taiwan  
2010.7.31

## Research Background

- This research was sponsored by Taiwan National Science Council.
- Background
  - Gifted girls limited their development under the traditional gender-role stereotypes.
  - The math/science gifted girls would have great conflict while facing with their career choice.
  - Career development was affected by one's self efficacy.
  - Science thinking formed from culture construction and psychological aspect, and then had the sex-role stereotypes.
  - Student's science learning and teacher's discourse affected their choice when they wanted to study science or enter the related science department.

## Research Goals

- Investigate the situation of the gender, career self-efficacy and career development, teacher discourse, and science learning of gifted and regular students.
- Try to understand the connection of sex role, career self-efficacy and career development, teacher discourse, and science learning of gifted and regular students who studied in high school through analyzing the result of the investigation.

## Research Problems

- Concerning the gender, career self-efficacy, career development, teacher discourse, and science learning of gifted and regular students studied in high school were discussed:
  - What was their situation?
  - What was their connection?
  - What was their influence according to teacher's discourse and encouragement?

## Research Sample

- Investigation research
- It provided 420 scales and the recovery was 88.1%. 137 gifted students were chosen from four high schools in Taiwan. Besides, 232 regular students were chosen from these same schools at the same time in order to make a comparison.
- 36 teacher were chosen in different subject and sex.

### **Research Tools (1/1/3)**

- “The Girl Sex Role and Development in High School” Scale (Yu, 2007)
  - The form was designed to six-point Likert-type scale.
  - 30 math/science gifted girls and 80 regular girls were pretested. Among them, 101 valid copies were collected to analyze the items, such as average, kurtosis, lean, factor analysis.
  - Analyzing the reliability and validity of the scale, 86 regular girls studied in high school were chosen to be retested after an interval of three weeks. The rate of recovery was 96.5%. According to the relevant analysis, it showed there were certain stabilities in the test-retest reliability. The factor analysis was used to identify the constructing validity.

### **Research Tools (1/2/3)**

- The content of quantity included:
  - Student's basic data: Including student's class type, interesting group, emotion stability and support etc.
  - Gender characteristics: It amounted to 35 questions and divided into the masculine characteristics (1-17) and the feminine characteristics (18-35). It could be explained the variation of 40.992%.
  - Gender-role attitude: It amounted to 34 questions and divided into the traditional gender-role attitude (1-14), non-traditional gender-role attitude (15-28), and social gender-role attitude awareness (29-34). It could be explained the variation of 62.063%.

### **Research Tools (1/3/3)**

- Career self- efficacy : It amounted to 30 questions in the form of six-point Likert-type scale. After analyzed the item,  $\alpha$  coefficient was .9688. Utilizing the factor analysis to select the single factor. It could be explained the variation of 54.258%
- Career development : It amounted to 18 questions and distinguished two parts as career attitude and belief (1-8) and career exploration and plan (9-18). It could be explained the variation of 47.719%.

### **Research Tools (2/1/3)**

- The Scale “Teacher’s Discourse and Encouragement about Gender”
  - The form was designed to five-point Likert-type scale.
  - 300 high school students were tested. Among them, valid copies were collected to analyze the reliability and validity by Cronbach's  $\alpha$ , factor analysis, and content validity.



- The content of quantity included:
  - Student's basic data: Including sex, school, class type etc.
  - Teacher's point and encouragement: It amounted to 21 questions and divided into the discourse about gender equality (1-4), tradition gender role (5-10), encouragement about gender equality (11-16) and traditional breakthrough (17-21). It could be explained the variation of 68.020%.

### **Research Tools (3/1/3)**

- The Scale “Science Interest, motivation, and Difficulty”
  - The form was designed to five-point Likert-type scale.
  - 300 high school students were tested. Among them, valid copies were collected to analyze the reliability and validity by Cronbach's  $\alpha$ , factor analysis, and content validity.
  - The content of quantity included:
    - Student's basic data: Including sex, school, class type, etc.
    - Science interest: It amounted to 12 questions and divided into the theory (1-4), verification (5-8), and application (9-12). It could be explained the variation of 69.833%.

### **Research Tools (3/2/3)**

- Learning motivation: It amounted to 9 questions and divided into the external motivation (1-4) and internal motivation (5-10), It could be explained the variation of 59.107%.
- Difficulty about science learning: It amounted to 20 questions and divided into the theory and count (1-4, 8-11), comprehension and reading (5-7, 16-17), transformation and practice (12-15) and time management (18-20). It could be explained the variation of 61.091%.

### **Data Analyzing**

- Statistical analysis and comparing
  - Calculated and describe the average of the sex role, career self-efficacy, career development, teacher discourse, and science learning of 4 high schools students, and compared the differences by ANOVA.
  - Probed into their connection by T-test and regression analysis.

### **Research Procedure**

- Consult relevant documents, and write the plan of studying.
- Design the scales, and consult with the professional experts and experiencing teachers to help to inspect the content.

- Pretest and revise the scale according to its result.
- Investigate 420 senior high schools' students.
- Analyze the data and compile the report.

### **Results (1/1/4)**

- The situation of the gender, career self-efficacy and career development, teacher discourse, and science learning of gifted and regular students
  - In gender characteristics
    - Both their masculine characteristics (Male: 4.17; Female: 4.24) and the feminine characteristics (Male: 3.83; Female: 3.93) were higher than the average 3.5. (Table 1)
    - More than high school's students (61.0%) were of neutral characteristics, that is, they had masculine and feminine characteristics concurrently.

### **Results (1/2/4)**

- In gender role attitude (Table 1)
  - Gifted students didn't completely agree to the traditional gender role (Male: 3.22; Female: 2.77, and lower than the averages 3.5). Female felt stronger than male.
  - They agreed the non-traditional gender role that emphasized the equal rights of men and women (Male: 5.04; Female: 5.39).
  - Their social gender role awareness (Male: 3.45; Female: 3.35 lower than the averages 3.5) showed that they need to improve gender role awareness in society.

### **Results (1/3/4)**

- In career self-efficacy, gifted students got above-average score (Male: 4.66; Female: 4.63) that showed they had the confidence of obtaining the vocation information, assessing self-ability, choosing career goals, and solving problems.
- In career development (Table 2)
  - In career attitude and belief, they got above-average score (Male: 4.40; Female: 4.28) that showed they had some directions and expectation of the future, but they sometimes felt helpless and afraid.
  - In career exploration and plan, they the above-average scale between 4.35 and 4.41, showed that they understood how to collect the career information.

### **Results (1/4/4)**

- In science learning (Table 3 & 4)
  - In science interest, gifted students got above-average score in theory, verification, and application that showed they had liked thinking, verifying, hypothesize, predict, and solve problems.
  - In learning motivation, gifted students showed internal learning motivation (above

averages 3), not external motivation, and showed they liked science because of curiosity and interest.

- In learning difficulty, gifted students showed little difficulty in theory-count, comprehension-reading, transform-practice, and time using. But, girls got more difficult than boys.

### **Results (1/5/4)**

– In teacher's discourse (Table 5)

- Gifted students' showed above-average score in teacher's view and encouragement about gender equality (Gifted male only showed below-average score in math/science teacher's view/point) that showed their teacher discussed the issue of gender equality in class and encouraged them to breakthrough and care about this issue.
- Besides, students felt non-math/science teachers discuss and care about this issues than math/science teachers, and teachers had more time discussing with gifted girls than boys.

### **Results (2/1/4)**

- The connection of the sex role, career self-efficacy, career development, teacher discourse, and science learning of gifted students
  - There was significant positive correlation ( $r > .2, p < .01$ ) with:
    - Masculine characteristics and career self-efficacy ( $r = .565$ ), career development, science interest, learning motivation
    - Gender attitude and career self-efficacy, career development, teacher discourse
    - Career self-efficacy and career development ( $r = .813$ ), non-math/science teacher discourse, science interest, science motivation.
    - Math/science and non-math/science teacher discourse ( $r = .734$ )
    - Career development and non-math/science teacher discourse
    - Science interest and learning motivation ( $r = .756$ )
    - Learning motivation and science learning difficulty

### **Results (3/1/4)**

- The difference of the gender, career self-efficacy, career development, teacher discourse, and science learning of high school's students
  - It analyzed this data by two-factor ANOVA.
  - There was significant difference in:
    - Gender attitude, teacher discourse, and science learning in different sexes.
    - Masculine characteristics and science learning in different class types.

### **Results (4/1/4)**

- Teacher's gender and subject

- It analyzed by T-test. (Table 9)
- It showed there was no significant difference in their age, gender attitude, and subject.
- However, female teachers got higher score in non-traditional gender attitude than male teachers ( $p < .05$ ).

## Results (4/2/4)

- The effect of teacher discourse, anxious, support, gender, and career self-efficacy
  - It analyzed by regression analysis. The explaining amount was 76.0% ( $p < .05$ ).
  - It showed that if a gifted student was more inclined to the neutral characteristics, less anxious, more self-confident in the career, and more equal about non math/science teacher's gender discourse, the better the career development.

## Discussion

- Could gender problems be solved?
- Did the gender characteristics have a greater influence on the career self-efficacy than gender attitude?
- Could the career self-efficacy be influenced by improving gender role attitude?
- How did science learning affect high school students' career development?
- How did teacher's discourse affect high school students' science and career development?

## Conclusion (1/4)

- First, 61% high school's students were of neutral characteristics which had high masculine and feminine characteristics, and they agreed non-traditional gender role attitude, but they needed to improve gender role awareness in society. And they had above-medium career self-efficacy and career development. Then, gifted students got above-average score in science interest. They were internal motivation. In learning difficulty, gifted students showed little science difficulty. However, girls got more difficult than boys. And, gifted students' showed above-average score in teacher's view and encouragement about gender equality, and students felt non-math/science teachers discussed and cared about this issue than math/science teachers.

## Conclusion (2/4)

- Second, probing into the connection of the gender role, career self-efficacy, career development, teacher discourse, and science learning, and found there was significant positive correlation with many variables. The most significant was masculine characteristics and career self-efficacy, career self-efficacy and career development, math/science and non-math/science teacher discourse, and Science interest and learning motivation.

### **Conclusion (3/4)**

- Third, in order to understand the difference of the gender, career self-efficacy, career development, teacher discourse, and science learning of high school's students in different sexes and class types, it analyzed the data by two-factor ANOVA. It showed there was significant difference with gender attitude, teacher discourse, and science learning in different sexes. Besides, there was significant difference with masculine characteristics, Science learning in different class types.

### **Conclusion (4/4)**

- Finally, It analyzed by regression, and showed that if a gifted student was more inclined to the neutral characteristics, less anxious, more self-confident in the career, and more equal about non math/science teacher's gender discourse, the better the career development.

### **Suggestion**

- Suggestion in education
  - Build up their neutral characteristics form the childhood.
  - Keep to improving student's career self-efficacy.
  - Improve student's interest about science learning and motivation.
  - The implementation of gender equality education and teachers' introspection of gender role.
- Suggestion in research
  - Probing into the factor of improving the career self-efficacy continuously
  - Exploring how to improve student's science learning.

# The introduction of teacher cultivation for gifted education in Taiwan and China

Presenter: Yu, Hsiao-ping  
National Taichung University, Taiwan  
2010.7.29

## Background

- This research was sponsored by National Taichung University.
- Research time: Aug 2009~ Jul 2010
- Research methods: literature review, interviews and field visits
  - Involved in cross-strait gifted Education symposium in Xi-an in October 2009
  - Involved in cross-strait conference on gifted and creativity in Taipei in May 2010

## Teacher Cultivation

- Good teacher is an important guarantee for success in education. In gifted education, teachers having the specialty and enthusiasm is the key to teaching successfully.
- Thus, teacher's training for gifted education is necessary to promote.

## Gifted Education in Taiwan

- Gifted education in Taiwan began in 1973, started from the experimental class for gifted programs. Now, there are more than 50,000 students receive gifted education services.
- Gifted students means they have outstanding potential or outstanding perform in six areas:
  - General intelligence, academic, arts talents, creativity, leadership, and other special talent.
- Placement includes:
  - contained gifted class, resource class, circulating counseling, and gifted education program.

## Teacher Cultivation in Taiwan 1

- The “teacher cultivation law” was amended in 1994. Compared to the past, the rule has several major changes
  - Diversity and openness of teacher cultivation
  - Stipulate teacher's examination and practice explicitly
  - Teacher cultivation has the spirit of trained human resource.
  - Education cultivation organization has the responsibility to strengthen in-service training.
- Teacher cultivation opens from the single system to multi-dimension. Many colleges and institutes can offer the education course.

## Teacher Cultivation in Taiwan 2

- Use the division system
  - Separate into preschool, elementary school, middle school, and special education, the examination also have different subject.

- Special education teacher must examine the subjects includes: language ability, education principle and system, evaluation and counseling for children with special needs, curriculum and teaching for children with special needs.
- If special education teacher wants to transfer the regular education teachers, or regular education teachers wants to transfer special education teacher, they need to study some credits and practical training.

### **Teacher Cultivation in gifted education in Taiwan 1**

- Teacher cultivation in gifted education included secondary education and in-service training.
- Secondary education
  - Normal universities or colleges provided the related credits and authentication to graduates, elementary and middle schools' teachers to carry on the teacher cultivation for gifted education.
  - And, they designed gifted education program. Students required to attend courses including common special education and special course for gifted education.
  - This is an important source that cultivated elementary and middle school's teachers to educate gifted children.

### **Teacher Cultivation in gifted education in Taiwan 2**

- Course and the credits
  - General education course: At least ten credits
    - **Teachers core curriculum in different stages of education**
  - Special education course: At least 30 credits
    - **Common course (ten credits) all for compulsory**
      - » Introduction to special education, the evaluation for children with special needs, and practicum in special education
    - **Special course in gifted education (at least 20 credits)**
      - » Compulsory course for each kind of group
      - » Compulsory course for gifted education (at least 12 credits for): Introduction to gifted education, instructional material & methods for gifted students, creativity education and so on.
      - » Selective course for Gifted education (at least 8 credits): theory & application of multiple intelligence, career guidance for the gifted, and gifted education for special groups.

### **Teacher Cultivation in gifted education in Taiwan 3**

- In-service training
  - In order to help the current teachers who didn't have the qualifications get the related specialty, it also set up the programs for them to study gifted education using weekends or winter and summer vacation.
  - In addition, various counties city and all schools also hold advanced courses or activities to their teachers non-periodically. Not only gifted student's teachers have the opportunity to take advanced courses continually and promote the professional

development, also let the general student's teachers have the opportunity to understand the gifted education, even puts into the gifted education. The activities they hold as follows:

- Lecture about gifted education
- Education seminar
- Visit and emulates

### **Current Situation in Taiwan**

- According to the statistics, normal education to nurture gifted teachers which gotten from normal colleges and universities is 31% and the supplementary education is 69%. However, it's still insufficient, especially in low passing rate.
- At present, the system for teacher cultivation has some problems, such as teachers for the gifted don't understand the general education. And, It has the teacher's examination, but still lack the evaluation system.
- Now, under the trend of inclusion education, it requests the general teacher's hire need to have special education's credit. It may help the general teacher understand the special education, and may also improve special student's adaption in the general class. (Stakes & Hornby, 1997).

### **Level of Professional performance**

- Wu (2008) proposed that the gifted teachers in Taiwan had specialized performance standard in seven aspects: The basic accomplishment, the dedication and manner, the specialized knowledge, the assessment and identification, the curriculum design and teaching, the classroom management and counseling, and the research development and further education
- Li (2009) in view of math/science teachers for the gifted in Taiwan, and proposed seven specialized performance standard as follows: Content knowledge, general teaching knowledge, curriculum knowledge, discipline teaching knowledge, learner knowledge, teaching environment knowledge, and educational goal, value, philosophy and historical foundation.

### **Problems in Taiwan**

- According to the special education statistics (2008), the teachers for the gifted who study in contained class reach as high as 90% and don't have gifted education's qualification. At present, many counties ask teacher cultivation's universities and colleges provide the professional training of gifted education to them.
- The teachers for the gifted not only need to teach, solve student's problems, but also need to communicate with parents, paper work, curricular adjustment, and establish support program and so on. Their burden and pressure is quite heavy.

### **Suggestion for Taiwan**

- Teacher's transformation should hold the flexibility.
- The demand of teacher for the gifted should understand regularly.
- The cultivation for the teachers that teach to gifted children should plan properly.



- The curriculum and plan for teacher cultivation need to connect with the practice.
- The organization for teacher cultivation need to apply and examine rigorously.
- Strengthen in-service training and the quality control.

### **Gifted Education in China**

- China has promoted the gifted education since in 1978. In that time, they built the contained class for the young gifted in Chinese Technical University and started the gifted education.
- Elementary and middle schools started from 1985 to nurture the gifted children and carry on the gifted education.
- In 1988, gifted education specialized committee was founded, and started to do the cooperation research by the university teachers and middle school's teacher's in 1996.
- Not only these extremely students make the outstanding performance in the international competition, but most of them are also the professional people after the graduation.

### **Example of High School 1**

- Tai & Zhao (2008) found from the teaching skill and experience, gifted teachers for the gifted were not necessary to teach outstandingly initially. The hardware facility in gifted education didn't have any difference with in general class.
- However, it has accomplished many outstanding middle-aged teachers in the practice. They had the educational idea and scientific thinking, enabled the management system more friendly. For example, flexible educational system, no judge student from one test; regard long-term education effect; stress comprehensive effect from various disciplines mutually, stress the whole performance, and encourage teachers and students to have achievement and so on.

### **Example of High School 2**

- They emphasized the acceleration. Students needed to finish their study from grade 5 to the grade 12 in four years. The time they learned was almost half of general education.
- This kind of study of high density and efficiency is not only the challenge for students, also the big pressure for teachers.
- School respected to teacher's creativity. The teacher is authorized to decide the course content, choose the teaching materials, and change the teaching progress.
- Different teachers integrate the teaching materials according to student's characteristics and background. And, they also pay attention to mutual connection in different disciplines to suit their psychological development.
- Besides, teachers may discuss with each other to understand student's learning condition, family and interpersonal problems and so on.

### **Problems in China**

- Wan (2009) mentioned that although the gifted education had substantial achievement in 30 years, it actually had many problems. For example, too stress the scores, sole model, deficient teachers, and the city and imbalanced urban-rural development.
- In (2007) proposed the problems in gifted education. In the aspect of teachers, they were

unstable and difficult to obtain the guarantee. There were little teacher training for them, and the teacher rate of flow was high. Besides, taking into consideration the entire teacher's usage, it's few that the professional teacher teach in gifted education, the same as less suitable teachers that understand gifted students or can be engaged in teaching and research actually. Therefore he proposed must strengthen the normal and in-service training of gifted education for them.

### **Teacher Classification in China**

- There is exact system of teacher classification. Its level includes: second-level teacher, first-level teacher, senior teacher, and special-level teacher.
- The teachers apply the classification and need to consider some terms: the further education, the service period, and the thought.
- Besides, it refers to the teaching performance, counseling, research, and the performance that assists to promote the emphasized education.
- The elementary and middle schools have different official rank, and different performance, so it is different from the number of teacher's level they distributed.

### **Professional Performance**

- Xu (2003) pointed that elementary and middle schools for gifted education need to have some practical consideration. She investigated some teachers from Jianping experimental school in Shanghai and collected their ideas and showed:
  - The standard of choosing teachers for general gifted children
    - Appropriate teaching ability (379)
    - Flexibility and modest (336)
    - Understanding special problems to gifted students (327)
  - The standard of choosing teachers for talented children
    - Be competent to teacher special skills (the fine arts, music) (323)
    - Appropriate teaching ability (203)
    - Related child's intelligence (sensitively, patience, sense of humor, interaction) (100)

### **Teacher Cultivation in gifted education in China 1**

- Yang (2007) conducted the research in view of the teachers for gifted education. He thought they had some characteristics that had innovative ideas, teaching in accordance with their aptitude, professional knowledge of gifted education, inquisitive consciousness, sacrificial spirit, and charming personality. This can promote student's individual and intelligent development.
- However, there was no teacher's training for gifted education, and no separated evaluation, management, and promotion which was similar with general education. The gifted education was unable to manifest particularly.

### **Teacher Cultivation in gifted education in China 2**

- It was not well about teacher's cultivation. He (2008) did the investigation and showed that 85% people thought the teachers for gifted education must pass through the training

specially. However, teachers engaged in the gifted education didn't have the actual training in fact.

- Some middle schools referred to other country's experience and unified own foundation, and then has formed some training pattern. It included teaching experiment, cooperative teaching, problem inquiring, and experience sharing and so on. Schools also had the school-based training, coordination, and long-distance training and so on.

### **Teacher Cultivation in gifted education in China 3**

- Yang's (2007) investigation showed some results
  - The number of female teachers were more than the male teachers.
  - In teacher's age, they chose the teachers "young but had certain teaching experience" and teacher's fluidity was very large.
  - The educational background of teachers for gifted education was lower than the general teachers, but had the rapid promotion.
  - The teachers for gifted education entered higher position than the general teacher obviously. They had more experiences and high academic standard and self-promotion consciousness.
  - The teachers for gifted education had the general knowledge of teaching method and rich teaching experience, but lack the knowledge of gifted education.
  - The major channel of their hire came from the general teachers, and didn't have public channel of hiring.

### **Teacher Cultivation in gifted education in China 4**

- This research interviewed some teachers and organized some ideas. Although there were many classes for gifted education in Chinese provinces, but actually didn't have teacher's cultivation about gifted education. Teacher's major was general academic subjects. In school, they had exact evaluation and classification.
- When teaching to the gifted, each school had different methods. Some school's teachers taught them lonely and depended on individual experience, and tried to use some teaching and the counseling strategy on their owns. Some school's teachers met together and discussed the teaching and counseling plan. Some schools developed the provided some programs of teacher's training. However, although some schools provided some case teaching and courses, but 68% teachers thought that these contents cannot meet teacher's need about professional training.

### **Gifted Education in Future**

- He (2003) thinks it is important about teacher's cultivation. "Summary of Chinese educational development" mentioned, except the teachers needed to have the basic quality, they must have healthy body and mind development, the educational ideas and curriculum design for gifted. The depth, difficulty, systematization of teaching materials are very important. This is core problem for teaching gifted person.
- Yang (2007) proposes some suggestions:
  - Sound the mechanism of teacher's hire and adjustment.
  - Improve mechanism of teacher's encouragement.

- Provide the teacher's guarantee and professional training.

### **Gifted Education in Hong-Kong 1**

- In order to nurture gifted students with appropriate learning opportunities and challenges, the Education Bureau stated in the Education Commission Report No.4 that they should develop school-based programs in mainstream schools. The report, as a milestone, initiated the development and implementation of gifted education in Hong Kong.
- In 1996, they supported that gifted children should be adequately supported and awareness of giftedness should be promoted in all schools at all levels. The purpose of gifted education should be equal opportunity, not elitism. They are concerned about the labeling effect on gifted children and their emotional and personality development. Therefore the need of the gifted should be met in the regular class using flexible and creative teaching approaches.

### **Gifted Education in Hong-Kong 2**

- Hong Kong doesn't care about student's identification. The schools also apply school-based programs freely.
- Basic principle of gifted education
  - Nurturing multiple intelligences is a fundamental goal of quality basic education and should be the mission of ALL schools;
  - Gifted education should be part of quality education. The needs of gifted students, like their less able counterparts, should basically be met in their own school;
  - A broad definition using multiple intelligences should be adopted;
  - Exploring students' thinking and creativity abilities and social skills should be the foci of gifted education.
  - Schools should provide sequential and multiple educational activities to gifted students at different levels;
  - To compile resources collected from educational parties/bodies as support to schools.

### **Model of Gifted Education in Hong-Kong 1**

- *Level One*
  - A: To immerse the core elements advocated in gifted education i.e. high-order thinking skills, creativity and personal-social competence in the curriculum for ALL students;
  - B: To differentiate teaching through appropriate grouping of students to meet the different needs of the groups with enrichment and extension of curriculum across ALL subjects in regular classrooms.

### **Model of Gifted Education in Hong-Kong 2**

- *Level Two*
  - C: To conduct pull-out programs of generic nature outside the regular classroom to allow systematic training for a homogeneous group of students (e.g. creativity training, leadership training, etc.);

D: To conduct pull-out program in specific areas (e.g. Math, Arts, etc.) outside the regular classroom to allow systematic training for students with outstanding performance in specific domains.

- *Level Three*

- E: The Education Bureau liaises with tertiary institutes and other educational organizations/bodies to form expert groups to initiate and develop external resource support for the exceptionally gifted (e.g. counseling, mentorship, early entry to advanced class, etc.)

## **Teacher Cultivation in Gifted Education in Hong-Kong**

- In teacher cultivation, Education Bureau, the Fung Hon Chu Gifted Education Centre (FHCGEC), the Hong Kong Academy for gifted children handle the programs for teacher training mainly.
- The training program which design by the Hong Kong Academy for gifted children includes: The structural course (overview of gifted education, leadership, creativity and critical thinking, affective education and so on), seminar, anniversary conference and encourage teachers to exchange good teaching practice and ideas in the network or community group.

## **Results**

- Taiwan's teacher cultivation for gifted education start early, and also have a series of principles and in-service training.
- China has the extremely strict teacher classification and evaluation. However, the teacher's employment for the gifted stress the discipline specialty, and doesn't have normal and related counseling and training system.
- Hong Kong's education for gifted children starts lately and its development freely. At present, it strengthens the teacher's and parents' training gradually.

# 國科會補助計畫衍生研發成果推廣資料表

日期:2010/11/29

國科會補助計畫	計畫名稱: 高中教師的性別論述與觀點對資優女生科學學習與生涯發展之影響探究
	計畫主持人: 于曉平
	計畫編號: 98-2629-S-142-001- 學門領域: 應用科學教育-其他
無研發成果推廣資料	

98 年度專題研究計畫研究成果彙整表

計畫主持人：于曉平		計畫編號：98-2629-S-142-001-				計畫名稱：高中教師的性別論述與觀點對資優女生科學學習與生涯發展之影響探究	
成果項目		量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）	
		實際已達成數（被接受或已發表）	預期總達成數（含實際已達成數）	本計畫實際貢獻百分比			
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力 （本國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
博士後研究員		0	0	100%			
專任助理		2	2	100%	邀請兩位高中老師擔任計劃助理，協助問卷設計與調查		
國外	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	1	1	100%		
		專書	0	0	100%		章/本
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力 （外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
博士後研究員		0	0	100%			
專任助理		0	0	100%			

<p>其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)</p>	研究成果除已於國際研討會進行論文發表，另將投稿於期刊論文發表之
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	成果項目	量化	名稱或內容性質簡述
科 教 處 計 畫 加 填 項 目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與(閱聽)人數	0	





# 國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

達成目標

未達成目標（請說明，以 100 字為限）

實驗失敗

因故實驗中斷

其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形：

論文： 已發表  未發表之文稿  撰寫中  無

專利： 已獲得  申請中  無

技轉： 已技轉  洽談中  無

其他：（以 100 字為限）

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）（以 500 字為限）

本計畫研究內容與原計畫相符，並已進行第二年計畫中的有關教師論述部分，以切合研究主題，另將於年末提出第二年計畫的申請，期望透過後續學生進入大學後的科學學習與生涯發展的情況，探討教師論述或其他相關因素影響資優學生的科學學習與生涯發展，此外，前往澳洲參加亞太資優會議進行兩篇論文的發表（將本研究部分成果進行其中一篇論文的發表），兼具學術或應用價值、未來擬將研究成果加以整理，於學術期刊發表。