

Self-Concept of Gifted Students: The Reddening and Blackening Effects

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Paper presented at the Annual Conference of the Australian Association for Research in Education, Sydney, Australia, 2005. We thank Rachel Y. H. Hon and Min Yang for constructive comments. Enquiries concerning this paper should be directed to Alexander Yeung, Division of Continuing Professional Education, The Hong Kong Institute of Education, 10 Lo Ping Road, Tai Po, N.T., Hong Kong or via email to ssyeung@ied.edu.hk

Based on an ancient Chinese saying that “near vermilion, you turn red; near sepia, you turn black”, when gifted students are grouped together, a vermilion (reddening) effect may result from assimilation. In contrast, when gifted students are grouped with non-gifted students, a sepia (blackening) effect may operate. However, recent theories have also shown a big-fish-little-pond (BFLP) effect resulting from comparison. Four groups of primary students (N=757) were placed into 3 classes. Class 1 had gifted students from Group 1. Class 2 had Group 2 (gifted) and Group 3 (average) students placed together. Average students of Group 4 were placed in class 3. When a gifted program for classes 1 and 2 started, Groups 1 and 2 (the big fish) had higher self-concept than Group 4 (the small fish) but Group 2 did not score higher than Group 3. One year later, whereas Groups 1 and 2 remained higher than Group 4, Group 2 scored higher than Group 3. Initially, there was a strong blackening effect for the big fish in Group 2, but a strong BFLP effect operated later. The results cast doubt on the provision of gifted programs where gifted students are pulled out from the regular classroom.

Recent research has distinguished between the components of competency and affect of academic self-concept (Marsh, Craven, & Debus, 1999). Although there may be a close association between the two components of self-concept, a person’s development of the competency component of self-concept is probably more complex than the component of affect. The component of competency in students’ self-concept is developed primarily on the basis of a mix of two effects. First, a big-fish-little-pond (BFLP) effect occurs when the students compare their competency in schoolwork with their peers (Craven, Marsh, & Print, 2000; Marsh, 1991). Second, an assimilation effect occurs when they establish a sense of belonging to their peers (Marsh, Kong, & Hau, 2001). In most school settings, these conflicting effects would occur at the same time. In classes with a diversity of student abilities, how these conflicting effects may impact on their overall academic self-concept is an important issue to investigate. For example, whereas gifted students and high achievers will experience an enhanced school self-concept due to the BFLP effect through a comparison with their average-ability peers, their school self-concept will be lowered due to an assimilation effect when they affiliate themselves with their less able peers. By the same token, whereas the average-ability students will experience the detrimental BFLP effect through a comparison with the gifted students resulting in a

lowered school self-concept, at the same time, they will also experience an assimilation effect by affiliating themselves with the gifted peers resulting in an enhanced school self-concept. Through an experimental study, the present investigation attempts to examine the differential impacts of these effects on the gifted and average students in the primary school. The findings would have important implications for the grouping of students with a wide range of abilities.

Components of Competency and Affect in Academic Self-concept

The understanding of academic self-concept is essential because self-concept is an important educational outcome and an important factor that contributes to other valued educational outcomes (Marsh, 1993). Numerous studies have shown good relations of academic self-concept to academic achievement and academic behavior (e.g., Chapman & Tunmer, 1995, 1997; Eccles & Wigfield, 1995; Hay, 1997; Helmke & Aken, 1995; Marsh & Yeung, 1997a, 1997b; Muijs, 1997; Wigfield & Eccles, 1992; Yeung & Lee, 1999). Whereas researchers in the area of self-concept have often focused on the domain specificity of academic self-concept in the past decade (e.g., Byrne, 1996; Byrne & Gavin, 1996; Cross & Markus, 1994; Harter, 1996; Hattie, 1992; Marsh, 1993; Marsh, Byrne, & Shavelson, 1988; Marsh & Yeung, 1996, 1998; Yeung & Lee, 1999), Marsh, Craven, and Debus (1999) proposed a distinction between two major components of self-concept, viz., the competency and affect components.

Marsh, Craven, and Debus (1999) separated the items in the Self-Description Questionnaires (SDQ) instrument (Marsh, 1987, 1992, 1993) into two categories: (a) items that probe students' sense of competency in schoolwork, and (b) items that asked to what extent the students like schoolwork. They found that although there was a close association between the two constructs, they were clearly distinguishable from each other. They recommended that these two components of student self-concept should be studied separately but they did not elaborate on the difference in the students' development of these separate components of self-concept in academic work.

Social Impacts on Self-concept Development

A major difference between the components of competency and affect in students' academic self-concept development probably lies with the differential impacts of social comparison on these components. The component of competency is primarily influenced by a social comparison with peers on the basis of academic ability and performance whereas the component of affect is unlikely to be influenced by social comparison (Yeung, Chow, Chow, Luk, & Wong, 2004). There have been thorough discussions on the phenomenon of social comparison in recent self-concept research. For example, Marsh (1986) has proposed an internal-external frame of reference (I/E) model to explain the near-zero correlation often found between math and verbal self-concepts (also see Bong, 1998; Skaalvik & Rankin, 1995; Tay, Licht, & Tate, 1995). Marsh argued that the development of students' academic self-concept is primarily based on their achievement in the specific subject domains. By comparing externally with other students in class, those students who are strong in their math scores tend to have a high math self-concept. However, for those students whose math ability is not as good as their verbal ability, an internal comparison across subject domains tends to give them a lower math self-concept. Marsh suggested that the combined operation of both the internal and external comparisons leads to their overall self-concept in math. The I/E model has been supported by other researchers using samples from different countries (Skaalvik & Rankin, 1995; Tay, Licht, & Tate, 1995; Yeung & Lee, 1999), and in some of these studies, the correlation between verbal and math

self-concepts was found to be even negative.

The strong evidence in support of the I/E model implies an inevitable phenomenon of social comparison in the school context. Thus when considering the separation of the components of competency and affect in students' self-concept suggested by Marsh, Craven, and Debus (1999), we might expect that high-ability students would have a high self-concept of competency on the basis of a comparison with their less able peers, even though they may not like schoolwork any more than the average-ability students. Hence, if we study academic self-concept in terms of the two components separately, we may find contrasting results.

The distinction between competency in and liking of a subject domain has provided a useful foundation for the study of special samples, such as underachievers. The distinction between the competency and affect components of academic self-concept has allowed a more vigorous study of Chinese students in Hong Kong who have failed in the school system (e.g., Wong & Yeung, 2002). Similar in many countries, underachievers may feel bad about their competencies in schoolwork but they do not necessarily dislike schooling. This discrepancy between competency and affect seems to be particularly pronounced in indigenous students in some countries such as the USA and Australia. In Hong Kong, for example, the era emphasizing lifelong learning (see Curriculum Development Council, Hong Kong, 2001; Education Commission, Hong Kong, 2002) calls for an increasing need for separating out the competency from the affect component of self-concept. We might speculate that the competency component of self-concept would have more direct and immediate effects on student achievement whereas the affect component of self-concept may have more long-term, even though perhaps remote, effects on the pursuit of lifelong learning. Thus in studying the academic self-concepts of underachievers, it would be more fruitful to separate out the constructs of competency and affect in the measurement. Although underachievers may not be expected to improve in their achievement drastically, if we could maintain their affect component of school self-concept at a reasonably high level, there are still chances for them to improve in the long term.

Self-concept of Competency of Gifted Students

Because of the social effects, the development of students can be very complicated. For gifted students who consistently outperform their relatively lower-achieving peers, academic self-concept may be established based on the facilitating BFLP effect described by Marsh (1991) and the inhibiting assimilation effect described by Marsh, Kong, & Hau (2001). The impact of the combined effects is an interesting phenomenon when examined in a variety of groupings of students.

In Hong Kong, the government proposed a 3-level gifted education policy in 2000. Since then, all schools are responsible to meet the educational needs of all students through various approaches. In level 1 of the proposed arrangement, all students who are identified as gifted and talented in one way or another are eligible to enjoy the provision of some immersion and differentiation modes of delivery of the gifted curriculum in regular classrooms. That is, they stay with their classes with those other students who are not gifted and talented but are given extra attention to address their strengths. For level 2, those students who are academically bright (at the top 2-4% in the school) or with superior intelligence in some specific areas would be invited to join additional pullout programs of either a generic or specific nature, and these programs are conducted outside the regular classroom. This is to allow systematic training for gifted students who may or may not bear the gifted label. The level 3 operation aims to provide the exceptionally gifted with a variety of individualized educational arrangements such as mentorship, attachment or early entry to university and

counseling outside the regular school.

Marsh (1991) and Marsh, Kong, and Hau (2001) have provided a strong framework for us to consider the differential impacts of the BFLP effect and the assimilation effect when students are grouped or pulled out in the three different levels of arrangements for the gifted students. For example, when all gifted students are grouped into one class (e.g., in the pullout class in level 2 described above), we might expect a prevailing BFLP effect where the big fish may find themselves not as big as they would have thought when compared with those students who are even better than themselves (e.g., in level 3 with all the gifted students in the same class). However, at the same time, the affiliation with all the big fish in the same class would facilitate their perception of being a real big fish due to the strong assimilation effect. The combination of the two contrasting effects may cancel out each other, and the big fish may remain reasonably big.

The Reddening Effect vs. the Blackening Effect

Whereas Marsh, Kong, and Hau (2001) have provided a strong framework for scrutinizing potential social impacts on self-concept development, in describing the assimilation effect as a consequence of social affiliation, they considered only an upward affiliation such that the lower achievers tended to experience a sense of “reflected glory” when affiliated with their higher-achieving peers. They did not consider a downward affiliation which may also operate for the higher achievers. Hence, when gifted students are grouped with other average-ability students, on the one hand, we might expect a strong BFLP effect where the big fish may find themselves much bigger than they would have thought when compared with their less able peers, but on the other hand, the affiliation with the less able peers would have an assimilation effect that leads to the perception that after all, they do not belong to the top of the rank. Whereas the combination of the two contrasting effects may cancel out each other such that the big fish would remain reasonably big, this balance would occur only when there is no comparison with other similarly big fish in another pond. In the case where there is another class where all the big fish are placed together, the comparison with the “real” big fish clearly placed in a class with only the gifted will trigger an extraordinarily strong comparison that may lead to a lowered self-concept due to the BFLP effect.

The original Chinese characters: 近朱者赤，近墨者黑

The Chinese pronunciation: jìn zhū zhě chì , jìn mò zhě hēi

Figure 1. The original Chinese saying and its pronunciation

At least for students who grow up in the Chinese culture, this downward affiliation is likely to operate as saliently as the upward affiliation. There is an ancient Chinese saying that “near vermillion, you turn red; near sepia, you turn black”, meaning that we are influenced by our immediate surrounding and the company we keep. The original saying in Chinese and its pronunciation are shown in Figure 1. It was believed that this old saying came from a story about Mencius, one of the most successful students of Confucius who signified ancient Chinese education. In fact, Mencius is the only person in China other than Confucius to have his Latinized name commonly recognized, and he is known as the “second sage” of Confucianism, after Confucius himself as the “first sage”. The story described how the mother of Mencius, a widow hoping for a

bright future for her only son, moved three times in order to get Mencius started to study. In the first two times, her son affiliated with their lower-class neighbors and did not want to study. In the third time, she finally settled in the neighborhood of a scholar and Mencius started to work hard to become the most prestigious scholar at that time.

Hence, the assimilation effects demonstrated in this context comprised both an upward and a downward assimilation. To the Chinese, because the red color usually signifies something good and preferable whereas the black color signifies something bad or evil, it is virtually self-explanatory by describing a vermillion (a red dye) effect vs. a sepia (the black fluid of a squid) effect, or simply a reddening effect vs. a blackening effect. Thus, an upward assimilation to feel like one of the big fish has a reddening effect which is facilitative in the formation of self-concept whereas a downward assimilation to feel like one of the small fish has a blackening effect which is detrimental to the formation of self-concept. Nevertheless, in the present context where the “small” fish may not be really small (as the students may be of average ability though relatively less able than the gifted students), the blackening effect may not be really “black as sepia”.

Even so, due to these effects, when average students are all grouped into one class, we might expect a BFLP effect where some small fish may find themselves not as small as they would have thought. However, at the same time, the affiliation with all the small fish in the same class would reinforce their perception of being a small fish due to a blackening effect. Again, the combination of the two contrasting effects may cancel out each other, and the small fish may remain reasonably small.

However, when they are placed in the same class with gifted students, we would expect a strong BFLP effect to operate. Comparing with the gifted students, the average students would tend to have lowered self-concept due to the social comparison. However, at the same time, the affiliation with the gifted students in the same class would have a reddening effect that leads to the perception of being good enough to be placed with the gifted in the same class. Again, the combination of the two contrasting effects may cancel out each other such that these small fish would remain reasonably small. Nevertheless, in the case where there is another class where all the small fish are placed together, it would be reasonable to expect that the comparison with the “real” small fish in the other class may lead to a higher self-concept of those mixed with the big fish.

Hence, the way that students are grouped together in classes may have significant impacts on the development of the competency component of student self-concept. Nevertheless, because it would be difficult to delineate the relative strengths of the BFLP effect (Marsh, 1991) and the assimilation effect (Marsh, Kong, & Hau, 2001), it would be difficult to predict which of the two effects would have a stronger impact on the students’ development of self-concept. The only clear prediction we can suggest is that since social comparison is less likely to influence the students’ affect, the component of affect may be expected to be more stable across the different kinds of grouping. In terms of the component of competency, if the self-concept of the gifted students remains high when mixed with average-ability students and that of the average-ability is not seriously lowered, then there will be good support for mixed-ability classes (i.e., level 1 in the gifted education model in Hong Kong). In the contrary, if mixed-ability classes would hamper the self-concept development of the gifted and does not do any good to the average-ability students, then there is support for the isolation of the gifted from the average students (i.e., levels 2 and 3 in the gifted education model).

Method

The Sample

The participants were 840 students from 4th and 5th grades in two highly reputed primary schools in Hong Kong (age ranging from 10 to 11; 48% girls). The students came from a wide range of socio-economic backgrounds but they were mostly working-class families. Because of the good reputation of the school and the high success rate of the students entering some of the best high schools in Hong Kong, students from a wide range of districts in Hong Kong chose to attend these schools. All the students spoke Cantonese, learned Mandarin Chinese (also known as Putonghua) as a school subject and English as a second language. Similar to other schools in Hong Kong, the curriculum of the schools had 10 subjects. As in the conventional primary curriculum in most schools in Hong Kong, students were expected to master the academic-specific subjects with great effort. They would be praised when they could show conformity to the school conventions. However, considering the importance of promoting lifelong learning in the future development of the younger generation in Hong Kong, as a good start, the schools in the present study found it appropriate to administer a pilot intervention program in an experimental fashion for enhancing the higher-order thinking capability and self-concept of the gifted and talented.

Gaining the permission from the school heads, the program began in October 2003 and was administered as a biweekly one-year course for a selected group of grade 4 and grade 5 students. They were all placed either in a small group of 15 or in a large group of 30. The course was not incorporated into the existing formal curriculum but was implemented as an enrichment program based on the 3-ring conception of giftedness and the enrichment triad model proposed by Renzulli and Reis (1997) aiming to tap the talents of the students through the enhancement of their critical thinking.

Table 1. Grouping of Students in Two Schools When the Program Commenced

<u>Groups</u>	<u>Class 1</u>	<u>Class 2</u>		<u>Control</u>
	<u>1. Gifted</u>	<u>2. Gifted</u>	<u>3. Average</u>	<u>4. Average</u>
<u>N</u> for School 1	15	15	15	360
<u>N</u> for School 2	15	15	15	330

Note: Due to dropout and missing data, N = 757 for analysis. Class 1 and Class 2 were the two classes undergoing an intervention program. Class 1 in each school had all gifted students in the same class whereas Class 2 had a mix of gifted and average students. The control group did not participate in the intervention but completed the same survey.

From a total of six classes from 4th grade and six classes from 5th grade from each school, 30 students who were identified as gifted based on their IQ test scores, or by nomination by teachers with reference to their performance in academic work, were invited to participate in an intervention program with an objective of further enhancing their learning skills. From the remaining pool of the 4th and 5th graders, 30 students were randomly selected also to take part in the program, so they were mostly average-ability students. There were a total of four groups in each of the two schools in the present experimental study. In each school, for the 30 gifted students, 15 were placed in class 1 and the other 15 were placed in class 2. A total of 15 students were

randomly drawn from all the rest of the students in 4th and 5th grades to form group 3 but were placed together with the gifted students in the same class 2. All the other average-ability students formed the control group. The grouping of students is shown in Table 1.

Since the patterns of results were similar in the two schools each of which had a small sample size for each group, we combined the students in both schools so as to provide a reasonable sample size for statistical analysis. Due to student dropout and some initial identification problems, the final sample comprised the following four groups of students: (1) 29 gifted students, (2) 28 gifted students, (3) 29 non-gifted students selected, and (4) 30 non-gifted students serving as a control group. Classes 1 and 2 were selected to participate in a special program for gifted students. However, whereas class 1 had all gifted students placed in one class, groups 2 and 3 were placed together in a single class (i.e., class 2). The control group did not receive any intervention and served as a control group only. Consent to participate in the study was obtained from the students and their parents, and the principals and teachers of the school before the study. After listwise deletion of missing data, the analysis used a sample size of 757.

Material and Procedure

The parents of the experimental groups were invited to join the project in October 2003. They were then informed of the experimental nature and the overall design of the project at a sharing meeting in the schools. During the meeting, the parents were also asked to prepare themselves to cope with the possible changes of their children due to the intervention but they were not told about the grouping arrangements and their implications at all. All students completed a survey on the constructs of competency and affect one week after the commencement of the program for the gifted. Five items were adapted from Marsh's (1990) ASDQ instrument (also see Yeung & Lee, 1999) to form the Competency scale. Another five items were designed to form the Affect scale on the basis of the Marsh's (1990) ASDQ instrument and the Marsh, Craven, Debus (1999) description of the affect component. The students responded to the survey on a 6-point scale (1 = absolutely disagree to 6 = absolutely agree) in the second session of the intervention program (i.e., Time 1: the second week of the program) and again near the end of the school year (Time 2). The responses were coded such that higher scores reflected more favorable self-concepts (see Appendix).

Statistical Analyses

Preliminary analysis was conducted to examine the alpha estimates of internal consistency of the school self-concept measures of the competency and affect components. Then, confirmatory factor analysis (CFA) was conducted to establish the validity of the two constructs separately for the competency and affect components. The conduct of CFA has been described elsewhere (e.g., Bollen, 1989; Byrne, 1998; Joreskog & Sorbom, 1993; Marsh & Hocevar, 1985; Pedhazur & Schmelkin, 1991) and is not further detailed here. The analysis was conducted with the SPSS version of PRELIS and LISREL (Joreskog & Sorbom, 1988). The goodness of fit of models is evaluated based on suggestions of Marsh, Balla, and McDonald (1988) and Marsh, Balla, and Hau (1996) with an emphasis on the Tucker-Lewis index (TLI), but we present also the chi-square test statistic and the relative noncentrality index (RNI). For an acceptable model fit, the values of TLI and RNI should be greater than .9.

A total of four CFA models were tested. Model 1 tested the ability of the 18 items to form four separate factors (two factors for Time 1 and two factors for Time 2). Because negative items were included in the present study, Model 2 differed from Model 1 by including two correlated uniquenesses in the model to

address possible negative-item effects and nine correlated uniquenesses for the parallel items across two time points (Marsh & Yeung, 1997a). Models 3 and 4 were models parallel to Models 1 and 2 respectively testing the possibility of the 18 items to form a single self-concept factor at each time point. We hypothesized that the nine items should form two separate factors representing the components of competency and affect in self-concept respectively at each time point. Thus Model 2 was expected to be the best-fitting model.

To the extent that Model 2 fitted the data best such that the items for each component could form a reasonable scale, then the scores of the items were averaged respectively to form a scale score for Competency and Affect. We then used the scale scores to conduct a oneway analysis of variance (ANOVA) with the scores of the component of competency and another oneway ANOVA with the scores of the component of affect for both Time 1 and Time 2. On the basis of the social comparison among students, we hypothesized that there would be significant between-group differences in the competency component but no significant difference among the groups in the component of affect.

Results

Factor Analysis

The alpha reliability estimates were good for the Competency scales (alphas = .86 for Time 1 and .89 for Time 2) and the Affect scales (alphas = .85 for Time 1 and .86 for Time 2) (see Appendix). We then tested four CFA models with the 10 self-concept items. A summary of the goodness of fit for each model is given at Table 2.

Model 1: Two Components of Self-concept at Two Time Points

Model 1 (Table 2) positing two Time 1 factors and two Time 2 factors provided a marginally good fit to the data (TLI = .87, RNI = .91). The factor loadings were also good (.59 to .87). The correlations among the four factors were reasonably low (r s ranging from .18 to .62), indicating that the four factors were distinguishable from one another. The correlations between corresponding factors at two time points were higher than the other correlations (r between Time 1 and Time 2 Competency = .62; r between Time 1 and Time 2 Affect = .57). Thus Model 1 provided preliminary support for the separation of the two components of school self-concept at two time points.

Model 2: Two Components of Self-concept with Correlated Uniquenesses

Model 2 (Table 2) differed from Model 1 in that Model 2 included two correlated uniqueness in the model for the negative items in the Affect scale and nine correlated uniquenesses for the parallel items across two time points. The inclusion of the correlated uniqueness in the model would address the negative-item effect and the residuals of identical measured variables in the longitudinal data, and therefore would provide more accurate parameter estimates. Model 2 with the correlated uniqueness included provided a better fit to the data than Model 1 (TLI = .97, RNI = .98). The factor loadings were good (.58 to .88). The correlations among the four factors were sufficiently low (r s ranging from .18 to .61) for the four factors to be distinguishable from one another. The correlations between corresponding factors at two time points were higher than the other correlations (r between Time 1 and Time 2 Competency = .61; r between Time 1 and Time 2 Affect = .55). Thus Models 1 and 2 provided good support for the separation of the Competency and Affect components of self-concept as described by Marsh, Craven, and Debus (1999). The solution of Model 2 is presented at Table 3.

Model 3: One Self-concept Factor at Each Time Point

Model 3 (Table 2) positing two parallel self-concept factors respectively at Time 1 and Time 2 did not fit

the data (TLI = .43, RNI = .57). The factor coefficients were also unreasonable (.17 to .87). Compared to Model 1, there was no support for Model 3 positing a single self-concept factor with 9 items at each time point.

Table 2. Goodness-of-fit Summary for Models

<u>Model</u>	χ^2	<u>df</u>	<u>TLI</u>	<u>RNI</u>	<u>Factor Loadings</u>
1. 4 factors	705.59	129	.87	.91	.59 to .87
2. 4 factors, CU	270.43	118	.97	.98	.58 to .88
3. 2 factor	2775.96	134	.43	.57	.17 to .87
4. 2 factor, CU	1627.88	123	.66	.78	.23 to .87

Note: N = 757. RNI= Relative noncentrality index. TLI= Tucker-Lewis index. CU=correlated uniquenesses included in the model. The null model for the analyses had a χ^2 of 6937.51 with 190 df.

Table 3. CFA Solution for Model 2

<u>Variable</u>	<u>T1 Competency</u>	<u>T1 Affect</u>	<u>T2 Competency</u>	<u>T2 Affect</u>
Factor Coefficients				
Item 1	.66*	.87*	.68*	.84*
Item 2	.58*	.80*	.66*	.86*
Item 3	.65*	.60*	.75*	.58*
Item 4	.84*	.57*	.85*	.63*
Item 5	.82*	--	.88*	--
Uniquenesses				
Item 1	.56*	.24*	.54*	.30*
Item 2	.66*	.36*	.57*	.27*
Item 3	.57*	.63*	.45*	.66*
Item 4	.29*	.67*	.27*	.61*
Item 5	.33*	--	.23*	--
Factor Correlation				
T1 Competency	--			
T1 Affect	.36*	--		
T2 Competency	.61*	.18*	--	
T2 Affect	.22*	.55*	.31*	--

Note: N = 757. Parameters estimates are completely standardized. *p < .05

Model 4: One Self-concept Factor with Correlated Uniquenesses

Model 4 (Table 2) differed from Model 3 by including correlated uniquenesses in the model like Model

2. This model did not fit the data either (TLI = .66, RNI = .78). The factor coefficients were also unreasonable (.23 to .87). Compared to Model 2, there was no support for Model 4 positing a single self-concept factor at each time point.

In sum, as expected, Model 2 was the best-fitting model indicating that the academic self-concept of the primary school students in the present study can be studied in two components, viz., Competency and Affect, separately at two time points.

Grouping Effects at the Commencement of the Program

The scores of the items for Competency and Affect at each time point were averaged respectively to form the scale scores for subsequent analysis. The means and standard deviations of scores for the competency and affect components of self-concept are presented in Table 4. The oneway ANOVA with the scores of the component of competency at Time 1 found statistically significant between-group differences, $F(3, 763) = 14.84$, $MSE = 0.95$, $p < .0001$. Range tests using the Tukey approach found that Groups 1 and 2 (the big fish) had significantly higher scores than Groups 4 (the control group), and Group 1 also scored significantly higher than Group 3 (the small fish in the mixed class). However, Group 2 (the big fish mixed with the small fish) did not score significantly higher than the small fish in Group 3. Hence, whereas the big fish in Group 1 where all the big fish were placed in the same class remained as big fish, those big fish in Group 2 were no bigger than those smaller fish in the same class although Group 2 did score higher than the control group (Figure 2).

Effects Near Completion of the Program

Oneway ANOVA with the scores of the component of competency at Time 2 one year after the intervention found statistically significant between-group differences, $F(3, 763) = 17.76$, $MSE = 1.00$, $p < .0001$. Range tests using the Tukey approach found that Groups 1 and 2 (the big fish) had significantly higher scores than Groups 4 (the control group), similar to the pattern found at the commencement of the program. Interestingly, however, Group 2 also scored significantly higher than Group 3 (the small fish in the same class). Hence, whereas the big fish in Groups 1 and 2 remained as big fish, those big fish in Group 2 seemed to have experienced some gain in the competency component of self-concept over time whereas Group 1 seemed to have experienced some decline in the competency component (Figure 2). Whereas the gain experienced by the big fish in Group 2 is consistent with expectations on the basis of the BFLP hypothesis in the context of the mixed-ability class, the drop experienced by the big fish in Group 1 is also consistent with expectations on the basis of the BFLP hypothesis in the context of a homogeneous class of gifted students.

Testing the Effects on the Big Fish

To test whether there was a decline in self-concept of competency of Group 1 students due to a BFLP effect when comparing against all the big fish but a gain in self-concept of competency of Group 2 students, also due to a BFLP effect, but when comparing against the small fish in the same class, we conducted a repeated-measures ANOVA with group (group 1 vs. group 2) as a between-group measure and time (Time 1 and Time 2) as a within-subjects measure. The ANOVA did not find any significant main effects of group, $F(1, 55) = 0.22$, $MSE = 1.41$, or of time, $F(1, 55) = 1.11$, $MSE = 0.32$. However, the group x time interaction effect was statistically significant, $F(1, 55) = 4.66$, $MSE = 0.32$, $p < .05$. That is, while the scores of Group 1 students dropped over time, the scores of Group 2 students increased over time. Hence, there was evidence

of the BFLP effect for both Groups 1 and 2 except that the effect was detrimental to the big fish in Group 1 but facilitative to the big fish in Group 2.

Testing the Effects on the Small Fish

To test whether there was a decline in self-concept of competency of Group 3 students (the small fish) due to a BFLP effect when comparing against the big fish in the same class, we conducted a repeated-measures ANOVA with group (group 2 vs. group 3) as a between-group measure and time (Time 1 and Time 2) as a within-subjects measure. The ANOVA found significant main effects of group, $F(1, 55) = 8.20$, $MSE = 1.48$, $p < .01$, showing that Group 2 had overall higher scores than Group 3. The main effect of time was also statistically significant, $F(1, 55) = 5.10$, $MSE = 0.49$, $p < .05$, showing that both Group 2 and Group 3 improved in the scores over time. However, the group x time interaction effect was not statistically significant, $F(1, 55) = 0.12$, $MSE = 0.49$. That is, both the big fish and small fish in the same class improved in their scores over time although the big fish were, after all, bigger than the small fish in the same class. Hence, instead of a BFLP effect that should have lowered the scores of Group 3 over time, the reddening effect of assimilation seemed to be operating with more strength than the BFLP effect for the small fish.

Table 4. Means and Standard Deviations of Self-concept Scores in 4 Groups

<u>Groups</u>		<u>Class 1</u>	<u>Class 2</u>		<u>Control</u>
		<u>1. Gifted</u>	<u>2. Gifted</u>	<u>3. Average</u>	<u>4. Average</u>
	<u>N</u>	29	28	29	681
<u>T1 Competency</u>	<u>M</u>	4.64	4.31	3.70	3.60
	<u>(SD)</u>	(0.85)	(0.98)	(0.89)	(0.98)
<u>T2 Competency</u>	<u>M</u>	4.52	4.65	3.95	3.60
	<u>(SD)</u>	(0.81)	(1.06)	(1.03)	(1.00)
<u>T1 Affect</u>	<u>M</u>	5.06	5.19	4.99	4.93
	<u>(SD)</u>	(1.00)	(1.09)	(1.02)	(1.16)
<u>T2 Affect</u>	<u>M</u>	4.94	4.90	4.46	4.67
	<u>(SD)</u>	(0.83)	(1.30)	(1.09)	(1.09)

Note: $N = 757$. Due to the small sample size in the experimental groups, the analysis grouped the students of the two schools together. Because the results for both schools were almost identical, the increased sample size did not cause any change to the pattern of results but improved the level of statistical significance. The students responded to the survey on a 6-point scale, coded such that higher scores reflected more favorable self-concept. Class 1 and Class 2 were the two classes undergoing an intervention program. Class 1 in each school had all gifted students in the same class whereas Class 2 had a mix of gifted and average students. The survey was conducted in the second meeting at the commencement of the program and then again at the end of the school year. The control group did not participate in the intervention but completed the same survey.

ANOVA with Affect Scores as a Control Measure

The oneway ANOVAs with the scores of affect did not find significant between-group differences in

Time 1, $F(3, 763) = 0.56$, $MSE = 1.31$, or in Time 2, $F(3, 763) = 1.40$, $MSE = 1.18$. An inspection of the mean affect scores for each group found that all the groups had a relatively high score (all means > 4 on a 6-point scale), indicating that they all liked schooling. Although there seemed to be a slight drop in the affect scores over time, there was evidence that the social comparison phenomenon did not influence the students' component of affect in their school self-concept (Figure 3).

Discussion

As expected, the students in the experiment experienced a complex social comparison with their peers when assigned to different groups. When the gifted students were placed together either in a purely gifted class or when placed together with average students, the BFLP effect and the assimilation effect seemed to work differently. The self-concepts of the gifted students as well as the self-concepts of the average students underwent a complex combined effect of a sense of belonging to the group of a similar kind (an assimilation effect) and a comparison of their competency with other students (a BFLP effect). When gifted students were grouped together with other gifted students, the facilitative reddening effect of assimilation and the diminishing BFLP effect may cancel each other. However, when gifted students were grouped together with non-gifted students (Group 2), their self-concept of competency seemed to drop immediately to a level comparable to their average-ability peers. Thus, whereas Group 1 students (the big fish) had higher self-concept of competency than the average students in Groups 3 and 4 at Time 1, Group 2 (also the big fish, but mixed with small fish) did not score significantly higher than Group 3 (the small fish in the same class). There was evidence that at least at the commencement stage of the intervention program there was a strong blackening effect of assimilation that tended to lower the self-concept of competency of the big fish (see Chow, Chow, Yeung, Luk, & Wong, 2004), which cancelled out the BFLP effect that should have maintained the self-concept of competency of these big fish at a level as high as in Group 1.

The lowered self-concept of competency of the big fish in Group 2 found at Time 1 seems to suggest that given level 1 of the proposed arrangement for the provision of intervention programs for gifted students in Hong Kong where the gifted remain in the same class with average students, there could be a detrimental blackening effect of assimilation that would lower the self-concept of the gifted students. Although by comparing their superior abilities and performance with their less-able peers, the gifted students could have an even higher self-concept of competency, the blackening effect (i.e., being in the group with average students) could have an even stronger effect that cancels out the social comparison effect which should otherwise positively reinforce the self-concept of the gifted students. Thus, the arrangements of levels 2 and 3 as proposed in the gifted education policy, which group the gifted students all together in the same class, seem to be more appropriate for maintaining the self-concept of competency of the big fish.

However, after a sufficiently long period of time (for example, one whole year in the present experiment), important changes could occur. In the present study, as the program proceeded, even though the gifted students in Group 2 found themselves not as "big" as they would have expected because they were placed together with the average students at the commencement of the program, because they had continually experienced superiority of their ability and performance as compared to the average students, their self-concept of competency greatly improved over time. Through experiences of success and merit compared to their less-able peers in the same class, the BFLP effect overwhelmed the blackening effect that tended to diminish their self-concept at the beginning of the program.

In contrast, the conflicting BFLP and assimilation effects seemed to operate in a different way for the “small” fish. The similarly low self-concept of competency of the small fish in Group 3 (the small fish in Class 2) as in Group 4 (the small fish in Class 3) at Time 1 suggests that at the commencement of the intervention program, the BFLP effect due to a comparison with the higher-ability peers in the same class and the reddening effect due to an affiliation with the higher-ability peers counterbalanced each other such that there tended to be a near-zero net effect. However, after one whole year’s working together with the more able peers, the reddening effect seemed to operate more strongly than the BFLP effect. Hence, at Time 2, the self-concept of competency for those “small” fish in Group 3 became higher than that for the “small” fish in Group 4. In other words, the “small” fish in Group 3 was no longer as small as those fish in Group 4 that were similarly small at Time 1.

Although the average students in Group 3 found themselves only as “small” as those other students in Group 4 at the commencement of the program, because the students in Group 3 had continually worked with their superior peers and found themselves coping in the same class, the shared experience of success in the intervention program seemed to have enhanced the self-concept of the average students. Hence at Time 2, they were no longer as small as they used to be at Time 1. Therefore, given level 1 of the proposed arrangement for the provision of intervention programs for gifted students in Hong Kong where the gifted remain in the same class with average students, the average students may eventually benefit from being mixed with gifted students. Considering the gain of self-concept of competency over time for both the gifted (Group 2) and the non-gifted (Group 3) when placed together, despite the initial drop at Time 1 for the gifted (Group 2), level 1 seems to be a reasonable choice that may benefit both the gifted and the non-gifted students. Although the results of the present study did not seem to refute the arrangements of levels 2 and 3 as proposed in the gifted education policy, if gifted students were all placed in the same class, the average students would not benefit from the reddening effect through working with their gifted peers. Nevertheless, we also need to be cautious about the present findings with the small sample of gifted students. Since the limitation of using a small sample is inevitable in most research on giftedness, it is important to replicate the findings with other samples and in other settings.

Although so far, we have been discussing the findings in terms of grouping effects, it is important to note that grouping per se would hardly lead to significant gains in student achievement and positive self-concepts in the long term. Ultimately, it will be the curriculum contents and processes that have significant impacts on students’ learning outcomes (Clark, 2002). Particularly for gifted students, the curriculum itself is most important. It has to be challenging enough such that the gifted students will have chances to exercise their high-level thinking skills. No matter how we group them, neither the gifted nor the average-ability students would benefit from the teaching and learning process without an appropriately designed intervention program.

The use of the affect component of self-concept in the present study has provided a useful control measure. Because the affect component is less likely to be associated with any social comparison, the comparison of the groups in the competency component using affect as a control variable would be indicative of possible changes in the competency component due to social comparisons. As expected, there was no significant difference among the groups of students in the component of affect. Thus, those students who like to go to school would remain to be fond of schoolwork, no matter how they were placed with other

students. Hence, the BFLP effect and the assimilation effect would operate only within a social comparison context. Furthermore, the reddening and blackening effects would also operate only within a social affiliation context. Even when the “small” fish may not be really small (given the fact that the students in the comparison group were mostly average-ability students in the present study) such that the “blackening” effect would not be very black, the assimilation effects would inevitably operate.

In sum, the way in which students in a gifted education program are grouped together could have important implications for the development of the gifted students in terms of self-concept and psychological well-being. Because a positive self-concept would probably lead to subsequent excellence in school work, it would be necessary to take caution in grouping the gifted students appropriately for their benefit. The results of the present study found detrimental effects of mixed-ability classes in gifted education only at the beginning of intervention. In the long-term, it seems that mixed ability classes could facilitate the self-concept of competency of the gifted students through BFLP effects as well as that of average-ability students placed together with their high-ability counterparts through a reddening effect of assimilation. These results therefore cast doubt in the provision of gifted programs when gifted students are pulled out from the regular classroom.

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Appendix

Self-concept of Competency and Affect Scales	α (Time 1)	α (Time 2)
<u>Competency</u>	.86	.89

1. I am good at most school subjects.
2. Most school subjects are easy to me.
3. I learn things quickly in most school subjects.
4. I have always done well in most school subjects.
5. I do well in most school subjects.

Affect

.85

.86

1. I like to go to school.
2. Going to school is enjoyable.
3. I wish I wouldn't need to go to school any more. #
4. I hate going to school. #

Note: The responses ranged from 1 (strongly disagree) to 6 (strongly agree) and were coded such that higher scores reflected more favorable responses. # These items were reverse coded.

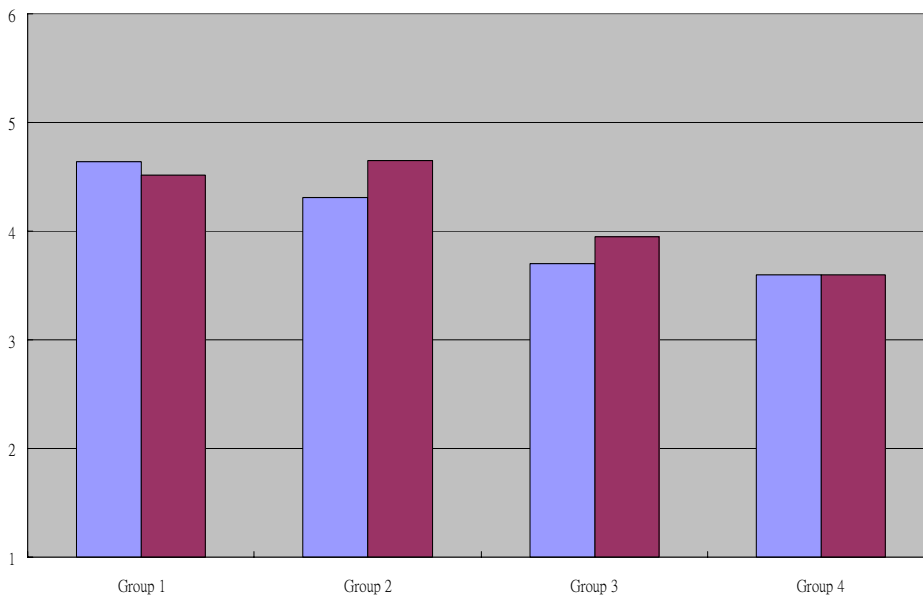


Figure 2. Self-concepts of competency of students at 2 time points.

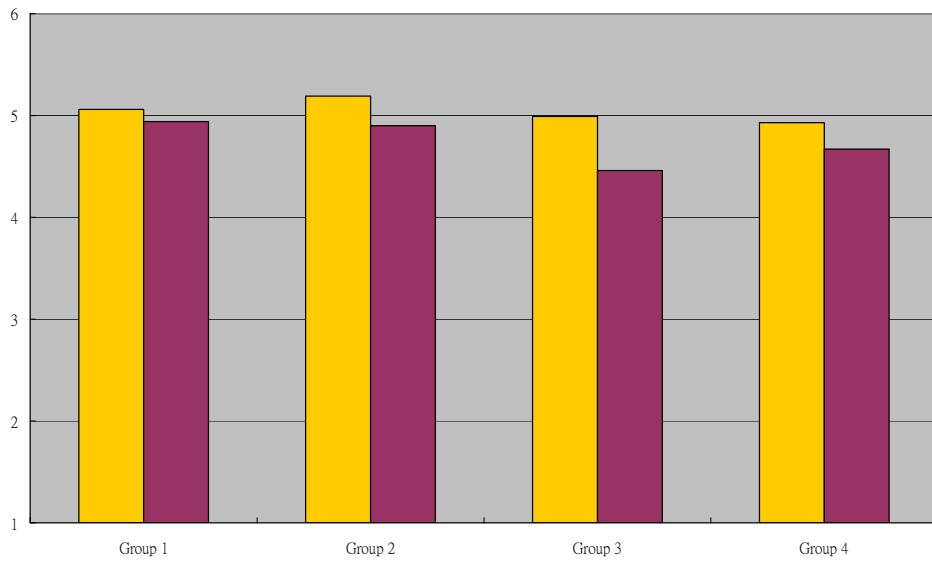


Figure 3. Self-concepts of affect of students at 2 time points.