Gifted/Talented and Mainstream Classes: Social Comparison Processes and Self-Perceptions of Academic Achievement in Mathematics

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Introduction

The placement of gifted and talented students in special full-time classes raises issues in relation to the impact that grouping may have on academic achievement and students' self-perceptions as learners. Students' self-perceptions as learners form and change in a social context (Marsh & Johnston, 1993) that comprises many factors, such as teaching and learning activities, the staff and parents and the other

students in the same class and school. Students make self-evaluations within this educational context, with a range of possible references which may inform their decisions, such as comparisons made with peers. The self-evaluations that students make may also be influenced by, and may influence, other factors which contribute to students' academic self-perceptions, such as learning style preferences (Owens, Nolan & McKinnon, 1992), learning goals (Duda and Nicholls, 1992) and expectations for academic achievement.

Brief Review of Literature

The aim of between-class ability grouping arrangements, such as full-time gifted and talented classes, is to reduce the heterogeneity of skills and knowledge of students in a classroom so that instruction can be pitched at a level appropriate for all students in a class. It is a controversial issue, with researchers such as Kulik and Kulik (1992) claiming that in homogeneous classes, high achievers are able to move more rapidly through the curriculum, whilst low achievers are provided with goals that are attainable and increased teacher support. Alternatively, opponents of ability grouping, such as Slavin (1987a. 1987b, 1989, 1991), argue that full-time ability grouping does not enhance the academic achievement of any group of learners. Further, opponents of ability grouping claim that low achievers are disadvantaged in homogeneous classes through lowered teacher expectations, slower instructional pace and the absence of able peer models. As the class group forms the reference with whom students make social comparisons as a means of judging their own achievements relative to those of their peers, ability grouping is of great importance, as it establishes the frame-of-reference for the students and is expected to have an impact upon academic self-concept.

Depending on the context in which learning has occurred, the decision to make social comparisons may be influenced by several factors: the perceived availability of similarly competent peers as references, the need for relativistic feedback about the standard of one's performance, one's own level of achievement and the nature of the task. Previous research has established that students are most likely to make social comparisons with students perceived as similar in ability to themselves, with students who are members of their own class, and on regular occasions (Suls, 1977; France-Kaatrude and Smith, 1985; Reuman, 1989).

In addition to social comparison processes and ability grouping, many other factors may influence the formation of students' self-perceptions as learners in an academic context. Other influences may include an individual's expectations for academic achievement, learning goals and learning style preference. These factors will operate in complex

interrelationships and with the processes of social comparison to contribute to the formation of students' academic self-perceptions. Students' expectations for academic achievement will probably be related to previous achievement in that academic subject area, their

level of self-concept for that specific subject, and the frame-of-reference students use when evaluating their previous achievements. Learning goals are likely to operate in a bidirectional relationship with learning style preferences and social comparison processes, since goals will often determine behaviour in other related areas, but the behaviours demonstrated by other students may also influence the goals adopted and pursued. Thus, it is possible that some students will prefer to learn within a competitive learning environment, where the goal is ego-oriented, aimed at performing at a higher level than other students and where comparisons with other students are frequent. On the other hand, some students may be more oriented towards learning in cooperation with others or focussed to a greater extent on completing the task effectively rather than achieving higher results that peers on a task, thus involving less need for competitive comparisons with others. However, it is still possible that task-oriented people may make comparisons for other non-competitive purposes, such as ascertaining who will complete elements of a cooperative task most effectively for the benefit of the group. Further, people may prefer to learn individually, and may be focussed on either a task-related goal or a goal of achieving a standard higher than others, thus perhaps tending to make social comparisons for a combination of reasons. The interrelationships between social comparison processes, expectations for academic achievement, learning goals and learning style preferences consequently are complex and are likely to contribute to the formation of students' self-perceptions as learners.

Research Issues

The present study examined the self-perceptions of girls in gifted and talented and mainstream classes at two independent schools, specifically in mathematics. The main aims of the study were:

1. to establish whether there were differences between the girls in the gifted/talented and mainstream classes in regard to mathematics self-concept, social comparison processes, learning style preferences, learning goals and expectations for achievement;

2. to explore, in considerable depth, the processes of social comparison, investigating how, when and with whom students engage in social comparisons with peers as a means of informing self-evaluations;

3. to explore the relationships amongst mathematics self-concept, social comparison processes, learning style preferences, learning goals and expectations for achievement.

Thus, in conducting research to investigate these three aims in the context of gifted/talented and mainstream classes in independent girls' schools, the present study aimed to contribute to an increased understanding of students' self-perceptions as learners, and the interrelationships that exist between aspects of students' academic self-perceptions, in an ability-grouped context.

Participants

The participants in this study were 87 girls from two independent, private fee-paying, single-sex schools in neighbouring suburbs of Sydney. The schools were selected on the basis of the introduction of full-time gifted and talented classes in 1994: the first school in the study introduced a gifted and talented class at a grade five level, while the second school introduced a class for academically gifted and talented girls in grade 7. The study involved a comparison of girls in the full-time gifted and talented class and girls in a mainstream class from the same grade at each school. In year 5, there were 14 girls in the gifted and talented class and 27 girls in the mainstream class. in year 7, there were 21 girls in the gifted and talented class and 25 girls in the mainstream class. Thus, overall, 35 students in the study were enrolled in full-time gifted and talented classes while 52 students were members of mainstream classes.

The two girls' schools participating in the research project were highly similar in terms of their student populations, academic standards and selection criteria for the special classes. Both schools had drawn their students from similar areas of Sydney, and the students were mainly from middle class home backgrounds. Both schools were also relatively high-performing schools using Higher School Certificate results as an academic indicator. Students in the gifted and talented classes were selected by the schools on the basis of IQ and achievement tests, parent nomination and interviews. Both schools' programs for gifted and talented students involved compacting the regular curriculum, with this a specific feature of the grade 7 program where all members of the gifted and talented class were being accelerated through all subjects as a result of compacting the Year 7-10 curriculum into three years, as well as both providing extension/enrichment programs for the students in these full-time gifted and talented classes. Therefore, the school populations and selection of students for the special classes were similar in many respects, with the differentiation of the curriculum also a significant feature of the gifted and talented programs offered by both schools.

The mainstream classes were selected on the basis of the relative heterogeneity of students in terms of their achievement in mathematics.

Procedure

Meetings with class teachers and observation sessions in each classroom established the research project and role of the researcher in each school, enabling positive professional relationships to form which would enhance the support for and credibility of the researcher in each school. Parental consent forms were collected and all questionnaires and interviews were then administered or conducted by the researcher during class time over a two month period from May to June, 1994. In each case, the data was collected in the same sequence: Leaning Preference Scale - Students (LPSS), Social Comparison Interviews, Self-Description Questionnaire-1, Motivational Orientation Scale (learning goals), Social Comparison Scale and Achievement Expectancy Ranking Scale, although the time frame for collection of data varied between classes as a result of times available for the researcher to visit schools.

Materials

Learning Style Preferences The Learning Preference Scale-Students (LPSS), designed by Owens and Barnes (1992), was used to collect data pertaining to the preference for cooperative, competitive or individualistic learning of all girls in the study. This 36 item scale, containing three subscales, comprised brief statements about features of learning, with ten negatively worded items. Students responded to the LPSS by indicating how true or false the statements

were for them on a four point scale. The LPSS was slightly adapted in this study to ensure that each question was specific to learning in mathematics, designed to focus students' attention on responding to the statements solely with regard to their learning preferences in maths. For example, item 4 from the individualistic subscale was adapted from, 'I prefer to work by myself so I can go as fast as I like' in the original scale to 'I prefer to work by myself in maths so I can go as fast as I like' in the mathematics-specific scale. Previous research (Owens & Barnes, 1992; Owens, Nolan & McKinnon, 1992) indicated that the LPSS was both a valid and reliable measure of the preference for a particular learning style. In this study, the reliabilities for the subscales of the LPSS were $a = .78$ for the Cooperative subscale, $a = .79$ for the Competitive subscale and $a = .74$ for the Individualistic subscale. The girls participating in this study took approximately twenty five minutes to complete the Learning Preference Scale - Students.

Social Comparison Processes Social comparison processes were explored using data collected from questionnaires and interviews.

The Social Comparison Questionnaire, completed by all students participating in the research project, comprises scales and questions based on Reuman (1989), and is divided into two parts. Part A contains eight questions, requiring participants to indicate on a 5-point scale ('Never'-'Often') how often they make comparisons in different mathematical situations with members of their class or grade, and how important comparisons with peers are to them. For example, in questions c and h respectively, students were asked to respond to the statements 'I compare my maths results to other students in all Year 5/Year 7 classes' and 'I compare my maths results to other students in my class'. The reliability for the subscale relating to within class comparisons in Part A of the Social Comparison Questionnaire was a = .90 for this sample. The subscale in Part A of the Social Comparison Questionnaire which related to within grade comparisons had a reliability of a = .73 for this sample.

Part B of the Social Comparison Questionnaire required students to respond to six hypothetical situations in mathematics by indicating the peer with whom the student would make a comparison, whether the comparison peer was perceived as better, similar or not as good at maths as the student, and the class in which this peer was a member. An example from the hypothetical questions is 'You have just received the results for last week's maths test. If you could look at someone else's test results, so that you could check how well you'd done, whose would you look at?" (question 1(a)). The emphasis in the hypothetical situations was on actual achievement so that comparisons were being made on a concrete basis. The reliability of the subscale which required students to identify whether the comparison peer was perceived as better, similar or not as good at maths as themselves was a = .61. The subscale which related to the identification of the class in which the perceived peer was a member had a reliability of a = .60 for this sample of students. The completion of the Social Comparison Questionnaire took students approximately twenty minutes.

Interviews with twelve individual students were conducted by the researcher, based on a series of questions which related to how, the occasions when and with whom these students make social comparisons in mathematics. Three students were selected from each class in the study, based on the preferred learning style indicated in the Learning Preference Scale - Students. Thus, a competitive, cooperative and individualistic learner from each class was interviewed. The students selected for interviews were also performing at a similar standard in mathematics within their class. The interviews typically took about ten minutes.

Mathematics Self-Concept The Self-Description Questionnaire - 1 (SDQ-1) devised by Marsh (1990) was used as a measure of self-concept. This is a widely used instrument, selected because of the multidimensional theoretical foundation on which the items comprising the scale are based. The SDQ-1 comprises 76 questions which represent eight subscales measuring self-concept in four main areas: physical appearance/abilities, relationships with others, academic abilities and general. For the purpose of this research project, an abbreviated version of the SDQ-1 was employed, in which only the mathematics items were included. This mathematics self-concept scale contained ten statements relating to a student's attitude towards mathematics and the self-perceptions of her ability and performance in maths, to which students responded on a five-point scale. Eight statements in the Mathematics subscale of the SDQ-1 were positively worded, while the remaining two statements were negatively worded and the latter statements were excluded, as suggested by Marsh (1990), from all statistical analyses. The reliability of the Mathematics subscale without negative items was $a = .89$ for this sample. The SDQ-1 Mathematics subscale took approximately five minutes for the participants to complete.

Learning Goals The Motivational Orientation Scale created by Nicholls (1983), initially developed for use with fifth grade students, was employed as a measure of the learning goals of students in the study. The questionnaire, constructed to relate specifically to learning in mathematics, was used for all classes for purposes of comparison and comprehension for all girls participating in the study. The Scale, which contains 21 items and is answered on a 5 point response scale, requires students to react to statements to indicate when they feel really successful in mathematics. The Scale contains four subscales: Task Orientation, Ego Orientation, Work Avoidance and Academic Alienation. Following initial tests of reliability for this sample, factor analysis was conducted on the Motivational Orientation Scale in response to low and inconsistent reliabilities (Task Orientation $a = .46$, Ego Orientation $a = .86$, Work Avoidance $a = .68$, Academic Alienation $a = .73$). Factor analysis of the Motivational Orientation Scale resulted in three distinct factors emerging for this sample: 'Ego-Competitive Orientation' ($a = .81$), 'Task-Intrinsic Orientation' ($a = .80$) and 'Avoidance Orientation' ($a = .81$). The three subscales derived from factor analysis were used for all subsequent analyses. During administration of the questionnaires, the Motivational Orientation Scale was completed by students in approximately twenty minutes.

Achievement Expectancies The Achievement Expectancy Ranking Scale was designed by the author for students to indicate their self-perceptions of achievement in mathematics relative to other students in their class and grade. Students were required to place a tick at any point along a line divided into 4 segments to indicate the perception of their own

performance in mathematics using each of two reference groups: class and grade. The Ranking Scale took students approximately five minutes to complete.

Results

1.Are there any differences between girls in gifted/talented and mainstream classes with regard to mathematics self-concept, social comparison processes, learning style preferences, learning goals and

expectations for achievement?

Use of multiple discriminant analysis
(Appendix 1.1) indicated that the classes could be differentiated on the basis of responses to questionnaires measuring the variables listed above. The most significant differentiating variables emerged as the Achievement Expectancy Ranking Scale (grade), Social Comparison Questionnaire (Part A - tendency to engage in comparisons with class members) and the Motivational Orientation Scale (Ego-competitive subscale), with a canonical correlation of .77 ($p<.001$). Correct classification was for 91.4% gifted and talented class members and 94.2% mainstream class members.

T-tests were used to explore whether
there were significant differences between the means of the responses for both the gifted and talented and the mainstream classes.

-Girls in the gifted and talented classes were generally more likely to engage in comparisons with within-class peers, $t(85)=4.50$, $p<.001$.

-Generally, girls in the gifted and talented classes tended to be more individualistic with regard to learning style preferences in maths, $t(85)=2.30$, $p<.05$, whilst girls in mainstream classes were more likely to be cooperative learners $t(85)=-2.54$, $p<.05$. Very few students in either the gifted and talented or mainstream classes expressed a preference for competitive learning in mathematics, although there was a significant difference between the groups, $t(85)=2.02$ $p<.05$, with a higher mean score for gifted and talented class members.

-Girls in the gifted and talented classes were more ego-oriented in terms of learning goals, $t(85)=4.64$, p,.001, whilst there was no significant difference between the classes for task-oriented goals.

-Girls in the gifted and talented classes were more likely to rank themselves higher in the year in terms of achievement in maths than girls in the mainstream classes, $t(85)=7.33$, $p<.001$.

-There was no significant difference between the classes with regard to

mathematics self-concept.

2.How, when and with whom do students make peer comparisons?

Students were most likely to make comparisons with students who were members of their own class.

Students were most likely to make comparisons with students perceived as achieving at a similar standard to themselves.

Students were most likely to compare themselves with others when completed tasks were assigned a mark - mainly exams, tests and assignments - as the allocation of a mark enabled easy comparison, as a relative form of feedback was provided.

Students were most likely to make comparisons when they perceived themselves as having performed poorly. It was in these circumstances that they used an external reference to evaluate their performance, checking to see whether everyone else had also performed poorly. Successful performance was evaluated using internal evaluation processes, such as comparisons made with previous performances.

A distinct 'etiquette' or system of rules associated with engaging in social comparisons was revealed from interviews with some participants in the study. Such rules included only asking people if a trade of comparison information was involved and only asking peers who the student sensed were willing to share their mark.

3.What are the relationships amongst mathematics self-concept, social comparison processes, learning style preferences, learning goals and expectations for achievement?

Multiple regression analysis (Appendix 1.2) revealed that achievement expectancy rankings within class, the tendency to engage in social comparisons with peers and an individualistic learning style preference were the three best predictors of academic self-concept in mathematics.

Correlational analysis (Table 1.1) revealed significant positive correlations between the scores on the following questionnaires and subscales:

-mathematics self-concept and task-oriented learning goals, individualistic learning style and achievement expectancy rankings across class and grade.

-competitive learning style and social comparisons with peers across grade.

-individualistic learning style and achievement expectancy within class.

-social comparisons made within class and both ego-oriented learning goals and competitive learning style preference.

-social comparisons made across grade and achievement expectancy ranking across grade.

Correlational analysis also revealed significant negative correlations between scores on the following subscales:

-cooperative learning style and social comparisons made within class.

Discussion

Research Issue 1

The present study did not support previous findings (Marsh & Johnston, 1993; Hoge & Renzulli, 1993) that special class placement had a debilitating effect on the self-concept of gifted and talented girls. However, after five months as members of a special class, there may not yet have been any great impact on the academic self-concept of girls in the gifted and talented classes. Further, it may also be the case that some features of the learning environment, such as the teaching and learning activities and differentiation of the curriculum, in the gifted and talented classes are countering any negative impact of special class placement on academic self-concept (Marsh & Johnston, 1993).

With regard to the finding that girls in gifted and talented classes were more likely to engage in social comparisons than girls in mainstream classes, girls in the special classes in the present study were moving from learning environments in which they were all probably performing near the top of their class, where they may have been following individualised programs to cater for their academic needs and where there would have been few students performing at a similar level of achievement. Thus, when placed in the context of a special class for gifted and talented children, where similarly achieving peers are 'available' for comparison within their external frame-of-reference, it is highly likely that these students will engage in social comparisons, as found in the present study, which was conducted after the initial five months of being placed in gifted and talented classes. It is

suggested that a similar explanation may also be valid for the finding that gifted and talented students in the study tended to be more competitive in terms of learning style preference and more ego-competitive with regard to learning goals than mainstream students.

The girls in the gifted and talented classes and mainstream classes in the study were able to be distinguished by their responses to questionnaires measuring mathematics self-concept, social comparison processes, learning style preferences, learning goals and expectations for academic achievement, as supported by multiple discriminant analysis. This finding provides support for advocates of gifted and talented education (Colangelo, Kelly & Schrepfer, 1987; Rogers, 1991; Feldhusen & Moon, 1992; Gross, 1993), who argue that gifted and talented students are a distinct population with needs that differ from other students. An alternative explanation may be that the effects of the adjusted curriculum in the gifted and talented classes are impacting upon gifted students' self-perceptions as learners.

Research Issue 2

With regard to how students make social comparisons, the girls in the study tended to be guided by a distinct set of rules. Competitive learners were more likely to engage in social comparisons than cooperative or individualistic learners.

With regard to when students make peer comparisons, girls were most likely to engage in comparisons when assigned a mark, especially when their performance was personally judged as poor. This finding does not support the expectation of Marsh and Johnston (1993) that in order to maintain a healthy academic self-concept, students tend to make comparisons when their performance is high so that comparison will reflect favourably upon themselves. However, the tendency for girls interviewed in this sample to make social comparisons when they achieve poorly is supported by research related to attribution theory (Weiner, 1978), which indicates that students are more likely to seek causes for their level of success when they are unsuccessful rather than when they achieve success.

With regard to the peers with whom students make social comparisons, girls in the study were most likely to engage in comparisons with similarly performing peers. In the homogeneously grouped gifted and talented classes, it was found that students were less selective in the students with whom comparisons were made than in the more heterogeneous mainstream classes. Justification provided by the girls interviewed for the tendency to engage in comparisons with other class members related to the difficulty in comparing their achievements with students doing different tasks, tests and assignments. In the light of concern that girls in mainstream classes may feel 'inferior' as a result of the introduction of the gifted and talented classes, social comparison processes could not explain such a phenomenon, as comparisons with

class members rather than students in other classes in the grade was much more likely for girls in this study.

Research Issue 3

The finding that achievement expectancy ranking within class is a good predictor of academic self-concept in mathematics provides supportive evidence for the belief expressed by Jerusalem (1984), Nicholls, Cheung, Lauer and Patashnick (1989) and Marsh and Johnston (1993) that students' conscious self-evaluations of their competence and ability reflect an evaluation of their own standing relative to that of others, and it is clearly the class that is forming an external frame-of-reference; this is also supported by the finding from multiple regression analysis that social comparisons made within class are significant predictors of academic self-concept, and the significant positive correlations between social comparisons made within class and expectations for achievement within class, and between social comparisons made across grade and expectations for achievement across grade.

A further significant predictor of mathematics self-concept were task-intrinsic learning goals, educationally significant because of the links indicated between self-concept and effortful learning strategies, increased understanding and tendency to seek more complex learning situations, which define task-intrinsic learning goals (Nicholls, Cheung, Lauer & Patashnick, 1989). An individualistic learning style preference was also a quite highly significant predictor of academic self-concept, possibly indicating that although approaches to teaching and learning in maths may be beginning to change to incorporate opportunities for cooperative learning as well as more traditionally competitive and individualistic tasks, a positive self-concept in maths may still be dependent on the ability to attain personal success in individualistic tasks.

Conclusion and Implications for Future Research

The present study has contributed to research in education in two main ways. It has provided detailed information about how, when and with whom students engage in social comparisons, extending beyond previous research conducted which has explored peer comparisons in an educational context. Secondly, the interrelationships amongst mathematics self-concept, social comparison processes, learning style preferences, learning goals and academic achievement expectancies have been investigated in an exploration of previously unestablished links between these variables, especially in the context of gifted/talented and mainstream classes.

Major implications from this research are that, in relation to ability-grouping, the class clearly forms a significant external frame-of-reference for students engaging in social comparisons, the latter of which has been linked to academic self-concept in maths in this study. Further, although only an initial observation of the newly-formed gifted and talented classes in this study, there is little evidence to indicate that social comparisons within class are having a negative effect on academic self-concept in mathematics, with the group means for self-concept similar for both gifted and talented and mainstream classes in this study.

Directions for future research include the need to further consider the impact of the learning environment, including teachers' expectancies and philosophies and the types of learning tasks on social comparison processes, and an exploration of the relationship between social comparison processes, self-attributions and self-concept, with social comparison processes possibly playing a mediating role. It would also be valuable to conduct a longitudinal study to explore whether there are changes in academic self-concept, social comparison processes, learning style preferences, learning goals and achievement expectancies over time.

The self-perceptions that students develop and maintain as learners are dynamically linked to academic achievement and success within schools. As education occurs in a social context, the interactions in which students engage with peers are a central feature in the development of learners' self-perceptions. Research, such as the present study, which explores the relationships between aspects of children's self-perceptions, such as academic self-concept, social comparison processes, learning style preferences, learning goals and expectations for academic achievement, provides insights into ways in which educational environments can be created and enhanced so as to maximise each student's likelihood of academic success and achievement.

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omparisons made within class are significant predictors of academic self-concept, and the significant positive correlations between social comparisons made within class and expectations for achievement within class, and between social comparisons made across grade and expectations for achievement across grade.

A further significant