Chapter Five
Discussion and Conclusion

The major objective of this study was to examine the relations of self-efficacy and self-concept measured with academic performance of 15-year-old students. The results and the implications of the current research are discussed in this chapter.

5.1 Measurement Models of Self-Concept and Self-Efficacy

In the present study, EFA was used to test the adequacy of the self-efficacy and self-concept measurement models. Cronbach's alpha for self-concept was .89 and that for self-efficacy was .87. It showed the internal consistency for these two variables. For the validity, both variables had high predictive validity and factorial validity. The results clearly demonstrated the adequacy of using these measures of mathematics self-efficacy and mathematics self-concept.

5.2 The Predictive Utility of Self-Efficacy and Self-Concept

The results of the present study suggest that self-efficacy measures are more suitable measures for predicating performance in mathematics. Mathematics self-efficacy was more highly related to performance when compared with mathematics self-concept. These finding correspond to those of Pietsch, Waler, and Chapman (2003), and Kiamanesh, Hejazi, & Esfahani (2004). In PISA Database, the questions about mathematics self-efficacy are basically focused on problem-specific and the results consistent with the study of Pietsch, Walker, and Chapman (2003). They

found out that problem-specific self-efficacy was a more predictive measure of performance in mathematics than mathematics self-concept. Similar to the findings in Pajares and Miller (1994, 1995), they found mathematics problem-solving self-efficacy to be an especially good predictor of performance on a problem-solving task that was linked to the same self-efficacy items. Marat (2005) proposed that participants had high levels of mathematics self-efficacy, and believed in their capability to achieve their goals in mathematics. Using specific problems to assess students' competence, they appear more likely to consider each problem and their perceived competence to solve it individually. Therefore, as shown in literature review, self-efficacy beliefs are more related to specific tasks as they are more likely to be related to future performance on those tasks.

Relative to academic self-efficacy, academic self-concept tends to be a weaker predictor of academic performance. The result of this study identified the significant relationships between self-beliefs and mathematics achievement which is correspond to the studies of Choi (2005) and House (2006). Although both constructs were related to performance to varying degrees. Both the self-efficacy items were found to be significantly related to the performance in mathematics but the effect from self-concept was not significant. The reason for this was that self-efficacy was found to be a mediator. This mediator suppressed the effect from self-concept to mathematics achievement. One other reason was that the definitions of self-efficacy were more clearly than self-concept and the questions for questionnaires were more problem-specific based. The direct effect of mathematics self-concept on

mathematics performance was only .03 and not significant in the present study, this result may refer to Hagtvet (1990) four possible patterns of causation between academic self-concept and academic achievement. He suggested that the "third variable" may cause the relationship betweeen self-concept and achievement. Skaalvik and Skaalvik (2006). They pointed out that there are many studies that indicating during elementary school years mathematics self-concept is mainly a consequence of achievement, but that it does not significantly affect later achievement (Skaalvik & Hagtvet, 1990). Therefore, it is worth to note that general academic self-concept is a more efficient predictor of the performance on a global indicator while mathematics self-efficacy is a good predictor of performance on a problem-solving task.

According to Klassen (2004), it was found that mathematics self-efficacy is a better predictor of mathematics performance than mathematics anxiety, conceptions for the usefulness of mathematics, mathematics self-concept and previous mathematics performance. Considering the findings related to predictive role of mathematics self-efficacy, it can be concluded that what students believe they can do in learning mathematics and solving mathematics problem plays a vital role in their actual math achievement. Therefore, it is possible that perceptions of inefficacy in mathematics would lead learners to reduce levels of motivation and lessen their engagement in mathematics and mathematics related courses (Randhawa, Beamer, & Lundberge, 1993).

5.3 Implications for Educational Practice

It is worth to note that the final goal of both self-concept and self-efficacy research is to help students with better functioning in academic demands. Many researchers try to understand students' self-perceptions in academic contexts and using this information to predict important outcomes. Strong self-efficacy and positive self-concept can lead students to feel better about themselves, enjoy their academic work, put more time and efforts on difficult tasks, and feel less anxious in learning situations. The findings from this study indicate that high school students who have a high degree of positive self-perceptions tend to attain higher academic achievement. The implication of these findings could serve as guidelines for teachers to designing appropriated classroom activities in order to enhance students' self-perceptions. In order to enhance students' self-concept and self-efficacy, designing classroom activities plays a curial role. According to Bandura (1978) social cognitive theory, human behavior is explained by a triadic reciprocal model which means the interaction among the person, environment, and human behavior are never ended. In other words, academic performance can be influenced by self-perceptions as well as by learning environment. The following recommendations can be considered to enhance mathematics self-efficacy and academic achievement through relevant teaching-learning interventions.

1. *Giving students successful experiences in the completion of tasks at increasing difficulty levels.* When students complete activities

successfully at increasing difficulty levels, they will be more likely to increase their self-efficacy and self-concept. As a result, students' academic achievement will be improved.

2. *Giving students an immediate feedback following by their performance.* Krbavac (2006) study indicated that there are statistically significant correlations between feedback and performance, performance and self-efficacy, and feedback and self-efficacy. Since there is a demonstrated relationship between self-efficacy and academic achievement of students, teachers can give feedbacks to students immediately followed by their performance. This strategy may have influenced in increases in student performance as increase in their mathematics self-efficacy.
3. *Encouraging or teaching the use of learning strategies*. These include goal setting, appropriate strategies for integrating new knowledge, self-regulation, reflection based on feedback and the responsibility for individual learning.
4. *Taking students' self-reflections into consideration*. The use of instructional methods should focus on student reflections on how they think and learn. Also, it is necessary for students to report to their most efficient learning strategies, and monitoring progress when dealing with problems (Krbavac, 2006). Therefore, teachers can use this information to design a proper curriculum.

Although the effects of mathematics self-concept are not as strong as the effects of mathematics self-efficacy. It plays an important role in students' learning and their achievements. Changing one's academic

self-concept may require more time and effort compared with strengthening one's self-efficacy. Bong and Skaalvik (2003) notified that there is only limited experience in how to successfully bring about change in students' overall views of themselves. On the other hand, it is a challenge to improve students' stable characteristics of academic self-concept in a relatively short period of time. Therefore, it is relatively easier to enhance students' efficacy perception toward specific academic tasks (Bong & Skaalvik, 2003). Teachers can focus on strengthen students' efficacy perceptions when the goal is to improve their immediate future performance. Also, it is important for teachers to create environments that tend to reduce students' attentions on ability comparison and the impact of academic self-concept on students' self-worth. If they believe in their own capacities, they would feel less anxious about their learning. Therefore, it is necessary for teachers and professors to examine their teaching practices, and to ensure the presence of students' self-constructs in order to design appropriated activities in their particular classrooms (Choi, 2005).

5.4 Limitations and Suggestions

Although the results from the current study largely support previous studies, there are still some limitations. First, according to Bandura (1997), when the test result is important for the students' academic performance, the students are motivated to do well in a test. Since the achievement in PISA did not contribute to formal scores in school records, the students might not put their full efforts in the PISA study. Therefore, taking this statement as a possibility, the researchers can observe

differences in mathematics achievement and also the factors affecting students' achievement in different countries. Second, the findings from this study were based on self-reported measures from high school students in general education classes from Hong Kong. The findings from the current study may not apply to the studies of other countries. It is also recommended that future studies may examine relations of self-constructs with achievement using different samples in some other disciplines, such as business, arts, or medical schools. Third, there are still debates about both conceptual and methodological perspectives of academic self-concept and academic self-efficacy. The complexity view of academic self-concept can include a host of perceptions, for example, competence, self-worth, interest, enjoyment, or motivation. It is worth to find better outcomes that are influenced and determined by these factors. Such outcomes may include choice and performance measures at both specific and general levels. It is possible that once these factors had been taken into account, the relative predictive utility of each self-perception may differ.