

CHAPTER 6

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

6.1. Introduction

Mathematics is being regarded by educationists as a crucial subject for learners to be able to perform in an academic setting as well as in a world of work (Arnold, 2003). However, it has always been a challenging and scary subject for many learners, which results in these learners not achieving in Mathematics. Consequently most of these learners would rather discontinue the subject when entering the FET phase (*cf.* 1.1). Various factors have either a direct or indirect influence on the performance of learners in Mathematics. An attribute such as low academic self-confidence is one of these factors that negatively influence a learner's ability to perform satisfactorily in Mathematics (*cf.* 5.2.2.1.1).

The intention of this research was to create awareness with regard to the vital influence academic self-confidence (including other factors that directly and indirectly influence academic self-confidence) has on learners' mathematical performances. Even though several other researchers have already proven that academic self-confidence influences mathematical achievement, the researcher wished to determine whether the same phenomenon could be a reason for many learners struggling to perform satisfactorily in Mathematics, resulting in them rather opting to take Mathematical Literacy instead of pure Mathematics at a specific school. In addition to this, the consequences of these influences needed to be identified in order for them to be addressed.

The research questions will be answered in this chapter, and the conclusions, limitations and recommendations will also be discussed here:

6.2. Conclusions

This chapter's main objective is to provide conclusions drawn from the literature review and to summarise recommendations made regarding the empirical study. It will all follow in the next section:

Research question 1

What is academic self-confidence?

Academic self-confidence was defined within the literature review (*cf.* 2.3) as that it refers to learners' self-confidence in relation to their academic abilities and achievements, rather than to their personal, emotional and social abilities (Alias and Hafir, 2009:2).

Research question 2

How does academic self-confidence influence the learning of Mathematics in particular?

The literature review uncovered that various researchers and authors drew similar conclusions regarding the influence academic self-confidence has on the successful learning of mathematical concepts (*cf.* 2.3, *cf.* 2.6 & *cf.* 2.9). Dednam (2011:215) affirmed that academic self-confidence is one of the fundamental requirements necessary for learning Mathematics successfully (*cf.* 3.5). Moreover, Woolfolk (2010:90) is of the opinion that academic self-confidence directly influences learners' belief about their abilities to learn Mathematics even before attempting a problem (*cf.* 2.3). The results from this research study revealed similar findings. The quantitative research showed a positive relationship between learners' attitudes and academic self-confidence and

their performances in Mathematics and consequently their learning abilities regarding the subject (*cf.* 5.2.2.1.1). Likewise, the qualitative research yielded similar results in that learners from the said school expressed that they felt their academic self-confidence had a significant influence on their ability to not only perform in Mathematics but to also successfully understand and learn Mathematics (*cf.* 5.3.1).

Research question 3

What are the mathematical achievements of learners in the GET phase at the school used for the study?

In 2011, the year in which the research was conducted at the said school, the grade 8 learners obtained a CASS average of 61.6%, a year-end exam average of 57.6% and a promotion average of 60.3%. Only 2.6% of the Grade 8 learners failed Mathematics at the end of 2011, compared to the 4.4% who obtained distinctions. Yet 14.9% of all the Grade 8 learners could not manage to achieve a year average above 50%. In the same year the grade 9 learners obtained a CASS average of 65.3%, a year-end exam average of 53.3% and a promotion average of 62.3%. Of all the Grade 9 learners 4.5% of them failed Mathematics at the end of 2011, compared to the 10.9% who obtained distinctions. Yet 16.3% of all the Grade 9 learners could not manage to achieve a year average above 50%. The drop-out rate (Grade 9 learners who decide no carry on with pure Mathematics in the FET phase) at the said school from 2011 to 2012 was 10%. This data was used to enable the researcher to divide the sample group into three sub-groups (*cf.* 4.2.7) and to compare these performances with the learners' academic self-confidence, as discussed in the next research question.

During the 2012 ANA-assessment the Grade 9 learners (the Grade 8 learners of 2011) from the said school achieved an average of 56.6% compared to the district average of 19% (*cf.* 1.1). An alarming 31.8% of the Grade 9 learners in the school failed the ANA-exam and a further 32.7% did not obtain an average above 50%. Therefore one can infer that only 35.5% of the learners obtained an average above 50% of which 7.5% received a distinction in the ANA-exam (*cf.* 1.1).

Research question 4

Is there a link between the academic self-confidence level of learners at the school used for the study, in the GET phase and their mathematical achievement?

According to the quantitative (*cf.* 5.2.2.1.1) and qualitative (*cf.* 5.3.1) research results, there is a definite significantly positive relationship between the learners from the said school's academic self-confidence and their mathematical achievement. In general it was found that learners who obtained higher marks and thus performed better in Mathematics showed a stronger sense of academic self-confidence and comfort regarding their mathematical achievement and performances when compared with their counter parts who obtained lower marks.

With this information in hand one can effectively answer the central research question: **“What influence does academic self-confidence have on Mathematics achievement?”**

Although most learners in this school perform better than learners from other schools in the same district, a link was found between academic self-confidence and mathematical achievement. There appears to be direct and indirect relationships between academic self-confidence and mathematical performances. In addition, the researcher also identified a cycle of influence between these two

factors. These 3 aspects will be discussed in the following paragraphs in order to answer the central research problem in full.

6.2.1. The direct influence of academic self-confidence

As mentioned above, both the quantitative and qualitative research identified a clear relationship between academic self-confidence and the learners' mathematical performances. Even though the researcher identified a significant positive relationships (*cf.* 5.2.2.1.1) within the learners' emotional attitudes and academic self-confidence and their CASS and promotion marks, it was interesting to note that the strongest influence emotional attitude and academic self-confidence had, was on the learners' ability to perform during an exam. Furthermore, 71.4% of the learners interviewed felt that their academic self-confidence had a direct influence on their performance regarding Mathematics (*cf.* 5.3.1), stating without hesitation that the more confident they felt the better they performed and the less confident and uncertain they felt the poorer they performed. Hence, based on these findings, the researcher felt convinced that academic self-confidence has a direct influence on these learners' ability to perform in Mathematics and consequently achieve good grades.

6.2.2. The indirect influence on mathematical performances

Various factors were identified that had an influence on the learners' sense of academic self-confidence and consequently their mathematical performances. These factors were identified as the comprehension and application of Mathematics, solving mathematical problems and educator assistance.

The research (*cf.* 5.2.2.1.2) indicated that a meaningful relationship exists between learners' self-confidence in their comprehension of mathematical concepts and their mathematical performances. Learners had a shared feeling that their confidence levels were positively linked to their comprehension of mathematical ideas (*cf.* 5.3.2). The more these learners understand new, as well as already taught, mathematical concepts, the more confident they are about the subject, which in turn results in them achieving better marks, as they are more willing to do additional work. Similar findings were made about how successful problem solving positively influences learners' academic self-confidence (*cf.* 5.2.2.1.3). In addition, the more successful learners become at effectively and confidently solving mathematical problems, the stronger their motivation and resilience to perform in Mathematics become (*cf.* 5.3.3). On the other hand, the research also indicated that failing or struggling to solve mathematical problems often result in lower academic self-confidence combined with mathematical anxiety, which could effect in a paralyzing fear of the subject and an inability to perform satisfactorily (*cf.* 3.10.1.3). Lastly, educator assistance and teaching also played an enormous role in the learners' academic self-confidence, which in turn influenced their mathematical achievement. Research showed that educator assistance and teaching strategies directly influence (*cf.* 5.3.4) the learners' ability to understand mathematical concepts as well as their belief in the subject and in themselves. In some cases it was found that the educator's confidence 'rubs off' on the learners: the more confident the educator is when explaining the mathematical concepts, the more confident and motivated learners become in Mathematics. Even though there was only a small positive relationship found between educator assistance and the learners' academic self-confidence and performances within the quantitative research (*cf.* 5.2.2.1.4), it became very apparent that learners rely heavily on their educators to build academic self-

confidence and perform well in Mathematics (cf. 5.3.4), indicating the importance of well-planned educator assistance throughout.

6.2.3. The cycle of influence

After setting out to determine whether academic self-confidence had an influence on learners' achievement in Mathematics, it became clear that not only is there a relation, the reverse was also true. It became evident in the analysis of the qualitative research (cf. 5.3.1) that mathematical performance also influences learners' academic self-confidence; thus a mathematical cycle of influence was identified. Within this cycle of influence, the learners were of the opinion that, as their self-confidence increases so does their Mathematics marks and performances, and as these mathematical performance increase, their level of academic self-confidence improves, which enables them to continue performing in the subject. On the contrary, if learners have low levels of academic self-confidence, they tend to perform poorly in Mathematics, which results in even lower levels of academic self-confidence, which in turn may hinder these learners' ability to perform satisfactorily in Mathematics.

Diagram 6.1: Positive Mathematical Cycle of Influence

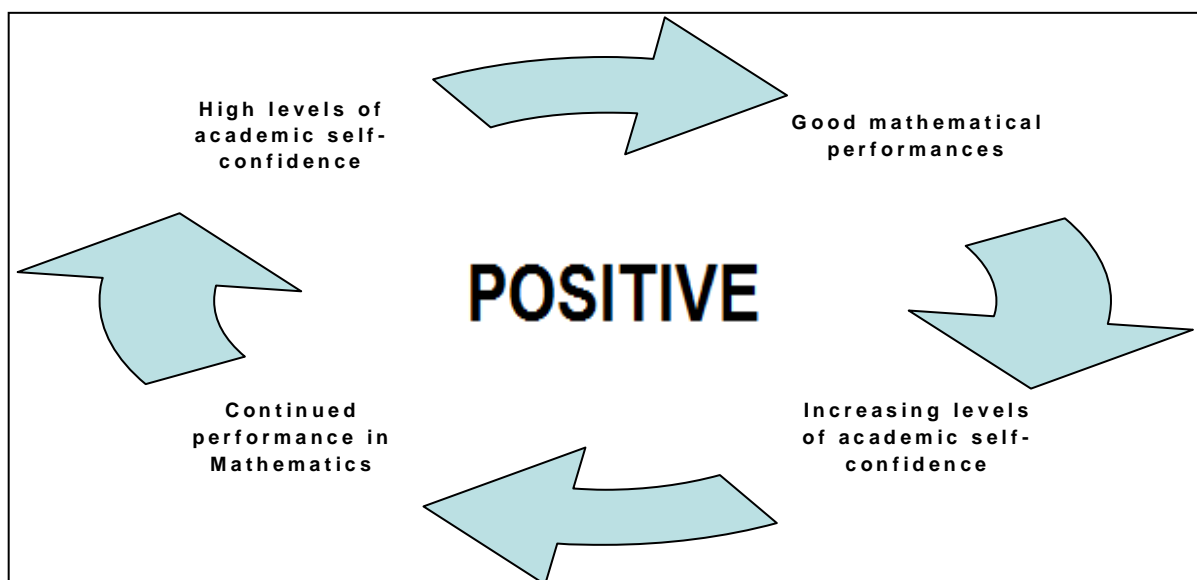
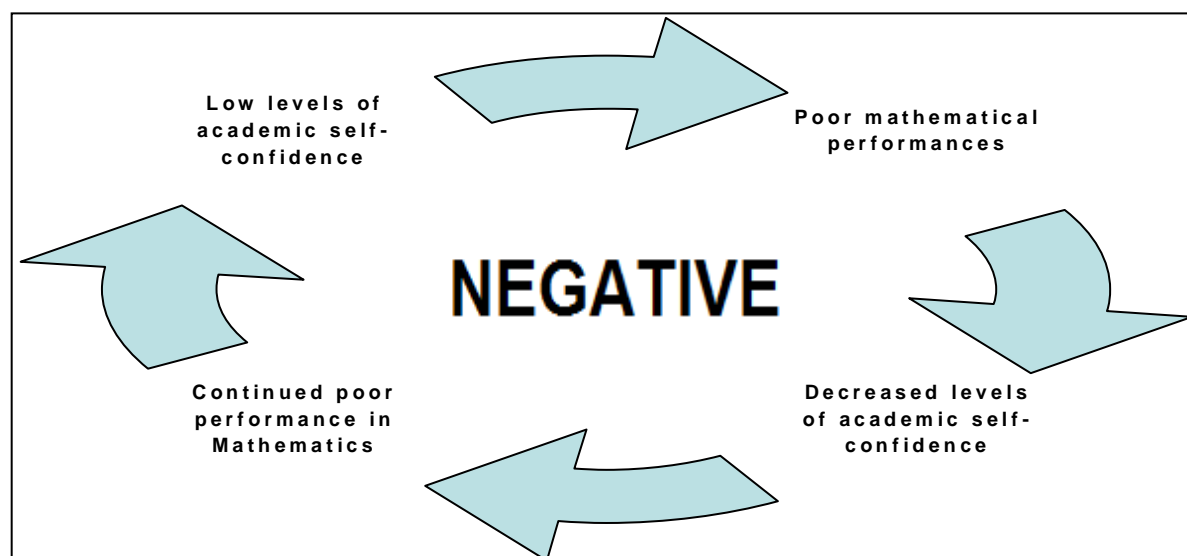


Diagram 6.2: Negative Mathematical Cycle of Influence



6.3. Limitations

The research was conducted with the GET phase learners at a specific school in Johannesburg North district and therefore the following limitations were identified by the researcher:

- Research was only conducted in one school. Consequently the researcher cannot make generalizations or assumptions that the findings in this research study are applicable to all schools in the district, province or country.
- The school caters for learners with an aptitude in Mathematics and Science. Only a small sample of learners who performed poorly (*cf.* 4.2.7) in Mathematics were available.

6.4. Recommendations

The researcher has the following recommendations for further research:

- In order to confirm whether the results from this research study relate to a larger sample group, the researcher

would recommend that a similar research be done within the district or province with several other schools.

- Further research is needed on the mathematical cycle of influence and how this cycle could be used to improve mathematical performances.
- Poor national and provincial mathematical performance is a concern, and the reason for these results to continue being so poor needs to be urgently researched in order to identify ways in which these results could be improved (of which one should deal with development of academic self-confidence).
- The drop-out rate in the Mathematics subject is also of concern. Therefore the researcher also recommends that research be done on the reasons why learners feel they do not want to continue with Mathematics in the FET phase, in order to find effective solutions to the problem.

6.5. Final Conclusion

Many people wonder about the importance of Mathematics. Galileo's (*in* Arnold, 2003) answer to this is that the 'great book of nature' is written in a special language, namely Mathematics. Arnold (2003) contends that this means that Maths is the gateway to understanding everything in the world around us. He goes on to explain that Mathematics makes people better problem solvers (not only in the subject itself, but also in the world around them) and it teaches people to think logically about the solutions to general problems.

This in its own way emphasizes the importance of Mathematics for all people. Bearing this in mind it becomes imperative to explain the importance of factors that influence mathematical performances. One of these key factors, as identified by various

other researchers and confirmed within this research study, is academic self-confidence. As mentioned in this chapter, academic self-confidence has a direct and indirect impact on mathematical achievement, making the influence it has essential to find solutions to improve learners' ability to successfully understand the subject and to perform in it.