FACTORS AFFECTING UNDERACHIEVEMENT IN MATHEMATICS

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ABSTRACT

Many students are considered underachievers in mathematics. They are average or above average in their intelligence but their actual achievement in mathematics did not coincide to their intellectual capabilities. This study seeks to unearth the factors that affect underachievement in mathematics. There are three suspected identified factors that will scaffold this study. First is teacher factor, which is compose of mastery of the subject matter, instructional techniques and strategies, classroom management, communication skills, and personality. Second is student factor which include study habits, time management, and attitude and interests towards mathematics. Third is environmental factor such as parents’ values attitudes, classroom settings, and peer group. The design of this study is descriptive – correlation method utilizing teacher – made questionnaire. Based on the findings, student factors such as study habits, time management, and attitude towards mathematics are the factors that affect underachievement in mathematics.

Field of Research: underachievement, student factors, teacher factors, environmental factors

1. Introduction

Mathematics education is one of the subjects recognized as a major factor in development, causing national agenda to focus in this area (Ogena, 2010). The development of mathematical reasoning is the goal of K-12 Education in US (National Research Council, 2001) and other countries for it is an important skills for employment (Ketterlin-Geller, Chard, Fien, 2008). Performance of schools in all levels, the kind of teacher quality and its teaching output became a national priority in addressing the quality of education learners receive. Evaluation of educational attainment using standardized high-stakes testing was administered, and the poor result was unforgiving. Low achievements in many areas are now the concern for all academic and government institutions (Cave and Brown, 2010). Therefore, revisiting how the way students learned and the way students’ achievement was performed is an effort worthwhile to consider.

However, failure to meet the standards of proficiency is a complex matter to pin point the blame even to the learners. There are many variables like teacher quality, financial resources of the school, quality of instruction, and many more are out of their control (McGuire, 2000).

This study attempts to find out the causes of 56 graduating students taking up Bachelor of Elementary Education studying at University of Cebu – Main Campus located at the heart of Cebu City, Philippines
whose achievement in mathematics lagged behind their intellectual potential. These students are average or above average in their intelligence but continue to fail and did not maintain a normal progress in school subjects. They are the ones who are good in other subject areas but mathematically deficient students. Therefore, they are called underachiever in mathematics.

McGuire (2000) mentions many variables in low achievement of students, but this study focuses on the context of three indentified factors: First is teacher factor, which is compose of mastery of the subject matter, instructional techniques and strategies, classroom management, communication skills, and personality. Second is student factor which include study habits, time management, and attitude and interests towards mathematics. Third is environmental factor such as parents’ values attitudes, classroom settings, and peer group. Other factors such as socio-economic and socio-cultural backgrounds were not included because disparity among the respondents did not exist. The objective of this paper is to find out among the identified factors that greatly affects underachievement in mathematics.

2. Teachers’ Impact on Students’ Learning

Teacher factor is the most recommended factors impacting students learning. Accumulated evidences suggest that it moderates the effect of other risk factors like parents educational level of attainments, gender of students, socio-cultural and socio-economic backgrounds (Darling-Hammond, 2000; Pianta, Belsky, Bendergrift, Houts, & Morrison, 2008; Rowe, 2003) as cited by (Cave & Brown, 2010). Teachers are responsible to the kind of learning and experiences the students may engage everyday as well as setting of educational goals and total personality development.

Professional development of teachers on content-focused instruction has tremendous effect on student achievement. The study of Blank and de las Alas (2009) provided a scientifically based evidence for its positive effect. The students of the teacher who participated in programs for faculty development had scored above the students whose teachers did not participate. The study of Hill, Rowan & Ball (2005) concluded that teacher’s mathematical knowledge had strong significant relationship on student achievement. Quimbo (2003) says that teachers who always absent or did not teach had among the lowest score in mathematics achievement test. Thus, mathematics achievement can be improved by improving teacher’s mathematical knowledge, commitment in the profession and always engaging in professional development.

3. The Role of Environment in the Learning Process

Learning process is a complex cognitive activity that happened in school and outside the school. The ability of the learner to engage with intellectually varies overtime on some other stimulus. It can be a motivation and support from a friend or the effect of peer group in the spirit of competitiveness. Some can be the parents’ values and attitudes and their academic influence or the school environment and classroom settings through visual aids. A complex process and variation can affect students in the learning process.
Biggs (1989) conceptualizes the learning process which is an interaction of three variables. He called this learning process as 3P model which consist of learning environment and student characteristics (Presage), students’ approach to learning (Process), and learning outcomes (Product). This model applies the idea that the learning environment which is the situational characteristics mention by Lizzio et. al. (2002) affects the learning process of the desired learning outcomes. Whether or not the kind of learning environment the student has affect the learning process and the learning outcomes depends on the students’ perception that identify the situational factors characteristic in influencing the motivation of students to learn. Lizzio et al.(2002) strongly affirms that students perception on the current environments were a strong predictor on learning outcomes.

Another study of Quimbo (2003) suggest that by effectively providing materials in school can improve achievement in mathematics and the home learning environment such as parental education have significant effect on students’ performance. The mere presence of learning materials such as books, charts, visual aids and others affect the learning outcomes. Another consideration is the home as the learning environment. Students whose parents are highly educated out-performed their peers whose parents have low educational achievement. The influence of the parents in the meta-cognitive trainings like study habits, achievement pressure can be considered as elements behind school performance (Quimbo, 2003).

4. Subjective Experience of Students Influences the Learning Outcomes

Students’ perception on the situational characteristics of the learning environment can be applied on the teachers’ personality, pedagogical approach and to the subject content. On the basis of experienced, students tend to dislike the subject as he dislike the teacher, as the “domino” effect, this perceived difficulties becoming his subjective experienced causes the lost of interest to learn the subject.

The study of Brown, Brown, & Bibby (2008) found out that the low participation of mathematics in UK was due to the perceived difficulties, lack of confidence, dislike, boredom, and lack of relevance on the subject. Their choice has significant relationship on their attitude towards mathematics. The main reason why others discontinue studying mathematics because of their perception as boring, hard, and useless.

5. Theoretical Background

Eggen and Kauchak (2004) views underachiever as students who are average or above average but despite the teacher’s effort in teaching, they have difficult time in learning. This underachievement can be defined as discrepancy between potential (ability) and performance (achievement) or discrepancy between predicted achievement and actual achievement. Some students have academic achievement commensurate with their intelligence. This means that there is no significant discrepancy between their ability to learn and outcomes to achieve. However, others have average or above average intelligence but they continuously perform low achievement in school.
Researchers have suggested that underachievement can be improved if students make specific goals, proximal, and challenging (Schunk, 2008). Fuligni (2007) recognized goal setting as the key aspect of achievement. Those underachievers must learn on how to set specific goals, make attainable plans, and adequately self-monitor their progress towards the goal. Students that have low expectations for success need constant reassurance that they can attain the goals and challenges by supporting them to succeed. Nevertheless, they need reminders that effort is the only way to fulfill it. Teachers may give them individualized teaching approach, ample instructional materials, set optimal challenging activities, and assess them formulate low reaching goals, however, they still needs to exert effort, nonetheless, progress is impossible.

In teaching, the most difficult to handle is underachieving students. These students are discouraged and uninterested who lack the confidence and motivation to learn. Marlowe (2006) suggested that to create highly motivated and achiever students, teachers must follow the following steps: 1) focus on their potential to learn, 2) teach them to value challenge and learning, 3) teach them to concentrate on effort and learning process in the face of hardships, 4) teach them to engage in processes that foster learning like task analysis and study skills.

To focus on the students on their ability to learn and to emphasize that effort is the key to learning, then the teacher give them the responsibility over their achievement. Learning is not something about telling the students that they are smart but on the things that they achieve as they overcome the many challenges that deliver mastery of new things. Students that valued learning and effort know how to make and sustain commitment to value goals. They will bestow no fear to work harder, they only recognized that memorable task involve setbacks, and knowing how to bounce back from defeat.

A contradicting practice among teachers is on praising the students in their intelligence. Marlowe (2006) stresses that praising the students in their intelligence can make them underachiever. This practice will lead to holding on one’s perception and beliefs that they cannot control and hook them to the idea that failure and setbacks signify weakness and incompetence instead of recognizing that effort is a key to success. They will believe that to exert effort is a sign of weakness and incompetence. Moreover, he said that a teacher can praise as much as he please when the students learn and perform well, but should focus on the strategies, effort, study habits, and attitude but not on their performance, preventing them to view their performance as an innate power which is beyond their control. The students who receive praise because of their intelligence become quickly shaken when things becomes difficult.

Classroom management is one of the most important jobs of a teacher. Its impact on achievement is very high (Sontrock, 2009). This means that students cannot learn in chaotic and an environment poorly managed by teachers. Sontrock (2009) identified important components of a classroom. Design a room conducive for learning environment, creation of procedures and its implementation must be properly carried out, and establishing a high level of teacher-students relationship such as exhibiting appropriate level of dominance and cooperation. Poor classroom management results to poor classroom environment and make the students underachiever.
On the aspect of the learning environment, specifically to their relationship with parents and friends and the quality of interactions with them profoundly affect their achievement and social motivation. Students who are accepted by their peers and who have good social skills often do better in school and have positive academic achievement (Rubin, Bukowski, & Parker, 2006). However, rejected students, especially those who are highly aggressive is at stake of achievement problem, including low grades and dropping out.

Students who are socially accepted ad supported by peers are more motivated, achieve higher, develop high self confidence, and are satisfied with life than those receiving less support. Peers continually communicate their attitudes and values to one another in day to day interactions. Unfortunately, peer influences are sometimes negative such as when students participate in gangs or other forms alike. Student’s choice of friends predicts grades, disruptive behavior, and teacher ratings of involvement in school. When student select academically oriented friends, their grades improve, when they choose disruptive friends, their grades decline and behavior problems increase (Berndt & Keefe, 1995) cited by Kauchak, 2004).

6. Methodology

This study used descriptive-correlation method of research utilizing teacher made – questionnaires. The research instrument is a five point Likert scale categorized into three: Teacher Factors, Student Factors, and Environmental Factors. Teacher factors were composed of mastery of the subject, instructional technique, strategies and facilities, communication skills, personality and professional aspect, and classroom management. Student factors were composed of study habits, attitude and interests towards mathematics subject, and time management. Environmental factors were composed of parents’ values, parents’ attitudes, classroom setting, and peer influences.

This study was conducted at University of Cebu – Main Campus in the College of Teacher Education. The respondents were the 56 identified students who performed low in mathematics but average and above on their performance in other subjects. The researcher utilized the grades from first to third year at the Office of the Registrar to identify their performance in all subject areas.

7. Results and Discussion

This section presents data on the factors that affect the student’s underachievement in mathematics. The identified factors are the teacher factors, Student factors, and environmental factors. The result was tested using Chi-square at 0.05 level of significance.
Chi-square Test on Relationship

<table>
<thead>
<tr>
<th>Paired Variable</th>
<th>Computed $X^2$</th>
<th>df</th>
<th>c.v. at 0.05</th>
<th>Interpretation</th>
</tr>
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<td>14.10</td>
<td>8</td>
<td>15.51</td>
<td>Not Significant</td>
</tr>
<tr>
<td>and Teacher Factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mathematics Performance</td>
<td>64.23</td>
<td>8</td>
<td>15.51</td>
<td>Significant</td>
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<tr>
<td>and Student Factors</td>
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<tr>
<td>Mathematics Performance</td>
<td>13.13</td>
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<td>15.51</td>
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<td>and Environmental Factors</td>
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</tbody>
</table>

As revealed, only the relationship between mathematics performance and student factors was significant. In the table, the computed chi-square for mathematics performance and student factors which is 64.23 is greater that the critical values of 15.51. This implies that there was a significant relationship between academic performance in mathematics and student factors. Thus this study failed to accept the null hypothesis that there is no significant relationship between the performance in mathematics and the meta-cognitive factors. It can be concluded that student factors such as study habits, attitudes and interests toward mathematics and time management directly affect the performance of students in mathematics.

Among the student factors indicators, the attitude and interests towards mathematics got the lowest mean score of 2.68 from the scale of 5. These includes “I don’t like math subjects, I have phobia in mathematics, I feel that I don’t have intelligence in solving math problems, and I feel, bored with math subjects.” The main reason for their low performance in mathematics in spite their actual capability as shown in other subjects was their attitude towards mathematic subject. The students viewed mathematics as a boring subject, difficult, and no relevance to their life experiences.

8. Recommendation

Many authors theorized various factors that affect performance on mathematics. Teachers often were the main contributor and have the greatest impact on achievement. However, looking scientifically other angles simultaneously the possible other contributor is the best idea. The amount of force exerted to a certain object requires a bounced back reaction in order work can be completed. No amount of strength, time, and effort is valuable can help any students to learn if they themselves are not willing for some internal reasons as the findings in this study reveals. For teachers handling below average students, performance expected is very low also. The disparity of performance among below average students can be attributed to the quality and dedication of a teacher. But for those above average students who performed good at other areas but not in mathematics, the problem is not the teacher but the students themselves. They have some subjective prejudiced on the subject that makes them unproductive.

Students’ attitudes and interest towards mathematics can be revolutionized by integrating the importance of mathematics in everyday life activities. Teacher should find ways to motivate the students to learn mathematics in spite difficulties. Animated discussion in mathematics must be
integrated. Teacher should walk extra mile to reach out the students, helping them to develop critical thinking analysis.

References


