Abstract

The present study explored the relationship between Self-Efficacy and Mathematics Achievement and Mathematical Attitude and Mathematics Achievement among adolescents. The study was descriptive one and has been conducted in Ludhiana District of Punjab. The sample comprised 200 students of 10+1 class (100 boys and 100 girls) of Government Senior Secondary Schools. The data was obtained using Self-Efficacy Scale by Mathur and Bhatnagar (2012), Mathematics Attitude Scale by Imam and Khatoon (2012) and the marks obtained in the subject of mathematics in 10th class Board examination. The obtained data was analyzed using Pearson's correlation and step-up regression. The major findings are (i) There exist significant positive relationship between Self Efficacy and Mathematics Achievement among girls, (ii) There exist significant positive relationship between Mathematical Attitude and Mathematics Achievement and (iii) The conjoint effect of Self Efficacy and Mathematical Attitude on the Mathematics Achievement of adolescents is significantly higher as compared to their separate prediction.

1. Introduction

Self-Efficacy has been argued to be an important construct in the organizational science, often examined as an individual difference factor capable of influencing the relation between antecedents and consequences. The Self-Efficacy theory holds that the initiation persistence of particular behaviour and course of action is affected by people's belief about their behavioural capabilities and their likelihood of coping with environmental challenges. According to Bandura's social cognitive theory, self-efficacy influence the choices people make and the courses of action they pursue. Individuals tend to engage in tasks about which they feel competent and confident and avoid those in which they do not. Efficacy also help determine how much effort people will expend on an activity, how long they will persevere when confronting obstacles, and how resilient they will be in the face of difficulty.
of adverse situations (Schunk, 1981; Schunk and Hanson, 1985; Schunk, Hanson, & Cox, 1987). The higher the sense of efficacy, the greater the effort, persistence, and resilience.

Self-efficacy was first defined by Bandura in 1977 as a person’s belief in his or her ability to succeed in specific situations. Bandura said it was “the conviction that one can successfully execute the behaviour required to produce the outcomes.”

Henk and Melnick (1995) defines Self-Efficacy as, "a person's judgment of his ability to perform an activity and the effect this perception has on going and future conduct of the activity." Scheier and Carver (1992) said "Self-Efficacy underlines people’s faith in their ability to carry out particular behaviour or produce a desired outcome.” Betz and Klein (1996) defined Self-Efficacy as “the confidence to engage in educational and vocational activities within each of six themes (i.e. Realistic, constructing, repairing, using tools), investigating (researching, solving abstract problems), Artistic (composing, creating, writing), Social (teaching, helping, serving) Enterprising (selling, managing, persuading) and Conventional (setting up procedures, organizing, operating computers)” commonly referred to as a RIASEC model.

Apart from Self-Efficacy Attitude towards an object can exert a potent influence towards the attainment of the object. Attitude when fully developed function as an internal frame of mind, work for a state of readiness, arouses motivational, gives achievement in subject like mathematics very much depends on the attitude of the individual towards the subject.

The general talent is that the human beings are not only cognitive individuals, but also social person with believes, emotions and views that influence their development as learner. Actually, a person’s behaviour and choice, when confronted with a task, are determined more by his/her believes and personal theories, rather than by his/her knowledge the species of task.

According to Hart (1989), "Attitude towards mathematics comprises three components: an emotional respond to mathematics, positive or negative, a conception on about mathematics and a behavioural tendency with regards to Mathematics.” Ma and Kishor (1997) purpose a wider definition towards mathematical attitude as,” an aggregated measure of liking or dislike of mathematics, a tendency to engage in or avoid Mathematical activities, a belief that one is good a bed at Mathematics and a belief that Mathematics is useful or useless.

There are ample empirical evidences that self-efficacy and attitude are related with and influence academic achievement. Moreover, they also mediates the influence of other variables that predict academic achievement, which is to say that it act as a filter between variables such as previous achievement and mental ability on academic achievement.

2. Emergence Of The Problem

From the review of related literature it was found that there were indeed numerous researches conducted on testing the relationship between attitude and academic achievement. Based on the past literature, there was a general consensus that attitude could be regarded as a significant predictor of one’s academic achievement. Most of these researches illustrated the more positive one’s attitude towards an academic subject, the higher the possibility for him/her to perform well academically. Even though most of the studies suggested that there was a positive relationship between attitude and academic achievement, there were other researchers arguing that students’ attitude might not be a significant predictor of their academic achievement. In a study conducted by Mickelson (1990), he stated that whether attitude could significantly predict one’s academic achievement depended on a number of variables, particularly the ethnic background and social class.
Correspondingly, Ma and Kishor (1997) also argued that the statement “attitude was a significant predictor of academic achievement” was indeed a paradox.

Also based on past literature, there was a general agreement that Self-Efficacy was strongly related to one’s academic achievement. For example, in Turner, Chandler and Heffer’s study (2009), the results indicated that Self-Efficacy was a significant predictor of one’s academic achievement. Also, in Lent, Larkin and Brown’s research (1986), they also supported that academic Self-Efficacy was a reliable predictor of one’s educational performance. Although the vast majority of the existing literature supported the notion that there was a significant relationship between Self-Efficacy and academic achievement, there were also few researches did not support such an argument. Strelnieks (2005) found that whether Self-Efficacy could influence one’s academic achievement depended on some external factors, like gender and socio-economic status. As reflected in the above research findings, it could be seen that there were inconsistencies in contemporary understanding on the relationship between Self-Efficacy and academic achievement.

3. Objectives Of The Study

The study was intended to fulfill following objectives.

I. To study the relationship between Self-Efficacy and Mathematics Achievement among adolescents.

II. To Study the relationship between Mathematical Attitude and Mathematics Achievement among adolescents.

III. To measure the predictive efficiency of Self-Efficacy and Mathematical Attitude on the Mathematics Achievement among adolescents.

4. Hypotheses Prepared

H_o1: There exists no significant relationship between Self-Efficacy and Mathematics Achievement among adolescents.

H_o2: There exists no significant relationship between Mathematical Attitude and Mathematics Achievement among adolescents.

H_o3: The prediction of Mathematics Achievement of Adolescents on the basis of conjoint effect of Self-Efficacy and Mathematical Attitude will not be significantly higher as compared to their separate prediction.

5. Research Methodology

I. Sample: For the present study a school sample was drawn from the representative government senior secondary schools of Ludhiana district of Punjab. 200 students (100 boys and 100 girls) were selected randomly from the 10+1 class.

II. Tools: For the present study the investigator has used following tools:

   a) Self-Efficacy Scale by Mathur and Bhatnagar (2012).
   b) Mathematics Attitude Scale by Imam and Khatoon (2012).
   c) Mathematics Achievement was assessed on the basis of marks obtained in the subject of mathematics in 10th Class Board examination.

III. Statistical techniques used

   a) To find the correlation between variables Pearson coefficient of correlation was used.
   b) To predict Well-Being on the basis of emotional intelligence and Self Efficacy, Step-up regression was applied.
6. Results

Table 1: Showing coefficient of correlation between Self-Efficacy and Mathematics Achievement among adolescents

<table>
<thead>
<tr>
<th>Respondent</th>
<th>N</th>
<th>Coefficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>200</td>
<td>0.26*</td>
</tr>
<tr>
<td>Boys</td>
<td>100</td>
<td>0.24*</td>
</tr>
<tr>
<td>Girls</td>
<td>100</td>
<td>0.28*</td>
</tr>
</tbody>
</table>

*Significant at 0.01 level of confidence

Table 1 reveals that the values of coefficient of correlation between Self-Efficacy and Mathematics Achievement for the total sample, boys and girls came out to be 0.26, 0.24 and 0.28 respectively. All the values are significant at level 0.01 of confidence. Thus we can say that there exists low positive correlation between Self-Efficacy and Mathematics Achievement among adolescents. Hence, the hypotheses Ho1 stating that, ‘there exists significant relationship between Self-Efficacy and Mathematics Achievement among adolescents’ stands rejected. The above result is supported by Zimmerman et al., (1992), Pajares, Miller and Johnson (1999), Pajares & Valiante, 1997, 1999), Abulibdeh (2011) and Gold (2012).

The above results seem to be justified because Self Efficacy gives the confidence to know about one’s own capacities. Hence helps the individual by learning how to minimize stress and elevate mood when facing difficult and challenging tasks.

Table 2: Showing coefficient of correlation between Mathematical Attitude and Mathematics Achievement among adolescents

<table>
<thead>
<tr>
<th>Respondent</th>
<th>N</th>
<th>Coefficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>200</td>
<td>0.49*</td>
</tr>
<tr>
<td>Boys</td>
<td>100</td>
<td>0.33*</td>
</tr>
<tr>
<td>Girls</td>
<td>100</td>
<td>0.47*</td>
</tr>
</tbody>
</table>

*Significant at 0.01 level of confidence

Table 2 reveals that the values of coefficient of correlation between Self-Efficacy and Well-Being for the total sample, boys and girls came out to be 0.49, 0.33 and 0.47 respectively. All the values are significant at level 0.01 of confidence. Thus we can say that there exists average positive correlation between Mathematics Achievement among adolescents. Hence, the hypotheses Ho2 stating that, ‘there exists significant relationship between Mathematical Attitude and Mathematics Achievement among adolescents’ stands rejected. The above result is supported by Cheung (1998), Orhun (2007,) Saha (2007) and Choi (2011).

The above result seems to be justified because attitude towards an object can exert a potent influence towards the attainment of the object. Attitude when fully developed function as an internal frame of mind, work for a state of readiness, arouses motivational, gives achievement in subject like mathematics very much depends on the attitude of the individual towards the subject.

Table 3: Step-up Regression Equations

<table>
<thead>
<tr>
<th>Variables</th>
<th>Degree of freedom</th>
<th>R²</th>
<th>R</th>
<th>F</th>
<th>Step-up regression equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model-I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>1,198</td>
<td>0.07</td>
<td>0.26</td>
<td>62.53*</td>
<td>Y = 57.40 + 0.26 X₁</td>
</tr>
<tr>
<td>Mathematical Attitude</td>
<td>1,198</td>
<td>0.24</td>
<td>0.49</td>
<td>57.40*</td>
<td>Y = 30.07 + 0.49 X₂</td>
</tr>
</tbody>
</table>

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Model-III

<table>
<thead>
<tr>
<th></th>
<th>2,197</th>
<th>0.29</th>
<th>0.54</th>
<th>31.28*</th>
<th>Y = 34.66+ 0.08 X1+ 0.48X2</th>
</tr>
</thead>
</table>

*Significant at 0.01 level of significance.

Model-I and Model-II of the table 3 shows that for adolescents the value of R^2 for Self-Efficacy is 0.07 and that of Mathematical Attitude is 0.24. Thus 7% of Mathematics Achievement is predicted by Self-Efficacy and 24% by Mathematical Attitude. Model-III shows the combined R^2 which is equal to 0.29. Therefore 29% of Mathematics Achievement is predicted by Self-Efficacy and Mathematical Attitude. The remaining 61% of Mathematics Achievement may be predicted by the variables not included in the present study. It leads to the conclusion that Self-Efficacy and Mathematical Attitude conjointly predict Mathematics Achievement significantly higher as compared to their separate prediction for adolescents. Hence the hypothesis stating that ‘The prediction of Mathematics Achievement of Adolescents on the basis of conjoint effect of Self-Efficacy and Mathematical Attitude will not be significantly higher as compared to their separate prediction’ stands rejected.

**7. Conclusion**

Significant positive relationship is found between Self-Efficacy and Mathematics Achievement and Mathematical Attitude and Mathematics Achievement. The result also showed that the Self Efficacy and Mathematical Attitude conjointly predict Mathematics Achievement significantly higher as compared to their separate prediction for adolescents.

**8. Implications**

Current research findings reveal that student’s Self-Efficacy and Mathematical Attitude are related to Mathematics Achievement. Many students have difficulty in school not because they are incapable of performing successfully but because they have come to believe that they cannot perform successfully—they have learned to see themselves as incapable of handling academic work.

Bandura (1997) has argued that beliefs of personal competence such as Self-Efficacy and Attitude constitute the key factor of *human agency*, the ability to act intentionally and exercise a measure of control over one’s environment and social structures. As children strive to exercise control over their surroundings, their first transactions are mediated by adults who can empower them with self-assurance or diminish their fledgling self-beliefs. Because young children are not proficient at making accurate self-appraisals, they rely on the judgments of others to create their own judgments of confidence and of self-worth. Parents and teachers who provide children with challenging tasks and meaningful activities that can be mastered, and who chaperone these efforts with support and encouragement, help ensure the development of a robust sense of self-worth and of self-confidence.

School is the primary setting in which cognitive capabilities are cultivated and evaluated (Bandura, 1997). It is also the primary setting in which academic self-regulatory practices are developed and maintained, and, as we reviewed earlier, the use of these strategies is intimately connected both with success in school and with the Self-Efficacy that accompany that success.

People are, in life, slaves to the self-regulatory habits developed during childhood. Once formed, these habits exert a powerful influence on the selection of life’s paths and on the success or
failure experienced on them. Self-regulation is the very stuff of which the self is made. Beliefs of personal competence and of self-worth ultimately become habits of thinking that are developed like any habit of conduct, and teachers are influential in helping students develop the habitual self-beliefs that will serve them throughout their lives (Schunk & Frank; 2001).

9. References