The study aims to determine Self-relative factors and problem solving ability of mathematics students. 50 students studying in XI standard were chosen as the sample. Problem solving ability scale by (McMillan&Sschumacher 2006), Mathematics self-efficacy by (Betz and Hacket 1963), Perception scale by (Cresswell 2009), were used to collect data. Results were statistically analyzed through Mean, Standard deviation, Correlation coefficient, Multiple Regression and Critical ratio. It has been concluded that Self-relative factors and problem solving ability are significantly correlated among mathematics students.

1. INTRODUCTION

Problem solving is an important component of mathematics education because it is the single vehicle which seems to be able to achieve at school level all three of the values of mathematics listed at the outset of this article: functional, logical and aesthetic. Let us consider how problem solving is a useful medium for each of these. It has already been pointed out that mathematics is an essential discipline because of its practical role to the individual and society. Through a problem-solving approach, this aspect of mathematics can be developed. Presenting a problem and developing the skills needed to solve that problem is more motivational than teaching the skills without a context. Such motivation gives problem solving special value as a vehicle for learning new concepts and skills or the reinforcement of skills already acquired (Stanic and Kilpatrick, 1989, NCTM, 1989).

Approaching mathematics through problem solving can create a context which simulates real life and therefore justifies the mathematics rather than treating it as an end in itself. The National Council of Teachers of Mathematics (NCTM, 1980) recommended that
problem solving be the focus of mathematics teaching because, they say, it encompasses skills and functions which are an important part of everyday life. Furthermore it can help people to adapt to changes and unexpected problems in their careers and other aspects of their lives. More recently the Council endorsed this recommendation (NCTM, 1989) with the statement that problem solving should underlie all aspects of mathematics teaching in order to give students experience of the power of mathematics in the world around them. They see problem solving as a vehicle for students to construct, evaluate and refine their own theories about mathematics and the theories of others.

A further reason why a problem-solving approach is valuable is as an aesthetic form. Problem solving allows the student to experience a range of emotions associated with various stages in the solution process. Mathematicians who successfully solve problems say that the experience of having done so contributes to an appreciation for the 'power and beauty of mathematics' (NCTM, 1989, p.77), the "joy of banging your head against a mathematical wall, and then discovering that there might be ways of either going around or over that wall" (Olkin and Schoenfeld, 1994, p.43). They also speak of the willingness or even desire to engage with a task for a length of time which causes the task to cease being a 'puzzle' and allows it to become a problem. However, although it is this engagement which initially motivates the solver to pursue a problem, it is still necessary for certain techniques to be available for the involvement to continue successfully. Hence more needs to be understood about what these techniques are and how they can best be made available. Schoenfeld (1983% 1983b) distinguished three types of knowledge needed in problem solving: a) resources - typically, domain-specific knowledge such as facts and algorithms, routine procedures and heuristics, representations, and other knowledge possessed by the individual which can be brought to bear on the problem at hand, b) control - planning, monitoring, assessment, "metacognitive" acts and other ingredients related to the selection and implementation of tactical resources, and c) belief systems - about self, the environment, the topic, and mathematics that influence an individual's behavior. Bandura (1986) argues that SE refers to personal judgments of one’s capabilities to organize and execute courses of action to attain specific goals, and measuring SE should focus on the level, generality and strength across specific activities and contexts. Therefore, whereas a subject-specific self-concept test item might require the respondent to react to the statement “I am a good student in Mathematics”, the SE item would require reaction to the statement “I can solve percent problems”. Ignoring of this tenet, leads to insufficient research findings, and that is why Pajares (1996) argues that if the purpose of a study is to find relationships between SE and performance, SE judgments should be consistent with and tailored to the domain of the task under investigation.

2. SAMPLE FOR THE STUDY
A convenient random sampling technique was adapted for the selection of sample the school selected for this study namely boys aided school. Then random convenient
sampling technique was adopted to select the sample. 50 mathematics students were taken for the study. The students studying in XI standard were chosen as the sample.

3. STATEMENT OF THE PROBLEM

“Self-Relative Factors and Problem Solving Ability among Mathematics Students” were chosen for the study.

4. OBJECTIVES OF THE STUDY

Gender plays a very important role on the Problem Solving Ability in Mathematics

I. To find out the significant relationship between Problem Solving Ability and Self-efficacy among higher secondary school students.

II. To find out the significant relationship between Problem Solving Ability and Perception among higher secondary school students.

III. To find out the significant relationship between Self-efficacy and Perception among higher secondary school students.

5. HYPOTHESIS

I. There is no significant relationship between Problem Solving Ability and Self-efficacy from the total sample

II. There is no significant relationship between Problem Solving Ability and Perception from the total sample

III. There is no significant relationship between Self-efficacy and Perception from the total sample

6. RESEARCH TOOLS SELECTED FOR THE PRESENT STUDY

The following tools have been used by the investigator to carry out this study.

I. Problem solving ability scale by (McMillan & Schumacher 2006).

II. Mathematics self-efficacy by (Betz and Hacket 1963).

III. Perception scale by (Cresswell 2009).

7. ANALYSIS & RESULTS

Hypothesis-1

Table-1: Correlation of problem solving ability with self-efficacy

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gender</th>
<th>N</th>
<th>Correlation</th>
<th>t test</th>
<th>L.S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem solving ability with</td>
<td>Boys</td>
<td>50</td>
<td>0.748</td>
<td>7.80</td>
<td>0.001</td>
</tr>
<tr>
<td>self-efficacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the table 1 and also from figure 1 it is understood that the calculated correlation coefficient values are significantly greater than that the table correlation coefficient values. Hence the hypothesis is rejected and proved that there is significant relationship between problems solving ability with self-efficacy in the total sample.
Hypothesis-2

Table-2: Correlation of problem solving ability with Perception

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gender</th>
<th>N</th>
<th>Correlation</th>
<th>t test</th>
<th>L.S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem solving ability with</td>
<td>Boys</td>
<td>50</td>
<td>0.685</td>
<td>6.49</td>
<td>0.001</td>
</tr>
<tr>
<td>Perception</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the table 2 and also from figure A it is understood that the calculated correlation coefficient values are significantly greater than that the table correlation coefficient values. Hence the hypothesis is rejected and proved that there is significant relationship between problems solving ability with self-efficacy in the total sample.

Hypothesis-3

Table-3: Correlation of Self-efficacy with Perception

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gender</th>
<th>N</th>
<th>Correlation</th>
<th>t test</th>
<th>L.S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy with Perception</td>
<td>Boys</td>
<td>50</td>
<td>0.79</td>
<td>8.928</td>
<td>0.001</td>
</tr>
</tbody>
</table>

From the table 3 and also from figure A it is understood that the calculated correlation coefficient values are significantly greater than that the table correlation coefficient values. Hence the hypothesis is rejected and proved that there is significant relationship between self-efficacies with perception in the total sample.

Multiple Regression Analysis

Table 4: Multiple Regression Analysis of Problem solving Ability, Self-efficacy and Perception.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gender</th>
<th>N</th>
<th>Multiple Regression Analysis</th>
<th>L.S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem solving Ability, Self-efficacy and Perception</td>
<td>Boys</td>
<td>50</td>
<td>0.756</td>
<td>0.001</td>
</tr>
</tbody>
</table>

From the table 4 and also from figure A it is understood that the Multiple Regression Analysis values are significantly greater than that the table Regression values. Hence the hypothesis is rejected and proved that there is significant relationship between Problem Solving Ability, self-efficacy and perception in the total sample.

Figure – 1: Correlation of Problem Solving Ability, Self-Efficacy, Perception and Multiple Regressions

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8. EVIDENCE AND DISCUSSION

Present investigation is supported by the following studies: Catherine .M.Aurah et al (2014) revealed a significant positive relationship between background knowledge, self-efficacy, and metacognitive prompting and genetics problem-solving ability indicating that students with higher scores on these variables tend to have higher genetics problem-solving ability. Small significant correlations existed between the predictor variables but were not worrisome. Based on this and supported more by theory, metacognitive prompting will be the strongest predictor. There was a significant difference between male and female students’ mathematics perceptions. It must be recalled that the study hypothesised that there is a significant difference between male and female students’ mathematics perceptions. And there was a significant difference in views and attitudes towards mathematics between the two age cohorts of students. The null hypothesis was rejected since the p-value is less than 0.05. Therefore we conclude that there is a significant difference in views and attitudes towards mathematics between the two age cohorts of students. Paul Mutodi, and Hlanganipai Ngirande (2014). It was revealed that revealed that problem solving ability was significantly predictive of study behavior of the secondary school students. The observed F ratio was significant at the 0.5 level. This is an indication that a combination of the independent variables (Problem solving ability subscales) were effective in predicting study behavior of the students and that it could not have occurred by chance. (Samuel O.Salami and A. Oyesoji Aremu. – drosalami 2002). The problem solving ability was found to be significantly predictive of study behavior corroborates the findings of Elliot , Godshall, Shrout and Witty (1990) Who had similar results with academically at-risk college students. It was suggested that problem solving ability involves more than social skills and interpersonal competence contrary to the assertion of D’Zurilla and Nezu (1987). One could infer that effective problem solvers in previous study were more aware of and recognized more effective study behaviours than ineffective problem solvers. It was very likely as suggested by Elliot et al (1990) that, effective problem solvers endorsed behaviours important for functioning successfully in academic environment. This finding is also in support of the work of Heppener and Krauskopf (1987) who theorized that effective problem solvers process and generate more adaptive, goal directed solutions to problems encountered in their environment then ineffective problem solvers. According to Heppener and Krauskopf (1987) effective problem solving implies an ability to plan, organize and recognize appropriate habits, attitudes and behaviors crucial to adaptive problem solving action.

9. EDUCATIONAL IMPLICATION

- Most of these difficulties can be explained by classroom practice.
- Students are not usually asked to construct the bridges, the links.
- How do students understand the functions in different representations and more importantly, how are they able to make the transition between representations?
Visualization, or more precisely the bridges between visual and analytic representations of the same mathematical concepts, may thus from a powerful agent on the way to abstraction.

The results of this study have at least two educational implications: the influence of self-efficacy and judicious use of reflective hints (metacognitive prompting) to facilitate problem-solving success. Given the typical constraints encountered in the classroom environment, such as lack of engaged time, educators should adapt methods to change both student self-perceptions and implement strategies to overcome problem-solving limitations. These findings inform self-efficacy literature as this study demonstrated the effect of self-efficacy and perception on problem-solving accuracy when controlling for background knowledge. The generalization of these results to other domains may not be warranted because self-efficacy is domain-specific.

10. DELIMITATIONS OF THE STUDY

➤ The study was restricted to Higher Secondary School Students.
➤ A Sample size was 50 Higher Secondary School Students

11. CONCLUSION

Problem solving in mathematics can be described as "thinking and working mathematically" but the converse is not true. Problem solving in mathematics is a complex process which requires an individual who is engaged in a mathematical task to coordinate and manage domain-specific and domain-general pieces of knowledge. Successful and unsuccessful problem solvers in mathematics differ with regard to knowledge, control and beliefs and affect factors. The review of the research literature on factors that contribute to students' in mathematical problem solving suggests that: 1. the mathematics content level of the problems which students at different year levels of schooling will be able to solve successfully, and 2. the different strategies or heuristics which students at different year levels use to solve the same mathematical problems must govern the design of problem-solving curricula at the various year levels of schooling.

12. REFERENCES


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