

## LOW ACHIEVEMENT FACTORS IN LEARNING MATHEMATICS AMONG SECONDARY SCHOOL STUDENTS

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### **ABSTRACT**

*Education helps a child become a useful and a responsible member of the society. It is regarded as the greatest force in the development of a nation economically, socially and culturally. Therefore, all citizens of a nation must have at least basic education to gain functional knowledge, skill to perform citizen's responsibilities as a citizen of the democratic country. In the context of school education in Nepal, most of the students fail or achieve a low score in mathematics that creates the barrier for the further study. The present study attempts to find out the basic causes and factors that create the low achievement in mathematics in students of grade IX and X. The researcher himself went to the field and consulted to the sample population. He based his research on achievement test and found that the low achievement in mathematics in grade IX and X is alarming. The girls, the students from rural areas and family with low income have worse result in mathematics.*

**KEYWORDS:** *Low Achievement, High Achievement, Discrepancy, Specification Grid*

### **INTRODUCTION**

Students in secondary levels have different standards of intelligence and varied rank of performance in mathematics. On the one hand, there are the students whose academic achievement are commensurate with their intelligence. There is no significant discrepancy between their ability and achievements. On the other hand, there are others who have average or above average intelligence, but they continually fail to maintain normal progress in a school subject, especially mathematics (William & Orlansky 1980). They often elude traditional categorization of exceptionality. The term 'low achievements' emerged from a need to identify and serve this latter group of students. The term 'learning low achievement' was first coined by Samuel Kirk in 1963 to describe children who have serious learning problems in school but do not fall under the categories of handicaps who need special education. By recognizing this problem as learning low achievements, teacher education programs in U.S.A and Europe started the identification, diagnosis and serve these children. But the developing countries like Nepal have not acquainted with this concept till now.

### **LITERATURE REVIEW**

According to Hallahan and Kauffman (1976), learning low achievement in mathematics has been defined as students with learning low achievement in mathematics performance that is below average and their intellectual functioning as measured by general mental ability test is average or above average, and they have normal hearing and visual acuity, no history of chronic disease, regular attendance in the class and there is a significant discrepancy between

their potential or ability and actual achievement.

Mathematics is not only essential to everyday life, but also indispensable in the field of science and technology. Greater value is given to mathematics at school as a background for the higher study. Therefore, mathematics has been occupying a well-established position in the school curriculum. Traverse et.al. (1977) writes, "Ever since the school of ancient Greeks over two thousand years ago mathematics has been a key subject in the curriculum the four liberal arts consisting of arithmetic, geometry, astronomy, and music where basically mathematics studies (p.2).

The liberal arts in the early Greek were studied basically focusing for the aesthetic values. Society changed in its economic activities, life patterns and cultural value systems. The needs and demands of the society have also been changed. The aim of education is to prepare citizen for the changing reality, according to the needs and demands of the existing society and the intermediate future society, consequently, mathematics education in the 21<sup>st</sup> century is no more limited to aesthetic values, it puts great emphasis on today's mathematics program to meet the needs and demands of rapidly growing society due to changes in science and technology. Indeed, the study of mathematics occupies a central place in the school programs of all countries. It has been estimated that in most school systems, twenty percent of the total instructional time is devoted to mathematics, only mother tongue reading and literature are allotted as much as mathematics (Husen & Waite, 1985, pp. 32-58).

Since NESP (1971), compulsory mathematics has been considered as an essential component of secondary school education. With the reestablishment of democracy in Nepal in 1990 A.D, Curriculum Development Center (CDC) has brought some improvements in school curriculum and textbooks. However, no more than 46 percent of the students have passed as a whole in the School Leaving Certificate (S.L.C.) examinations for three years and nearly 60 percent students have failed in mathematics. It is really distressing and upsetting condition for the students, parents, and teachers along with others. Curriculum, textbooks, teachers' training, teaching materials, teaching method, self-study habits, socioeconomic status of their parents and behavior towards them, size of family structure, housework, assistance for study, teachers' behavior, irregularity in the class and teachers' negligence would be responsible factors behind the high failure rate in mathematics. Several studies have shown that the achievement in mathematics is affected by different variables such as language, ethnicity, gender and socio-economic condition of the student's family (K.C. 2001).

For the last three years of the S.L.C result, it can be observed that most of the unsuccessful students are from rural areas, mostly girl because girls have to do more work at home than boys, due to parents' negative behavior to them and disadvantage castes students because they are hated by the upper caste students as well as teachers. Thus, the researcher in this present study is interested in finding out students' low achievement caused by various reasons.

Cott (1982) present hypothesis that learning low achievements can be caused by the inability of child's blood stream to synthesize a normal amount of vitamins. Hawks and Gekin (1977) performed and experimented to test the effect of megavitamin therapy with low achieved children. Their results show that huge doses of vitamins did not improve the performance of learning low achieved children. Learning low achievements tends to run in families, but whether this is due to genetic factors or similar learning environment is yet to be determined.

Some researchers claim that biochemical factors within a child's body are the causes of low achievers. Scientists are also investigating other biochemical factors, such as the effect of food coloring as possible causal agents.

In a comprehensive review of diet related studies, Spring and Sand Oval (1976) concluded that there is a little evidence in support of this cause.

Environmental causes are hard to pinpoint, although it appears that children from ghetto area tend to exhibit more learning problems. Poor quality of teaching can be another environmental factor contributing to academic difficulties (Hallahan & Kanffanan, 1994). Supporting this argument Wrill (1978) quotes a condition that might contribute to a low achievement is poor instruction.

Although many students are also able to learn in spite of poor teachers and inadequate techniques, others are less fortunate. According to McLoughlin (1985), environmental factors might be involved in the case of learning low achievements. Poor nutrition, health and safety precipitate these problems as can inadequate linguistic and cognitive models at home. Further, he pointed out that socio-cultural factors that do not reinforce values of education regular school attendance work and study habits and other supportive still may create more difficulty for the learning low achieving students.

From the review of literature, it could be seen that most of the studies have been conducted in the USA and Europe. No study has been done in Nepal that can be identified for review. In the light of above consideration, this study would be conducted to investigate the factors related to low achievement in mathematics among secondary school students.

## **OBJECTIVES OF THE STUDY**

### **The Objectives of the Study Were:**

- To study the incidence of the students for low achievements in mathematics among secondary school students in Lalitpur district.
- To relate the incidence of low achievers in mathematics to students on the basis of
  - Sex
  - Rural/urban schooling background.
- To identify factors related to low achievement in mathematics.

## **METHODOLOGY**

The researcher firstly conducted a survey of the incidence of learning low achievement in mathematics among grade IX and X students in Lalitpur district in the academic year 2014/2015. It involved an individualized diagnosis of the specific learning low achievement in mathematical operations among the identified learning low achieving students. In the research, 10 community schools from rural area and 5 community schools from the urban area of Lalitpur district were taken, though the researcher could not go to the remote hilly geographical terrain of this district because of time constraints. Hence, the researcher delimited the study only in community schools that has been running from grade I and X. According to location and sex, 30 boys and 20 girls were selected from urban areas and 90 boys and 60 girls were from the rural areas.

**Table 1: Distribution of Sample by Sex and Location**

S.No	Location	Boys	Girls	Total
1.	Urban	30	20	50
2.	Rural	90	60	150
	<b>Total</b>	<b>120</b>	<b>80</b>	<b>200</b>

***Development of Mathematics Achievement Test (MAT)***

First of all the researchers developed a mathematics achievement test himself for the pilot study consisting 40 multiple choice items based on the new mathematics course contents of grade IX of secondary school curriculum, textbook, teachers' guide according to the weight age prescribed by the Ministry of Education Culture and Support HMG of Nepal. It was developed in accordance with the specification grid based on the new curriculum of compulsory mathematics grade 9/10, that covered all eight areas of the course, namely, set, arithmetic, mensuration, algebra, geometry, trigonometry, statistics and probability.

The mathematics achievement test was written in Nepali version for public schools to make it suitable for all types of students. After constructing the test, it was standardized by the pilot testing. Item analysis procedure was used to find out the level of difficulty, the effectiveness of distracts and discriminating index to maintain the standard of mathematics achievement test item. The content validity of the instrument was maintained with the help of an expert teacher in the field experienced mathematics teacher of the secondary schools.

***Validity of the Test***

The validity of an achievement test indicates how far the test can measure what it intended to measure. The researcher consulted with the experienced mathematics teachers and other mathematics experts in order to make the test more comprehensive and valid from the content point of view. Content validity is essentially a matter of judgment done by expert on the representatives of the content since each item of the MAT was based upon the related curriculum content, textbook, statement of educational goals, the specification grid formulated by the CDC/HMG of Nepal. Thus the content validity has been considered in MAT.

***Final Form of the Test***

With the consultation of experts and teachers of mathematics, the researcher tried his best effort to establish mainly the content validity of the test.

**Table 2: Area Covered by the MAT (for Pilot Survey)**

Areas	No. of Questions	Marks
Set	3	3
Arithmetic	6	6
Mensuration	4	4
Algebra	9	9
Geometry	9	9
Trigonometry	3	3
Statistics	3	3
Probability	3	3
<b>Total</b>	<b>40</b>	<b>40</b>

### **Reliability of the Tool**

To estimate the reliability of the total MAT which was prepared for the pilot study, the scores of the 14 students that were selected for the item analysis consisting 27 percent upper-level students and 27 percent lower level students were analyzed by split-half reliability method.

### **Analysis**

On the basis of the data of this study, the following analysis was done.

The incidence of low achievements in mathematics among grade IX and X students in the Lalitpur district of Nepal is 9.4 percent. The 9.4 percent incidence of learning low achievements in mathematics is a very alarming figure, particularly if it is evaluated in the light of the findings of McLeod and Crump (1978) who reported that "only one tenth of learning low achieving students have severe in mathematics". If it is true for Nepal also, then the incidence of low achievers in general works out to be around 90%.

"Personal variables of the children like their sex and age are not related to low achievements in mathematics." The finding of this study suggests that the girls have more learning low achievement than boys. It may be due to the reasons that the girls have to do more works at home than boys, due to the parents' negative behavior towards them.

"Environmental variable such as the location of schools is related to learning low achievements. This conclusion is based upon the findings pertaining by the "incidence of learning low achievements with students in rural/urban school background". Although there is no direct empirical evidence to support this conclusion, however the theoretical argument of ITallahan and Cruickshank (1983) and Frosting (1984) who have devoted much of their text to the consideration of ecological culturally and environmentally related ecological factors in understanding learning low achievements support the position that cultural deprivation and environmental backwardness may be related to learning low achievements. If this position is accepted, then students coming from rural schools should have more low achievements than the students in urban schools, because of the cultural and environmental backwardness of rural areas in Lalitpur district.

The argument that urban students are more low achieved than rural student because the letter may have been taught better appears to be valid if it is weighed in the light of following observation given by Engelmann (1977) perhaps 90 percent or more of the students who are labeled "learning disabled" exhibit a low achievement, not because of anything wrong with their perception, synapses or memory but because they have been seriously miss-taught, learning low achievements are made, not born (P.P. 46-47). It appears obvious that better teaching helps in reduction of learning low achievements. If so, the implications for practice obviously are:

- Proper arrangement of remedial instructions should be made for learning low achievement in both rural and urban areas.
- Particularly in urban area teachers have to remain very cautious in dealing with learning low achievement in their classes as they are more susceptible to be categorized as learning low achievement.
- Any child who fails to make a normal progress in school subjects should be suspected to have learning low achievements and immediately referred for diagnosis.

- Hence arrangements should be made, if not in each school, then at least at the block level where the proper diagnosis of learning low achievement and their exact low achievement can be done.

Achievement in mathematics of secondary level students is closely related to the parents' income and educational atmosphere at home is also related to the parents' income.

Higher income group students achieved significantly higher than middle & lower income group students. There is not a statistically significant mean difference in the achievements of the middle and low-income group students. However the mean achievement of middle-income group students was found to be higher than those of low income group, i.e. self-study habit, socioeconomic status of students and their parents behavior had affected to the learning achievements in mathematics most of the learning low achievers student came from medium and large family size.

## Findings

### The Basic Findings of this Research Could be Pointed out as Follows

Out of 200 students from grade IX and X student of Lalitpur district, 19 students (14 boys and 5 girls) were identified as having learning low achievements in mathematics. Hence, the exact incidence of low achievements in mathematics was found to be 9.4 percent.

When sex factor was considered, the incidence of students with low achievers among boys was found to be 10 percent and girls were found 9 percent, statistically the observed difference was not significant.

When the rural/urban location of schools was considered the incidence of student with low achievement in mathematics was to be significantly more in urban schools (11.5) than is rural schools (7.2 percent).

When the age factor was considered, the incidence of students with low achievement in mathematics was found to be 9 percent among 14-15 year age groups. Similarly, the incidence of learning low achievers in mathematics was 10 percent in 15-16 year age groups, students 7.9 percent in 16-17 years age group students and 10 percent in 17-18 years age group children. Statistically, it was found that the age is not significantly related to the incidence of learning low achievements.

When the school attendance of these students was reported by the schools in the bio-data performance, we checked, no students had attendance problem i.e. all 200 students were regular in their mathematics classes. This learning low achievement could not be attributed to poor attendance in the case of the grade IX and X students.

There is not a statistically significant mean difference in the achievements of the MI and LI. MI group students were found to be higher than those of LI.

HI group students achieved significantly higher than MI and LI group students in the rural area of Lalitpur.

Availability of reading materials, separate study room, mathematics tuition and parental inspiration to the children to study mathematics were found directly connected to the parents' income. Average study time of students at their home and expenditure pattern of parents to their children's education was also found positively related to parents' income.

Hence, an achievement in mathematics of secondary level students is closely related to the parents' income. Educational atmosphere at home is also related to the parents' income.

## CONCLUSIONS

Based on the findings, it is necessary that this type of study should be carried on an extensive scale. For the sake of reliable measure of students' low achievements, a large number of items from the whole course should be chosen while constructing the test. This study shows that most of the school teachers were not aspired to take the teachers' training for effective teaching. So it is recommended that special training programmers should be organized to uplift the teacher's capability to teach in the class. This study shows that special training exposures should be provided for rural teachers and various textbooks with more examples and illustrators should be available in the prescribed text book in mathematics. The special remedial package should be provided to low achieved student groups to boost up their achievement. Low achievement might exist in socially backward (low cost) economically backward (low Socio-economic status to morally backward to educationally backward) groups. Further research should be done for these group students in extensive scale. The finding of this type of research can be helpful in developing a behavioral checklist for early degradation of learning low achieving students. Cognitive personality and perceptual major characteristics in learning low achievement and other low achieving students have voiced for leveling all low achievers as learning low achievements. This requires further co-relational researcher finding relationship between both types of learners on various cognitive and non-cognitive variables and at the same time the reactions of both types of learners to similar type of instructional strategies require to be experimental for further consideration of this issue.

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