Mathematics Achievement in Secondary Education Examination at Diktel Rupakot Majhuwagadhi Municipality, Khotang

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Abstract

This study is undertaken to assess gender(boy and girl), school type [Community School (CS) and institutional school (IS)] and parent condition [parents living together (PLT) and parent living separately (PLS)] differences in mathematics GPA in theory (MG). Data are collected by interview schedule, grade sheet of results of the 2080 Secondary Education Examination (SEE) and from school records. The accessible population was class 10 students from secondary schools in Diktel Rupakot Majhuwagadi Municipality (DRMM) in Khotang District. Five CS and Two IS are selected for the sample purposively. 348 students are selected by census method from sampled school and their grade sheets are downloaded. Out of 348 students, 198 are boys and 150 are girls, 260 students are from CS and 88 students are from IS 195 students studied staying with parents and 153 students studied without staying with parents. Information about gender, school type and parent condition is collected through interviews with head teachers, and mathematics teachers and from school records. It is found that grade grade-wise result of SEE 2080 of DRMM is better than the national level, there is no gender difference in MG of SEE 2080 of DRMM, and there is a significant difference in MG between CS and IS students. Specifically, MG of IS are better than MG of CS, there is a significant difference in MG between PLT and PLS students. Specifically, the Mean of MG of PLT is more than PLS. Findings suggest that educational planners, educators, administrators, parents, teachers and students create an environment of teaching-learning of mathematics like IS in the CS. Parents try to stay with their children and teachers should give more focus to those students who do not stay with their parents while teaching mathematics.

Keywords: Mathematics GPA (MG), gender, Secondary Education Examination (SEE), Community School (CS) and institutional school (IS), Parents Living Together (PLT) and Parents Living separate (PLS)

Introduction

Gender refers to the characteristics of women and men or girls and boys that are socially constructed. Gender refers to the social distinction between men and women (Bardley, 2013).This includes norms, behaviours and roles associated with being a woman and man or girls and boy as well as relationships with each other. Gender is the socially assigned characteristics, duties, roles, and obligations associated with being male or female within a particular community (March et al., 1999). As a social construct, gender varies from society to

society and can change over time. Gender is the characteristic distinguishing between male and female. Gender play important role in every aspect of life. It also play important role in teaching and learning. Gender differences may play significant role in meaningful understanding of subject matter. In teaching learning process, student's achievement is more or less affected by gender.

Mathematic is useful subject in daily life. According to James (2001), "mathematic is the logical study of shape, arrangement, quantity, and many related concepts. Mathematic is the science of structure, order, and relating that has evolved from elemental practices of counting, measuring, and describing the shapes of objects". It deals with logical reasoning and quantitative calculation. Mathematics considered as a queen of science. It is also daily uses subject. We are using mathematic in every movement of our life. It is non-separable subject of human being. Mathematics is an important subject in school education curriculum. Many people do not know that mathematics is more than what is taught at school and different from what most people think it is. The students have a wrong image of mathematics that mathematics consists of many formulae to learn without understanding why it is never meaningful, not lively subject.

The achievement test measures the status of individuals with respect to proficiency in given areas of knowledge or skill, Gay (1997).

Secondary Education Examination (SEE) is the final examination at the end of class/grade 10 in the secondary school system of Nepal, which is being taken by National Examination Board. It is upgraded from what was previously known as School Leaving Certificate (SLC).

Rai (2024) has posted the Result of DRMM of SEE 2080

Table 1

Result of DRMM of SEE 2080

SN	Name of school	participated no. in SEE	GPA							
			3.61-4	3.21-3.6	2.81-3.2	2.41-2.8	2.01-2.4	1.61-2	1.6	NG
1	Saraswati MAVI Diktel	177	12	50	91					24
2	Pancha MA VI Diktel	37	12	14	10	1				
3	Diktel English Boarding	58	51	7						
4	Mt. Everenst. Boarding	35	17	18						
5	Himalay MA VI Solma	9			4	2	1			2
6	Janajagriti MA VI Dandagau	11		3	8					
7	Hilside Sample Acedemi	8	2	6						
8	Sabitra MA VI Bamrang	24		6	11	5				2
9	Sital MA VI. Khalle	19		3	9	6				2
10	Shree MA VI	35	1	17	8		5	1		3

No	School									
11	Bansbhote Kalika MA VI Nerpa	29		9	17	3				
12	Bidhodaya MA VI Nirmalidanda	34		1	10					23
13	Annapurna MA VI DorpaChiuridanda	27								26
14	Manokamana MA VI Nirmalidanda	14				1				13
15	Mahendrodaya MA VINirmalidanda	18		11	4	2				1
16	Sarsawoti MA VI Patheka	53		2	3	10				38
17	KalikaMA VI Kharmi	40			3	24		3	1	9
18	Jalapa MA VI Jalpa	45		17	15	5	1			7
19	JyotiMA VI Jalpa	25	4	7	9					5
20	Jalapa MA VI Nunthala	24				8				16
21	Champawati MA VI Buipa	61		5	13	23	3			17
22	JagadambaMA VI Buipa	13	1	2	8	2				
23	Champawati MA VI Bijayakharka	10	2	2	2	2				2
24	Panchakanya MA VI Mala	27		1	2	9				15
	Total	832	106	181	227	103	10	4	1	202

Source: School administration records

Literature review

Globally, mathematics has been viewed as a subject favouring male students (Fennemma & Leder, 1990). Majority of the students (boy and girls) had a positive attitude towards learning mathematics. However, when comparing the attitude of boys and girls, the results have demonstrated that boys were more inclined to positive attitudes than girls (Kiptum et al.,2013).

John and Benjamin (2015) carried out an experimental research on the topic 'Gender difference in mathematics achievement and Retention scores' and found that male and female student taught algebra using problem based learning did not significantly difference in achievement and retention scores. This finding showed that performance is a function of orientation, not gender.

Nepal (2016) carried out an experimental research on the topic "Impact of Gender and location on mathematical thinking and mathematical achievement" and found there is no significance difference on mathematical achievement between male and female students in Nepal and another finding was that there is significant difference between rural and urban student on mathematics achievement.

Panthi (2012) carried out "A comparative study of the Eighth Grades Achievement in Geometry in terms of gender and rural and urban area" and found that the achievement of male was better than that of female. Similarly, he found that there was poor achievement of the students of rural area than that of urban area. He has concluded that home environment at rural area and more responsibility for girls at household chore are the main causes for this result.

Pahari (2023) carried out a research on the topic "Mathematics Achievement of Grade Eight Students in Lalitpur District" and found that there is no significance difference between gender (male and female) and mathematics achievement. There is no significance difference between school type (private and public) and mathematics achievement. There is no significance difference between the achievements in mathematics of parents living (together and separate).

A study through a meta-analysis reveals that males tend to do better on mathematics tests that involve problem-solving (Hyde et al., 1990). Females tend to do better in computation, and there is no significant gender difference in understanding mathematics concepts. Another study shows that females tend to earn better grades than male in mathematics (Kimball, 1989).Some recent studies have revealed that gender differences in mathematics education seem to be narrowing in many countries. However, studies indicate that as students reach higher grades, gender differences favor increase in mathematics achievement by males (Campbell,1995 and Gray,1996)

Subedi (2013) carried out a comparative study of the class 8 boys and girls achievement in mathematic on the topic "Achievement in mathematics in Ilam districnt". He found that gender play an important role in mathematics achievement. Specifically, the achievement of boys found to be higher than that of the girl students.

Gautam (2017) carried out a research on the topic "Parental occupation and academic achievement of their children". In his research, he has taken achievement of mathematics at S.L.C. level. He concludes that the job-holder parents were more concerned about their children's study moreover their children have healthy competition on study. He also finds that parents' occupation determines about availability of mathematics private coaching, separate study room and parental inspiration to the children to study mathematics.

Khanal (2019) conducted a qualitative research and found that the assessment of teaching styles by public and private school students were not different. Students from both public and Private school preferred inductive method, respect and encouragement with practical methods in teaching mathematics.

Re-searchers have conceptualized parental involvement as "parents" interaction with schools and with their children to promote children's academic success. Researchers have incorporated the multidimensional construct of parental involvement by identifying specific components. Grolnick and Slowiaczek (1994) proposed a three-dimensional

model for exploring particular parents' influence on their children's educational outcomes, including cognitive/intellectual involvement, behavioral involvement, and personal involvement. First, cognitive/intellectual involvement refers to whether the children are exposed to educationally stimulating activities and experiences. Second, behavioral involvement, refers to parental involvement through their by their participatory behavior in activities, such as assisting children with homework or

volunteering at school. Finally, personal involvement, refers to parental socialization around the attitudes and expectations about school and education. (Huang et al., 2021)

The key Research Question/ hypothesis

Is there a gender gap in mathematics achievement in class 10 SEE in DRMM, Khotang district? Is there difference between CS and IS in mathematics achievement in class 10 SEE in DRMM, Khotang district? Is there difference between PLT and PLS in mathematics achievement in class 10 SEE in DRMM, Khotang district? An assumption or a gueses or a statement of quantity about the population parameter is called a hypothesis (Gupta, 2011). In quantitative studies, the null hypothesis refers to a hypothesis of no significant difference between the statistic and the parameter, i.e. there is no significant difference between a sample statistic and a population parameter (Charan et al., 2021; Rao, 2012). In addition, an alternative hypothesis (H1) is the opposite of the null hypothesis, which indicates a significant difference (Das et al., 2016). This is why it is also called the difference hypothesis. The study is tested the following hypothesis at 0.05 level of significance.

Null Hypothesis: There is no difference between gender and MG in the survey.
Alternative Hypothesis: There is difference between gender and MG in the survey.
Null Hypothesis: There is no significant difference on MG across the CS and IS of the students.
Alternative Hypothesis: There is significant difference MG across the CS and IS of the students.
Null Hypothesis: There is no significant difference on MG across the PLT and PLS of the students.
Alternative Hypothesis: There is significant difference MG across the PLT and PLS of the students.

Delimitation of the study

MG of this study is limited on the result of class ten SEE 2080 of selected school. MG of theory only taken MG of internal is not taken in the study. It has limited respondents. MG of the child is not determined by only a single factor. The variable like age level of students, their order of birth, students' capabilities on I.Q., teachers' personality, teaching method, parents' education, exam environment etc are not controlled in this study (Chhetri,2022 p. 129). This study deals only about MG and gender, MG and school type, and MG and parent living condition.

Objectives

The objectives of this study are as follows:
  (i) To compare result of SEE of 2080 of Diktel Rupakot Majhuwagadhi Municipality and national level.
  (ii) To establish the relation / to compare the Mathematic Grade Point Average in theory in Secondary Education Examination of boys and girls in class 10 in Diktel Rupakot Majhuwagadhi Municipality, Khotang District.
  (iii) To establish the relation /to compare the Mathematic Grade Point Average in theory in Secondary Education Examination of Community School and Institutional School in class 10 in Diktel Rupakot Majhuwagadhi Municipality, Khotang District.

(iv) To establish the relation / to compare the Mathematic Grade Point Average in theory in Secondary Education Examination of Parent Living Togerther and Parent Living Separate in class 10 in Diktel Rupakot Majhuwagadhi Municipality, Khotang District.

Method

Quantitative research design is used in this study.All students studying in grade 10 in DRMM, Khotangin academic year 2080 are population of the study.In collecting data concerning the characteristics of a group of individuals or objects, it is often impossible or impractical to observe the entire group called the population. Instead of examining the entire group, one examines a small part of the group called a sample (Kothari, 2009).In Khotang district there are 10 local level government. Among them two are municipalities remaining eight are rural municipalities. There are 24 secondary school in DRMM among them 21 are CI and three are IS (Office of Executive of DRMM, 2078). Five CS and two ISare selected purposively. Five CS are (1) Saraswati Ma Vi. Diktel (one of the model school in khotang district, DRMM -1 and lying in district headquarter) (2) Panch Ma Vi Diktel (school lying DRMM -1 near to Diktel Bazar) (3) Sital Ma Vi khalle (school in DRMM – 3 in rural area) (4) Janajagriti Ma. Vi. Solma Dandagau DRMM-2 (All the students stay in school hostel & no students got Non-graded NG) (5) Annapurna Ma. Vi. Buwalung (all students got (NG) and lying in rural area). Two IS are (1) Diktel English secondary Boarding School DRMM-1 (No students got NG) (2) Hillside Acedemy DRMM-2 Alchhedunga (Some student got NG). In this year 2080 BS, 832 students attend in SEE among them 348 students, all students from selected school are taken as a sample.

Kafle and Nepal (as cited in Solvin, 1960) have mentioned formulation to find sample size $n = \frac{N}{1+Ne^2}$ where n is the sample size, N is the number of population, e is the margin of error (2075, p 67). In this study, N = 832, if e =2% then n= 194 and if e=5% then n=270.So, 348 sample is sufficient number of sample for sample survey.

Information about sex (boys & girl), symbol number, Name of students, Date of birth of students, PLT, PLS, CS, IS and other are collected from administration of respective school record and telephone conversation with head teachers and Mathematics teacher of the school. Grade sheets of 348 studentsare downloaded (Nepal Telecom, 2080) and the data entered into SPSS 16.0. SPSS software is used to analyze the data and to test the hypothesis. It is calculated the mean and standard deviation of boys and girls students, CS and IS, PLT and PLS. For significance it is calculated t-test.

Analysis and interpretation

The letter grading system, 2078 has mentioned the following methods for determining graded marks and letter achievement level in school level curriculum:

Table 2

Letter grading system, 2078

SN	Achievement percentage	Graded points	Achievement level in letters	Explanation of the achievement level
1	90 and above	4.0	A+	Outstanding

2	80 and above less than90	3.6	A	Excellent
3	70 and above less than 80	3.2	B+	Very good
4	60 and above less than 70	2.8	B	Good
5	50 and above less than 60	2.4	C+	Satisfactory
6	40 and above less than 50	2.0	C	Acceptable
7	35 and above less than 40	1.6	D	basic
8	less than 35	-	Ng	Non Graded

Source: Ministry of Education, Science and Technology (Curriculum Development Centre [CDC], 2075)

Table 3

Grade wise result summary of SEE 2080 in DRMM and national level

DRMM	Total	A+	A	B+	B	C+	C	D	Ng
	832	106	181	227	103	11	4		202
percentage %		12.74	21.75	27.28	12.38	1.32	0.48		24.29
National level	464785	31209	68256	78874	41177	2950	6		242313
percentage %		6.71	14.69	16.97	8.86	0.63	.0012		52.13

Source: (Technical Kuro, 2024) and school records of DRMM

Table 3 shows that Percentage of students getting grade A+ in DRMM (12.74%) is higher than national level (6.71%), Percentage of students getting grade A in DRMM (21.75) is higher than national level (14.69), Percentage of students getting grade B+ in DRMM (27.28%) is higher than national level (16.97%), Percentage of students getting grade B in DRMM (12.38%) is higher than national level (8.86%), Percentage of students getting grade B in DRMM(12.38%) is higher than national level (8.86%), Percentage of students getting grade C+ in DRMM(1.32%) is higher than national level (0.63%) and Percentage of students getting grade C in DRMM(0.48%) is higher than national level (0.0012%).So, grade wise result of SEE 2080 of DRMM is better than national level.

Table 4

Mean and standard deviation of MG in theory of boys and girls

		Group Statistics			
	sex	N	Mean	Std. Deviation	Std. Error Mean
Maths GPA in	boy	198	2.470	1.2399	.0881
	girl	150	2.443	1.1391	.0930

Source: survey data analyzed by SPSS 16.0

The table 4, shows that mean of Mathematics GPA of 198 boys is 2.470 with standard deviation 1.2399 and mean MG of 150 girls is 2.443 with standard deviation 1.1391. Difference of their mean of MG is 0.027. The mean and standard deviation of the MG of the students are calculated and then the t-value is calculated to facilitate the comparison between boys and girls

by using SPSS 16.0. t-test is used to examine the differences, given the categorical nature of the independent variable (Nominal scale) against a continuous dependent variable. Here independent variable for this study is sex of the respondent and Dependent variable is MG.

Table 5

Level of significance, t- value and degree of freedom.
independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Mathematic GPA in theory	Equal variances assumed	2.180	.141	.212	346	.832	.0275	.1296	-.2274	.2825
	Equal variances not assumed			.215	333.384	.830	.0275	.1281	-.2245	.2796

Source: survey data analyzed by SPSS 16.0

Table 5 shows that the value of Levene's test is 0.141, which is greater than p value 0.05, this means variance are equal, so we use top value of t-test. The value of significant of two tiled test is 0.832> 0.05 at 0.05 significance level at degree of freedom of 346. That means there is no significance difference between the MG of boys and girls student. It looks statistically not significant. Accept hull hypothesis. There is no difference between sex and MG in the survey.

Table 6

Mean and standard deviation of MG in theory of CS and IS

Group Statistics

	school	N	Mean	Std. Deviation	Std. Error Mean
Mathematic	community school	260	2.102	1.1365	.0705
	institutional school	88	3.512	.5955	.0635

Source: survey data analyzed by SPSS 16.0

The table 6, shows that mean of MG of 260 students of CS is 2.102 with standard deviation 1.1365 and mean of MG of 88 student in IS is 3.512 with standard deviation 0.5955. Difference of their mean GPA is 1.41. t-test is used to examine the differences, given the categorical nature of the independent variable in Nominal scale against a continuous dependent

variable. Here independent variable for this study is types of school (IS and CS) of the respondent and Dependent variable is MG.

Table 7

Level of significance, t- value and degree of freedom

independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Mathematic GPA	Equal variances assumed	30.414	.000	-11.133	346	.000	-1.4110	.1267	-1.6602	-1.1617
	Equal variances not assumed			-14.875	287.117	.000	-1.4110	.0949	-1.5977	-1.2243

Source: survey data analyzed by SPSS 16.0

Table 7 shows that the value of Levene's test is 0.000, which is less than p value 0.05, this means equal variance are not assumed, so we use bottom value of t-test. The value of significant value of two tailed test is 0.00 < 0.05 at 0.05 significance level at degree of freedom of 346. Reject hull hypothesis that means there is significance difference between the MG of CS and IS student. It looks statistically significant. i.e. mean MG of IS is better than CS.

Table 8

Mean and standard deviation of MG in theory of PLT and PLS

Group Statistics

	parent	N	Mean	Std. Deviation	Std. Error Mean
Mathematic GPA	studied staying with parent	195	2.732	1.0745	.0769
	studied without staying without parent	153	2.110	1.2542	.1014

Source: survey data analyzed by SPSS 16.0

The table 8, shows that mean of MG of 195 PLTstudents is 2.732 with standard deviation 1.0745 and mean of MG of 153 PLS student is 2.110 with standard deviation 1.2542. Difference of their mean GPA is 0.622. t-test is used to examine the differences, given the

categorical nature of the independent variable in Nominal scale against a continuous dependent variable. Here independent variable for this study is parent condition (PLT and PLS) of the respondent and Dependent variable is MG.

Table 9

Level of significance, t- value and degree of freedom
independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Mathematic GPA in theory	Equal variances assumed	5.797	.017	4.978	346	.000	.6220	.1249	.3762	.8677
	Equal variances not assumed			4.886	299.617	.000	.6220	.1273	.3715	.8725

Source: survey data analyzed by SPSS 16.0

Table 8 shows that the value of Levene's test is 0.017, which is less than p value 0.05, this means equal variance are not assumed, so we use bottom value of t-test. The value of significant value of two tailed test is 0.000 < 0.05 at 0.05 significance level at degree of freedom of 346. Reject hull hypothesis that means there is significance difference between the MG of PLT and PLS student. It looks statistically significant. So, Mean of MG of PLT is more than PLS.

Conclusion

Objectives of this study were to compare result of SEE of 2080 of DRMM and national level, to establish the relation of MG in SEE of boys and girls, to establish the relation of MG in SEE of CS and IS and to establish the relation of MG in SEE of PLT and PLS in DRMM, Khotang District.

832 student were attended in SEE 2080 from 24 secondary school of DRMM. There are 24 secondary school in DRMM among them 21 are CI and three are IS. Out of them Five CS and two IS were selected purposively and 348 students were selected by census method form sampled school. Out of 348 student, 198 were boys and 150 were girls, 260 students were form CS and 88 students were form IS and 195 students studied staying with parent and 153 students studied without staying with parent. Findings of the study are as follow:

Grade wise result of SEE 2080 of DRMM is better than national level. There is no significance difference between the MG of boys and girls student. There is significance difference between the MG of CS and IS student.There is significance difference between the MG of PLT and PLS student. Stakeholders of CS are suggested to create/ provide teaching learning environment like as IS to improve theoretical MG in SEE. Parents are suggested to stay with their child upto SEE.

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