



(RESEARCH ARTICLE)



A study on analysis of mathematics teaching-practice among secondary level students in Rural-Urban areas of Nepal

Rajendra Dura, Siddhi Prasad Koirala and Pooja Gupta

Mewar University, Department of Education, Gangrar, Chittorgadh, Rajasthan, India.

International Journal of Science and Research Archive, 2024, 13(02), 3646-3651

Publication history: Received on 13 November 2024; revised on 24 December 2024; accepted on 26 December 2024

Article DOI: <https://doi.org/10.30574/ijrsra.2024.13.2.2554>

Abstract

Mathematics is a key subject in the Nepalese education system and majority of the students are called a very tough subject in the higher secondary level. Nepal experienced a series of challenges in its education system as country confronted many ups and downs from the natural and political hazards. The rural and urban story of education is stimulating. This paper examines the teaching practice of Mathematics (*Geometry*) in the rural and urban areas of Sindhupalchok, Ramechhap and Chitwan districts within the Bagamati Province of Nepal. A set of questionnaires was prepared and executed in Jan-March 2024 within the secondary level of public schools.

The result found that Mathematics (Geometry) teaching is challenging in the study area. The number of teachers in the study area is diverse and lack of mathematics faculties is noticed in the rural areas. However, the mathematics lab and other set up are much better in the urban sectors than rural. The rural student face challenges in access, availability of devices, and number of scientific materials and most importantly the students at the rural areas are facing multiple social, domestic and economic challenges as a result the teachers-student tuning is challenging in the surveyed areas. The study concluded that mathematics teaching is challenging in the present context, however after federalizations the local government support and monitoring has raised awareness and initiation has taken positively for the quality education but still the human resources and technical competencies is limited due to the lack of sufficient materials. Local level initiations and support are essential and local government and community initiation can brought change in this course.

Keywords: Mathematics Education; Higher Secondary; Teaching Practice; Education System.

1. Introduction

Around the globe, mathematics is one of the hard subject. In Nepalese context, all schools must offer mathematics as a subject due to future perspective. For both daily life and advanced study in the sciences and technologies, mathematics is crucial. Every discipline makes use of it. No discipline can progress without mathematics (Acharya, 2017). Burton (2003), added mathematics is the "queen of science". Nitisha (2018) argued that ignorance of mathematics harms all knowledge, as it prevents one from knowing the other sciences or the world. Mathematics is essential for lifelong learning and technical practice, enabling students to find jobs and be successful in the labor market (Nitisha, 2018).

According to Rameli and Kosnin (2017), students' performance in mathematics is a significant concern within mathematics education. However, many students perceive mathematics as a challenging subject to grasp. Factors such as students' attitudes, interests, and teaching methods contribute to lower academic outcomes and students' indifference towards learning mathematics, highlighting the influence of students' perceptions on their approach to the subject (Jumadi & Kanafish, 2013). The way mathematics is perceived by students is crucial for effective learning and teaching. The school system, family background, and students' overall attitudes towards school collectively shape their

* Corresponding author: Rajendra Dura

perspective on mathematics (Pontian, 2018). Perception plays a pivotal role in mathematics learning, as it influences students' indifference or engagement in the subject. Lamb and Fullarton (2002) examined interconnected factors that impact mathematics teaching and learning, encompassing personal, classroom, and school-related elements. Personal factors encompass beliefs, attitudes, readiness, and willingness to teach (Lamb & Fullarton, 2002).

Mathematics is vast subject. So, for the effective study, both teaching and mathematical practices should be carried out. Mathematical practices include use of symbols, representations, justification of mathematical ideas (RAND Mathematics Study Panel, 2003). Mathematical teaching approach is also very important for fruitful result. These practices are like two sides of a same coin. Each one should go parallel for better mathematical skill and knowledge of students. Teaching process has been a topic to discuss all over the globe. The way of teaching affects a lot to the level of education that the students receive. Teaching process is mainly categorized into traditional and modern. This distinction between traditional and reform creates a dichotomy, which can be used to argue that many teachers "fail" to achieve reform practice (Lavi & Shriki, 2008). The ones who try to reform their practices get stuck in the middle of traditional and modern way creating hybrid way (Brodie, 2008). Students should be allowed to go beyond the bookish knowledge. Practical way of learning should be implemented. Moreover, interaction should be carried out in class to give rise to new ideas and way of solving. If one cannot stand outdated medicine then how can one sustain outdated way of teaching (Nico Molefe & Karin Brodie, 2010)? For most students of secondary level, mathematics simply means memorizing formulas and procedures to solve the problems. Kilpatrick, Swafford and Findell (2001) identify five strands of mathematical proficiency: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning and productive disposition (The literature review of algebra learning: Focusing on the contributions to students' difficulties Kilpatrick, J., Swafford, J., & Findell, B. (2001) (Basnet et al., 2018).

After Federal Act 2015, Nepal established three-tier of Governments to provide service for people, among which Local Government more prioritized to supporting serving people from their doorsteps. All sectoral development like education, agriculture, Social development sectors come under the local government system. The education system is considered as one of the most vital sectors and primary to secondary level of schools were monitored under the local Government who lead after being publically elected (Chhetri et al., 2020) (Pokhrel & Chhetri, 2024).

After a restructuring of Government sectors in 2015, the federal system given an opportunity locals to participate and function of education system at the local levels, like School management committee, hiring of local teachers and local government and bodies became more powerful to work and act for the local peoples and education system. The Urban and rural sectors of Nepal is diverse and unequal distribution of materials and resource cases are high. This indicates a strong advocacy and lobby will generate a force and allocation can possible but if the area is remote and negotiation and political lobby is average the allocation of the area will be minimal. This means the two different resources and priorities in the same areas cannot give a similar result and that is why it is called a diversity in the education system (Chhetri, et al., 2024).

Thus, various literature and facts shows that urban and rural sector and education practice is not so easy to measure and mathematics-Geometry education is challenging and vital, thus instead if other subject the practice of mathematics-geometry study would be interesting to find out from the different Local government areas.

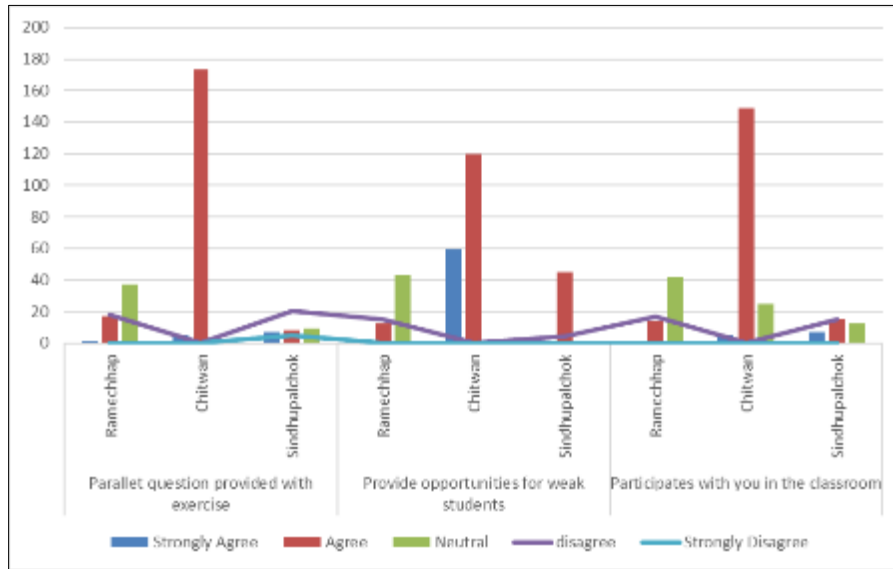
2. Methods

This is a cross sectional research following mixed method techniques on which one time field visit with a set of questionnaires was prepared and executed for the two major respondents Teachers and students of the same schools. Sindhupalchok, Ramechhap and Chitwan district were chosen from Mountain, hills and Terai region of Bagamati Province Nepal. A total of 371 teachers (Ramechhap-73, Chitwan-179 and Sindhupalchok-49). In addition, students of Higher secondary (class IX and X) was interviewed for the cross checking of the study practice and impact of the Geometry study in the school premises. In addition, KII from the School Management committee and mathematics and head of the Schools were interviewed to find out the Mathematics-Preferably Geometry study practices and students concern in the study area.

The study was taken into consideration during Jan-March 2024 through face to face questionnaires and the data were further compiled and analyzed through SPSS Vol 22 and MS excel were used for the analysis. Table and graphs were used to analysis and interpreted the data obtained from the field.

3. Results

In this section, various tables and graphs are explained through mixed method analysis.



(Source: Field visit, 2024)

Figure 1 Summary of survey with teachers on the support of teachers for the Geometry –Mathematics study in the study area

Out of 371 teacher respondents the majority of surveyed agreed that the teachers provides support on student for the geometry education in the surveyed area. However, Parallet question and exercise practices found high in CHitwan district as this is highest majority of trained teachers and located in the accessible location in Terai regions where the scholarsTeachers ratio is high than Rameshhap considered as a Hilly area and Sindhupalchok is mountain based district so the availability of teachers and students levels are challenging.

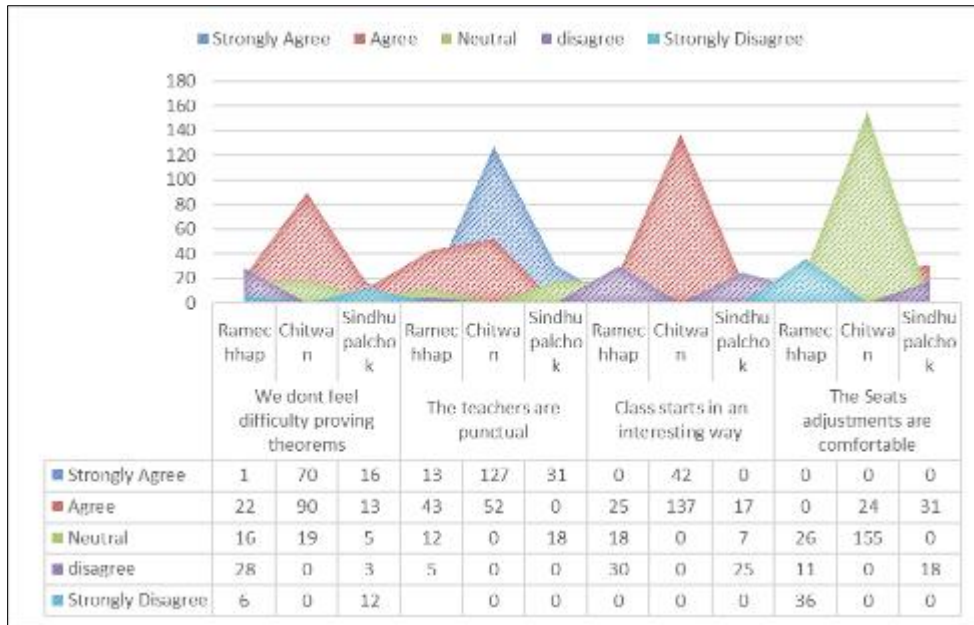
For providing opportunity to the weak-students majority of Chitwan is higher and Sindhupalchok district also stands the second largest majority among the respondents, this indicate that the management, teachers, parents and teachers supports are higher on the area. In addition, Chitwan is Terai based district and metropolitan city is available in the area thus the number of education and other sectoral monitoring is high than Ramechhap and Sindhupalchok had a majority of rural municipality and monitoring and school investment is limited in the area and local government support is ongoing but still limited human resources in the government offices and Schools has recorded.

In contrast of participation of Students in the mathematics exercise and other activities, the majority of Chitwan district is high because the number of activities and support from the all sector for the instruments, human resources and local monitoring mechanism is high than hilly areas as a result of which study and practices and revision are high in the municipal and high density areas where local resources and students are available than remote areas deals with limited resources and facilities.

KII with Local government-LG and teachers added that Mathematics-Geometry is a technical subject and required series of devices for the practical and theoretical classes. But the limited financial resources cannot prioritized procurement for mathematics , instead other priority are immediate placed, thus interest is one part and support is another part.

KII added that teachers competencies have no questions but the students and parental importance is important in too some extent.

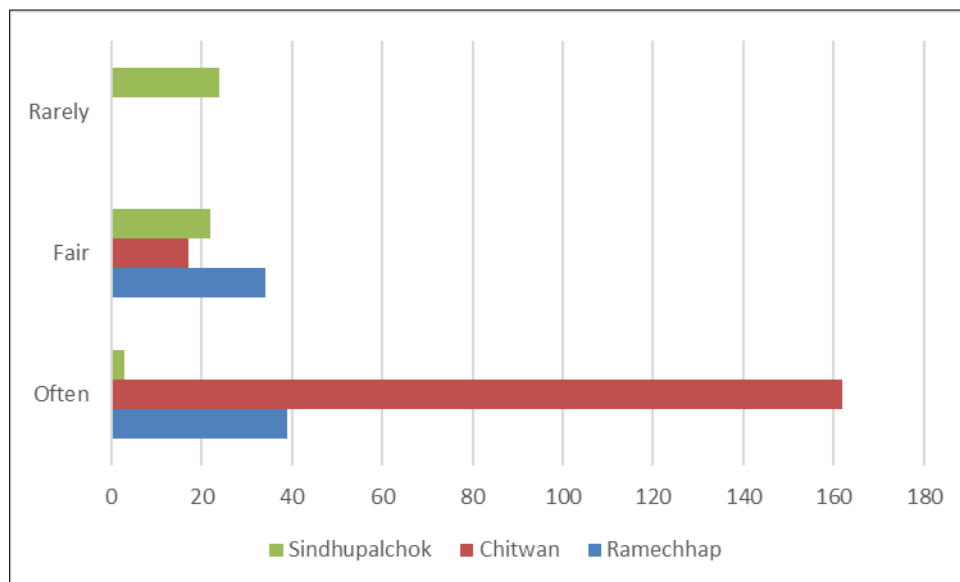
FGD added that the Mathematics is tough subject and parents support at the home is difficult die to average education background in the family, thus school is the ultimate center to learn and teach, if teacher is available there will be no worry but if resources are irregular or insufficient this will be a problem.



Source: Field visit, 2024

Figure 2 Students opinion on the Mathematics study and support of teachers

According to figure-2, providing theorems and teachers punctuality both are strongly agree opted as the teachers are proving their best. The Mathematics teachers on the other hand found very competent and technically sound in the subject because as per the Public school norms and assignment system the teachers must be qualified and competent in the field. But here the students ration and level is a question based on the location. The rural ratio of students are weak and average whereas the urban access and student level are high. The rural poverty and local availability is challenging and materials and support is limited but in the urban area the human resources, materials and access is high.



Source: Field visit, 2024

Figure 3 How frequently do you receive feedback on your geometry assignments and tests?

On the Other hand KII with teachers and principal added that the training facilities and many other upgradation programs are ongoing mandatory opportunity based program for the teachers and they do but still rural and urban school have number of problems such as poverty, transparency, politics, Lack of Government access and monitoring

and unequal distribution of the resources at the local levels are the common problems of Education system in the study area.

KII with Urban areas added that all set up are given and teachers are doing their best, additional support from the local government is limited because the political interest and resource allocation is not same. The know areas and political lobby areas are well off than lower connection.

In case of feedback system, the majority is often asked with both Teachers and Students and agreed that the feedback is continued from the teachers to students, this indicates that learning program and coordination is well tuned to each other but the local level of education is challenging in the present context because after federal system, the local government involvement is vital and playing a role in the future development. The public school at the local levels are fully monitored by the Local Government and as per the mandatory system budget allocation runs accordingly. Hence this priorities by the local Representatives and focus on the Mathematics-Geometry education is a part of long term thinking for the Policy makers. Thus education system-Local Bodies, Management and parents combinations are well tuned in Urban areas because all types of Facilities, communication and access is easily available than Rural areas. Hence Mathematics priority is challenging.

4. Conclusion

The study concluded that Mathematics-Geometry is a vital subject and teaching is challenging in the secondary level of education in Nepal. The rural-urban education practice in a public school is follows Government regulations. However, the learning practice and allocation of budget is distinct and urban education practice remain far-better than the rural sector as because of adequate human resources, proper monitoring, students availability, and importantly the education lobby through local community is high. Whereas, in the rural areas, remoteness, low human resources, interest, lack of material sufficiency and inadequate monitoring are the primary differences in between rural and urban sectors.

Thus, local level of initiation and innovation in the mathematics is the need and possible to manage when all sectors like community, schools, management and all types of government think and work together are advised.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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