

Perceptions and Types of Workloads among Chemistry Teachers in Middle Secondary Schools

Kinley Wangchuk¹, Dr. Sonam Richen_(PhD)²

¹Jomotsangkha Middle Secondary School, Ministry of Education and Skills Development, Bhutan.

²Samtse College of Education, Royal University of Bhutan, Bhutan

Received: 25 Jul 2025; Received in revised form: 22 Aug 2025; Accepted: 25 Aug 2025, Published on: 31 Aug 2025

©2025 The Author(s). Published by TheShillonga. This is an open-access article under the CC BY license

(<https://creativecommons.org/licenses/by/4.0/>)



Abstract— This study explored perception and types of workloads for middle secondary school chemistry teachers, in one of the districts of Bhutan. The participants included chemistry teachers ($n=7$), Principals ($n=4$), and class 9 and 10 students ($n=200$). Data were collected through semi-structured interviews, survey questionnaires, classroom observation, and document analysis such as chemistry teachers' teaching schedule, job delegation documents, and class 9 and 10 students' chemistry notebooks ($n=32$). The qualitative data were analysed using thematic analysis while the quantitative data were analysed using the features such as mean and standard deviation of Statistical Package for Social Sciences (SPSS). The findings of the study highlighted that the chemistry teachers' workloads were perceived as heavy, caused by 4 different types of workloads such as academic workloads, non-academic workloads, workloads due to inadequate academic resources, and nature of chemistry.

Keywords— Workload, Chemistry, Middle Secondary School, Chemistry Teacher, Perception

I. INTRODUCTION

Chemistry is indispensable for quality living. Human body is made up of chemical compositions, and the environment required for human life to sustain is inseparable from the chemical composition of matter (Anwar, 2018). Additionally Chogyel and Wangdi (2021) added that chemistry is important in the scientific and technological advancement of the nation. Therefore, Chemistry education is critical for improving the quality of teaching, research, and development, as well as ensuring that students are well-prepared to generate intensive goods and services to meet human requirements for food, health care products, and other materials that improve the quality of life (Khanam, 2018).

However, many studies have shown that school teachers are burdened with a heavy workload, affecting general education and chemistry in particular. For instance, a study done by Ayeni and Amanekwe (2018) in Nigeria revealed that 93% of teacher were overloaded with the work in the school, which had negative implications on the students' learning achievements. Further, the study done by Gwambombo (2013) in Mbeya City of south Tanzania also found that the teachers' workload resulted to poor academic performance by students in secondary schools.

Similarly, evidences on heavy workloads for the teachers in Bhutan are evident too. For instance, Wangchuk and Dorji (2020), proposed that teachers perform multiple tasks and shoulder numerous responsibilities, besides teaching, which forced them to do more but achieve less. Similarly, Kaka (2017) argued that policy direction does not recognise the fact that school teachers in Bhutan perform one or more additional co-curricular, and administrative responsibilities, besides academic roles.

In addition, school teachers in Bhutan devote more time to work than any other civil servants. Each teacher spends approximately 14 hours per week planning and preparing lessons, approximately 13.15 hours per week assessing and marking students' work, and 13 hours for non-academic activities (NCB, 2016). In addition, teachers in Bhutan work 10.45 hours in a day which calculated to 2.45 hours extra in a day than any other civil servants (National Council of Bhutan [NCB], 2016)

Similarly, the researcher who has been a chemistry teacher in the school for the last 10 years has experienced that the teacher's task begins at 8 AM and goes up to 5 PM for various academic and non-academic activities. The spillover of the school work is done at home in the evening and early morning, affecting private and personal

obligations. These are the usual practices in the day school. However, work for the teachers in the boarding school begins as early as 6 AM which starts with morning prayer or morning study whichever is conducted first, and goes up to 9 PM, with the completion of the night studies, particularly when the teacher(s) has to take up the responsibility of Teacher on Duty (ToD).

II. LITERATURE REVIEW

This section presents various scholarly works on perceptions of teachers' workloads and types of teachers' workloads as presented below.

Perceptions of Teachers' Workload

Teachers' workload is considered as the amount of work assigned to teachers that generally includes teaching, performing administrative duties, supervising students, and other activities (Ndioho & Chukwu, 2017). However, teachers' workload in the context of this study is the time (hours) obliged to be devoted per week by the chemistry teachers to deliver the academic and non-academic responsibilities.

Different studies have shown that teachers across various nations have heavy workloads. For example, a study done at Akoko in Nigeria and the University of Missouri in Columbia claimed that 93% of teachers were overloaded with works (Cooper & Travers, 2012), that had negative implications on the learning achievements of the students. Similarly, Wangchuk and Dorji (2020) argued that the teachers' workload obliged teachers to do more but achieve less in Bhutan. Furthermore, an analysis done by NCB (2016), showed that teachers' workloads in Bhutan stand at 10.45 hours in a day which calculates to 2.45 hours extra in a day, compared to rest of the civil servants.

Further, stress related to workload among teachers has become a matter of concern. A study done in Nigeria suggested that the activities for teachers needed reduction, to enable them to cope up with the stress of the workload (Attah & Adebayo, 2018). On the other note, Namgyal (2018) argued that the teachers in Bhutan either take their school work home or attend to it, during their private times.

Types of the Teachers' Workloads

Teachers' workload is attributed to the varying roles shouldered by the teachers. They consisted of factors such as academic roles, non-academic roles that include leadership roles and responsibilities, teacher shortages and improper teacher deployment, class size, and other factors such as ad-hoc activities, poor salary and rewards, the expectation from society and parents, lack of appropriate training to meet new teaching demands, a subjective assessment system mainly focusing on students' scores in

exams and limited time for too much requirement of teaching-related works as detailed below.

Academic Workload

Studies done in Ondo state in Nigeria by Ayeni and Amanekwe (2018) and in Tanzania by Gwambombo (2013) claimed that administering, scoring, analyzing, and marking internal tests contributes to building the workloads of teachers. Further, a study done in Scotland proposed that the curriculum reorganization based on bureaucratic guidelines from the authorities added to pressing workloads of the teachers (Wakoli, 2016). Similarly, a study done in Bhutan by NCB (2016), found out that teachers spent 18.54 hours teaching, about 14 hours for lesson planning and preparation, 13.15 hours for assessing and marking students' work per week.

Non-Academic Workload

The requirement of teachers to take up non-academic related roles contributes significantly to the existing workloads. Teachers perform one or more additional co-curricular activities, extracurricular works (Wakoli, 2016; Yezer, 2020), and administrative responsibilities (Ayeni & Amanekwe, 2018; Kaka, 2017; Namgyal, 2018). Similarly, a study done by NCB (2016), argued that the teachers in Bhutan spent about 13 hours for non-academic activities and leadership.

Teacher Shortages and Improper Teacher Deployment

A teacher shortage is one of the factors that contributes essentially to teachers' workload in Nigeria (Adeyemi, 2011). Shortages of teachers mean that existing teachers cater to additional teaching and learning areas, often in multi-grade classes and across grades (Xabanisa, 2011). For countries like Indonesia, Nigeria, and Northern Ireland, problems in teacher deployment are evident, which had resulted in in-efficient utilisation of available teachers, an indication of teacher mis-management (Mulkeen, 2013). For example, substantial disparities in primary school teachers' distribution were found in all districts in Indonesia between schools, between sub-districts, and between specialist subjects (Heyward et al., 2017).

Similarly, in the Kwara State of Nigeria, there are extreme imbalances in teacher distribution between rural and urban areas due to female teachers resisting to move out from urban to rural schools (Tao, 2014). Further, 1 in 5 teachers in Northern Ireland have no educational experience outside their community of origin because of the policy that restricts the movement of teachers outside their community (Milliken et al., 2019).

Class Size

Class size in the context of this study refers to the number of students in a class. The class with a larger

number of students is referred to as the big class size and the class with a lesser number of children is termed as small class size. In a study done by Wakoli (2016) in the Kanduyi Division of Bungoma District, Kenya, and Ayeni and Amanekwe (2018) in Tanzania, confrontation by the government to make meaningful changes to class sizes subsidizes the teachers' workloads.

Further, it was noted that the primary school teachers in Kenya teach overcrowded classes, where the majority of teachers, believed to have resulted from the country policy of free primary education in the country (Wakoli, 2016). A similar study done by Tarimo et al. (2020) concluded that class size as the predictor of students' academic performance in the secondary schools of Singida Urban States in Tanzania. The same study found that class size had negative correlation with students' academic performance, and recommended to emphasis on reducing class size, if teachers and education stakeholders have to increase students' academic performance (Tarimo et al., 2020)

The class size is considered to be the factor that contributes to the teacher workloads in Bhutan, too (Yezer, 2020). A researcher's experiences of being the science and chemistry teacher for more than 10 years have experienced that the bigger class size builds up the workload for teachers. For example, a bigger class size with a greater number of children, consumes more time during the classroom instruction, assessment, and giving feedbacks compared to the small class size. This result in cutting down the teachers' instructional time in the classroom as well as planning the lessons, and assessing students works.

Other Related Factors

A study done in Shaanxi province in China by Yazhuan et al. (2010), pointed out five emerging sources of workloads for teachers. They are poor salary and rewards, expectation from society and parents, lack of appropriate training to meet new teaching demands, a subjective assessment system mainly focusing on students' scores in exams, and limited time for too much requirement of teaching-related works are the emerging sources of secondary teachers' workloads. The same study also claimed that the expectation from society and parents topped, amongst other four sources.

Additionally, ad-hoc activities in the schools are also found adding on the teacher workload in Bhutan. For example, the study done by Yezer (2020) concluded that teachers in Bhutan are overburdened by activities other than teaching, including ad-hoc activities. In addition, the researcher, who served as a teacher in the school system for more than 10 years have experienced disruptions in the normal functioning of the teaching and learning processes

in the schools, due to ad-hoc activities, such as inclusion of activities as per the directives from the higher authority, decisions made at school levels in an ad-hoc manner, otherwise not planned and reflected in the school calendar.

III. METHODOLOGY

This study employed convergent parallel mixed method approach. Mixed methods as an approach to inquiry, combined both qualitative and quantitative approaches. It provided more comprehensive answers to research inquiry, overcoming the limitations of a single approach. This study employed both the purposive and random sampling methods. Participants for interview such as principals, chemistry teachers, and students for focused group interview (FGI) were purposively sampled. In addition, teaching schedule of teachers, and job delegation documents were purposively collected from the class 9 and 10 chemistry teachers. The random sampling method was also employed to select the school for the study from each cluster. In addition, collection of 4 chemistry notebooks each from classes 9 and 10 students, which totaled up to 8 notebooks from each sampled school was also done randomly.

This study adopted 5 data collection tools. They were document analysis, semi-structured interview(n=11), focused group interview(n=16), class observation, and survey questionnaire(n=200). The study used 3 types of documents, which consisted of teachers' job responsibilities (n=4), chemistry teachers' teaching schedule (n=4), chemistry notebook of classes 9 and 10 students from each participating school (n=32).

The qualitative data (semi-structured interviews, focus groups, and documents) collected were analysed using the thematic analysis, using the inductive and deductive analysis approach. Similarly, quantitative data collected through the 5-point Likert scale survey questionnaire were analysed by the Statistical Package for the Social Sciences (SPSS) software using the descriptive statistics features such as mean and standard deviation.

IV. RESULTS

Qualitative data obtained through the interview, document analysis, and class observation were analysed thematically. Themes generated were supported by verbatims, tables, and sample of pictures. For convenience and to maintain anonymity of the participants, the interview participants were represented with codes such as Std1 for Student 1, and Std2 for Student 2. Similarly, teacher 1 is represented as Tr1, Teacher 2 as Tr2, and principal 1 as Pr1, principal 2 as Pr2 and so on. Quantitative data were analysed using

descriptive analysis features such as mean and standard deviation of SPSS. The findings were presented under 2 major themes. They are perception on the chemistry teachers' workloads, and types of chemistry teachers' workloads, bifurcated into sub-themes as presented below.

Perceptions on the Chemistry Teachers' Workloads

Perception on workload in the context of this study refers to the magnitude of chemistry teachers' workload

Table 1: Students' Perception on Chemistry Teachers' Workload

Items	Mean	Std. Deviation	Level of opinion
My chemistry teacher comes to the class with the lesson plan.	4.7	0.6	Very High
My chemistry teacher comes to the class with teaching aids.	4.2	0.9	High
My chemistry teacher is smooth with the lesson while teaching.	2.3	1.0	Low
My chemistry teacher takes up varieties of roles in the school.	3.8	1.1	High
My chemistry teacher comes to the class on time.	2.2	1.1	Low
My chemistry teacher attends all the classes without fail.	3.9	1.1	High
My chemistry teacher is available to consult him/her.	4.4	0.9	High
My chemistry teacher gives clear feedback on my work.	4.4	0.7	High
Overall mean and standard deviation	3.8	0.9	High

[1.0-1.50=Very low, 1.51-2.50=Low, 2.51-3.50=Moderate, 3.51-4.50=High, 4.51-5.00=Very High (Adapted from Zangmo, 2016).

The interview data too supported that the chemistry teachers have heavy workloads. Majority of the teacher-participants in the interview expressed that the chemistry teachers in the middle secondary schools have heavy workloads. For instance, Tr7 expressed that:

We have to shoulder the roles and responsibilities other than teaching and academic related works. We have to somehow manage to do them, which is really difficult.

Similarly, Tr1 reported that "Not only we teach in the schools, but we are also obliged to perform other activities, apart from the usual classroom teaching".

Furthermore, most of the principals from the participating school opined that the teachers are burdened with the academic work and even more by the non-academic related task of the school. Pr2's comments were reflective of teachers feeling:

viewed by the chemistry teachers, principals, and students (classes 9 and 10) in the middle secondary schools.

The students' survey data revealed that chemistry teachers' workload is moderately heavy, as evident from the high mean score of ($M=3.8$; $SD=0.9$) as reflected in Table 1.

Chemistry teacher or any other teacher in the school, do have heavy workloads as the school have to engage the teachers for the academic activities as well as to take up the responsibilities for non-academic activities.

Likewise, the feedback given by the teachers on students' chemistry notebook were found consistent with the opinions of principals and teachers. For instance, the feedback provided by teacher on students' work were not specific, which could be due to the heavy workloads of chemistry teachers, that deprived them from giving mindful feedback. The tick mark awarded by chemistry teacher for unscientific chemical formula written by students, indicated that the teacher had failed to note the errors in the students' work as evident from students' work sample in Figure 1.

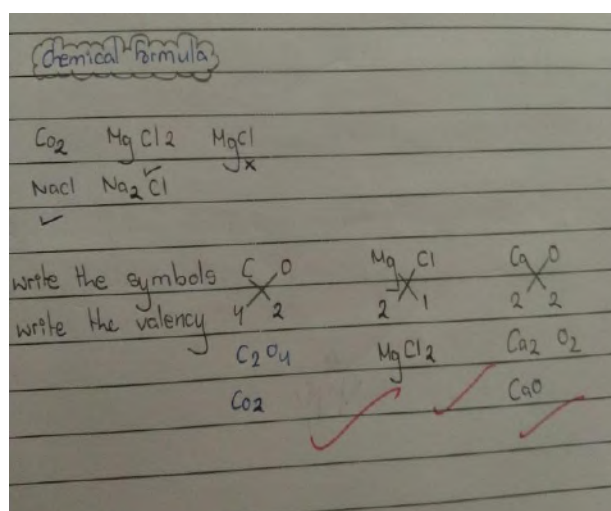
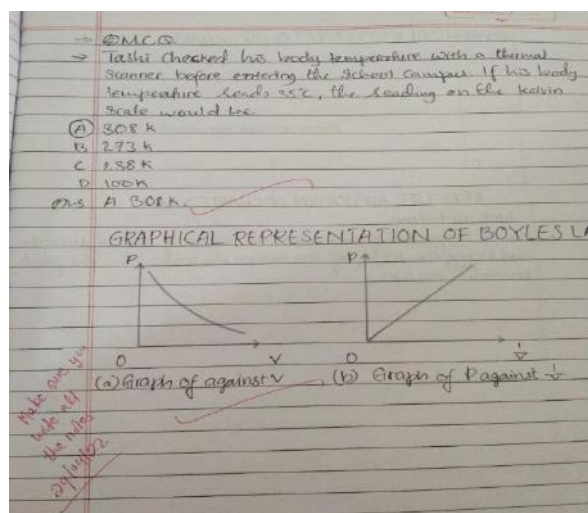


Fig.1: Non-Specific Feedback on Students' Work

Similarly, interview data of the students resonated with what was observed from the students' chemistry notebook. For example, Sdt5 mentioned that:

I think that my chemistry teacher has heavy workloads in the school, because he seems to have no enough time to perform the works. My chemistry teacher seldom checks our notebook. Even if the notebooks were taken for correction, I have seen that my chemistry teacher had awarded tick mark, though what I have written was wrong.

Additionally, Student Sdt7 spoke that:

The chemistry teacher does not check our notebook regularly. This may be because he does not get time to look at our notebook as he has to do other works of the school as, academic head, and other teaching related works such as lesson planning, teaching, conducting test, making questions etc.

Types of Workloads Shouldered by Chemistry Teachers

Findings of this study revealed that the chemistry teachers experienced 4 types of workloads namely, academic workloads, non-academic workloads, workloads due to inadequate academic resources, and workloads due to the nature of chemistry as a subject. The academic workload consisted of academic head, teaching periods, lesson planning, preparation of teaching and learning materials [TLMs], assessment, and remedial classes. Non-academic workloads included responsibility of in-charges, focal persons, and coordinators for various programmes, and members of committees as presented below.

Academic Workload

Academic workload in the context of this study refers to tasks that the chemistry teachers were obligated to perform in the school, to enhance academic outcome of students. Academic workloads such as academic head, teaching periods, lesson planning, preparation of TLMs, assessments and remedial classes were evident across the middle secondary schools as presented below.

Academic Head

A record of teachers' job delegation document showed that the chemistry teachers take up the responsibility of academic head in the school. For instance, 2 teachers from the participating schools were acting as academic head as indicated in the Table 2.

Table 2: Academic Head Responsibility Shouldered by Chemistry Teachers

Participant code	Responsibilities
Tr1	HRC Committee
	Examination and Tir
	Admission Committe
	Academic Head
Tr3	Admission Committe
	Academic Head
	Exam Committee
	Discipline Coordinat
	School Management
	Action Research Cor

Similarly, the interview data too showed that the chemistry teachers shouldered the responsibility of academic head in the school. For example, Tr1 in an interview said, “I as an academic head have to lead the conduct of academic meetings, study supervision, lesson observation, mentoring and coaching, and academic meeting”. Further, Tr3 in an interview added that:

I get very less time to do the lesson planning, because I have to look at the overall academic management of the school because I am taking the role of academic head, like weekly test, then coming up with academic intervention plan, doing the result analysis for the whole school, submission of this to the various stakeholder like DEOs and MoE. Such task consumes a lot of time.

Similarly, Sdt1 in the interview mentioned that:

I think my chemistry teacher has heavy workloads in the school. If I talk about my chemistry teacher, he is the academic head of the school. He is also the chemistry teacher of my class. In that case I think he have a heavy workload.

Teaching Periods

Teaching periods in the context of this study refers to the number of periods a chemistry teacher teaches in a week. It includes periods allocated to teach chemistry in classes 9 and 10 as well other additional subjects allocated to them.

Record of teachers’ teaching schedule in the school revealed that, chemistry teachers in the participating schools have teaching loads ranging from 3 periods (2.5hours), to as high as 23 periods (19.2 hours) per week as reflected in the Table 3. Tr1 and Tr3 have a lesser number of teaching periods as they are the vice principals (VP) of the school. As the VP, they are given lighter teaching periods as they have to look after the management of the school.

Table 3: Chemistry Teachers’ Teaching Periods/hours Per Week

Participant code	No of periods/week
Tr1	3
Tr2	12
Tr3	9
Tr4	12
Tr5	20
Tr6	23
Tr7	21

The data from the teachers teaching timetable revealed that the chemistry teachers teach multiple subjects across many classes as indicated in Table 4.

Table 4: Multiple Subjects taught Across Different Levels of Classes by Chemistry Teachers

Chemistry teachers
Tr1
Tr2
Tr3
Tr4
Tr5
Tr6
Tr7

The data from the interview of the school principals also supported that teachers’ teaching workload is heavy due to the variety of subjects that the teacher had to teach across different classes. For example, Pr1 opined that:

In the present scenario, I always feel that the heaviness is being felt due to the more numbers of subjects that a teacher has to teach across different levels of the classes.

In addition, Pr2 added that:

One of the reasons why chemistry teachers in my schools feels heavy in terms of teaching period may be because he has to take five different classes due to shortage of teachers. Taking more periods with different subjects, and class levels, along with extracurricular workload definitely is going to be more challenging and heavier for them.

Lesson Planning

Lesson plan in the context of this study refers to the teachers’ detailed description of the course of instruction for chemistry lesson and other additional subjects. It is developed by the teacher on a daily basis, to guide teachers’ teaching, and students’ learning incorporating various components such as teaching skills, strategies, assessment techniques, and evaluation plan for a lesson.

Majority of the chemistry teachers in interview mentioned that lesson planning attributed to academic workloads, that require lots of efforts and time. For example, Tr7 mentioned that:

I cannot go to the class and then just read from the textbook and tell whatever is there in the textbook. I need more planning for the effective execution and implementation of lesson, and more resources

to enrich the students. So, to do that, I have to do a lot of information searching, and put them into words, that is actually planning for the lesson delivery.

Further, Tr6 said, “For lesson planning it takes minimum of 2 hours per day. This would total up to about 10 hours per week for lesson planning”.

Similarly, majority of the principals supported teacher’s view that teachers need to plan lesson for all the lessons they teach and get it endorsed by the academic head. This is also a mandate of the Ministry of Education to ensure that each teacher walking into the classroom must have fully prepared lesson to have maximum impact on students’ learning. For example, Pr2 mentioned that:

It is a mandate for all the teachers to have a detailed lesson plan prepared prior to the classroom teaching. As far as I know, no teacher goes to the class without the prepared lesson plan. I feel that a good lesson plan makes effective and engaging teaching and learning experiences, irrespective of subjects or the experiences of the teachers.

Preparation of Teaching and Learning Materials

Another activity that added to teachers’ workload is the preparation of teaching and learning materials (TLMs) as revealed by the interview data. All the teacher participants pointed out that chemistry teachers invest significant amount of their time and effort in the preparation of the TLMs. For instance, Tr5 expressed that:

For the preparation of TLMs, I need at least 30 minutes per day. So, in total I spent about 2.5 hours per week solely for the preparation of TLMs. I feel use of TLMs are the critical part of the teaching and learning processes. It helps me to teach better and I feel my students learn better when I teach them using the readymade TLMs.

Similarly, Tr1 said, “I have to dedicate my time in preparing the TLMs. I do that, because it helps me to do better teaching in the class”.

The teachers’ use of TLMs in teaching chemistry, helped students learn concepts better as revealed by the classroom observation data. The classroom observation data revealed that majority of chemistry teachers (n=6) used TLMs while teaching chemistry. For instance, Tr4 used video to teach the use of root words in the nomenclature of organic compounds, using the television (TV) screen. Similarly, Tr3 also used video to teach homologous series, and structural & molecular formula, while the rest of the lesson was done using the power point presentation (ppt) as indicated in the Table 5.

Table 5: Portion of Classroom observation for Use of TLMs

Teacher	Teaching and learning materials used
Tr3/Tr4	☐ 4 minutes video on Homologous series
	☐ Used PPT
	☐ Video on Structural and Molecular formula.

Assessment

Assessment in the context of this study is evaluating the students’ understanding of the taught lesson for chemistry as well as other subjects, that a chemistry teacher teaches. Assessment includes, a plan of formative and summative assessment, such as preparation and conduct of class test, and evaluation of students’ classwork, homework, and project work. It also includes setting questions and evaluation of exam papers.

All the chemistry teacher-participants in an interview mentioned that another type of academic workload is due to assessment task. For example, the Tr6 revealed that:

One type of workloads related to academic work is due to the assessment works. I consider it as one of the factors that contributes to heavy workloads, as assessment task is continuous in formative mode as well as in the summative mode. I have to keep on planning the assessment for the students’ learning, which is followed by evaluation and giving feedback to individual students.

In addition, Tr7 pointed out “assessment of students works takes around 3 to 4 hours per week”.

Most of the students in the interview data also supported the above views that teachers are burdened with assessment tasks. For example, Sdt9 reported that:

Besides teaching and other works, my chemistry teacher prepares the questions for class test, correct them, and give the answer sheet back to us with the feedback. I think he does this, not only to our class but also in the other classes whom she teaches. This has to go every week or month for different classes and sections. That’s why I feel my chemistry teacher is overloaded with the works.

Similar views were expressed by Sdt14 and reported that:

I feel that my chemistry teacher has heavy workloads in the school because she makes sure our notebooks are timely taken for correction. She gives back the notebook with written feedback and sometimes when she feels that majority of us

requires clarification, she comes in the class and discuss with the whole class.

Remedial Classes

Majority of the schools conduct remedial programme after school hours to help students who did not fare well in the term exams. Remedial classes were conducted before or after class hours, where teachers extend their stay in the school either delivering the lessons or supervise students during study hours.

For example, Tr5 expressed, "I prepare and conduct remedial classes for students. This usually happens in the second term of the academic year".

Further, Tr1 also mentioned:

We usually take 1 hour of remedial lessons in a week. For this, identifying the area to scaffold students, planning for its implementation, and 1 hour of implementing remedial classes require time and effort from teachers.

In support of the above claim, Pr3 mentioned that:

In our school, remedial programmes are considered as one of the important academic programmes. We look at the test and examinations and find out the area where the teacher needs to give extra effort. We also look for the students who perform low in the exams and test and cater to their learning needs through the remedial classes.

Data obtained from chemistry teachers' interview also showed that the chemistry teachers take up the responsibility of supervising the study hours in all the school. Study supervision is an integral part of any school be it in the boarding school or day-school. In the boarding school, all the students come together in the morning, evening, and at night to study. Similarly, a day-school also adopted such culture in the morning and evening. Such programme demands the presence of teachers to supervise the students, which is either done by the ToD or a group of volunteer teachers. For example, Tr1 said that:

I actually supervise Sunday studies alone. I also supervise the study supervisors. So, I am the supervisors of the supervisors. So, I do monitor work as well, as an academic head and Vice Principal (VP) of the school.

In addition, Tr5 expressed that:

10 of the teachers including me, have volunteered to supervise the study hours in the morning, evening and night, which in the previous years was done by ToD. So, I use about 3 hours per day. This will sum up to 9 hours of supervision duty per

week, as each of us get 3 days for the supervision of studies.

Further, Tr7 said that:

In our school, supervision of study hours in the morning and evening is done by the ToD, as we don't have night study because our school is a day school. I do supervision duty during my ToD turn, as per the schedule made by the school management.

The second major workload that the chemistry teachers grapple with is related to non-academic activities as discussed below.

Non-academic Workloads

Non-academic workload in the context of this study refers to the roles and responsibilities such as in-charges, focal persons, teacher on duty, and members of various committees, discharged by the chemistry teachers in the middle secondary schools.

The data from the job delegation document indicated that majority of the chemistry teachers serve as in-charges, focal persons, and coordinators for various programmes, and members of various committees in the schools as reflected in the Table 6.

Table 6: Chemistry Teachers' Non-academic Roles in the Schools

Participant-Code	In-charges/coordinators
Tr2	Nature Club Coordinator
Tr3	Academic Head
Tr4	Discipline Coordinator
Tr5	School Management Team
Tr6	House Master
Tr7	Health In-charge
	Class Teacher
	Health Club Coordinator
	Pastoral Head
	Cultural Club Master
	Nazhoen Scout Master
	Disaster and COVID 19 Focal Person.
	Health In-charge
	House Master
	Health Club In-charge

Similarly, the interview data of teachers also revealed that the role of health in-charge in the school is

burdening as well as distracting from performing the teaching task. For instance, Tr7 in an interview expressed that:

When it comes to health in-charge, though I have got a co-partner it is difficult to carry out the role of health in-charge along with the teaching. Because at any time anything happens with the students. Sometimes when I go to the class, let's say class 10 in a particular period, what happens is that students come with lots of health complaints such as, stomach ache, headache or sometimes students come saying that, they want to go home or to the hospital. I have to send friends with him/her. In some situations, I have to call the parents, inform the class teacher. Often, I have to give medicines such as paracetamol, antacids, apply iodine solution, and other routine tablets like vitamin A, deworming tablets and so on. Tr1

In a similar manner, the students also believed that the chemistry teachers' role as in-charge, focal person and coordinator have added more work pressure to the teachers. For instance, Sdt12 expressed that:

In our school, we have 2 chemistry teachers who are health in-charge and pastoral head. Both of them are scout masters too. I believe that my chemistry teacher is stressed with works and teaching and learning is compromised when they are involved in such programmes often, and also when they go out to attend workshops. Tr5

In addition, majority of the chemistry teachers in an interview session pointed out that ToD is one of the areas that adds on their workload. For example, Tr6 stated that:

Besides the teaching workloads that I bear with, non-academic academic activities such as performing the duty of ToD is really tiresome, though I do not have to perform it every day. However, such duty makes me to work from dawn to late night, when I am a ToD, taking up the responsibility of overall functions of the school activities.

In addition, Tr7 mentioned that:

ToD takes the charge of all the activities of the school in a day. Due to this role, during such day I do not get time to carry out planning and other teaching related task for next day. In a way, my work gets piled up for the next day or later at night, which becomes so difficult to attend to it due to the obligation for next day.

This is further confirmed by the students' interview. For instance, Sdt3 expressed that "I see my

chemistry teacher so busy and also burdened particularly when she is ToD. I see her early in the morning moving around to monitor the morning study hours. This goes until the night study gets over".

Further, a data from the job delegation document from each participating school indicated that chemistry teachers are members of various committee. Table 4.8 below, showed that out of 7 chemistry teacher participants, 5 were members of committees. Further, the chemistry teachers were members ranging from of 2 to 5 committees as illustrated by the Table 7

Table 7: Chemistry Teachers as Members of Various Committees

Participant-Code	Name of Committee
Tr1	HRC Committee
	Examination Committee
	Timetabling Committee
	Admission Committee
Tr3	Admission Committee
	Exam Committee
Tr4	Games and Sports Committee
	Scouting Committee
Tr5	Scout Committee
	Mess Committee
	Disaster Committee
	Literary Committee
Tr6	Cultural Committee
	Mess Committee
	Semso Committee
	Scout Committee
	SEN Committee

Workload due to Inadequate Academic Resources

Inadequate academic resources in the context of this study refers to the insufficient resources required for the delivery of academic responsibilities in the schools. Inadequate resources include non-availability of laboratory equipment, reagents, and apparatus required to conduct chemistry and science practical. Further, inadequate computers, gadgets and low internet speed or lack of internet connections forms the part of inadequate resources in the context of this study as discussed below.

Data obtained from the interview of chemistry teachers showed that inadequate resources in the school

contribute to their workloads as they have to look for alternative ways or improvise it. For instance, Tr1 expressed:

We do not have the resources that we want. When there are not enough teaching resources, then we have to look for it or either try to make them ourselves. In a way we have to invest huge time and effort which could be saved if the materials are readily available.

The above view was echoed by Tr5 that:

When the ready-made resources are not available in the laboratory, I have to devote more time into finding these materials, and prepare them for the lessons. Especially for chemistry, materials required for practical such as reagents and chimerical are not available locally or in the shop, if not available in the school laboratory. For example, if I need 0.5 M Sulphuric acid, there is only concentrated acid in the laboratory. I have to work on making it 0.5M. The situation here is, I cannot get it from the community or nearby shop if it is not made available in the school.

The shortage of resource was also felt in the school library and internet connectivity as expressed by the teachers. For instance, Tr7 expressed that:

When it comes to library, I have not seen much resources particularly for chemistry. But anyhow, I have to manage it. I have to find out through the google, you tube or other sources.

Similarly, Tr1 also expressed that:

One constraint we have is internet connections. If the internet connections are not good, we do not get the required information that we want to use. So, some of our time is wasted in the course of looking for the information from other sources like books and expertise.

Workload due to Nature of Chemistry as a Subject

Majority of the chemistry teachers in the interview considered chemistry subject technical and abstract in nature which requires extra time and effort in the preparation of lessons. This is evident from an interview data. For example, Tr7 said that:

For me, like I have been teaching class 10 and the class 9 chemistry for two years. Two years is not enough for me. I would say that I am not much confident when it comes to teaching chemistry subject, though this is my major electives. I would like to say that I am not that confident, to teach chemistry in classes 9 and 10. It is very difficult. I

did not face such difficulties while teaching other subjects. Teaching is one, while students understanding it, is another when it comes to chemistry as it is an abstract subject.

Further, Tr7 added that:

So, I feel it is not easy to be a chemistry teacher, as lots of preparation has to be done. I would like to mention that chemistry is technical subject, where conveying the concepts involves understanding of lot of technical terminology, equations, and chemical formulae.

Similarly, Tr6 also mentioned that:

When it comes into the curriculum content part, there are some things in chemistry which we cannot show to students in the form of real objects. This adds to the complication in understanding the taught concept. Therefore, we have to resort to different ways and means of representations like drawing, looking for images, search for videos and other appropriate ways of representation.

Also, Tr3 mentioned that:

Since chemistry is an abstract subject, giving clear concepts to students is very difficult compared to other subjects like sciences in lower classes, or biology. We have to make students to make mental picture in their mind. For example, concepts such as atoms, molecules, compounds in periodic tables are very difficult to teach by teachers and understand by students as they are so abstract in nature.

V. DISCUSSION

Findings of this study are discussed in relation to 2 themes. They are perceptions on chemistry teachers' workload and types of teachers' workload among chemistry teachers as detailed below.

Perception on the Chemistry Teachers' Workloads

This study revealed that the workloads of chemistry teachers were found to be heavy, as evident from the high average rating of ($M=3.8$; $SD=0.9$) from the student survey, interview data of teachers, students and principals, and samples of student notebook. This finding is consistent with the study done by Wangchuk and Dorji (2020), in Bhutan where they found out that teachers perform multiple tasks and shoulder numerous responsibilities such as mandates to coordinate cultural and literary activities, coach games and sports, besides teaching, that force them to do more but achieve less. Similar findings were also reported by Kaka (2017) and NCB (2016), that in

Bhutanese schools by mandates, teachers are required to teach 22 hours per week which calculates to a little more than 5 periods of 50 minutes every day, with just 1 period (50 minutes) for planning, assessment, and other academic-related works.

Similar case was also found in Nigeria, Columbia, and Bangladesh. For instance, a study done in Akoko in Nigeria and the University of Missouri in Columbia by Cooper and Travers (2012) reported that 93% of teachers are overloaded with work in the schools. In Bangladesh, the types of teachers' workload include academic tasks such as attending classes, making lesson plans, assessing scripts, and participating in conferences and training sessions, and non-academic roles in a variety of extracurricular activities such as proctoring, organising various university events, and holding various administrative positions (Hossain, 2016).

The present study pointed out that chemistry teachers in middle secondary school, perceived non-academic workloads, heavier than academic workloads. Similar finding was reported by Kaka (2017) and argued that the mandates of teachers in the school do not consider one more additional non-academic responsibilities that teachers in Bhutan shoulder, besides teaching task. A similar trend was also found by Lee and Poon (2014) in Singapore who pointed out a variety of professional work activities, most of which were similar to those carried out by their counterparts elsewhere in the world.

Types of Chemistry Teachers' Workloads

Finding of this study revealed that one type of the chemistry teachers' workload was found to be the academic workload, which include role of academic head, teaching periods, lesson planning, preparation of TLMs, assessment, and remedial programmes.

Different studies done in Bhutan came to a similar conclusion. For example, a study by NCB (2016), found that teachers spent 18.54 hours teaching, about 14 hours on lesson planning and preparation, and 13.15 hours assessing and marking students' work per week. Further, a study done by Kaka (2016) agreed with the existence of heavy teaching periods (teaching loads) of teachers in Bhutanese schools. He concurred that the teaching load amongst the teachers calculated to more than 5 periods of 50 minutes every day totaling up to more than 20 hours per week. He also found out that, that teachers are expected to perform various obligatory tasks such as preparing lessons and teaching aids, conducting assessments and evaluations, conducting school-based action research, and exploring wider information and knowledge from the internet or library with just 1 hour per day which sums up to about 5 hours per week.

Academic workloads for teachers in Nigeria, and Tanzania were found consistent with the finding of this study. For example, a study done in Ondo state in Nigeria by Ayeni and Amanekwe (2018) and in Tanzania by Gwambombo (2013) claimed that academic-related tasks such as administering, scoring, analysing, and marking internal tests contributes to building up the workloads of teachers. A similar finding was also reported by Lee and Poon (2014) in Singapore that academic roles related to classroom instruction such as teaching, marking, setting papers, giving remediation to students, and giving feedback are prominent academic workloads for school teachers. Further, this finding was consistent with the study of Hossain (2016), who reported that the academic workload in Bangladesh involves regular teaching activities such as taking classes, preparing a lesson plan, evaluating the scripts, and attending training programs and conferences.

The finding of this study revealed that chemistry teachers also perform non-academic activities such as in-charge, focal person, coordinator of various non-academic activities, teacher on duty [ToD], and members of various committees. This finding concurred with several studies. For instance, various studies done in Kenya, Nigeria, and Bhutan, found that teachers perform one or more additional co-curricular activities, extracurricular works (Wakoli, 2016; Yezer, 2020), and administrative responsibilities (Ayeni & Amanekwe, 2018; Kaka, 2017; Namgyal, 2018).

Further, a study done by Kaka (2017), in Bhutan aligned with the finding of this study. He found a variety of non-academic and administrative responsibilities such as taking up the roles of staff secretary, Head of the Departments (HoDs), literary coordinator, class teacher, housemaster, cultural coordinator, club coordinator, mess in-charge, game and sports in-charge, health coordinator, discipline coordinator, examination secretary and many more, besides routine school chores such as morning social work, morning assembly, evening prayers, morning and evening studies, that require time, energy, knowledge, and skills to supplement and compliment quality wholesome education. This finding was further supported by NCB (2016), where it was found that the teachers in Bhutan spent about 13 hours in non-academic and leadership roles. Non-academic and leadership roles according to Kaka (2017) include, role of subject coordinator, Head of Department (HoD), literary coordinator, class teacher, house master, cultural coordinator, club coordinator, mess in-charge, game and sports in-charge, health coordinator, discipline coordinator, staff secretary, and examination secretary.

In addition, engagement of teachers in non-academic workload was evident in the teachers of Singapore and Bangladesh too. As per Lee and Poon (2014), in

Singapore, teachers' responsibilities which were considered important in their professional lives such as committee work, mentoring other teachers, co-curricular activities, interacting with students, parents, and vendors, and going for courses and professional development are non-academic in nature. Similarly, teachers in Bangladesh have to involve themselves in different non-academic activities such as proctoring, coordinating different activities, and taking various administrative posts other than academic responsibility (Hossain, 2016).

VI. CONCLUSION

In conclusion, principals, chemistry teachers, and students perceived chemistry teachers' workloads heavy in the middle secondary schools. The workloads comprised of academic workload, non-academic workload, workloads due to inadequate academic resources, and nature of chemistry as a subject. Academic workloads included discharging roles related to academic affairs as the academic head, number of teaching periods, need to plan lessons, preparation of teaching and learning materials (TLMs), assessment of students, and carrying out remedial classes. Similarly, non-academic workloads were mostly, a result of the involving the chemistry teachers as, in-charges, focal persons, coordinators, teacher on duty (ToD) and members of various committees.

Recommendation to Relevant Stakeholders

The finding of this study revealed that chemistry teachers in the MSS perceived heavy workloads. Therefore, reducing the workload for chemistry teachers must be given the due importance, which is possible by apprising the relevant stakeholders in Ministry of Education and Skills Development (MoESD) and Dzongkhag Education Officer (DEO) offices, so that during the formulation of plans, policies, programmes, and directives, the teachers' workload could be taken in to account. Similarly, the MoESD and DEO office shall be also diligent and collaborative in recruiting, and deployment of the staff across the various schools, considering the subject requirement.

The findings of this study also revealed that the reasons of chemistry teachers' heavy academic workload were due the preparation of TLMs and Assessment. Therefore, the study appraises the Centre for School Curriculum Development to ensure Digital learning materials to be made available for middle secondary school chemistry teachers. Further, the mandates of the teachers, for the implementation of the curriculum, such as assessment and evaluation approaches be taken into consideration initially during the development of curriculum. In addition, Centre for School curriculum

Development shall also be reflective on the depth and size of the chemistry curriculum, during the due course of the curriculum reform and review process, keeping in mind the workload of the chemistry teachers.

The school leaders such as principals and vice principals have a bigger role and authority in the management of the programmes, activities, and mobilisation of resources at the school level. To reduce the workloads, the non-academic related roles shall be shifted and be given to the non-teaching staff. Moreover, this study also recommends school management to ensure that that an individual teacher does not get varieties of subjects. For example, school leaders can maintain the consistency of ensuring one teacher one subject policy, that help the teachers in reducing the burden of academic workload amongst the teachers in the school.

Recommendation for Future Researcher

There are numerous areas in which the future researcher can explore the perceptions and workloads of chemistry teachers as detailed below.

1. The present study involved principals, chemistry teachers, and students as participants for the study. Therefore, this study suggests future researchers to involve different stakeholders such as District Education Offices, the Department of Curriculum and Research Development, and the Ministry of Education for broader perspectives.
2. The future researcher has a wider scope of doing a similar study in Higher Secondary Schools and university levels by employing the participants and collecting data covering all the districts of Bhutan.
3. An important document that can be used as a data source is teachers' lesson plans. However, the present study could not use them. The future study may consider the use of lesson plan as source of data, because the shred of workload evidence can also be seen in their lesson plan.
4. The future researcher is also recommended to make more numbers of class observation for each teacher. Doing this would help the researcher in getting the authentic and more genuine workload evidences.

REFERENCES

- [1] Adeyemi, T.O. (2011). Teachers' job satisfaction and job performance in secondary schools in Ekiti State, Nigeria. *International Journal of Afro-Asian Studies*, 2(2), 41-51. <https://bit.ly/3giEE1v>
- [2] Anwar, S. (2018). Role of chemistry in human life. *Jagran Josh*. <https://www.jagranjosh.com/general-knowledge/role-of-chemistry-in-human-life-1454479952-1>

- [3] Attah, B.G. & Adebayo, O.J. (2018). Effects of training and workload of teachers on achievement of students in mathematics in senior schools in Jos Metropolis, Plateau State, Nigeria. *KIU Journal of Humanities*, 3(1). <https://www.ijhumas.com/ojs/index.php/kiuhums/article/view/264>
- [4] Ayeini, J.A., & Amanekwe, A.P. (2018). The teachers' instructional workload management and students' academic performance in the public and private secondary schools in Akoko north-east local government, Ondo state, Nigeria. *American Center of Science and Education*. <https://doi.org/10.46545/aijcl.v1i1.24>
- [5] Chogyel, N., & Wangdi, N. (2021). Factors influencing teaching of chemistry in class nine and ten in the schools under Chhukha District, Bhutan. *Asian Journal of Education and Social Studies*, 14(4) <https://doi.org/10.9734/ajess/2021/v14i430360>
- [6] Creswell, J.W., & Creswell, J.D. (2018). *Research design. qualitative, quantitative and mixed method approaches*. (5th ed.). Sage Publication.
- [7] Cooper, C., & Travers, C. (2012). *Teachers under pressure: Stress in teaching profession*. <https://bit.ly/2J2mIat>
- [8] Gwambombo, I. (2013). *The effect of teachers' workload on the students' academic performance in community secondary schools*. <http://repository.out.ac.tz/id/eprint/913>
- [9] Heyward, M., Hadiwijaya, A.S., Mahargianto, & Priyono, E. (2017). Reforming teacher deployment in Indonesia. *Journal of Development Effectiveness*, 9(2). <https://doi.org/10.1080/19439342.2017.1301978>
- [10] Hossain, M.S. (2016). Teaching workload and performance: An empirical analysis on some selected private universities of Bangladesh. *International Journal of English and Education*, 5(3). <https://dx.doi.org/10.2139/ssrn.2810640>
- [11] Kaka, K. (2017). *Teacher workload in Bhutan: An analysis and proposal*. DOI: 10.13140/RG.2.2.34589.67040
- [12] Khanam, R. (2018). The importance of chemistry education. *Journal of Organic and Inorganic Chemistry*. <https://doi.org/10.21767/2472-1123-C5-014>
- [13] Lee, Y.J., & Poon, C.L. (2014). The professional work of teachers in Singapore: findings from a work-shadowing study. *Asia Pacific Educ. Rev.* doi 10.1007/s12564-014-9338-5
- [14] Milliken, M., Bates, J., & Smith A. (2019). Education policies and teacher deployment in Northern Ireland: Ethic separation, cultural encapsulation and community cross over. *British Journal of Educational Studies*, 68(2). <https://doi.org/10.1080/00071005.2019.1666083>
- [15] Mulkeen, A. (2013). Teachers in anglophone Africa. *Issues in Teacher Supply, Training, and Management*. <https://doi.org/10.1596/978-0-8213-8053-6>
- [16] Namgyal, T. (2018, December 14). *Teacher workload- How should it be workout?* <https://www.facebook.com/tnam9/posts/1089916824517699>
- [17] National Council of Bhutan (2016). *A review report on the quality of education in Bhutan*. <https://www.nationalcouncil.bt/assets/uploads/files/Final%20Education%20Report%20-%202016-Special%20Committee-18th%20Session.pdf>
- [18] Ndioho, O.F., & Chukwu, J.C. (2017). Biology teachers' workload and academic performance of secondary school students in Abia State. *Journal of Research & Method in Education (IOSR-JRME)*. 7(1). doi: 10.9790/7388-0701019194
- [19] Tarimo, V.M., Bahati, D., & Labito, R.A. (2020). Teachers' workload and class size as correlate of students' academic performance in selected secondary schools in Singida Urban. *International Journal of Scientific research and Management*, 8(4). <https://doi.org/10.18535/ijssrm/vi04.el03>
- [20] Tao, S. (2014). Using the capability approach to improve female teacher deployment to rural schools in Nigeria. *International Journal of Educational Development*, 39. <https://doi.org/10.1016/j.ijedudev.2014.08.011>
- [21] Wangchuk, C., & Dorji, J. (2020). *Teacher attrition: The former teachers' perspectives in the Bhutanese context*. doi: 10.9734/AJESS/2020/v11i430299.
- [22] Wakoli, C. (2016). Effects of workload on the teachers' performance in Kanduyi Division, Bungoma District. *International Journal of Science and Research (IJSR)*.5(10). DOI: 10.21275/SUB154454
- [23] Xabanisa, X.V. (2011). An investigation on how educators experience their workloads against the background of teacher shortage. *South East Academic Libraries System (SEALS)*. <https://core.ac.uk/reader/145039690>
- [24] Yazhuan, L., Qing, Z., & Yugui, Z. (2010). An investigation into sources of stress among high school chemistry teachers in China. *Procedia Social and Behavioral Sciences*. doi: 10.1016/j.sbspro.2010.12.382
- [25] Yezer (2020). Educators and education at a crossroad in Bhutan. *Contemporary Education and Teaching Research*, 1(2). <https://doi.org/10.47852/bonviewCETR2020010202>.
- [26] Zangmo, S. (2016). *Attitudes of grade ten and twelve students towards science in Bhutan* [Prince of Songkha University]. <https://kb.psu.ac.th/psukb/bitstream/2016/11093/1/TC1359.pdf>