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# Andragogy and pedagogy working together in shifting balance: An Evaluative Study of the Teaching-Learning Process in Samtse College of Education (SCE)

**Purna Bahadur Subba**

## **Abstract**

This article informs about andragogy and pedagogy working together in shifting balance at SCE: the perceptions of students and lecturers on these methods of teaching-learning process, shifting balance of teaching styles of lecturers taking place in between these two methods, how students are learning in such shifting balance and preference of the students among these two methods. The same sets of self-administered survey questionnaire were executed by both the students and lecturers, classroom teachings scenarios of lecturers at various seniority levels were observed and interviews were conducted with these lecturers and two senior students. Data collected from the survey questionnaire were analyzed using MS Excel. The interviews data were analysed using the process of emerging themes. The data from observations were used to see if the information collected from survey questionnaires and interviews were valid. Study found out that most respondents were aware that both methods co-existed depending upon nature of the subject matters being dealt with, shifting balance of teaching between these methods in SCE was confirmed, students were found preferred andragogy more than the lecturers and most of the modules need to be taught by applying both methods. Study recommends that a module on andragogy could be offered in SCE. The lecturers of SCE may be trained in shifting balance between andragogy and pedagogy. The lecturers of SCE should apply more andragogical approaches in SCE.

**Keywords:** *Andragogy; pedagogy; perceptions; shifting balance; co-existed*

Teaching is a noble profession. It is done applying various teaching skills and teaching strategies in accordance to the nature of the subject matters, age level and background of the students, availability of the teaching-learning facilities and the context in local and global perspectives. More in general, teaching approaches can be categorized into two broad categories termed as andragogy and pedagogy.

Seventeen years of teaching experiences as a teacher and a teacher educator provided the researcher with an insight of making distinction in teaching methods. The shift of his teaching environment from schools to that in the teacher education colleges has given him a vivid perception of the difference in teaching strategies in various levels of learners. He perceived andragogy and pedagogy are blended together and applied in a lesson (Nicholas and O'Brien, 2008) in such way that the lesson often shifts back and front between andragogy and pedagogy.

This study was done in order to see the perceptions of lecturers and students of SCE about andragogy and pedagogy and how lecturers are applying these methods in their teaching approaches: if the shifting balance in their teaching approaches was taking place between andragogy and pedagogy and which one (andragogy or pedagogy) they are applying more, which modules need to be taught applying more andragogy. The study was also done in order to see how students are learning and towards which (andragogy or pedagogy) students were more interested.

The researcher feels that it is high time in Bhutan to practice the adult teaching approach to teach specially the college students. The self-directed learning appears "more in tune with our natural process of psychological development" (Knowles, 1968, p.14) has been realized and felt that andragogy is necessary in Bhutanese colleges and universities.

So the reason for this study was to investigate/learn about the perspectives and preference of lecturers and students regarding the andragogy and pedagogy, learn about the shifting balance between these methods in teaching and examine the possibility of recommending andragogy in SCE. The researcher also perceived that in Bhutanese colleges and universities, it has been highly needed to apply the four postulates of Knowle's theory (as stated by Thomas (2008)) that adults need to be involved in the planning and evaluation of their instruction (Self-concept and Motivation to learn); experience (including mistakes) provides the basis for learning activities (Experience); adults are most interested in learning subjects that have immediate relevance to their job or personal life (Readiness to learn) and adult learning is problem-centered rather than content-oriented (orientation to learning). These postulates obviously help college and university students own the ownership of learning through independent and freedom of learning.

Lecturers of SCE are applying the blended of andragogy and pedagogy, but would not know to distinguish them and deal accordingly. This article informs and enable the lecturers of colleges and universities to make a clear distinction between these methods, so that they would apply in their lessons accordingly. In an andragogical lesson there is less lecturing, demonstrating and monitoring task of tutor in comparison to that in pedagogical lesson. It is because, andragogy is focused more in independent study of students whereby tutor's manual workload gets reduced. However, it is equally not so easy to prepare such lesson plans. A tutor has to be really versatile and champion in conducting an andragogical lesson. In andragogical lesson plans, a tutor has to invest more inputs. Eventually, students also will have to learn in more of learning by doing approaches.

This motivates lecturers to apply more of andragogical lesson in their teaching styles. If the lecturers apply more of andragogical styles of teaching then this will lead students to become more independent learners. Students becoming more independent learners means they are realizing the importance of ownership of learning. Students realizing the ownership of learning indicates an improvement in quality of education.

In 1833 the concept of andragogy was invented in the West and it was flourished worldwide by Malcolm Knowles in 1968. Still in Bhutan it is not so much popular. However, it is very much useful for adult teachings. Therefore, this articles educates lecturers and students of colleges and universities towards striving for quality education. This study has discovered that limited no.of researches has been done in adult teaching-learning approaches, but no one has so far done research in shifting balance of teaching between andragogy and pedagogy. So there is still a high scope for researchers to fill this gap. These findings also have implications for educators involved in designing online learning applications and will be used to develop a prototype of individualized online learning environment based on the pedagogy and andragogy.

## Literature Review

The word “andragogy” was first coined in 1833 by Alexander Kapp (1800–1869), a German teacher (Loeng, 2017). In Greek, ‘andra’ means ‘grown-up man’ and ‘andragogy’ means ‘man-leading’ whereas ‘peda’ mean ‘child’ and ‘pedagogy’ means ‘child-leading. Knowles (1968) stated, ‘andragogy is the art and science of helping adults learn whereas pedagogy is the art and science to teach children in a teacher-directed approach’.

According to Savicevic (1981) (as cited in (Knowle, 1968)), several European countries, such as Hungary, Poland and Yugoslavia also had used the term prior to 1968. Hungarian educators place teaching and learning within an overall system called “anthropogogy”. This system is subdivided into andragogy (concerned with adult education) and pedagogy (dealing with youth education). This gave the researcher an insight on distinction between teaching methods to different levels of students.

Hiemstra & Sisco (1990) clearly specified that in a pedagogical model a teacher has full responsibility for making decisions about: what will be learned, how it will be learned, when it will be learned, and if the material has been learned. They also sketched an outline of the development of andragogy in the field of education: andragogy as a system of ideas, concepts and approaches to adult learning was first introduced to adult educators in the United States by Knowles in 1968.

Mezirow (1994) stated “Educators should actively assist those already going through transformations in learning and may participate transformative learning as well”. Lecturers have vital role to guide the college students in helping them learn the in-depth knowledge, skills and wisdoms, thereby enabling them become independent learners. This became another motivational factors for the researcher to arouse a sense of curiosity to study about the shifting balance between andragogy and pedagogy.

Corner (2008) (as cited in (Knowle, 1968)), added that the five didactic principles be observed by a teacher before applying an andragogical approach to formal learning: (1) learners must know why something is important to learn, (2) learners must be shown how to direct themselves through seeking and gaining information, (3) topics must be related to the learners’ experiences, (4) people will not learn until they are ready and motivated to learn, and (5) teachers must help learners overcome inhibitions, behaviors and beliefs about learning.

Andragogy is a learner centered method to teach adults. It is mostly applicable in tertiary level of education: colleges and universities. Pedagogy is a teacher centered method. It is mostly applied in schools: Primary to Higher Secondary. Shifting balance means maintaining the balance of application of andragogy and pedagogy in teaching-learning process. More generally, a blend of these methods (Nicholas and O’Brien, 2008) is applied at tertiary level of education. The teaching styles of lecturers in colleges and universities shifts from andragogy to pedagogy and vice versa, balancing their application. So that teaching can be done effectively.

A similar type of study in Malaysia informs that a blend of andragogy and pedagogy (Nicholas and O’Brien, 2008) is practiced in higher institutions in Malaysia. Norah et al. (2012), claims that andragogical and pedagogical assumptions should be utilized in moder-

ation based on the student preference. Some student preferred learning based on the pedagogical principles orientation while the others do not. Majority of the undergraduate students are found preferred a combination of pedagogical and andragogical orientation on their learning process. Undergraduate students are able to work independently since their self-concept has progressed to the self-directed learning practice. Norah et al. (2012) `s findings also do not highlight exactly how the shifting balance takes place between these methods in higher institutions in Malaysia.

Above mentioned literature inform that in USA, Malaysia and many European countries, there is a clear distinction of teaching methods whereas in Bhutan so far the system of following a distinction in teaching methods has not been established. According to Gyamtsho and Maxwell (2013), the teaching methods practiced in the five colleges of Royal Universities of Bhutan (RUB) has been stated in two approaches: teacher centred and learner centred. When we say teacher centred, it normally focuses on pedagogy (teacher directed) and the "learner centred" is not exactly an andragogy. So the findings of Gyamtsho and Maxwell do not highlight a clear distinction between andragogy and pedagogy, and the shifting balance of teaching styles of lecturers in the colleges of RUB. Whatever methods applied in Bhutanese schools and institutes are simply called as pedagogy. In fact, andragogy is an approach to teach the intrinsic values of subject to the adult learners through teachers` motivation and inspiration. If this is done properly then the students will realize the ownership of learning. The present study is informed by the above literature and observations.

### **Research question and objectives**

The study attempted to answer the following main question: How is the shifting balance taking place between andragogy and pedagogy in SCE?

The following sub-questions were the set to address the above question:

- a) What are the perspectives of lecturers and students regarding andragogy and pedagogy?
- b) What are the benefits of andragogy?
- c) How does the shifting balance between andragogy and pedagogy take place in SCE?
- d) Which is preferred: andragogy or pedagogy?

### **Research Method**

Since it was an evaluative study on teaching –learning process in SCE, a mixed method comprised of survey questionnaires (with quantitative and qualitative items), observation of classroom teachings and interviews was employed. Survey questionnaires and interviews provide in-depth understanding on perceptions and preferences of the respondents. So these two tools were used to collect information from the respondents on their perceptions about andragogy and pedagogy and to see their preferences among these in teaching-learning in SCE. Triangulation in the process of analysing data gives a clear picture on an evaluative study. It confirms the information provided by the respondents which helps researchers analyse and get the correct findings. Therefore, observations on classroom teaching scenarios were done which not only informed about how the lecturers used these methods in lessons, but also informed about how the students were learning.

### Samples: Students

The data collected through survey questionnaires were quantitative and less qualitative items. So in order obtain a suitable sample size, the Taro Yamane (1967) (cited in Samdrup, 2013) was used as shown below:

$$\text{Taro Yamane's formula: } n = \frac{N}{1 + N * e^2}$$

Where:

n= number of samples of students / lecturers,

N= total number of students/ lecturers and

e = standard error of not more than 0.05 confidence level.

Calculation of students' sample size: N= 961 (Annual Report, 2014); e = 0.05.

$$n = \frac{N}{1 + N * e^2} = \frac{961}{1 + 961 * (0.05)^2} = 282 \text{ i.e. } 29.34\% \text{ of the total number of students.}$$

The actual number of students (N=148) participated in survey questionnaires falls short by 47.52 % from the intended sample size (N=282). The reason was that, during the time of data collection, 300(Three hundred) Bachelor of Education (B.Ed.) students were on teaching practicum in schools. This is a normal practice in SCE that every year about 300 B.Ed. students are placed in different schools in Bhutan on their teaching practicum for six months. Besides, the first year B.Ed. students are not included in this study since they were newly admitted and it was assumed that they would not know the system of the college. However, students' sample being homogeneous, a small sample size would have been enough to represent the entire student population of the college for this study. So a stratified sampling of the study population was of students from the second, third, fourth year B.Ed, and Post graduate Diploma in Education (PgDE) who were present in the college.

Correlation coefficient denoted by 'r' is a numerical value used to measure the degree of a statistical relationship between two variables. For example, variables in this study are the means of the parameters: perception, preference, shifting balance and benefits in context to andragogy and pedagogy and their application in teaching-learning process in SCE. In order to see the relationship between the mean of students and that of lecturers in measuring the perception on andragogy and pedagogy working together in shifting balance at SCE, Pearson's correlation formula (as shown below) was used to calculate the correlation coefficient 'r'.

$$r = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{[N\sum x^2 - (\sum x)^2][N\sum y^2 - (\sum y)^2]}}$$

Where:

- N = number of pairs of scores
- $\sum xy$  = sum of the products of paired scores
- $\sum x$  = sum of x scores
- $\sum y$  = sum of y scores
- $\sum x^2$  = sum of squared x scores
- $\sum y^2$  = sum of squared y scores

$\sum$ = symbol for summation. Nearer the value of 'r' to 1, stronger the relationship between the two means.



**Samples: Lecturers.**

The lecturers' sample size was calculated to be 38 of the total 42 lecturers (Annual Report, 2014). Calculation of students 'sample size:  $N= 42$ ;  $e = 0.05$

$$n = \frac{N}{1 + N * e^2} = \frac{42}{1 + 42 * (0.05)^2} = 38 \text{ i.e. } 90.47 \% \text{ of the total number of lecturers.}$$

The actual number of lecturers respondent was 27 i.e. 62.28% of the total lecturers. The variation in teaching styles and the effectiveness in teaching of lecturers differ significantly with respect to their seniority in teaching experience. So a stratified sample size of the lecturers comprising representative from three different categories: Senior, moderately senior and junior lecturers was chosen.

**Data collection and analysis procedures****Quantitative data collection and analysis**

Before executing the survey questionnaire, participants were briefed on the meaning, definition and distinction of the terms 'andragogy' and 'pedagogy'. Such details were also given in the very first section of the survey questionnaire. Equipped thus with enough background regarding 'andragogy' and 'pedagogy', the participants took part in this study even though 'andragogy' was new term to them.

This study did not require gender difference of the respondents. The samples was homogenous. Twenty three items were used in the survey questionnaires. The data collected in each item was measured using the Likert-type rating scales in five different levels of agreement:

Strongly Disagree (SD) =1; Disagree (D) =2; Slightly Agree (SLA) =3; Agree (A) =4 and Strongly. To determine the overall ratings, the interval mean mid-scores was calculated, based on the number of interval levels each Likert-type scales were composed of, by using the following equation:

$$\text{Interval} = \frac{\text{Highest level score} - \text{lowest level score}}{\text{Number of levels}}$$

For example, following denotations for mean scores and the abbreviations have been applied in all the tables of scores of agreement level for easy interpretation of data:

Mean scores:

1.00 - 1.80= strongly disagree (SD)

1.81 - 2.60 = disagree (D)

2.61 - 3.40= slightly agree (SLA)

3.41 - 4.20 = agree (A)

4.21 - 5.00= strongly agree (SA).

sd =standard deviation; m = mean; OA-level= overall agreement level

The data were analysed using MS Excel 2007. To obtain a quantitative measure of respondents' perception, above mentioned Likert-type rating scales was used in the questionnaire. These rating scales were used as the basis for calculating the mean scores (m) and standard deviation (sd) of the various statements. Referring to Briggs cited in (Soley-



Bor, 2013), the number of missing data from each variable has been removed from the data analysis. The observed sample size has been used in computation of the required statistical parameters: mean and standard deviation.

### **Qualitative data collection and analysis**

The participants took part in this study even though the term 'andragogy' was new to them. Ten lecturers participated in observations and interviews: The classroom teachings (each teaching period being of one hour duration) of three senior most, six moderate senior and one junior lecturers were observed. Semi-structure interviews were conducted with these lecturers immediately after the observation of their classroom teachings. Two senior students participated in interviews. In order to shed more light on the data collected, the audio/video of semi-structured interviews conducted with two lecturers and the two senior students have been recorded.

The coding of qualitative data gathered from the interviews, qualitative items in the survey questionnaires and the audio/video recordings were analysed for emerging themes in the perspectives of andragogy and pedagogy working together in shifting balance

### **Data presentation and findings**

This article presents the data and finding in the following sequence based on the mean and standard deviation scores:

First, it presents the quantitative data and findings from the survey questionnaires: perceptions of students on andragogy and pedagogy, shifting balance of teaching style of lecturers between these methods and the benefits of application of andragogy, followed by students' preference among these two methods. Second, in the same way, it presents the quantitative data and findings from the lecturers' information. Third, it reports on overall mean scores, discussion, conclusion and recommendation from this study on quantitative data analysis. Fourth, it presents the qualitative data and the findings, conclusions and recommendations from observations of classroom teachings scenarios of lecturers and the interviews.

### **Data presentation and findings from survey questionnaire**

#### **Perception of students on pedagogy and andragogy at SCE(Table 1)**

Based on the mean and standard scores, the three most agreeable statements: in pedagogical approach, motivation to learn is through external pressure such as parents, teachers, competition for grades & fear of failing in exams where as in andragogical approach it is intrinsic (  $m=4.14$ ,  $sd=4.51$  ); andragogy provides scopes of becoming more independent learner ( $m=4.12$ ,  $sd=4.53$ ) and shifting from pedagogy to andragogy helps students become more responsible citizen ( $m=4.02$ ,  $sd=4.23$ ) showed that the means are quite high and close to each other than that of the other six statements in the table 1. On other hand, the standard deviations of these statements are quite low but almost equal to the means.

This indicates that quite high no.of students agree with these statements showing less variation in their perceptions on these methods of teaching (andragogy and pedagogy).

**Table 1: Scores of agreement level on the perception of students on andragogy and pedagogy (N=148)**

Sl#	Statement	m	sd	OA-level
1	The ownership of learning is more in andragogy than in pedagogy.	3.93	4.04	A
2	The backbone of pedagogy is transmission techniques where as that of andragogy is transformational.	3.91	4.19	A
3	In pedagogical approach, motivation to learn is through external pressure such as parents, teachers, competition for grades & fear of failing in exams whereas in andragogical approach it is intrinsic.	4.14	4.52	A
4	In pedagogical approach it's the instructor's responsibility to cover all the content of the curriculum where as in andragogical approach the instructor is a facilitator or resource person.	3.97	4.24	A
5	Shifting from pedagogy to andragogy helps students become more responsible citizen.	4.02	4.23	A
6	Andragogy helps learners realize why they are learning something where as pedagogy doesn't.	3.60	3.70	A
7	Students of SCE are adults and tend to be self-directing.	3.70	3.81	A
8	Andragogy provides scopes for becoming more independent learner.	4.12	4.52	A

Similarly the least agreeable statements: andragogy helps learners realize why they are learning something whereas pedagogy doesn't ( $m=3.6$ ,  $sd=3.70$ ) and the students of SCE are adults and tend to be self-directing ( $m=3.7$ ,  $sd=3.81$ ) are quite close to their respective means in comparison to that of the other six statements. Standard deviations being close to the means, it is quite small.

This indicates that quite a high no. of students agree with these statements showing less variation in their perceptions on andragogy and pedagogy.

The overall agreement levels indicated that all the statements were at the agree (A) level: mean score 3.41 - 4.20 where most of the perceptions were close to 4.20. There are no strong agreements; neither is there any disagreement.

Therefore, an assumption can be made that there is less variation in these perceptions of the respondents whereas the variation in other six perceptions were quite high.

### **Students' perception on the shifting balance between pedagogy and andragogy (Table 2)**

Except the statement (the least agreeable): most of the time tutor's lesson is moving from andragogy to pedagogy ( $m=2.92$ ,  $sd=4.04$ , SLA) other three statements are within agree (A) level within the range of mean score 3.6 to 3.73. There are no strong agreements; neither is there any disagreement on this statement.

This indicates that there is very high variation in the perceptions of students on the shifting balance between andragogy and pedagogy (shown in all four statements). However, except the least agreed statement, other three indicates that most students think shifting balance is taking place from pedagogy to andragogy. It can be assumed that there is less variation in this perception.

**Table 2: Students` perception level on the shifting balance between pedagogy and andragogy (N=148)**

Sl#	Statement	m	sd	OA-level
1	Most of the time tutor`s lesson is moving from pedagogy to andragogy.	3.73	4.14	A
2	Most of the time tutor`s lesson is moving from andragogy to pedagogy.	2.92	4.04	SLA
3	I want the shift of teaching method from pedagogy to andragogy.	3.60	4.02	A
4	I need more of andragogical lesson.	3.71	4.03	A

**Students` perception on benefits of andragogy (Table 3).**

Based on the mean scores, the study has indicated that all the statements given in the following table 3 are at agree (A) level within the range of mean scores 3.41 - 4.20. There are no strong agreements; neither is there any disagreement.

The sd of all the statements were very high ranging from 4.28 to 4.75 except the statement: andragogy reduces the teaching workload of tutors ( $m=3.8$ ,  $sd=3.97$ ). This indicated that the no.of students agreeing this statement is very high with this statement but there is a less variation in the perception of students even though the overall agreement level was agree (A).

**Table 3: Scores of Students` perception level on how beneficial andragogy is for them (N=148)**

Sl#	Statement	m	sd	OA - level
1	Andragogy reduces teaching workload.	3.86	3.97	A
2	Andragogy helps me become more reflective.	3.96	4.52	A
3	Andragogy helps me become more independent.	3.94	4.75	A
4	Andragogy helps me become more resourceful.	4.04	4.64	A
5	Andragogy provides me with unlimited learning scopes.	3.97	4.28	A

**Students` preference (Table 4)**

Based on the mean and sd scores the most agreeable statements presented are: I prefer andragogy to be applied by tutors ( $m=3.73$ ,  $sd=3.92$ ) and I prefer andragogy because it helps me become self-directed ( $m=3.69$ ,  $sd=4.08$ ). The least agreeable statement was: I prefer pedagogy to be applied by tutors in SCE ( $m=2.95$ ,  $sd=3.67$ ). There are no strong agreements; neither is there any disagreement. Among the four statements, the second statement with ( $m=3.69$ ,  $sd=4.08$ ) had the highest variation in the preference of the respondents. The overall agreement level of all the statements also indicated that the variation in the preference of respondents was quite high. Thus an assumption can be made that there is a very high variation in this perception of students.

**Table 4: Scores of students' preference level on teaching Method: pedagogy or andragogy (N=148)**

Sl#	Statement	m	sd	OA-level
1	I prefer pedagogy to be applied by tutors in SCE.	2.95	3.67	SLA
2	I prefer andragogy to be applied by tutors in SCE.	3.73	3.92	A
3	I prefer pedagogy as it helps cover syllabus easily.	3.11	3.81	SLA
4	I prefer andragogy because it helps me to become self-directed.	3.69	4.08	A

**Perception of lecturers on pedagogy and andragogy at SCE (Table 5)**

Based on the mean and sd scores the most agreeable statement was: the ownership of learning is more in andragogy than in pedagogy ( $m=3.93$ ,  $sd=9.27$ ) whereas the least agreeable was: Andragogy helps the learners realize why they are learning something where as pedagogy doesn't ( $m= 3.07$ ,  $sd=9.72$ , SLA). However, rest all statements were in overall agreement level 'agree (A)' within the mean score range of 3.56 to 3.85. There are no strong agreements; neither is there any disagreement. The sd in all the statements are very high ranging from 9.27 to 12.63(table 5).

This indicated that a large no.of lecturers agree with these statements, but there is a very high variation in the perceptions. (See the Table 5 in the following)

**Table 5: Scores of lecturers' perception level on andragogy and pedagogy at SCE (N=27).**

Sl#	Statement	m	sd	OA-level
1	The ownership of learning is more in andragogy than in pedagogy.	3.93	9.27	A
2	The backbone of pedagogy is transmission techniques where as that of andragogy is transformational.	3.85	12.63	A
3	In pedagogical approach motivation to learn is through external pressure such as parents, teachers, competition for grades & fear of failing in examinations where as in andragogical approach it is intrinsic.	3.59	10.34	A
4	In pedagogical approach it's the instructor's responsibility to cover all the content of the curriculum where as in andragogical approach the instructor is a facilitator or a resource person.	3.67	11.36	A
5	Shifting from pedagogy to andragogy help the student-teachers become more responsible citizen.	3.78	10.95	A
6	Andragogy helps the learners realize why they are learning something where as pedagogy doesn't.	3.07	9.72	SLA
7	Students of SCE are adults and tend to be self-directing.	3.56	10.47	A
8	Andragogy provides scopes of becoming more independent learner.	3.78	9.60	A

### Lecturers' perception on the shifting balance between pedagogy and andragogy (Table 6)

Based on the mean scores of perceptions of lecturers, slightly agreeable statement ( Table 6 ) indicated was : most of the time my lesson is moving from andragogy to pedagogy ( $m=2.85, sd=11.35$ ), and the rest all statements were in overall agreement level 'agree (A)' in the mean score range of 3.44 to 3.77. There are no strong agreements; neither is there any disagreement. The sd in all statements are very high ranging from 10.36 to 11.35.

Thus an assumption can be made that the variation in the perception of lecturers on the shifting balances between andragogy and pedagogy was very high.

**Table 6: Scores of students' perception level on the shifting balance between andragogy and pedagogy (N=27)**

SI#	Statement	m	sd	OA-level
1	Most of the time my lesson moves from pedagogy to andragogy.	3.44	11.35	A
2	Most of the time my lesson is moving from andragogy to pedagogy.	2.85	10.42	SLA
3	I want to shift my teaching method from pedagogy to andragogy.	3.77	10.36	A
4	Students of SCE need more of andragogical lesson.	3.56	10.45	A

### Lecturers' perception on the benefits of andragogy (Table 7).

Based on the mean and sd scores, the study has shown that all the statements were at agree (A) level within the range of mean scores 3.41 - 4.20 (Table 8). However the only statement with SLA was: Andragogy reduces the teaching workload of tutors ( $m=3, sd=10.10$ , SLA), but still its sd is very high. There are no strong agreements; neither is there any disagreement. The sd in all the statements were found to be very high ranging from 10.104 to 15.27.

Thus an assumption can be made that the variation in the perception of lecturers on the benefits of andragogy is very high.

**Table 7: Scores of lecturers' perception on benefits of andragogy (N=27)**

SI#	Statement	m	sd	OA-level
1	Andragogy reduces the teaching workload of tutors.	3.00	10.10	SLA
2	Andragogy helps students become more reflective	3.89	14.11	A
3	Andragogy helps students become more independent	4.00	15.27	A
4	Andragogy helps students become more resourceful.	3.89	14.12	A
5	Andragogy provides the learners with unlimited learning scopes.	4.00	11.61	A

### Lecturers' preference (Table 8)

Based on the mean and sd scores indicated that the only agreeable statements presented was: I prefer andragogy because it helps students become self-directed ( $m=3.93$ ,  $sd=10.70$ ), rest all statements were at slightly agree level (table 8).

However, the mean score of all the statements is ranging from 3.04 to 3.93(very high) and the sd is from 9.71 to 10.88 (very high). Both the statements: I prefer pedagogy to teach in SCE ( $m=3.6$ ,  $sd=9.71$ ) and I prefer andragogy to teach in SCE ( $m=3.26$ ,  $sd= 10.55$ ) indicated equal preference (based on the equal mean) of the lecturers, but the variation (sd) of their perception is higher in the second statement.

Thus an assumption can be made that there was a very high variation in the prefer-ence of lecturers on their preference. (See the Table 8 in the following)

**Table 8: Scores of lecturers' preference level on teaching method: andragogy or pedagogy (N=27)**

Sl#	Statement	m	sd	OA-level
1	I prefer pedagogy to teach in SCE.	3.26	9.71	SLA
2	I prefer andragogy to teach in SCE.	3.26	10.55	SLA
3	I prefer pedagogy as it helps cover syllabus easily.	3.04	10.88	SLA
4	I prefer andragogy because it helps the students become self-directed.	3.93	10.70	A

### Overall mean scores

Among all the 23 statements measured, the highest mean score (Table 9) was recorded on the statement: Most of the modules at SCE need to be taught by applying both andragogy and pedagogy equally ( $m= 4.24$ ,  $sd= 4.46$ ), agreeable perception of students. Same statement had an agreeable perception of in the statement ( $m=4.22$  and  $sd=11.031$ ) of lecturers. It was followed by the statement: In pedagogical approach, motivation to learn is through external pressure such as parents, teachers, competition for grades & fear of failing in exams where as in andragogical approach it is intrinsic ( $m=4.14$ , $sd=4.52$ ), agreeable perception by students.

The least agreeable mean score was on the statement: Most of the time my lesson is moving from andragogy to pedagogy ( $m=2.85$ ,  $sd=10.424$ ), agreeable perception by the lecturers followed by the statement,: Most of the time tutor's lesson is moving from andragogy to pedagogy ( $m=2.92$ ,  $sd=4.043$ ) agreeable perception by students. This indicated that the lower mean score is close to 4 and upper mean score is greater than 4.

**Table 9: Highest and lowest mean scores on the overall perception and preference (Students=148, lecturers=27)**

Rank by levels of mean score	Perceptions	m	sd
1	Most of the modules at SCE need to be taught by applying both andragogy and pedagogy equally (students).	4.24	4.46
2	Most of the modules at SCE need to be taught by applying both andragogy and pedagogy equally (lecturers).	4.22	11.03
3	In pedagogical approach, motivation to learn is through external pressure such as parents, teachers, competition for grades & fear of failing in exams whereas in andragogical approach it is intrinsic.	4.14	4.52
	<b>17 other statements</b>		
21	Most of the time my lesson is moving from andragogy to pedagogy.	2.85	10.42
22	Most of the time tutor`s lesson is moving from andragogy to pedagogy.	2.92	4.04
23	I prefer pedagogy to be applied by tutors in SCE.	2.95	3.67

## Discussion

According to Mezirow(1994), a proper guidance to the adult learners who are in transformation stage will lead them to transform themselves into an independent learners thereby enabling them realize the importance of ownership of learning.

The correlation coefficient ( $r = 0.2600$ ) calculated using Pearson`s correlation formula, of the overall means of perceptions of students and lecturers indicated that they knew at least something about the concept and practice of andragogy and pedagogy at SCE: Lecturers were found agreeing slightly with the statement: andragogy helps the learners realize why they are learning something where as pedagogy doesn`t ( $m=3.07$ ,  $sd=9.72$ , SLA, Table 5), rest all statements were at agree (A) level. It can be assumed that pedagogy also can make learners realize why they are learning something. However the overall agreement: Most of the modules at SCE need to be taught by applying both andragogy and pedagogy equally (students) ( $m=4.24$ ,  $sd=4.46$ , Table 14) indicates that both (andragogy and pedagogy) need to be applied equally in SCE.

The overall agree level of students` perception as well as that of lecturers on the shifting balance between pedagogy and andragogy was found to be agree (A) with only one statement: Most of the time tutor`s lesson is moving from andragogy to pedagogy ( $m=2.92$ ,  $sd=4.04$ , Table 9), at slightly agree (SLA) level. It means, an assumption can be made that both the groups of respondents have a slightly agreeable perception such that



there is a shift from andragogy to pedagogy in the teaching styles of lecturers. On other statement: Most of the time tutor's lesson moves from pedagogy to andragogy ( $m=3.73$ ,  $sd=4.14$ ), indicates that shift from pedagogy to andragogy in the teaching styles of lecturers is not so much since the variation ( $sd$ ) in their perceptions is very high even though there is no significant difference between the mean scores of both the groups of respondents.

The correlation coefficient ( $r = 0.10904$ ) of perceptions of both the students and lecturers on shifting balance between andragogy and pedagogy and vice versa is positive (not so high). It means both groups have the same perceptions that there is a shifting balance of teaching style between these two methods.

Following findings indicate that both the groups are in agree level (A) in the Overall Agree Level with a slight difference in the means. However, the variation in perceptions among lecturers is very high: Students (Table 3): I need more of andragogical lesson ( $m=3.71$ ,  $sd=4.03$ , A) and Lecturers (Table 6): Students of SCE need more of andragogical lesson ( $m=3.56$ ,  $sd=10.45$ , A). This indicates that students ( $m=3.71$ ) are more positive to shifting from pedagogy to andragogy in the teaching styles of lecturers ( $m=3.56$ ) at SCE.

The correlation coefficient  $r = 0.7611$  (of the degree of relationship) was the highest among all the correlation coefficients in the perceptions of both students and lecturers on benefits of andragogy. This indicated that andragogy is extremely beneficial to both students and lecturers in SCE.

Study also indicated that the perceptions of students are more agreeable than that of lecturers on the benefits of andragogy. The overall level of agreement of perceptions of the students is agree (A) except the statement: Andragogy reduces the teaching workload of tutors ( $m=3.86$ ,  $sd=3.97$ , Table 9), was agreed slightly by the lecturers. It indicated that students were more positively accepting the statement whereas lecturers ( $m=3$ ,  $sd=10.10$ , SLA, Table 7) accepted only slightly. According to Knowle's theory of adult learning, stated by Thomas (2008), andragogy helps students become independent, reflective and resourceful, but this significant variation in the means and  $sd$  of students and lecturers could be due to huge difference in their sample size: Students ( $N=148$ ) and lecturers ( $N=27$ ).

However the correlation coefficient ( $r = 0.7611$ ) of the two independent means scores of these groups of respondents indicated that the degree of relationship in their perceptions on the shifting balance between andragogy and pedagogy was found to be extremely high. It means an assumption can be made that there was lots of benefits of andragogy to students and lecturers of SCE. It was found that both groups prefer andragogy over pedagogy as per the correlation ( $r = 0.2415$ ) of the mean scores of their preference. However the further study of the statement: I prefer andragogy to be applied in SCE, the scores of students ( $m=3.73$ ,  $sd=3.92$ , A, Table 4) and the scores of lecturers ( $m=3.26$ ,  $9.71$ , SLA, Table 8) indicated that the students prefer andragogy more than the lecturers do. However, the overall agreement level for the preference of andragogy and pedagogy has been seen just a slightly agreeable (SLA) indicating that both groups do not have very strong preference to either even though they have quite good positive correlation.

RUB applies two approaches in teaching: teacher centred and learner centred (Gyamtscho and Maxwell (2013)), in Malaysia a blend of andragogy and pedagogy (Nicholas, S. and O'Brien, T. 2008) is practiced in higher institutions in Malaysia (Norah et al. 2012)

and this study indicates SCE has the shifting balance of teaching styles of lecturers in between andragogy and pedagogy.

### **Conclusion and recommendation from the Quantitative Data Analysis**

The overall perception of the respondents indicated that the students and lecturers knew at least something about the existence of andragogy and pedagogy in the teaching-learning process at SCE. Students were found to prefer andragogy to be applied in SCE. Study also indicated that there were lots of benefits of andragogy for both students and the lecturers. So a module on andragogy could be recommended to be offered in SCE.

Even though the existence of both andragogy and pedagogy in the teaching-learning process in SCE has been understood, the co-existence of these two teaching methods embedded in a lesson was not realized by the respondents. Therefore, an assumption can be assumed that there is co-existence between andragogy and pedagogy in SCE, but due to the high variation in the perceptions of students, the shifting balance between andragogy and pedagogy in the teaching styles of lecturers could not be confirmed.

Therefore, in general, both andragogy and pedagogy are blended in application in a lesson (Nicholas and O'Brien, 2008) has been indicated in the perceptions of the respondents. So the lecturers of SCE may be trained in shifting balance between andragogy and pedagogy.

Since the mean score ( $m=3.93$ ) for both the respondent groups was same for the statement: the ownership of learning is more in andragogy than in pedagogy, an assumption can be made that andragogy should be given more importance in SCE. The study indicated that there is a shifting balance between andragogy and pedagogy in SCE.

### **Qualitative Data Presentation and Findings**

The data and findings from observations are presented in the sequence senior, moderate senior and junior lecturers. Similarly a summary interpretation of the findings from observations has been presented in the same sequential manner. The data and findings from interviews are presented in the sequence of the three questions asked (mentioned in the interview section of this article) Conclusion and recommendation mention the findings of these qualitative data analysis.

### **Observations of Lecturers' class room teachings**

Observations confirm the information provided by the respondents in the survey questionnaires and interviews. So it was intended to observe classroom teaching scenarios of ten lecturers in order to get the information for triangulation process of analysis. It was not intended to interview only ten lecturers, but during the time of data collection only these ten lecturers were available for interview. Three senior, six moderate senior and one junior lecturers were observed to study how they applied andragogy and pedagogy in their classes of teaching period for one hour each. Following are the results of this study.

### **Senior lecturers' classroom teaching**

The three senior lecturers' classroom teaching styles were more of andragogical. Either the students knew some background of the lesson beforehand or they had high level of maturity of understanding the situation. Their lesson topics were: Role of Language in community and cultural difference, Human values and Techniques to Write Expository Essay respectively.

The andragogy seen in these observations were: role play, simulation and dramatization under teacher's direction, the interview approach without teacher's direction, student's discussion in small groups on their own within a prescribed time, lecture cum demonstration, asking open ended questions such as "How to construct an idea of role play?, can you think of one best actor and actress to show off here?, analyse the story and note down the themes shown in the story such as cultural themes etc.". In one of the lessons, a small group test was conducted. One lecturer taught how to map three concepts by the triangulation approach. The lesson content was quite appropriate for andragogy. For assessment, the lecturers asked few open ended questions spread over the class.

The pedagogy seen in these observations comprised: use of ICT, prompting, additional information input, it bits/anecdote, lecture cum demonstration, questioning techniques and the use of local language familiar and easy for students to understand the concept.

### **Moderate senior lecturers` classroom teaching**

Six moderate senior lecturers` classroom teaching styles were seen to be mostly traditional such as recapitulation, making connections, introducing the current lesson topic, lecturing cum demonstration, students hands- o n- practice under the teachers` guidance and sometimes without the teacher`s guidance. The subjects taught by them were Physics, Mathematics, Geography, Socio-dramatic Play and Life Skills. The Science and Mathematics lesson were completely content based using lecture cum demonstration.

The andragogy seen in these lessons were: identification of a hummed tune, discussion of the given materials, independent thinking, open discussion and reaching a solution, presenting the solution on charts, students` asking questions and the teacher answering them. The lesson content was quite suitable for andragogy. To assess students, the lecturer used basic questioning technique spread over the class.

The pedagogy seen in these observations were: teacher directed activities, teacher explaining every detail of the issues, giving a series of instructions, directing individuals/groups to present their work, outlining the lessons, solving problems to show examples on how to solve problems, and the use of ICT.

### **Junior lecturer`s classroom teaching**

The junior lecturer`s classroom teaching was observed on a mathematics lesson. The topic was new to the students. The style of teaching applied by the tutor was 100% teacher directed. The teacher did everything on the chalk board, students were just looking, listening and sometimes noting. There was hardly any activity or students` independent thinking. Every problem was solved by the tutor. Besides these, assessment was seldom done. Neither blend of andragogy and pedagogy was seen applied nor was andragogy seen applied. It was fully pedagogy only.

### **Summary Interpretation**

The senior lecturers tried the blend of andragogy and pedagogy till the learners achieved adequately the lesson objectives. After having ensured students` understanding of the subject they tried to incline slightly towards the andragogical approach giving more independence and freedom to explore further by students. Students were seen happy, contented and interested in the class with the way the teaching-learning took place. This was evidenced by their willingness to volunteer to present ideas/learnt lesson or take up the responsibility for

carrying out the assignments. At the end of the class, some students expressed their excitement and enthusiasm for the day's lesson. Especially when the lecturers shifted their approach towards andragogy such as by letting students perform the tasks on their own based on the ideas taught, they were seen to be more active, energetic and excited since they were acquainted with the background of the task through the pedagogical approach of the lecturers.

The moderate senior lecturers were seen applying both approaches within the lesson. They were found keeping the shifting balance continuous between andragogy and pedagogy, sometimes more towards pedagogy. If the learners have understood the lesson then that was the end of their lesson of the day. It means the independence and freedom of learning for students were comparatively less than that seen in the senior lecturers' lesson. Students were seen happy, contented and interested in the class with the way the teaching-learning took place. This was evidenced by their willingness to volunteer to present ideas or to sum up the lesson or take up responsibility for carrying out assignments.

The junior lecturer's lesson was fully in a teacher directed approach. It was mostly pedagogical: such as no sign of any blend of andragogy and pedagogy. The only reaction of students included: doubtful facial expression, no questions asked, no voluntarily answering the teacher's questions and most of them were silent. The lesson content was suitable for the pedagogical approach since the key concepts were new to the learners and a bit abstract for them to understand. Andragogy was not seen.

The conclusion from the observations of Lecturers' class room teachings, is that andragogy is in fact practiced in SCE classrooms. There is a seniority-based progression in the 'amount' of the practice of andragogy. It follows that one has to be well versed in his/her teaching area with adequate experiences in order to effectively handle the shifting balance between andragogy and pedagogy. Those lecturers who adopt andragogy in their lessons use them just out of their experiences and intuition besides the knowledge of the principles of adult teaching-learning.

## **Interviews**

Through interviews researchers can collect in-depth understandings of qualitative information. The interview conducted with 10 lecturers and two senior students was a semi-structured interview. In order to shed more light on the data collected, the audio/video of semi-structured interviews conducted with two lecturers and two students have been recorded. To explore further, following three research questions were asked that guided the methodology and the data gathering techniques from interviews:

- a) How do andragogy and pedagogy co-exist in the Teaching-Learning Process in SCE?
- b) What could be the possible approaches to make an andragogical lesson?
- c) The difference between ownership of learning in andragogy and ownership of learning in pedagogy.

## Following are the results from interviews

### Co-existence of andragogy and pedagogy

Although Malcolm Knowles` principle on andragogy does not focus on coexistence of andragogy and pedagogy, the following findings indicate andragogy and pedagogy co-exist in the Teaching-Learning Process in SCE.

The responses of the eight lecturers and one student indicate that there is co-existence of andragogy and pedagogy. For example, lecturer 5 said, "I always try to use andragogy and pedagogy by 50-50 even though the final year physics is very difficult to teach in the andragogical approach. The reasons for this are: this module is examination oriented, students are incapable to cope with the contents and the time allotted for this module is limited to cover the syllabus". This means there are many factors to consider to balance the application of these two approaches. For example lecturer 16 said, "According to the nature of the modules, time limit, quality of students, sometimes trying to become more creative, we need to make a shift back and front in between andragogy and pedagogy."

Lecturer 14 justifies the balance of shift. He said, "Firstly lecturers should be aware of "how we teach" then it might lead to student centeredness. In teaching elective modules we must balance the use of these two approaches." lecturer 15 added, "In teaching the professional modules, both approaches should be applied." Some lecturers try to apply equally both across all teaching areas for all the time while some apply only pedagogy or only andragogy or sometimes both according to the nature of the modules he or she teaches.

For instance: Lecturer 13 says he applies mixture of both depending up on the nature of the module. Lecturer 12 says he applies approximately 60% pedagogy and 40% andragogy in his teaching while the lecturer 16 says "I apply andragogy in a range of 50-60% and pedagogy by 5-10%." These figure means some lecturer are slightly tilted towards the application of andragogy whereas some are more towards pedagogy as evidenced by the statement of some participants. For instance the lecturer 11 said, "I apply mostly teacher centered approach".

The responses given by the students were in line to the above statements given by lecturers. For example student 2 said, " Even though in the beginning, tutors in SCE deliver lessons through lecturing with lots of pedagogical approaches, finally they follow the andragogical approaches to cover up the module such as giving assignments , project works , tasks on presentation to be done by students, research work etc. Cooperative learning approaches are seen being implemented in SCE. So there is coexistence of andragogy and pedagogy in the Teaching-Learning Process at SCE".

Thus, these findings indicate there is co-existence of andragogy and pedagogy working together indicating the shift of teaching methodology slightly inclined towards andragogy although in most of the cases pedagogy is used first.



### Possible approaches in andragogy

Lecturers gave different ideas for better approaches of andragogy: In the lecturer 11's point of view, "Research based project work with theoretical frame work and making lessons similar to Place Based Learning(PBL)" helps in making teaching approach more andragogical. Put differently, in a research based lesson, students have self - directedness and freedom of learning by doing. Hands-on-experience is also gained through the PLB model of lessons. This obviously leads them to the induction process of the lesson and thereby they can learn by discovering themselves. PBL is a student-centered approach. According to the lecturer 17 giving more group activities, assignments, maintaining journals and letting students present are more practical approaches of Teaching-Learning Process. This is close to andragogy.

Teaching same class continuously for three consecutive semester obviously enables tutors know more about the student-teachers and identify their weaknesses and strengths. So long-lasting teacher-student relationship may make the teacher feel more secure in applying andragogy. For instance lecturer 12 supplements as follows:

"Same class should be taught minimum for three consecutive semesters, which enables the lecturer to understand more about the student-teachers".

Some lecturers have slightly classified point of views in making a better andragogical lesson. For example teaching professional modules, Post-graduate Diploma in Higher Education (PgDHE) and Distance Education (DE) B.Ed. need more of andragogical approaches. Reason is that professional modules have hardly few abstract content that need to be taught by more of teacher centered approaches, PgDHE students are assistant lecturers of Royal University of Bhutan (RUB) under various colleges. These students are mature and highly qualified. They do not need to be detailed about the subject matters. (DE) B.Ed. students are school in-service teachers undertaking B.Ed. Primary courses in Distant Education mode. So they are also quite mature and have at least some years of teaching experiences. In this regards, the lecturer 14 expresses as below:

Firstly lecturers should be aware regarding how we teach, then it might lead to student centeredness: lessons of professional modules should focus more andragogically. Post-Graduate Diploma in Higher Education (PgDHE) and Distance Education (DE) B.Ed. should be taught fully through andragogy.

Further, the lecturer 2 stated "The mode of instructions and the delivery of lesson for the DE candidates are mostly done in andragogical approaches and it is found to be very compatible and useful approach".

The lecturer 15 said, "Maintaining less number of student-teachers (max.30) in class and making student-teachers realize about andragogy would help make better andragogical teaching." Lecturer 16 supplements "For mature student, design the activity very carefully, more meaningfully and interestingly; fewer students obviously help make lessons more andragogical. So that the ownership of learning in students can be realized."

So some possible approaches worth noting to make teaching andragogical are research based project work, giving more group activities, PLB model of lessons, letting students present, teaching minimum for three consecutive semesters and maintaining less number of student-teachers (max.30) in class.

### **The ownership of learning in andragogy and pedagogy**

As mentioned in the literature, the ownership of learning is more in andragogy than in pedagogy, this study also indicates the same points. For example, lecturer 11 further highlighted such belief below:

I think andragogy and pedagogy, both provide ownership of learning, but comparatively andragogy provides more ownership of learning. The learners at SCE are grown up and can understand the instructions properly. So it has made it easy to teach or help them Learn in andragogical ways. Thus, there is a shift from andragogy to pedagogy at SCE.

Student 1 supplements saying that in-depth learning beyond the prescribed topics takes place in andragogical approach, which is an indication of the ownership of learning of students. For example, he explains, “students can do in-depth learning beyond the prescribed topic. Teachers will be there guiding and helping the learners, but making it a student centered learning environment”.

What I have seen is that both the lecturers and the students show a preference for andragogy: there is shift from pedagogy to andragogy; andragogy is compatible and useful especially for Distant Education; andragogy facilitates student-centred learning and also there is the co-existence of both. Thus this study indicates that the ownership of learning in student-teachers is provided more through andragogical approach by shifting between andragogy and pedagogy and vice versa.

### **Conclusion and Recommendations from the Qualitative Data Analysis**

No matter how good the content is, quality of education depends up on quality of the delivery of lessons. Poor methodology of teaching will certainly add a bad impact on the quality of education. Lecturers and students of SCE have been found to have an adequate knowledge on andragogy and pedagogy and their coexistence in teaching styles depending upon the nature of the subject matter being dealt with. It was confirmed that these two methods of teaching in SCE coexisted. More andragogy and less pedagogy was found applied in teaching professional modules whereas it was opposite in the case of teaching the elective modules. In Distant Education, almost 90% teaching is andragogical. However, students are found to be more interested and prefer andragogy.

The data also indicate that the lecturers of SCE may be trained in andragogy so as to enable them apply it more efficiently in their daily teachings. For this, a module of andragogy is necessary. Whereas SCE has modules like ‘Teaching skills’ and ‘Teaching Strategies’ for pedagogy. Besides there is also adequate amount of resources for pedagogy, there is lack modules or reference materials for andragogy in SCE.



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# Determinants of Financial Performance of Banks in Bhutan: A Case study of Bhutan National Bank Ltd

**Aaditya Pradhan and Krishna Murari**

## **Abstract**

Banking can be defined as an activity of accepting, as-well-as preserving money owned by other individuals and entities. Then banks lend out this money to other needy individuals or corporates in order to earn a profit. The economy of a country mostly depends on how strong their banking system is. This paper highlights the determinants that are responsible for the financial performance of commercial banks presently operating in Bhutan with a reference to Bhutan National Bank. The data collected for this study are from Bhutan National Bank from 2005-16. Multivariate regression analysis is performed on three dependent variables (Return on Assets, Return on Equity and Net Interest Margin) using five independent variables. The result showed that for explaining the determinants of financial performance of Banks in Bhutan, ROA model was considered to be the best as compared with ROE and NIM. The independent variables which had bearing on ROA were Interest income to total income, Interest on loan, Interest expenses to deposit and Credit to deposit ratio.

**Keywords:** *Bhutan National Bank Limited, Return on Assets, Return on Equity, Net Interest Margin, Determinants*

The banking sector plays an important role in channelizing the funds from savers to borrowers. The growth and development of an economy largely depends on the success and efficient functioning of the banking sector. For any sector to survive, profitability of that sector is critical. There are many factors that affect the profitability of banks. These factors are not only bank specific but also industry specific. Banking performance is also affected by the macro economic variables. These variables are GDP of the country, inflation rate, the financial environment and also the development level of a country.

Banks are the financial intermediaries that play an important role in the development of a country's economy by providing different services. It strengthens the economic activities and growth of an economy and is also considered as the back bone of the economy.

This paper aims at determining the factors that are affecting the financial performance of Bhutan National Bank Limited (BNBL). It was established in 1997 with the technical assistance of Asian Development Bank. BNBL operates through 11 branches in the country and it was the first bank to launch ATM service in Bhutan for convenient banking service.

The findings of this paper are based on three different models which consider three different dependent variables; Return on Assets, Return on Equity and Net Interest Margin.

## Review of Literature

The banking sector is considered to be a crucial part of a sustainable economic growth in any economy. However, the performance of banking sectors is affected by many internal and external forces of a country's economy. In the words of Nouaïli, Abaoub, & Ochi, (2015), the performance of banks is measured mainly by two advanced indicators. These are the profitability of assets (i.e. return on assets and return on equities) and the net margin interest. However, the performance of banks cannot only be measured by these two variables. There are other variables that must be considered for the overall performance of banks.

These variables include number of managers, the capital ratio, loans, ownership structure, the expenses management, the liquidity ratio as well as the size of the bank. In the findings of Naifar, (2010) the performance of banks was significantly related to expenses management, ownership structure and bank loans. The banks should also have to consider these factors to be more competitive in the market and this will in turn encourage financial innovation.

An empirical study conducted by Petria, Capraru, & Ilnatov (2015) revealed that credit and liquidity risk, management efficiency, the diversification of business, the market competition and the economic growth have influence on bank profitability, measured by Return on Average Assets and Return on Average Equity. In another study by Tariq et. al. (2014), the authors have explained the banks' profitability by using Return on Equity and Net Interest Margin. The result indicated that the capital strength of a bank was found to have high significance in affecting its performance and was observed to be less risky. This in turn would lead to the banks having higher profit.

Khalifaoui & Saada, (2015), conducted an empirical analysis on the factors affecting the performance of banks in Tunisia. It was found that credit risk management, liquidity, size, and disclosure of credit information are the main determinants of bank performance. In another study by Jabbar (2014), the author has also concluded by stating that the size of banks and adequate capital helps in earning more profit for a firm. The other studies have found that the performance of banks is also affected by the board of directors of banks and its management (Ongore & Kusa, 2013)

The determinants of bank performance can be divided in two factors that is; internal and external factors. Internal factors comprise of microeconomic determinants, while external variables are those which reflect economic and legal environment in which the bank operates. The results of this paper show that size, control and credit quality are the important variables that can determine the performance of bank. The size of banking business is considered to be important factor because larger banks which are expected to promote economies of scale, reduce the cost of gathering and processing information. (Garoui, Sessi, & Jarboui, 2013). Staikouras & Wood (2004) in their study stated that the profitability of banks operating in European countries is influenced not only by those factors related to their management decisions but also by the changes in the external macroeconomic environment. This study contradicts the other studies where the authors have found that the profitability of a bank is affected by the internal business environment (Bhatia, Mahajan, & Chander, 2012; Samad, 2015).

The performance and profitability of bank is not only determined by liquidity, size, credit risk management, etc. but also effected by external forces. Wong et.al (2007), in their

report have presented that when market consolidation take place, the competition of banks decreases in that place by increasing the profitability of the firm. On the other hand, cost efficiency is positively correlated with bank's profitability. The banks whose cost efficiency is high will be able to attract more customers.

The performance of banks are also affected by the economic growth (GDP) of the country. In the study of Mushtaq et. al. (2014), the author concluded by stating that the GDP of a country can have an impact on financial performance of the banks. In other studies, the authors have found ROA as a significant measure of determinants for explaining profitability of banks using panel data regression analysis and independent variables like equity, overheads, interest bearing assets, macroeconomic and financial structure indicators (Naceur, 1992), size, capital credit risk, efficiency, stock market capitalization, GDP, interest rates, cyclical outputs, economic development (Ramlall, 2009), asset utilisation, efficiency, total income to total capital employed, deposit concentration, loan concentration, asset concentration, total deposits to owned funds, capital adequacy, interest expended to interest earned, interest spread, net interest income to total funds (Malhotra, Poteau, & Singh, 2011). On the other hand some authors have found NIM and ROE as a significant measure of determining banks profitability using independent factors like default risks, opportunity cost of non-interest bearing reserves, leverage and management efficiency (Angbazo, 1997), individual bank's characteristics as well as macroeconomic conditions, taxation, regulations, financial structure and legal indicators (Demirguc-Kunt & Huizinga, 1999), Capital Asset Ratio (Berger, 1995).

With the background of above mentioned reviews, this paper will make an attempt to identify the determinants that have an impact on financial performance of banks in Bhutan with special reference to BNBL.

### **Objectives of the Study**

The following are some of the objectives for this study:

- a) To identify factors that have a significant bearing on the performance of Bhutan National Bank Limited
- b) To determine which factors impact significantly on bank's profitability.
- c) To determine the best measure of profitability from NIM, ROA and ROE.

### **Hypotheses of the Study**

Based on review of literature the following hypotheses are formed.

H<sub>0a</sub>: Interest income to total income has no significant relation with profitability of BNBL

H<sub>0b</sub>: Interest on loan ratio has no significant relation with profitability of BNBL

H<sub>0c</sub>: Interest expenses to deposit has no significant relation with profitability of BNBL

H<sub>0d</sub>: Credit to deposit ratio has no significant relation with profitability of BNBL

H<sub>0e</sub>: EPS has no significant relation with profitability of BNBL

## Research Methodology

### Research design

This study uses a hypothesis testing research design. Three models are checked with different dependent variables i.e. ROA, ROE and NIM. The model equations are given below:

Model I:  $ROA = a + b_1IITI + b_2IITL + b_3IETD + b_4EPS + b_5CDR + e$

Model II:  $ROE = a + b_1IITI + b_2IITL + b_3IETD + b_4EPS + b_5CDR + e$

Model III:  $NIM = a + b_1IITI + b_2IITL + b_3IETD + b_4EPS + b_5CDR + e$

Where a is constant and  $b_1$ ,  $b_2$ ,  $b_3$ ,  $b_4$  and  $b_5$  are the coefficients of the respective independent variables; e is the error term.

### Sources of data

The data that are used in this paper are all from secondary sources. The data is collected from the annual reports of Bhutan National Bank (2005-2016) and annual reports of Royal Monetary Authority of Bhutan (2005-2016). Information related to all dependent and independent variables is collected for a period of 10 years from BNBL and RMA.

### Operational design

Since this paper aims at identifying the determinants that have a bearing on the performance of Bhutan National Bank, the following variables are considered.

1. **Return on Assets (ROA):** It is a financial ratio that shows the percentage of profit a company earns in relation to its overall resources. ROA is generally calculated by dividing net income divided by total assets. Net income is calculated by deducting taxes from gross profit of the company. The total assets derived from the balance sheet of the company.
2. **Return on Equity (ROE):** It is a measure of profitability that calculates how much of profit a company generates with the money collect from shareholders' equity. Return on Equity is calculated by dividing Net Income by Shareholders' Equity. ROE is sometimes called "return on net worth." Net Income is derived from income statement of the company which is calculated by deducting taxes from gross profit of the company. A rising ROE suggests that a company is increasing its ability to generate profit without needing as much capital.
3. **Net Interest Margin (NIM):** NIM is a ratio that measures how successful a firm is at investing its funds in comparison to the expenses on the same investments. A negative NIM denotes the interest expenses greater than the amount of returns generated by the investment.
4. **Earnings per Share (EPS):** EPS is generally considered to be the single most important variable in determining a share's price. It is the part of profit earned by the company which is earned from each outstanding shares of the company.
5. **Interest income to total income (IITI):** It is the difference in revenue generated from a bank's assets and expenses associated with paying out its liabilities. It is calculated by dividing interest income of the company with company's total income.

- 6. Credit deposit ratio (CDR):** It is the ratio of how much a bank lends out of the deposits it has mobilised. Credit deposits ratio helps in assessing a bank's liquidity and indicates its health. If the ratio is low, banks may not be earning as much as they could be. If the ratio is high, it means that banks might not have enough liquidity to cover any unforeseen funds requirement.
- 7. Interest expenses to total deposits (IETD):** It is the ratio of interest spent to total deposits of the bank.
- 8. Interest Income to loans & advances (IITL):** It is the ratio of interest income divided by total loans and advances.

### Tools for analysis

The data collected is analysed using statistical software. The tools like correlation and multivariate linear regression modelling is used to model the determinants. In order to find the best model for financial performance of banks in Bhutan, adjusted R2 along with F-statistics, Variance inflation Factor (VIF) and Durbin-Watson (DW) statistics is used.

### Findings and Analysis

To determine the relation of different variables with the performance of banks, three different models were tested using regression. These models considered three different dependent variables which were Return on Assets, Return of Equity and Net Interest Margin. Collinearity Diagnosis was also done to check if there was any multi collinearity problem. Some of the results are discussed below.

**Table 0.1: Correlation matrix of independent variables**

Variables	Statistics	CDR	IITI	IITL	EPS	IETD
CDR	Correlation (Sig. 2-tailed)	1				
IITI	Correlation (Sig. 2-tailed)	0.517 (0.085)	1			
IITL	Correlation (Sig. 2-tailed)	-.652 (0.021)	-0.438 (0.154)	1		
EPS	Correlation (Sig. 2-tailed)	-0.018 (0.956)	0.443 (0.149)	-0.039 (0.904)	1	
IETD	Correlation (Sig. 2-tailed)	.876 (0.000)	0.355 (0.257)	-0.326 (0.301)	-0.184 (0.568)	1

Source: Authors' calculations

Table 0.1 presents the correlation between different independent variables considered in three different models. From the table it can be seen that the most significant variables were Credit to deposit ratio and Interest expenses to deposit ratio. Interest on loan shared a strong negative relation with Credit to Deposit ratio.



**Table 0.2: Descriptive Statistics of the dependent and independent variables**

DV & IV	Minimum	Maximum	Mean	Std. Deviation
ROA	0.017	0.042	0.034	0.008
ROE	0.298	3.364	1.562	1.068
NIM	0.024	0.058	0.042	0.010
CDR	0.068	1.310	0.794	0.346
IITI	0.857	0.988	0.913	0.040
IITL	0.106	0.998	0.190	0.255
EPS	0.190	2.682	0.977	0.815
IETD	0.025	0.064	0.039	0.013
Source: Authors' calculations				

Table 0.2 presents the descriptive statistics of three dependent variables i.e. Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM) and five independent variables i.e. Credit to Deposit ratio (CDR), Interest Income to Total income (IITI), Interest Income to total Loans & advances (IITL), Earning per Share (EPS) and Interest expenses to total deposits (IETD) to be used for modelling under this study.

**Table 0.3: Model I, Dependent Variable-ROA**

Predictor Variables	Coefficients	Std. Error	t- statistics	Collinearity Diagnostics	
				Tolerance	VIF
(Constant)	0.122	0.038	3.228**		
IITI	-0.116	0.044	-2.654**	0.516	1.937
IITL	0.034	0.009	3.72**	0.292	3.425
IETD	-1.031	0.298	-3.463**	0.106	9.43
EPS	0.000	0.002	-0.171	0.618	1.618
CDR	0.066	0.014	4.836*	0.07	14.25
<b>Model Summary</b>	R <sup>2</sup> : 0.917	Adjusted R <sup>2</sup> :0.481	F-Value: 6.337**	P-Value: .022	DW: 1.571
Source: Authors' calculations					
*,** indicates the significance at 1% and 5% level of significance respectively					

Table 0.3 presents the regression analysis of model I. In this model, return on assets is considered as a dependent variable. In this model, Interest on loan (P-value 0.01) and Credit to deposit ratio (P-value 0.003) showed a positive significant relationship with ROA. Interest income to total income ratio and Interest expenses to deposit ratio on the other hand had a negative significant relation with ROA. EPS was not significant for this model. The value of adjusted R<sup>2</sup> is 0.481 which means that approximately 48.1% of variation on ROA is explained by its independent variables. The P-Value from ANOVA table is less than 0.05 (i.e. 0.22), which shows that there is a significant relation between the dependent and independent variables. Thus, the model I can summarily be presented as follows:

$$\text{Model I: ROA} = 0.122 - 0.116\text{IITI} + 0.034\text{IITL} - 1.031\text{IETD} + 0.066\text{CDR}$$



**Table 0.4: Model II, Dependent variable-ROE**

Predictors	Coefficients	Std. Error	t-statistics	Collinearity Diagnostics	
				Tolerance	VIF
(Constant)	7.127	1.353	5.266*		
IITI	-7.119	1.568	-4.541*	0.516	1.937
IITL	-0.995	0.325	-3.061**	0.292	3.425
IETD	15.546	10.697	1.453	0.106	9.43
EPS	1.428	0.07	20.445*	0.618	1.618
CDR	-1.107	0.488	-2.268***	0.07	14.25
<b>Model Summary</b>	R <sup>2</sup> : 0.989	Adjusted R <sup>2</sup> :0.981	F-Value: 112.743*	P-Value: 0.000	DW: 2.826

Source: Authors' calculations  
\*, \*\*, \*\*\* indicate the significance at 1%, 5% and 10% level of significance respectively.

Table 0.4 presents the regression analysis of second Model where ROE is considered as a dependent variable. In this model, out of five independent variables, interest income to total income ratio, Interest on loan ratio and EPS were found to be significant. EPS was found to be strong positively significant with ROE. However, interest income to total income ratio and Interest on loan ratio was negatively significant with ROE. The value of adjusted R<sup>2</sup> is 0.981, which means that approximately 98.1% of variation on ROE is explained by its independent variables. The P-Value from ANOVA table is less than 0.05, which shows a significant relation between the dependent and independent variables. Thus, the model II can summarily be presented as follows:

$$\text{Model II: ROE} = 7.127 - 7.119\text{IITI} - 0.995\text{IITL} + 1.428\text{EPS} - 1.107\text{CDR}$$

**Table 0.5: Model 3, Dependent Variable-NIM**

Predictors	Coefficients	Std. Error	t-statistics	Collinearity Statistics	
				Tolerance	VIF
(Constant)	0.047	0.022	2.145***		
IITI	-0.045	0.025	-1.793	0.516	1.937
IITL	0.035	0.005	6.746*	0.292	3.425
IETD	-0.577	0.173	-3.337**	0.106	9.43
EPS	0.005	0.001	4.336*	0.618	1.618
CDR	0.059	0.008	7.508*	0.07	14.25
<b>Model Summary</b>	R <sup>2</sup> : 0.968	Adjusted R <sup>2</sup> :0.942	F-Value: 36.732*	P-Value: 0.000	DW: 1.219

Source: Authors' calculations  
\*, \*\*, \*\*\* indicate the significance at 1%, 5% and 10% level of significance respectively.

Table 0.5 presents the regression analysis of third model in which net interest margin is considered as a dependent variable. In this model, it can be seen that Interest on loan, Interest expenses to deposit, EPS and Credit to deposit ratio has shown a significant relation with NIM. However, Interest expenses to deposit ratio shared negative significant relation

with NIM. The value of adjusted  $R^2$  is 0.942, which means that approximately 94.2% of variation on NIM is explained by its independent variables. The P-Value from ANOVA table is less than 0.05, which shows a significant relation between the dependent and independent variables. Thus, the model III can summarily be presented as follows:

$$\text{Model III: NIM} = 0.047 + 0.035\text{ITL} - 0.577\text{IETD} + 0.005\text{EPS} + 0.059\text{CDR}$$

### Hypothesis testing

In model I, out of five independent variables, the coefficient of EPS (0.87) was not significantly different from 0 ( $p\text{-value} < 0.05$ ). Thus, it can be stated that EPS does not have significant relation with ROA. Therefore, we do not reject the null hypothesis and state that EPS has no significant relation with the profitability of BNBL measured by ROA. For the remaining independent variables, since the  $p$ -values are less than 0.05, we reject the null hypothesis and state that Interest income to total income ratio, Interest on loan, Interest expenses to deposit ratio and Credit to deposit ratio have a significant relation with the profitability of BNBL measured by ROA. However, Interest income to total income has a negative bearing on ROA.

In model II, out of five independent variables, the coefficient of Interest expenses to deposit (0.196) and Credit to deposit ratio (0.64) were not significantly different from 0 ( $p\text{-value} < 0.05$ ). Thus, it can be stated that Interest expenses to deposit and Credit to deposit ratio do not have significant relation with ROE. Thus, we do not reject null hypothesis and state that Interest expenses to deposit and Credit to deposit ratio has no significant relation with the profitability of BNBL measured by ROE. For the remaining independent variables, since the significant values are less than 0.05, we do reject the null hypothesis and state that Interest income to total income ratio, Interest on loan and EPS have a significant relation with the profitability of BNBL, measured by ROE. However, Interest income to total income and Interest on loan has a negative bearing on ROE.

In model III, out of five independent variables, the coefficient of Interest income to total income (0.123) was not significantly different from 0 ( $p\text{-value} < 0.05$ ). Thus, it can be stated that Interest income to total income does not have significant relation with NIM. Thus, we do not reject null hypothesis and state that Interest income to total income has no significant relation with the profitability of BNBL measured by NIM. For the remaining independent variables, since the significant values are less than 0.05, we reject the null hypothesis and state that Interest expenses to deposit and Credit to deposit ratio, Interest on loan and EPS have a significant relation with the profitability of BNBL, measured by NIM. However, Interest expenses to deposit have a negative bearing on NIM.

### Concluding Remarks

The economic performance of any country is partly determined by how its banking sector operates. The performance of banks is further determined by various variables which help in increasing the profitability of the bank. We tested three models for assessing the profitability of banks in Bhutan taking three dependent variables (ROA, ROE and NIM) and five independent variables (Interest income to total income, Interest on loan, Interest expenses to deposit, EPS and Credit to deposit ratio) using multivariate linear regression analysis. The first model (taking ROA as dependent variable) met the 'BLUE' (Best Linear Unbiased Estimator) properties of multivariate regression analysis. This implies that the financial performance of Banks in Bhutan using ROA as a dependent variable and Interest income to

total income, Interest on loan, Interest expenses to deposit, EPS and Credit to deposit ratio as independent variables is found to be best model. However, other two models taking ROE and NIM as dependent variable are also statistically significant but, model I gives the best results. This finding is in line with that of Bhatia, Mahajan, & Chander (2012) and Samad, (2015). To check the problem of autocorrelation in residuals, Durbin Watson statistic was used. The value of this statistic is considered better when it is between 1.5-2.5 and in our study, the value of Durbin Watson statistic for the residuals of ROA model was 1.571. it indicates that there is no problem of auto correlation and model is best.

Therefore, it can be concluded that the key determinants of financial performance of Banks in Bhutan are Interest income to total income, Interest income to loans & advances, Interest expenses to total deposit and Credit to deposit ratio. The policy makers should have a monitoring of these variables in order to ensure the sound financial performance (measured by ROA) for the Banks in Bhutan.

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# Efficacy of City Bus Service in Thimphu Thromde Service and Service Need Assessment

**Phurba Sonam Waiba and Tenzin Chophel**

## **Abstract**

With the growing number of population and vehicles, traffic congestion is common worldwide. And a good public transport system is a necessity to curb the issue. Thimphu Thromde, the most populous city in Bhutan is currently witnessing problems of public transportation and its related consequences.

Hence service quality of the city buses and service need assessment has been carried out in this study using the model of service quality (SERVQUAL). A sample of 380 respondents in Thimphu Thromde were surveyed through randomly distributed questionnaire. The data for this study was analysed using the statistical package for social sciences version 21. The study found that there is a significant difference between perceived and expected services from the city bus system, also the quality of service is low and unsatisfactory to the public. Reliability (-1.28) has the highest negative gap followed by Tangibles (-1.15) and Empathy (-1.03 each) of the system as per the SERVQUAL instrument. Specifically, the city bus timing, routes/lack of connectivity, lack of adequate resource and capacity of parking are some of the major problems. Thus, there is a need to increase routes and connectivity of the buses, construct better city bus stand and parking, and construct enough bus stop points for better and prompt services to the people. The responses in the need assessment also indicated that 92 percent of the respondents would avail the service if it met their expectation in future. And the people are aware of the fact that public transport system is cheap, efficient and economically satisfying.

**Keywords:** *Service Quality, Public Transportation, SERVQUAL*

Thimphu Thromde is the capital city of Bhutan, the most populous district of the country. With the growing number of population until recently Thimthrom has about 114,551 residents as per Population and Housing Census report 2017. The figure itself is a clear indication of the fact that there is a need for transportation services in the city. And no sooner was the pressure of inadequacy of the transport services was felt, than the number of private vehicles and taxi/cab services boomed in the country. As per the record of Annual Info-Comm and Transport Statistical Bulletin 2017, there are 43,625 vehicles in the Thromde alone constituting about 51.78 percent of the total number of vehicles in the country. On the other hand the bulletin also recorded that 2832 (66.98 percent) taxi/cabs are in the Thromde alone. Hence the rise in number of vehicles have led to impounding affects to the city, roads, traffic, people, and environment to name few.

Increased travel demand have led to using private vehicle similar to many other countries. Taxi fare is much expensive but comfortable for the people but it has been felt economically a necessity to own a private car. According to the Annual Info-Comm and Transport Statistical Bulletin 2017, vehicle growth rate in the country is 12.11 percent and it is a matter of economic concern for the country to head the same direction. Perhaps a good

public transport system is a necessity in the places like the capital city of Bhutan Thimphu Thromde.

Thus, Royal Government of Bhutan with Road Safety and Transportation Authority spearheading the issue intervened with urban transport/city bus services to ease the issue. The city bus services in Thimphu is operated by Bhutan Postal Corporation Limited and other three private firms. A total of 52 buses are operational on the 15 routes with limited frequency (MoIC, 2017). The Office of City Bus Services have been trying to tackle the issue and the problem seem to get diluted, except during the morning and evening rush hours. Having said that, 52 buses on the road with limited frequencies and routes and catering to more than hundred thousand plus population is absolutely crazy. Many people do not use city bus service due to the fact that our city bus system is already over-crowded and conventional with limited numbers. People concern for less waiting time and reliability of the system, capacity and routes of the buses. Many are facing trouble to afford taxi fare and given a chance many would not refuse to avail city bus services. Having said that there are many new reforms such as bus information technology and enhanced bus stop points and terminals by the office of city bus services and Thimphu Thromde.

Yet the issue pertaining to public transportation has always been confusing and challenging, hence this study will try to seek the understanding on the service quality of the city buses from those who have/are availing the service and additional bus service need assessment from those who have not been able to avail the service in the Thromde. Keeping service quality as the core area of interest and importance of any business performance (Stefano, Casarotto, Barichello, & Sohn, 2015), (Chatzoglou, Chatzoudes, Vraimaki, & Leivaditou, 2014) the model of service quality (SERVQUAL) or the gap theory has been adopted which will guide the research as to what practical recommendations can be made to the related stakeholders as it is still in the conceptualization stage.

### Objective

The objective of this research is to assess the efficacy of city bus services in Thimphu Thromde by understanding current service delivery system of the City Bus Service with further evaluation of factors and dimensions associated through the SERVQUAL instrument and carry out service need assessment. The following are the hypotheses made prior to the study.

H<sub>0</sub>1: There is no significant difference between perceived and expected overall city bus service quality in Thimphu Thromde (RESPONSIVENESS, ASSURANCE, TANGIBILITY, EMPATHY, and RELIABILITY)

H<sub>1</sub>1: there is a significant difference between perceived and expected overall city bus service quality (RESPONSIVENESS, ASSURANCE, TANGIBILITY, EMPATHY, and RELIABILITY).



## Literature Review

### ***The model of Service Quality Concept***

SERVQUAL is a multi-dimensional research instrument, which is designed to assess expectations and perceptions of a service (Yousapronpaiboon, 2014). It is based on expectancy-disconfirmation paradigm, which means whether the consumers' expectation of the quality of service is confirmed or not by their actual perception of the service experience (Sabir, Javed, Ahmad, Noor, & Munir, 2014). The SERVQUAL instrument was first tried in the early 1980s by a team of three American researchers viz, Parasuraman, Zeithaml and Berry to measure quality in the service sector (Yousapronpaiboon, 2014). Later in 1985, they conceptualized with subsequent pre-tests, tests and refinement (Parasuraman, Zeithaml, & Berry, 1988). It was a major breakthrough in measurement methods in service quality research (Yousapronpaiboon, 2014).

### **SERVQUAL Dimensions and Instruments**

During the origin of SERVQUAL scale, there were ten dimensions which after further testing it was reduced from ten to five dimensions (Islam, Chowdhury, Sarker, & Ahmed, 2014), (Yousapronpaiboon, 2014). According to Parasuraman, Zeithaml, and Berry, (1988), the five dimensions are identified as follows:

*Table 1. Five dimensions of SERVQUAL model with number of items and definition.*

<b>Dimension</b>	<b>No. of Items</b>	<b>Description</b>
Responsiveness	4	<i>the willingness to help customers and to provide prompt service.</i>
Assurance	3	<i>the knowledge, courtesy of employees and ability to convey trust and confidence in the customer towards the service provider.</i>
Tangibles	6	<i>the appearance of physical facilities, equipment, personnel and communication materials.</i>
Empathy	4	<i>the provision of caring, individualized attention provided to customers.</i>
Reliability	5	<i>the ability to perform the promised service dependably and accurately.</i>

A total of 22 scale items were derived from these dimensions, and each item is measured on two responses; the customer expectations concerning a service (E) and the perception of the actual service delivered by the service sector (P) (Parasuraman, Zeithaml, & Berry, 1988).

### **Model of Service Quality and Gap Theory**

In this method, service quality is the gap between perceived service and expected service, hence it is also known as gap theory (Pradela, 2015), (Kumar & Muthupandian, 2012). In the gap theory of service quality;

$$Q = P - E \text{ (Quality = Perceptions - Expectations)}$$

Where a positive gap score would mean that expectations have been met or exceeded and service quality is perceived to be satisfied. Similarly, a negative gap score would



mean that expectations have not been met and quality is unsatisfactory (Yousapronpaiboon, 2014), (Parasuraman, Zeithaml, & Berry, 1988).

Table 2. Examples of matched pairs of items in the SERVQUAL questionnaire.

Dimension	Eg. of Expectation Item	Eg. of Perception Item
Responsiveness	Company should provide timely and efficient service	Company provides timely and efficient service
Assurance	Company employees should be trustworthy	Company employees are trustworthy
Tangibles	Company should have adequate resource and technology	Company has adequate resource and technology
Empathy	Company should always look after interests of the customer	Company always looks after interests of the customer
Reliability	Company should render services as and when required	Company renders services as and when required

Thus, the model of service quality or the gap theory conceptualized the SERVQUAL model. Gap scores can be analysed for each individual statement and can be aggregated to give an overall gap score for each dimension (Yousapronpaiboon, 2014).

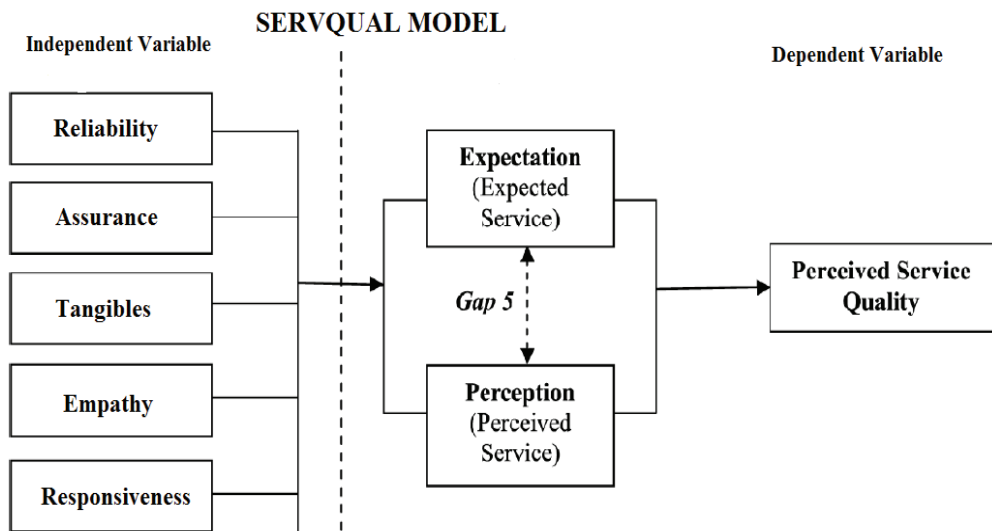


Figure 1. Diagrammatic representation of Theoretical framework.

### Related Work

So far there is no literature and studies carried out in Bhutan pertaining to public transportation. But similar research attempts have been made in other countries using the same model which was successful in making recommendations to the transport service provider. A case study in Pakistan transport service confirmed that the model was very relevant to study transport service quality, it tried to assess the impact of SERVQUAL dimensions on the passenger satisfaction and found that all the five dimensions of the model were positively correlated to passenger satisfaction (Sabir, Javed, Ahmad, Noor, & Munir, 2014). Another study in India was conducted to see the quality attributes that influenced passenger satisfaction and found that comfort and safety was the most important factor in the context of their public

transport service provider. The study also found that accessibility and capacity of the transport service were key factors to the quality of services offered to the passengers (Sanjay, 2016). Similarly, Kumar & Muthupandian, (2012) found that the highest expectation of passengers is "ASSURANCE" meaning the passengers are more concerned about the safety and security, indicating negative score/dissatisfaction with it. And in case of perception, "RESPONSIVENESS" was highest which in other words meant that the service provider were active and responsive catering to the needs of the passengers at all times. Hence the SERVQUAL model has been found fit and applicable in this study to assess service quality of city bus service in Thimphu Thromde, which would enable related stakeholders make necessary interventions for future.

### **Methodology**

The study is based on quantitative analysis, which is more about assessing the service quality and service need assessment of the city bus system in the Thromde. The data was collected through randomly distributed questionnaires through convenience sampling method.

The questionnaire was developed from the SERVQUAL model, in which there were three sections as follows;

Section A: General Profile to collect demographic details of the respondents such as gender, age, occupation, reason for transportation and primary mode of transportation used.

Section B: Expectation of Service and Perception of Service (same 22 items in five-point likert-type scale of strongly agree, agree, undecided, disagree and strongly disagree were used).

Section C: City Bus Need Assessment which covered preference for secondary mode of transportation, whether respondents would want city bus service if enhanced and improved and general comments.

### **Study Population and Sampling**

Since the sample population was very large (100,000 plus) the study adopted the method postulated by Shekaran, (2003). Based on the method the sample size can range from 380-384 if the sample population is more than 100,000. Hence the sample size was 380.

### **Data Analysis Methods-Statistical Planning**

The data for this study was analyzed using the Statistical Package for Social Science Software (SPSS) version 21. The SERVQUAL score was calculated between perceived service and expected service with respect to the following measures: responsiveness, assurance, tangibles, empathy and reliability. Each dimension score was obtained by calculating the difference (means of responses) between the perceived (P) and expected (E) service scores (SERVQUAL score = P- E). The data was also analysed through paired sample t-test to compare means and see the significant difference between expectation and perception of the services.

General profile information was used to obtain basic data of the respondents and used as supportive figures in the discussion and finally SERVQUAL score and city bus need assessment data were used for recommendation.

## Findings and Discussion

**General Profile:** the survey was responded by a total of 380 respondents of which 88 percent were residents of Thimphu. Among the respondents 58 percent were male and 42 percent were female. It could be also noted that majority of the responses came from the elderly aged between 21 to 31 years. On the other hand the largest section of the respondents were public sector employees (55 percent) followed by unemployed youth and students. Hence it could be clearly understood that the primary reason for movement within Thimphu Thromde is travelling home to office and office to home (60 percent) followed by movement for personal works (32 percent). And as discussed earlier, the primary mode of transportation for most of the respondents were personal vehicle (39 percent), and then it is taxi/cabs (36 percent). Taking a note to use of city buses as primary mode of transportation it has been found just few (15 percent) of the respondents avail the service, and it includes all the private/company buses/school buses along with the public city buses.

**Expectation and Perception of Service:** this section includes the expectation and perception of those 15 percent respondents who have used the city bus services. As discussed in the literature and conceptual framework the analysis have been made in accordance to the SERVQUAL instrument. In the larger context, it has been found that the services provided by the city bus system have not been able to meet the passengers' expectation, as gap score is negative (-1.0), hence according to Parasuraman, Zeithaml and Berry, (1988), a negative gap score would mean that expectations have not been met and service quality is presumed to be unsatisfactory. On the other hand p value (0.00) is less than 0.05 at 95% confidence level, hence there is a significant difference between perceived and expected services of the city bus system.

Taking individual dimension for better understanding; out of the five dimensions (RATER-responsiveness, assurance, tangibles, empathy and reliability), RELIABILITY (-1.28) has the highest negative gap followed by TANGIBLES (-1.15), EMPATHY (-1.03), RESPONSIVENESS (-0.93) and ASSURANCE (-0.83).

*Table 3. Mean scores of Perception (P), Expectation (E) and Gap (G) items of RESPONSIVENESS.*

<b>RESPONSIVENESS</b>	<b>P</b>	<b>E</b>	<b>G</b>
1.City bus association should always inform people about change of timetable and prices in advance	3.72	4.72	-1.00
2.City bus association should provide timely and efficient service	4.03	4.90	-0.86
3.Staff should communicate with passengers clearly and helpfully	3.97	4.86	-0.90
4.City bus staff should be readily willing and handle problems/complains with care and seriousness	3.90	4.86	-0.97
<b>MEAN</b>	<b>3.91</b>	<b>4.84</b>	<b>-0.93</b>

Table 4. Paired Sample t-test of RESPONSIVENESS.

	Paired Differences					t	df	Sig.(2-tailed)
	M	SD	SEM	95% Confidence Interval of the Difference				
				Lower	Upper			
RESPONSIVENESS (P-E)	0.93	1.32	0.25	0.43	1.43	3.82	28.00	0.001

Table 3, shows that there is (-0.93) mean gap between perceived and expected service quality of the dimension RESPONSIVENESS which means that expectations have not been met and service quality is presumed to be unsatisfactory. Likewise table 4 indicates that the p value is (0.001) which is less than 0.05 at 95% confidence level. Hence it can be concluded that there is a significant difference between perceived and expected service in the dimension RESPONSIVENESS.

Table 5. Mean scores of Perception (P), Expectation (E) and Gap (G) items of ASSURANCE.

<b>ASSURANCE</b>	<b>P</b>	<b>E</b>	<b>G</b>
5.Passengers should feel safe in their transactions with staff on the bus and in the bus stand	4.24	4.76	-0.52
6.City bus staff should be always polite and approachable	3.79	4.83	-1.03
7.City bus staff should have in-depth occupational knowledge of their jobs	3.83	4.76	-0.93
<i>MEAN</i>	3.95	4.78	-0.83

Table 6. Paired Sample t-test of ASSURANCE.

	Paired Differences					t	df	Sig.(2-tailed)
	M	SD	SEM	95% Confidence Interval of the Difference				
				Lower	Upper			
ASSURANCE (P-E)	0.83	1.07	0.20	0.42	1.23	4.11	28.00	0.001

Table 5, shows that there is (-0.83) mean gap between perceived and expected service quality of the dimension ASSURANCE which means that expectations have not been met and service quality is presumed to be unsatisfactory. Likewise table 6 indicates that the p value is (0.001) which is less than 0.05 at 95% confidence level. Hence it can be concluded that there is a significant difference between perceived and expected service in the dimension ASSURANCE.

Table 7. Mean scores of Perception (P), Expectation (E) and Gap (G) items of TANGIBLES.

<b>TANGIBLES</b>	<b>P</b>	<b>E</b>	<b>G</b>
8.City bus online services should be flawless	3.59	4.66	-1.07
9.City bus seats should be comfortable and cozy	3.79	4.72	-0.93
10.City buses should be clean and are equipped with modern technologies	3.45	4.62	-1.17
11.City bus stand should have adequate resource and capacity	3.34	4.66	-1.31
12.City buses should have enough bus stop points	3.72	4.79	-1.07
13.City bus should have routes/connectivity services in all places within the thromde	3.55	4.90	-1.34
<b>MEAN</b>	<b>3.57</b>	<b>4.72</b>	<b>-1.15</b>

Table 8. Paired Sample t-test of TANGIBILITY.

	Paired Differences					t	df	Sig. (2-tailed)
	M	SD	SEM	95% Confidence Interval of the Difference				
				Lower	Upper			
TANGIBILITY (P-E)	1.15	1.34	0.25	0.64	1.66	4.63	28.00	0.000

Table 7, shows that there is huge (-1.15) mean gap between perceived and expected service quality of the dimension TANGIBILITY which means that expectations have not been met and service quality is presumed to be unsatisfactory. Likewise table 8 indicates that the p value is (0.000) which is less than 0.05 at 95% confidence level. Hence it can be concluded that there is a significant difference between perceived and expected service in the dimension TANGIBILITY.

Table 9. Mean scores of Perception (P), Expectation (E) and Gap (G) items of EMPATHY.

<b>EMPATHY</b>	<b>P</b>	<b>E</b>	<b>G</b>
14.City buses should always look after the best interest of the passengers	3.72	4.66	-0.93
15.City bus association should have operating hours convenient to all the passengers	3.38	4.59	-1.21
16.City buses should have first aid box and emergency kits (fire extinguisher, emergency exit etc.)	3.62	4.62	-1.00
17.City buses should have reserved seats for disabled, old and women	3.72	4.69	-0.97
<b>MEAN</b>	<b>3.61</b>	<b>4.64</b>	<b>-1.03</b>

Table 10. Paired Sample t-test of EMPATHY.

	Paired Differences					t	df	Sig. (2-tailed)
	M	SD	SEM	95% Confidence Interval of the Difference				
				Lower	Upper			
EMPATHY (P-E)	1.03	1.27	0.24	0.54	1.51	4.37	28.00	0.000

Table 9, shows that there is huge (-1.03) mean gap between perceived and expected service quality of the dimension EMPATHY which means that expectations have not been met and service quality is presumed to be unsatisfactory. Likewise table 10 indicates that the p value is (0.000) which is less than 0.05 at 95% confidence level. Hence can be concluded that there is a significant difference between perceived and expected service in the dimension EMPATHY.

Table 11. Mean scores of Perception (P), Expectation (E) and Gap (G) items of RELIABILITY.

RELIABILITY	P	E	G
18.The city bus should always arrive and depart on time	3.24	4.86	-1.62
19.City buses should never break down on the way	3.38	4.48	-1.10
20.It should be very easy to book/buy city bus tickets	3.86	4.83	-0.97
21.City bus staff should satisfy passengers request immediately	3.45	4.55	-1.10
22.The timetable of the city bus service should be error free	3.14	4.72	-1.59
MEAN	3.41	4.69	-1.28

Table 12. Paired Sample t-test of RELIABILITY.

	Paired Differences					t	df	Sig. (2-tailed)
	M	SD	SEM	95% Confidence Interval of the Difference				
				Lower	Upper			
RELIABILITY (P-E)	1.28	1.46	0.27	0.72	1.83	4.70	28.00	0.000

Table 11, shows that RELIABILITY has the highest (-1.28) mean gap score between perceived and expected service quality, which means that expectations have not been met and service quality is presumed to be unsatisfactory. Likewise table 12 indicates that the p value is (0.000) which is less than 0.05 at 95% confidence level. Hence it can be concluded



that there is a significant difference between perceived and expected service in the dimension RELIABILITY.

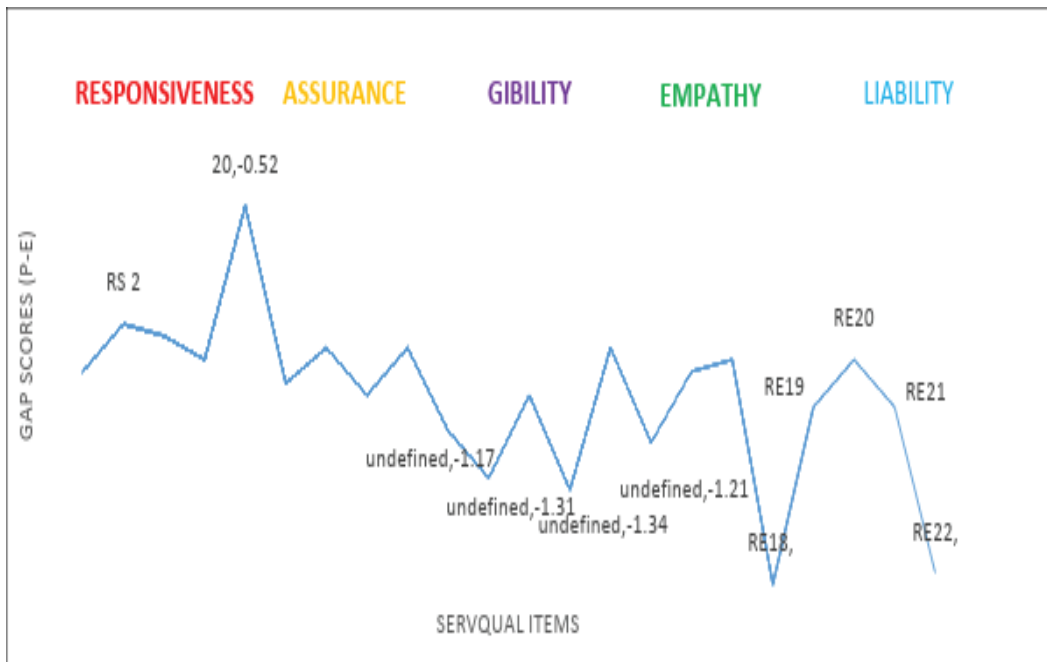


Figure 2. Comparative gap scores of the 22 items of five SERVQUAL dimensions.

In a nutshell, the findings according to the SERVQUAL instrument indicates that item wise, the highest gap score is in item RE18 (-1.62) and RE22 (-1.59) of reliability, item T13 (-1.34), T11 (-1.31) and T10 (-1.17) of tangibility and item E15 (-1.21) of empathy indicating that the quality of services delivered by city bus service does not meet passengers expectation. Similarly, the lowest gap score is in item A5 (-0.52) of assurance indicating certain degree of service quality in terms of assurance (this does not mean that passenger's perception have met/exceeded their expectation, as it is still negative). Also most of the items are within the range of gap score -0.86 to -0.10 and this can also be attributed to having low service quality and the services being unsatisfactory.

Paired Samples Test								
	Paired Differences					t	df	Sig.(2-tailed)
	M	SD	SEM	95% Confidence Interval of the Difference				
				Lower	Upper			
RESPONSIVENESS (P-E)	0.93	1.32	0.25	0.43	1.43	3.82	28.00	0.001
ASSURANCE (P-E)	0.83	1.07	0.20	0.42	1.23	4.11	28.00	0.001
TANGIBILITY (P-E)	1.15	1.34	0.25	0.64	1.66	4.63	28.00	0.000
EMPATHY (P-E)	1.03	1.27	0.24	0.54	1.51	4.37	28.00	0.000
RELIABILITY (P-E)	1.28	1.46	0.27	0.72	1.83	4.70	28.00	0.000
<b>OVERALL (P-E)</b>	<b>1.04</b>	<b>1.29</b>	<b>0.24</b>	<b>0.55</b>	<b>1.53</b>	<b>4.33</b>	<b>28.00</b>	<b>0.000</b>

Table 13. Paired sample test analysis of the overall SERVQUAL between perceived and expected city bus services.

The table shows the paired sample t-test of the five dimensions between perception and expectation. The overall mean standard deviation 1.29 clearly shows that there a large gap between perceived and expected services of the city bus service. On the other hand since the overall p value is less than 0.05 at 95% confidence level, it can be deduced that there is a significant difference between perceived and expected overall city bus service in Thimphu Thromde rejecting the null hypothesis. Hence, it can also be noted that there is a significant difference between perception and expectation of quality of services in all the five dimensions (RESPONSIVENESS, ASSURANCE, TANGILIBILITY, EMPATHY and RELIABILITY) as shown in the above tables.

City Bus Need Assessment: there is no doubt that people aren't aware of the prevailing city bus service in the Thromde, but the reason most do not avail the service could be one of factors discussed above. Hence need assessment was also carried out, the opinion from those respondents who do not use the service. 88 percent of the respondents were positive about availing the bus service if it was up to their expectation and 92 percent of them accepted that it would be cheapest, most efficient and economical and that it would ease traffic congestion, accidents and environmentally suitable for the country.

## Conclusion

As we know that the customer satisfaction is indispensable for survival of any kind of business, and precisely for a highly populated city like Thimphu Thromde, the growing number vehicles and taxi/cabs have enormous effect on the road, traffic, people, economy and environment, thus passenger satisfaction and using city bus services effectively will by far reduce and lighten the problem complex.

As Discussed in the results and discussion some of the key findings are; the passengers have indicated all the dimensions negative meaning unsatisfactory and none of the items under these dimensions are positive; RELIABILITY (-1.28) is the top factor leading to dis-satisfaction among the passengers, followed by TANGIBLES (-1.15), EMPATHY (-1.03), RESPONSIVENESS (-0.93) and ASSURANCE (-0.83). On the other hand the paired sample t-test indicated that there is a significant difference between services delivered and expected from the city bus association with as the significant p value is less than 0.05.

Specifically, the city bus timing, routes/lack of connectivity services in all places within the Thromde, lack of adequate resource and capacity has been found to be a big problem. Hence the study recommends following for improvement and betterment in future (refer figure 2);

1. The highest rated item is “the city bus is/should always arrive and depart on time” (-1.62), hence there must be strict and timely compliance and inspection of city bus timing. Prior to the monitoring there must be thorough analysis on traffic congestion and time it would take for the bus to reach/depart in different points and circulate to all so that people do not waste time or get delayed.
2. The item “the timetable of the city bus service is/should be error free” (-1.59), is rated low. This is similar to the above but different as it means that the timetable provided by the city bus association has flaws which is way people land up waiting long for buses or can't catch it even on the time the association have provided, the above recommendation would also take this issue into consideration.
3. The item “city bus should have/has routes/connectivity services in all places within the thromde”, (-1.34) is also rated low. Logically the result does justice to the opinion of the respondents and needs of people, as discussed earlier with just more than 15 routes and with limited bus frequency, passengers would undoubtedly face problems traveling by bus. So, possibly routes and connectivity of the buses if enhanced and increased would help dilute this problem.
4. Similarly, the item “city bus stand should have adequate resource and capacity”, is also rated low (-1.31), this could mean that the resources and capacity of the bus stands is poor. In fact, city bus stand and taxi parking being together and few benches for the people to wait and sit is one reason, the passengers' could have rated the item low. Thus, construction of city bus stand and arranging necessary resources such as benches and stalls for the people would help solve this problem.
5. And few other items such as bus operating hours (not just limited to morning and evening rush hours), updating the buses with modern technologies and constructing enough bus stop points are some recommendations for better and prompt services to the people.

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# Using Mnemonic Method to Improve Student's Ability to Remember Economics Concepts, Facts and Ideas: An Action Research

Tshewang Dorji

## Abstract

Although, Economics is a living subject and relates to day-to-day life, Bhutanese students studying Economics in higher secondary schools face difficulty in learning and understanding Economics concepts, facts and ideas. The action research was carried out in Dechencholing Higher Secondary School in Thimphu with students of class XII Arts and Commerce in 2018. There were 39 students (12 female and 7 male in XII Arts and 7 female and 13 male in XII Commerce). In this action research, use of mnemonic as a strategy was studied in teaching concepts, facts and ideas in Economics. This action research in particular studies the effectiveness of mnemonic in improving the capability of students in remembering economics concepts, facts and ideas. Mixed method was used for the study. Pre and Post-test data were collected through one to one semi structured interviews, observations and analysis of students score in the Unit Tests. The findings showed that mnemonic strategy helped students remember concepts, facts and ideas more easily. The findings also revealed that mnemonic strategy is effective in enhancing student's academic performance and their engagement in the lesson or topic. However the action research revealed that it was important for teachers to train students in using mnemonic.

**Keywords:** *Action research, students, strategy, method, mnemonic, teaching learning, economic concepts, facts and ideas.*

Dechencholing Higher Secondary School (DHSS) is one of the oldest and biggest schools in Thimphu Thromde. The school was established in 1960 to cater to the students from the encampment of the Royal Body Guards. The school was upgraded to accommodate the steadily increasing number of students from the residents in the catchment area. It was upgraded to a higher secondary school in 2015 offering Arts and Commerce streams for classes XI & XII. It is a coeducational day school with 1700 students (854 girls and 846 boys) studying from Pre-Primary to class XII. There are 76 teachers (53 females and 23 males), 9 supporting staff (6 females and 3 males) and 4 operational staff (1 female and 3 male). The school has won various awards and accolades for academic achievement and aesthetic championships, but improving student academic achievement has been a challenge for all these years.

The researcher taught Economics in class X Economics for twelve years and class XII for two years. Currently the researcher teaches Economics in classes X, XI (Arts and Commerce) and XII (Arts and Commerce) for 20 hours every week. Class XII Economics syllabus consist of micro and macroeconomics. Students expressed difficulty in understanding concepts, facts and ideas. Students also reported that Economics requires a lot of effort in memorizing concepts, facts and ideas without understanding just to score marks in the examination. Although the researcher tried to use various teaching methods, strategies and skills to teach Economics, but often lecture and lecture cum demonstration methods dominated.

The researcher have access to 'A Guide to Action Research: Enhancing Professional Practice of Teachers in Bhutan', a publication of the Royal Education Council, 2018 which

provides practical guide to teachers to conduct action research. The researcher have studied research methodology and data analysis during his Masters Degree and also attended training on Business Research Methodology and Data Analysis at the Entrepreneurship Development Institute of India. The researcher has the support of colleagues who have attended action research work-shop at Paro College of Education in 2018. The researcher hopes to gain insights and helpful tips in helping students enjoy learning Economics and deriving meaningful lessons from the study of Economics. The researcher hopes to gain greater understanding of the use of mnemonic in improving students' learning of Economics.

Mr. Tshering Wangchuk, a colleague at the same school who has studied action research at Paro College of Education has agreed to be his critical friend. He has also attended workshops on action research and conventional research. He has knowledge about the role of a critical friend. The researcher has discussed his action research proposal with him. He has observed his lessons, kept records of the class observations, verified the Unit Tests questions paper and crosschecked the test marks scored by the students during Unit Tests.

### **Significance of the Action Research**

Economics in higher secondary school is often said to be a very demanding and rewarding subject. As a result there is good reason that teachers use innovative teaching strategy to teach economic concepts, facts and ideas. The purpose of this action research is to try out an alternative strategy particularly to support students learn economics concepts, facts and ideas.

### **Literature Review**

The Bhutan Higher Secondary Education Certificate (BHSEC) examination 2017 recorded the worst performance in Economics. According to the Bhutan Council for School Examination and Assessment (BCSEA), the mean score for Economics was 49.9 percent (Rinzin, 2018). Mean scores measure the quality of performance. Economics result of Thimphu Thromde for BHSEC examination 2017 is shown in Table 1.



Table 1. Economics Result for Bhutan Council for School Examination and Assessment Examination 2017

Thimphu Thromde	Appeared			Pass			F		M		Total	
	F	M	Total	F	M	Total	M	SD	M	SD	M	SD
Dechencholing Higher Secondary School	35	36	71	27	19	46	44.6	8.6	41.2	11.2	42.9	10.1
ELC High School	4	16	20	2	4	6	40.6	3.4	33.9	8.9	35.2	8.5
Kelki Higher Secondary School	191	134	325	140	104	244	48.7	12.3	49.9	11.4	49.2	11.9
Motithang Higher Secondary School	104	78	182	99	65	164	55.2	10.5	51.2	10.1	53.5	10.5
Nima Higher Secondary School	142	92	234	104	73	177	47.8	12.9	49.8	13.2	48.6	13.1
Pelkhil School	123	104	227	95	82	177	48	11.4	48.6	11.3	48.3	11.3
Rinchen Higher Secondary School	131	89	220	95	61	156	47.12	11.9	47.6	11.9	47.3	11.9
Yangchenphug Higher Secondary School	137	90	227	113	68	181	50.4	11.3	47.2	11.9	49.1	11.7

Source: Bhutan Council for School Examinations and Assessment, 2018, p.98-99

Table 1 shows the highest mark scored in Economics by the students of DHSS in the BHSEC examination in 2017 is 67 out of 100, and the lowest is 21 out of 100. 53 students (64.8%) passed the BHSEC examination in Economics while 25 (35.2%) failed. None of the students from DHSS falls in distinction (70 % & above). As compared to other schools, DHSS has not been able to do well in the BHSEC examination in 2017. The academic result in general is only average. Introduction of Economics in schools is only from class IX and that some students study Economics only from class XI, students often find it extremely hard to learn economics concepts, facts and ideas.

According to Ni (2014), a teacher should make teaching learning encouraging by planning and implementing a variety of teaching methods or strategies that are relevant to the topic so that students are helped to overcome forgetting concepts, facts and ideas. There are number of method such as group discussion, group activities, project, cooperative learning, problem solving, problem based learning, drill, question and answer session and use of mnemonic among others to help student remember concepts, facts and ideas. The researcher wanted to try out mnemonic method to improve academic performance among stu

dents studying Economics by encouraging the use of mnemonic method to remember concepts, facts and ideas. To be able to use mnemonic method in teaching and learning it is important to understand what mnemonic method is. There are different kinds of mnemonic strategies to be adopted in the classroom. According to Fontana, Mastropieri and Scruggs (2007) mnemonic strategy includes a certain reconstruction of specific content to relate new information to learners' existing knowledge base and to teach information. Yin (2012) outlined, mnemonic is a device that helps student remember words and facts. Mnemonic consists of letters or words to enhance student's memory. Peg word mnemonic are also used to facilitate the learning of information using order or numbers to be part of what was being recalled (Fontana et al., 2007; Pressley & Schneider, 1997).

Mnemonic creates a cue such as keyword, phrase or acronyms familiar to the students. Mnemonic is a method or strategy that helps students with associated memory of a substance or phrase based on the letters to remember (Yin 2012). Although mnemonic method does not promote creativity and innovation, many teachers and students use mnemonic method to remember the concepts, facts and ideas meaningfully (Ni, 2014). According to Gettinger and Seibert (2002) mnemonic strategies are seen as effective study skills that have positive effects on student performance over the years.

Deleshmatt and Nebraska (2007) outlined two types of mnemonic methods: organization mnemonic and encoding mnemonic. Organization mnemonic is used to organize new information in the memory so that one can recall information easily. Whereas encoding mnemonic is used to transform abstract words into highly imagery substitutes in order to store more easily in the memory (Cansino, Maquest, Dolan & Rugg, 2002).

Literature and studies show that there is significant improvement in student's memorizing and remembering power when taught using the mnemonic method (Muha, 2000; Yin, 2012). Mnemonic is a practical method or strategy of assisting students to grasp new concepts (Seay & McAlum, 2010). It is based on the concreteness (Paivio, 1979) to foster recall and remembering. According to Yin (2012) "mnemonic can transform information into concrete and meaningful proxies. Mnemonic creates cues such as keyword, phrase or acronyms that students are familiar with" (p. 605). Similarly the keyword method uses concrete, acoustical similar words to cue the recall of a new term (Fontana et al., 2007).

In this action research, keyword method is used as prior studies have shown that keyword method is best when the information to be learned is new to the students (Wang & Thomas, 2000; Scruggs & Mastropieri, 2000; Mastropieri & Scruggs, 2007). The research has selected acronyms because letter strategies can be used to help students remember lists of information, such as: Did Flora Make Icing Pineapple Pie Sunday (Yin, 2012). Similarly 'actually' can be referred to seven functions of marketing: Distribution, Finance, Marketing, Information, Product, Place, Selling (Scruggs & Mastropieri, 1989; Yin, 2012).

### **Objective of the Action Research**

This action research aims to:

1. Investigate the effectiveness of using mnemonic on teaching and learning economics concepts, facts and ideas.
2. Improve academic performance among students studying Economics by encouraging the use of mnemonic method to remember concepts, facts and ideas.

### Action Research Question

This action research aim to answer the following questions:

1. Does mnemonic method help students remember Economics concepts, facts and ideas?
2. Would mnemonic method improve academic performance among students studying Economics?

### Research Design and Methodology

This action research was carried out during the first week of April 2018 and completed in the last week of June 2018. Mixed method was used in this action research. Pre and post data were collected through score of Unit Tests I and II, one to one semi structured interviews and student observation during lessons.

### Base line data collection

#### Unit Test I

In 2018, there were 39 students (12 female and 7 male in XII Arts and 7 female and 13 male in XII Commerce) within the age range of 18-20 years old. Of the 39 students, 24 students (12 female and 12 male) had not taken Economics in class IX and X.

The syllabus for class XII Economics consists of five units, each unit comprising of related sub topics. At the completion of each topic, a unit test is conducted as required by the school academic policy. The unit test is part of the continuous assessment and it helps teachers to diagnose student-learning gaps and also determine the level of knowledge that students possess. For class XII Economics, the marks scored by students in the Unit Tests are accounted towards their Continuous Assessment records for internal examinations. The Score of Unit Test I was used as the baseline data.

The Unit Test I was conducted on April 1, 2017. The Unit Test I consisted of eight questions, seven questions carrying 3 marks each and one question carrying 4 marks. The total mark was 25 and scores of students were converted to 100 for easy tabulation. The duration of the Unit Test I was 35 minutes. The score of the Unit Test I show that 66.7% of student scored below 50 marks, while 33.3% of student scored below 50 marks (Table 2).

*Table 2. Score of class XII Unit Test I for Economics*

Marks	Number of Student
80-100	0
65-79	4
50-64	9
40-49	13
0-39	13
<b>Total</b>	<b>39</b>

The marks scored by student as shown in Table 2 is unsatisfactory. The pass percentage is 66.5 and the mean mark is 42. The researcher identified the underlying issues and the challenges faced by students in studying Economics. After interacting with students the researcher discovered that the primary reason for student's difficulty was in remembering the concepts, facts and ideas in Economics. Other factors that they shared included not having scheduled revision, not having reference materials, their lack of interest and the huge syllabus. Students also shared that Economics being an optional subject did not provide them substantial reason to put a huge effort in studying it, rather they chose to focus on studying other subjects that were much easier and also helped score high marks.

As many students are pursuing Economics for the first time in classes XI and XII, keyword or mnemonic method is seen to be more suitable. This cue is expected to help students learn and recall the concepts they have learned during the lessons. Therefore the researcher has decided to help my students use the mnemonic method to enhance their ability to remember Economics concepts, facts and ideas for a longer period. In this action research the researcher planned to be careful so that student can apply mnemonic in Economics as well as in other subjects.

### **Interview**

Eight students (4 females and 4 males) from both the Arts and Commerce classes were selected through non-probability convenient sampling techniques for one to one semi structured interviews to collect in-depth information.

During one to one semi structured interview six students said that they found difficult to remember the concepts, facts and ideas taught in Economics. Eight students said "I quickly forget concepts even after revision". Five students outlined, "I do not understand and remember what I have learned in the classroom". Two students said, "Economics is an optional paper and I am less interested in it." Six students said "Economics is quite difficult because I have to remember many things". Three students said "I do not get time to study Economics at home. I will study Economics only during exam or test so that I can remember the concepts and facts".

During interview the researcher also found that mnemonic is very new among many students. Five students have learned to use mnemonic in science in class X. Five students also said that they used words or abbreviations to remember chemical formula. Acronym 'RBG' was used to remember the three primary colours, Red, Blue and Green. Five students also said that science teachers used mnemonic twice or thrice in the teaching learning process. However, these five students did not know how to apply the mnemonic in other topics and subjects.

### **Observation**

Observation of general behavior of each student in each class (XII Arts and Commerce) for pre data was done. Anecdotal records were kept for each student in the class. Two rounds of observation (consisting of 45 minutes each) were carried out during the entire period of action research. During the first two periods, only five students (2 female and 3 male) were found to be familiar with the mnemonic method. Frequency of participation was less. More than 80% students were not aware of mnemonic. Before the intervention, 70% of students did not actively participate in the group activities. During group activities students discuss and gossip and look around the class. A few students had to be reminded to participate in the group activities.

### **Intervention**

The researcher informed the aim and objective of the action research. The students were briefed about the planned action research and its purpose to ensure proper usage of the method. They were ensured anonymity and confidentiality and briefed on how the data was going to be used and protected. The researcher's critical friend recorded observations. The researcher maintained records of observation on the implementation of the mnemonic method and to assess students' participation in discussion and activities.

Mnemonic method was introduced in classes XII Arts and Commerce for three weeks after the Unit Test I. The researcher divided students into eight groups with roughly three members each. The researcher introduced the use of mnemonic during one period prior to the implementation of mnemonic to ensure the proper usage of the method. All the students received planned instruction method or strategy to practice keywords or phrase after his teaching. Researcher introduced the mnemonic method to the students and applied mnemonic method in teaching learning process based on appropriate topics. The researcher encouraged students to create a character based phrase or keywords or letter to remember the economics concepts, facts and ideas. For example elasticity can be presented by keyword 'electric' (Yin, 2012).

The researcher explained to students on the importance of understanding the purpose and concept of keywords or phrase or letter used. The researcher introduced the mnemonic method on previous study topic: Factors Affecting Price Elasticity of Demand. Together with students we coined the keyword for factors affecting Price Elasticity of Demand as ICELANDS. Income-Complementary-Electricity-Luxuries- Alternative uses-Necessities-Durability-Substitutes.

Since students became familiar with the creation of a mnemonic; students in groups of three were tasked to create their own keywords or phrases for the importance of Price Elasticity of Demands for Decision –Monopolist- Factor Prices-Policies-Trade- Exchange-Taxation-Paradox.

*Table 3 shows the list of mnemonic students created on the importance of Price Elasticity of Demand:*

Group	Range of words used by the student
1	DIMAPIPT
2	DEC–MFPE
3	D–FPRIEX
4	DEMFASPIR
5	DIMFASPIT
6	DIMFASPITR
7	DE–FPRIE
8	DE–FACPE

During the activities the researcher guided each group to achieve the expected learning outcomes of the lesson. The researcher scaffolded all XII Arts and Commerce students when students learn the given lesson or topic using mnemonic method. However the researcher reduces scaffolding, as students became more experienced with mnemonic method. During lessons where mnemonic was relevant, hands-on activities were assigned to students. For example, hands on activity on the topic: the meaning of Price Elasticity of Supply and determinations of Price Elasticity of Supply and Importance of Price Elasticity of Supply was assigned.

## **Post-Data collection**

### **Unit Test II**

The objective for administering post-test was to investigate students' level on performance in Economics after implementing mnemonic methods for three weeks. A post-test was collected following an intervention period of three weeks. The Unit Test II was conducted on April 24, 2018 using standard questions similar to that of Unit Test I. The Critical Friend verified the Unit Test II question paper. Students were made aware of the test a day before the test. The post-test score was compared with the pre-test score, and analyzed and interpreted.

### **Interview**

After the intervention program, eight students (4 females and 4 males) from both the XII Arts and XII Commerce classes who participated for one to one semi structured interviews in pre-test were interviewed. During one to one semi structured interviews, five students said that, "I can use mnemonic method in remembering facts, ideas and concepts". 90% of students agree that they can remember important concepts, facts and ideas for a longer period of time through the use of mnemonic. During interview, 90% student said that the mnemonic method makes easier for them to remember concepts, facts and ideas resulting better performance in test. Students are able to coin the keyword or phrases during group activities by discussing with other students in the group. It made learning fun and enjoyable. To further enhance remembering, all groups displayed their group activities in the corner dedicated to Economics subject. 3 students who are exceptionally good at studies remarked, "It's frustrating. I don't like mnemonic method. It's waste of time for me". 5 students said with practicing appropriate mnemonic has helped them to remember economic concepts, facts and ideas effectively.

The researcher has also learned from students that the mnemonic method can make topic or lesson easier for students to learn and remember for an extended period of time. Many students were in favour of using mnemonic method to teach economic concepts, facts and ideas. Participating students also shared their opinion that learning was fun, enjoyable and very interesting with different keyword, phrase or acronyms.

### **Observation**

Observation on general behavior of students during intervention program was done. Data collected from anecdotal records was inspected for any shift in the behavior towards learning. The Critical Friend and researcher observed that mnemonic method was relevant in teaching Economics lessons. The researcher observed students actively participating in the group activities. The group activities became lively and enjoyable. The Critical Friend found that students were active, responsive and ready to take part in the teaching learning process. The Critical Friend also commented during the last observation of the class that use of keywords or phrases helped students learn Economics better if students understood the use of mnemonic.

The researcher felt happy and satisfied with the ability displayed by the students. Almost 50 students shared satisfaction with the keywords and phrases created during the group activities. 50% of students are excited and interested in learning Economics through mnemonic.



## Result and Findings

The data analysis shows students performed with good scores in the Unit Test II. The pass percentage of Unit Test II was 97.4% and a mean mark is 62. The score of Unit Test II in table 4 revealed an improvement in the students' performance in the Economics to the base line date (Unit Test I).

*Table 4. Score of class XII Unit Test II for Economics*

Marks	Unit Test II
	Number of Student
80-100	0
65-79	6
50-64	20
40-49	12
0-39	1
<b>Total</b>	<b>39</b>

Data collected through different sources were triangulated to confirm the result. The triangulation of the data revealed an overall effectiveness of the intervention program. The results showed that students' performance had significantly improved in the test scores as evaluated by their post-test assessment. When results of Unit Test I and II were compared as in Table 5, student performance improved in Unit Test II. The average score in Unit Test II shows that 66.7% of student scored above 50 marks while 33.3% of student scored below 50 marks in Unit Test I.

*Table 5. Comparison of results of Unit Tests I and II*

Marks	Unit Test I	Unit Test II
	Number of Student	Number of Student
80-100	0	0
65-79	4	6
50-64	9	20
40-49	13	12
0-39	13	1
<b>Total</b>	<b>39</b>	<b>39</b>

There was increase in mean marks after the intervention program. The mean mark of Unit I (baseline data) was 42 while the Unit Test II (post data) was 62.

From one to one semi structured interviews; the researcher found out that students could use mnemonic method in remembering facts, ideas and concepts. Students agree that they can remember important concepts, facts and ideas for a longer period of time through the use of mnemonic. Student said that the mnemonic method makes easier for them to remember simple facts, concepts and ideas in Economics. Students are able to coin the keyword or phrases during group activities by discussing with other students in the group. Research found mnemonic made learning fun and enjoyable. The analysis of one to one semi structured interviews also revealed that by using mnemonic they can remember concepts; facts and ideas resulting better performance in test. Use of mnemonic method had enhanced long-term retention power of students because it summarizes information or lesson through key words, which ultimately help students to remember concepts, facts and

ideas. However few high achiever students (3 students) remarked, mnemonic method is frustrating and waste of time for them.

From the study of anecdotal records, the students who did not participate in the group activities at the start of the intervention improved in participation as the intervention program progressed. They become more familiar with creation of a character based phrase or keywords or letter to remember the Economics concepts, facts and ideas. The increase in participation during group activities is a positive indication of students' ability to use mnemonic method in remembering economic concepts, facts and ideas and being convinced of its usefulness. The researcher observed that the creativity and ability of student were discovered as they displayed potential in coming up with varying mnemonic. From the observations, the researcher has learned that mnemonic method can increase the interest and curiosity to study Economics and overcome the challenge to remember concepts, facts and ideas. The researcher critical friend and researcher found that students are active, responsive and ready to take part in teaching learning process.

### **Conclusion**

Based on the scores of the unit tests, interviews and observations, the researcher concludes that mnemonic can be used as a method or strategy in the teaching learning process to learn and remember economic concepts, facts and ideas as well as it enhance academic performances. The findings of this action research were consistent with Muha (2000); Yin (2012); Gettinger and Seibert (2002) that there is significant improvement in student's memorizing and remembering power and enhance academic performance when taught using the mnemonic method. The data analysis also showed students had positive opinions towards mnemonic in learning and remembering economic concepts, facts and ideas. Students agreed that they could remember important concepts, facts and ideas for a longer period of time by framing phrase based on the letters. Mnemonic is important method to encourage student in learning economic concepts, facts and ideas (Yin, 2012; Ni, 2014). The researcher has learned that mnemonic method creates greater enjoyment and interest in the lesson or topic. By implementing mnemonic method, teacher can increase students' score in tests and enhance their participation in the class.

The researcher would also recommend the mnemonic method or strategy to be adopted in Economics class. In the future the researcher will design lesson plans that incorporate mnemonic method. Every teacher is encouraged to use mnemonic in their classroom teaching because unless one doesn't use it one will never know the advantages. It provides opportunity for student to explore and remember economic concepts, facts and ideas. However, the researcher feel that teachers and students should be innovative and creativity in forming keywords or phrase or letter to implement the mnemonic method (Ni, 2014). It is essential for teachers to train students in mnemonic method in order to become skillful and independent learners (Yin, 2012).

However, the researcher would like to remind teachers that different teaching strategies work for different student. Not everybody could cope with what the teacher has been teaching. Therefore teacher should employ different instructional approaches in terms of teaching and learning process (Yadav, 2006).

### Limitation

The main limitation for this action research is on the literature available for review due to limited number of books available in the school library and hard to find authentic research works online on the topic of interest. The Internet facility is poor and limited in the school. The study could have more reliable if intervention program period was longer and the population/ population size was larger.

### Implications for further action research

In promoting learning, there is no single blueprint for effectiveness, though there are many characteristics of what constitutes effective teaching and effective learning (Cohen, Manion, Morrison & Wyse, 2010). There is no one particular instructional strategy or methods that are suitable or best for the improvement of test score (Yadav, 2006). Teachers should consider the power of small group settings when it came to their instruction.

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# Upper Primary School Student Attitude Towards Health and Physical Education Programme in Bhutan

Ugyen Choden, Ugyen Namdel and Kezang Sherab

## Abstract

Student attitude toward Health and Physical Education (HPE) formed during childhood can influence the choices they make in daily lives to be active or to remain sedentary. Therefore, this study investigated the attitude of upper primary students toward HPE for the first time in the Bhutanese education system ever since the programme was introduced in 1999. This is important for Bhutan whose vision is to promote gross national happiness. The study employed a quantitative approach with a survey design consisting five major themes- attitude towards HPE, perception of teacher's instruction, perception of benefits of HPE, attitude towards participation in HPE classes, and perception of support system for resources. A total of 1087 upper primary students (male= 568 & female= 519) responded to the survey from seven dzongkhags. The findings generally showed a positive attitude and much higher perceptions of HPE. More specifically Class V students showed much higher perceptions on benefits of HPE compared to Classes IV and VI, while students in urban schools revealed a positive attitude towards HPE compared to semi-urban students. Implications of the study and recommendations for improvement are discussed.

**Keywords:** *Attitude, Health and Physical Education, Upper Primary Students, Perception*

Attitude is the most distinctive and indispensable concept in contemporary American psychology (Allport, 1968). The most important way in which attitude influences our lives is our attitude towards physical activity (PA) (Nelson, Benson, & Jensen, 2010). Those who have a positive attitude toward PA are likely to lead a healthy lifestyle as a part of their lives, whereas those who have a negative attitude are not (Phillips & Silverman, 2015). Attitudes formed during childhood can influence the choices one makes in daily lives to be active or to remain sedentary. It is important to identify the attitude of students towards Health and Physical Education (HPE) at an early age. A number of scholars have stressed that student attitude could influence participation in future PA (Cameron, Norgan, & Ellison, 2006; Rady & Schimdt, 2013; Silverman, Keating, & Phillips, 2008; Zeng, 2011). Furthermore, the attitude of a student is likely to determine their choice of activities. Existing literature suggests that a person's attitude is developed from their personal belief system. These belief systems are formed at a young age and once these belief systems take hold, they eventually impact a person's attitude (Eagly & Chaiken, 1993; Sabini, 1995; Silverman & Subramaniam, 1999). It is imperative that students form a positive attitude towards HPE during their formative years so that they are able to continuously participate in PA.

Student attitude toward HPE has been proven worldwide as one of the gateways to a healthy body with a healthy mind. Therefore, this study investigated the attitude of upper primary students toward HPE for the first time in the Bhutanese education system. The HPE is a learning process that contributes to the optimum development of an individual's potential including health, growth and development, and physical and psycho-social competencies through a balanced and coherent range of physical activities (REC, 2016). Research indicates that the HPE makes a significant contribution to the total education of the human being by means of movement, play, and sport (Haag, 2003; Sherab, 2001; Gyeltshen, 2013).

Though the potential benefits of HPE programme in the Bhutanese education system were understood and recognised, it took some time for Bhutan to integrate the programme in the school curriculum (only in 1999) because of other competing needs and priorities (Sherab, 2001). One of the key reasons for the introduction of HPE in the Bhutanese education system in 1999 was the concern that the school children started adopting a sedentary lifestyle. It was observed that:

The Bhutanese lifestyle is changing rapidly as development expands. Unlike in the past, many school children now have a tendency for leading a sedentary life. Much of their free time outside the school is increasingly spent on activities ranging from viewing video films to loitering around without many physical activities. Such a sedentary and physically inactive lifestyle especially amongst the school children can be detrimental to their academic attainments because children who are physically fit and healthy can think, concentrate and learn better. (CAPSD (1999, p. 1)

However, the existing research has shown that there were several drawbacks for the successful implementation of HPE. Some of these drawbacks were the lack of appropriate curriculum, facilities, trained and specialized HPE teachers, management support, and not aware of the importance of physical movement (Sherab, 2001) and not much has changed even after twelve years (Gyeltshen, 2013).

However, the Government initiated the development of a new HPE curriculum which was introduced in 2008 as an interdisciplinary approach that deals with the concepts of health, interpersonal relationships, life skills and physical activities (REC, 2012). It emphasizes the knowledge of nutrition, habits and understanding the core regular physical activities necessary to guide and influence learners to practice physical activities as an integral part of their life. The curriculum is based on the ideals of healthy living, and that when cascaded to others in the society develop the community that possesses the fundamental health literacy to lead a healthy life (Sherab, 2001).

Internationally, the need for quality HPE curriculum in schools is increasingly recognized, mainly for the promotion of students' knowledge, skills and attitudes necessary for leading active and healthy lifestyles (REC, 2016; UNESCO, 2015). The development of a sound HPE programme in school can also support in building youths who are psychologically and physically healthy, which makes up two of the nine domains of Gross National Happiness (GNH) – the development philosophy that Bhutan expounds (Gyeltshen, 2013). Therefore, the HPE programme has the huge potential to contribute towards the national vision of promoting happiness. To work towards this vision, it is crucial that young children in the schools develop a positive attitude towards HPE.

Ever since the HPE was introduced in the Bhutanese primary schools in 1999 and the implementation of the new curriculum in 2008, nobody has studied student attitude. Considering the importance of implementing such educational innovation successfully from the formative years of education, this study examined the upper primary students' attitude towards HPE.



### Significance of the study

This study is the first of its kind in the Bhutanese context and is significant in several ways. The findings of this study add to the existing body of knowledge and benefit various organizations and individuals, both within and outside the education ministry. First, this study contributes to the existing body of knowledge in terms of understanding the Bhutanese students' attitude toward HPE. Second, the findings of this study are useful to the Ministry of Education (MoE) in making research-informed policy decisions related to the implementation of the HPE curriculum in schools. Third, this study provides insights in reviewing and modifying the existing HPE for upper primary schools to make it more responsive to the developmental needs and interests of students. Thus, making HPE more friendly and lively educational experience for students. Fourth, this study may help the school management and the teachers to understand the impact and significance of the HPE in the holistic development of students that are healthy at the head, hands, and heart (3H).

### Objectives of the Study

This study aimed to explore the attitude of upper primary students toward participating and learning HPE.

### Research questions

1. What is the upper primary students' attitude toward HPE, perception on teacher's instruction, perception on benefits of HPE, attitude towards participation in HPE classes, and perception on the support system for resources?
2. Is there any correlation between student attitude towards HPE, perception on teacher's instruction, perception on benefits of HPE, attitude towards participation in HPE classes, and perception on the support system for resources?
3. Is there any difference in the attitude of upper primary students in terms of their class level, gender, and location of the school?

### Literature Review

The main purpose of this study was to explore the Bhutanese upper primary students' attitude toward school HPE. Existing literature indicates that student attitude toward HPE is an important determinant of their participation in physical activities outside of school. For instance, research in Kuwait has shown that students consider physical education (PE) classes as fun, makes them feel happy and satisfied, keeps them fit and healthy, and acquire more friends (Mohammad & Mohammad, 2012). While anecdotal evidence shows that this could be true in Bhutan, currently there is a lack of research. Research by Pirot (1993) in Western Australia for secondary level found that both girls and boys held positive attitudes toward compulsory physical education; however, boys' attitudes were more positive than girls. Research also suggests that as the class level increased, attitudes towards compulsory PE were less positive for both boys and girls collectively. A similar study by Ramiz (2009) in Turkish high schools indicated a significant difference in students' attitude toward PE. The attitude mean scores of boys were higher than those of girls. These differences in attitude in terms of gender and class level have implications on the successful implementation of the HPE. Would this be similar to the Bhutanese upper primary students? It is important that such differences are identified and addressed at the earliest.

A recent study by Tulin and Merve (2016) in Ardahan, Turkey concluded that students' class, gender, place of residence, parents' level of education, level of income and number of siblings did not affect the PE and sports lesson attitude scores of secondary school students who were between the ages 11 and 14 years. Due to the lack of research in the Bhutanese context, it is not sure if the situation could be similar. However, it could be tentatively speculated that there could be differences in terms of students' class level and gender.

Teachers play an important role in the successful implementation of any educational innovations (Sherab, 2017; Yero, 2010; Fullan & Hargreaves, 1992; Fullan, 1999). Yero (2010) rightly argues that "teachers have always had the power to determine the tone and direction of a school, to create exemplary worlds within the classroom, and to scuttle reform movements that failed to fit their mental models" (2010, p. xiv). If HPE is to be successfully implemented in the Bhutanese schools, it is important that HPE teachers are knowledgeable and skilled and that they are able to motivate their students to actively participate in HPE classes. One way to measure whether HPE teachers are able to motivate their students is to examine student attitude towards HPE and their perceptions, which is the intention of this study.

There is plenty of student attitude research on HPE at the high school level (Atan & Imamoğlu; 2016; Zeng, Hipscher, & Leung, 2011; Ramiz, 2009; Rikard & Banville, 2006; Villegas, 2001; Pirot 1993) which shows that students usually prefer a wide variety of sport and fitness activities, an increase in level of challenge in PE classes, and an increase in student motivation for participating in activities outside of school (Rikard & Banville, 2006). They also found that student attitudes were accepting or tolerant of participation in fitness activities due to known health benefits. Most students liked PE classes that included some form of game-play. In addition, they stressed the need for adding interesting activities that included active participation while having fun. Student recommendations included strategies for improving instruction and for grouping students by skill levels for an appropriate challenge. Another study in California (USA) mentions that high school students were active only when they were enrolled in PE classes and were rarely physically active outside the class (Villegas, 2001). Such finding has implications on school HPE. If schools do not have a strong HPE, students are likely to lead a sedentary lifestyle outside of the school. This, in turn, has implications on the overall development of a nation. As such Bhutan has been already making a huge investment on the treatment of lifestyle-related diseases such as diabetes, hypertension, and cancers (Yangchen, Tobgay, & Melgaard, 2017).

Among the significant importance that HPE has on the holistic development of the children, health-related fitness programme plays a vital role in promoting a healthy lifestyle in early education. Colquitt and Langdon (2012) explored student attitudes toward PE among students in Georgia (USA) after the state implemented a policy requiring statewide fitness testing with the purpose of addressing the social and emotional health of students- as advocated in the Coordinated School Health Model. They concluded that student attitude toward PE can serve as a facilitating factor for health-related fitness. So, finding out student attitude toward the HPE is important considering the health benefits that they acquire from the programme.

Lack of facilities is seen to be one of the prominent drawbacks in implementing HPE in schools successfully (Sherab, 2001). According to Sherab (2001) due to large class size

(On average 40 to 50 students in a class) in the Bhutanese context, provision of basic infrastructure and sufficient equipment play a significant role in implementing the HPE. Limited space restricts free movement, therefore when the class becomes too congested it is not safe to conduct most activities. Hastie and Saunders (1991) examined the effects of two different environmental conditions upon the classroom behaviours of teachers and students in Australia. Student involvement showed significantly more motor appropriate activity and more cognitive and less organizational activity in classes where there were unlimited amounts of equipment available irrespective of class size. The teacher decision making and resultant pupil opportunity to respond were strongly influenced by environmental variables and that such environments can be both systematic and predictable. Besides teaching style of the instructor, curriculum and school infrastructure were also the main determinants of student attitude towards PE (Bozoğlu & Göktürk, 2016). This study aimed to explore if Bhutanese upper primary students' attitude is being determined by factors such as their teachers' teaching style, curriculum, and resources.

Quite surprisingly there is a lack of research on upper primary school students' attitude toward HPE. A literature search using Google Scholar and ResearchGate found only two such studies. For instance, a study by Phillips and Silverman (2015) in the United States that explored upper primary student attitude found an overall positive attitude toward PE. Their study also concluded that the attitude toward PE did not differ in terms of gender. In terms of class level, class IV students exhibited positive attitude compared to class V students. Another study by Adamcak and Bartik (2014) in Slovakia concluded that as students move higher up in terms of class level (especially from primary to secondary) their attitude towards PE declines as they undergo transition facing different learning environment. This is something that this study explored in the Bhutanese context.

## **Methods and Materials**

### **Research approach and design**

The study employed a quantitative approach with the self-administered survey design (Cooksey & McDonald, 2011; Creswell, 2012). The stratified random sampling in terms of class level, location, and dzongkhag was employed and members were randomly selected from each group for data collection. Permission for the conduct of surveys was obtained from the Director of the School Education, MoE and the respective school principals. The researchers visited the schools for survey administration except for the two remote dzongkhags of Pemagatshel and Mongar. For these two dzongkhags, HPE teachers from a few schools were contacted via Facebook and the questionnaires were sent to them through email. Prior to the survey, the researchers explained to the students the purpose of the survey and the process for responding to each of the items in the survey to avoid any confusion. A total of 1087 (72.5% response rate) students responded to the survey out of 1500 questionnaires distributed.

The questionnaire had a total of 28 items, first two were related to demographic information while the other 26 were based on a 5-point Likert type items ranging from Strongly Disagree (1), Disagree (2), Neither Disagree nor Agree (3), Agree (4), and Strongly Agree (5), measuring five different themes: i) attitude towards HPE (6 items); ii) perception of teacher's instruction (4 items); iii) perception of the benefits of HPE (7 items); iv) attitude toward participation in HPE classes (5 items); and perception of support system for resources (4 items).

## Data Analysis and Findings

Statistical Package for Social Science (SPSS) version 23, was used for analysis. After entering the data from the questionnaire into the SPSS database, a thorough screening process was undertaken to confirm that the data were entered correctly and to understand the distributive analysis of the items. A few wrong entries were sorted out after crosschecking with the original responses in the questionnaire. Items showed no substantive none normality in terms of values. The cases of missing values were also observed to be minimal and without any patterns. The presentation and analysis of data are grouped into three categories answering each of the three research questions: i) overall level of student attitude and perceptions related to different themes; ii) correlation analysis to check if the five themes have any significant relationship or not; iii) MANOVA analyses to compare student attitude and perceptions in terms of gender, class level and location of the school.

## Demographic Information

A total of 1087 upper primary students responded to the survey from eight dzongkhags (see Table 1).

**Table 1: Demographic characteristics (n=1087)**

Characteristic	Category	n	%
Class level	4	380	35.0
	5	342	31.5
	6	365	33.6
Gender	Male	568	52.3
	Female	519	47.7
Location	Urban	730	67.2
	Semi-urban	357	32.8
Dzongkhag	Samtse	87	8.0
	Chukha	262	24.1
	Paro	124	11.4
	Thimphu	184	16.9
	Haa	251	23.1
	Pemagatshel	81	7.5
	Mongar	98	9.0

## Level of student attitude and perceptions

To understand the overall level of student attitude and their perceptions of HPE, the score for each item under each of the five themes (theme 1= 6 items; theme 2= 4 items; theme 3= 7 items; theme 4= 5 items; and theme 5= 4 items) were aggregated to compute a mean score for each theme (see Table 2).

**Table 2: The five themes with mean and SD**

SL.N o	Theme	N	Mean	SD
1	Attitude towards HPE	1087	4.26	0.59
2	Perceptions of teachers' instruction	1086	4.14	0.63
3	Perceptions of the benefits of HPE	1087	4.36	0.52
4	Attitude towards participation in HPE classes	1058	4.00	1.38
5	Perceptions of support system for resources	1085	4.06	0.77
	Valid N (listwise)	1056		

As shown in Table 2 above, all the themes scored a mean between 4.00 and 4.36. For five-point Likert scale items, all the means appear to be on a higher side. However, relatively speaking the student *attitude towards participation in HPE classes* showed the lowest mean with the highest standard deviations (M= 4.00; SD= 1.38). This is followed by the student *perceptions of support system for resources* (M= 4.06; SD= 0.77). This is an indication that students who participated in this research comparatively did not show a robust attitude towards participation in HPE. They tend to show hesitation to participate in HPE classes actively because they are not good in movement skills, do not want to show their body, do not like to interact with others, do not like to wear sports attire, and that their HPE teacher does not like them. Students also showed comparatively lower perceptions of the kind of support they receive to attend HPE in their schools. More specifically the findings showed that schools do not have a good place to conduct HPE classes, no adequate equipment, no regular HPE classes, and no trained HPE teacher. Higher standard deviations of these two themes compared to the other three themes also indicated that these students have differences in their opinion when it comes to the attitude towards participation in HPE classes and their perceptions of support system.

Meanwhile, the two themes that showed the highest means were student *perceptions of benefits of HPE* (M= 4.36; SD= 0.52) and their *attitude towards HPE* (M= 4.26; SD= 0.59). Such findings suggest that these students are able to understand the benefits of HPE and that they also exhibit a strong positive attitude toward HPE. Much lower standard deviations demonstrate that these students have a similar opinion that the HPE benefits them by gaining confidence, making friends, improving knowledge on movement and sports skills, developing healthy habits, and help understand the value of regular participation in physical activities. The findings also showed that upper primary students have a positive attitude towards participation in competitive activities, playing fun activities, playing sports, HPE classes should be more than one period a week, HPE is for everybody, and that all students get equal opportunities to participate during HPE classes.

### Correlation Analysis between the Five Themes

A correlation analysis was conducted to see if there are any significant correlations between student attitude towards HPE, their perceptions of the benefits of HPE, their attitude towards participation in HPE classes, and their perceptions on the support system for resources. As shown in Table 3, significant positive correlations were found between different themes except for students' attitude towards participation in HPE classes and their perceptions on the support system for resources. This is an indication that the increase in students' score for one theme is likely to increase the scores for all the other themes. For instance, an increase in students' attitude towards HPE is likely to increase their perception of

teacher's instruction, their perception of the benefits of HPE, their attitude towards participation in HPE classes, and their perception on the resource support system for HPE. Therefore, it is imperative that schools and HPE teachers give their best to inculcate a positive attitude towards HPE, higher perceptions of teacher's instruction, higher perceptions of the benefits of HPE, positive attitude towards participation in HPE classes, and higher perceptions on the support system for resources. Meanwhile, students' attitude towards participation in HPE classes does not seem to have any relation to their perception of whether the schools get good support in terms of resources or not for HPE classes.

**Table 3: Correlations between different themes**

		HPE				
		programme	Instruction	Benefits	Participation	Support
<b>HPE programme</b>	Pearson Correlation	1	.559**	.332**	.768**	.125**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	1087	1086	1087	1058	1085
<b>Instruction</b>	Pearson Correlation	.559**	1	.302**	.545**	.168**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	1086	1086	1086	1058	1084
<b>Benefits</b>	Pearson Correlation	.332**	.302**	1	.091**	.241**
	Sig. (2-tailed)	.000	.000		.003	.000
	N	1087	1086	1087	1058	1085
<b>Participation</b>	Pearson Correlation	.768**	.545**	.091**	1	.007
	Sig. (2-tailed)	.000	.000	.003		.828
	N	1058	1058	1058	1058	1056
<b>Support</b>	Pearson Correlation	.125**	.168**	.241**	.007	1
	Sig. (2-tailed)	.000	.000	.000	.828	
	N	1085	1084	1085	1056	1085

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### Comparison of student attitude in terms of their class level, gender, and location

A total of three one-way MANOVAs (Multivariate Analysis) were conducted between the five themes (attitude towards HPE, perception of teacher's instruction, perception of the benefits of HPE, attitude towards participation in HPE classes and perception on support system for resources) as dependent variables and three demographic characteristics (class level, gender, and location) as independent variables to explore if there were any statistically significant differences in the scores of the five dependent variables. Inspection of Box'M Test showed significance ( $p < 05$ ) for two MANOVAs (class level and location) indicating that observed covariance matrices of the dependent variables were not equal across groups. However, an examination of the standard deviations for various groups showed that differences were minimal. Levene's tests for each of the five dependent variables were produced to check homogeneity of variances. While two of the dependent variables (gender and location) were not significant ( $p > .001$ ) for each MANOVA, attitude towards HPE, attitude towards participation in HPE class, and perception on the support system for resources in terms of class level showed significant ( $p > .001$ ). However, an inspection of the standard deviation for these three themes showed relatively small differences between the grouping categories,



which suggested that violation of the assumption of homogeneity of variances had not been very serious. Thus, the findings indicated that MANOVA should be interpreted.

### Results of Multivariate F-tests

The overall MANOVA F-tests (see Table 4) showed a significant difference for class level and location and marginal significance for gender.

**Table 4:** MANOVA results showing significant differences

Effect	Wilks Lamda	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Class	.938	6.811	10.000	2098.000	.001	.031
Location	.933	15.148	5.000	1050.000	.001	.067
Gender	.985	3.244	5.000	1050.000	.007	.015

### Results of Univariate F-tests

Univariate F-tests were examined for class level, location, and gender to identify which theme contributed to the significance. Furthermore, Posthoc Tukey HSD multiple comparisons tests were consulted for a class level to identify which categories were significantly different. According to the results of univariate F-tests, as shown in Table 5, the benefits of HPE and support system for resources showed significant differences on class level. Attitude towards HPE programme, teacher's instruction, benefits of HPE, and support system for resources showed significant difference and participation in HPE classes showed marginally significant differences on location. However, an examination of the effect size as measured by Partial Eta Squared (see Table 5) for all the significant variables indicated that the actual variance explained in the mean values between various categories were very small. Meanwhile, none of the themes showed significant differences on gender.

**Table 5:** Tests of Between-Subjects Effects with significant results

MANOVA effect	Dependent variable	Type III Sum of Squares	df	Error df	F	Sig.	Partial Eta Squared
Class	Benefits of HPE	7.072	2	1053	13.539	.001	.025
	Support systems for resources	12.749	2	1053	11.010	.001	.020
Location	Attitude towards the HPE pro- gramme	13.192	1	1054	38.966	.001	.036
	Teacher's instruc- tion	15.725	1	1054	42.616	.001	.039
	Benefits of HPE	4.731	1	1054	17.977	.001	.017
	Participation in HPE classes	17.087	1	1054	9.001	.003	.008
	Support system for resources	11.582	1	1054	19.985	.001	.019

Inspection of mean and standard deviations for each of the grouping variable showed the following results:

In terms of class level, the mean for perceptions of benefits of HPE and support system for resources differed significantly. Consultation of Posthoc Tukey multiple comparison tests showed that class 5 students' mean was significantly higher ( $M = 4.48$ ;  $SD = 0.51$ ) than for Class 4 students ( $M = 4.31$ ;  $SD = 0.51$ ) as well as for class 6 students ( $M = 4.31$ ;  $SD = 0.52$ ). Furthermore, Class 4 students' mean for perception on support system for resources was significantly higher ( $M = 4.21$ ;  $SD = 0.77$ ) than for Class 5 students ( $M = 3.99$ ;  $SD = 0.82$ ) as well as for Class 6 students ( $M = 3.98$ ;  $SD = 0.70$ ).

In terms of location, the mean for urban students was significantly higher than the mean for semi-urban students for all the five themes (see Table 6).

**Table 6:** Mean and SD for the location of the school

Theme	Urban		Semi-urban	
	Mean	SD	Mean	SD
Attitude towards HPE	4.33	0.57	4.09	0.61
Perception of teacher's instruction	4.22	0.63	3.96	0.56
Perception of benefits of HPE	4.41	0.50	4.27	0.54
Attitude towards participation in HPE classes	4.09	1.36	3.82	1.41
Perception of the support system for resources	4.14	0.76	3.91	0.76

## Discussion

While there is a lack of research in the Bhutanese context, there have been numerous studies conducted to understand student attitude toward HPE in other contexts. This is an indication that student attitude plays an important role in the success of the school HPE. However, most of these research works are at the secondary schools (Atan & Imamoglu; 2016; Pirot, 1993; Ramiz, 2009; Rikard & Banville, 2006; Villegas, 200; Zeng, Hipscher, & Leung, 2011) and not much at the primary school level (Adamcak & Bartik, 2014; Phillips & Silverman, 2015). Therefore, this study adds to the existing literature on upper primary student attitude toward HPE from the Bhutanese perspective. Understanding primary school student attitude is more important as they are in their foundation years. When students in primary school develop a positive attitude, it is likely that they also become active outside of the school. These students will not only experience success in their HPE classes throughout their school life but also become active and healthy adults. This has the potential to contribute towards achieving the national vision of gross national happiness.

Findings from this study corroborated with earlier findings of Phillips and Silverman (2015) and Adamcak and Bartik (2014) that upper primary students generally exhibit a positive attitude toward HPE. Furthermore, this study also showed that upper primary students in Bhutan have higher perceptions about their teacher's instruction, benefits of HPE classes, and support system for resources. Such findings indicate that HPE is likely to be successfully implemented in Bhutanese schools. However, relatively speaking student attitude toward participation in HPE classes and their perception of support system for resources were not as robust as other themes.

This study found that student attitude toward HPE, their perception of teacher's instruction, perception of benefits of HPE, attitude towards participation in HPE classes, and perception on the support system for resources were positively correlated against each other. This is an indication that each of these themes has an influence over the other and that relevant stakeholders such as the MoE, REC, school management, and teachers provide more emphasis on supporting students experience success in their HPE. Meanwhile, student attitude towards participation in HPE classes and their perception of support system for resources did not show any relationship, indicating that student perception toward support system for resources is unlikely to affect the nature of student attitude toward participation in HPE classes.

The overall findings from this study showed that student attitude and perceptions differed in terms of class level and location of school while gender did not show any significant differences. In terms of class level, evidence from this study indicates that class V students had much higher perceptions in terms of benefits of HPE compared to the Classes IV and VI students. As shown by earlier research (Adamcak & Bartik, 2014; Hodgkin, 2014; Subramaniam, 2018), both Classes IV and VI are in a transitional period and hence they experience decline in their perception of how HPE benefits them in terms of gaining confidence, making friends, improve my knowledge on movement skills, improve sport skills, develop healthy habits, and importance of participating in regular PA. Class IV students face the transition from lower primary to upper primary and Class VI students from upper primary to lower secondary. However, it is important that in-depth research in the future be carried out to explore the deeper meaning behind such differences. In terms of student perception on the support system for resources, Class IV students exhibited much higher perceptions compared to Class V and VI students. This finding corroborated with earlier findings that with the increase in the class level there is a decrease in student attitude (Subramaniam, 2018). Furthermore, research also shows that as students enter the age of puberty, they tend to develop a negative attitude towards HPE. However, this issue merits further investigation.

Findings from this study confirmed earlier findings of Chatterjee (2013) that students in urban schools revealed a positive attitude toward HPE compared to their counterparts in the semi-urban schools. Furthermore, this study found that urban school students had much higher perceptions of teacher's instruction, benefits of HPE, and support system for resources.

These findings could be attributed to better facilities and infrastructure in urban schools compared to semi-urban schools (Chatterjee, 2013). According to Eraslan (2015), one of the plausible reasons could be related to parents' lifestyle. Parents who exercise and lead active life seems to directly influence the attitude and perceptions of their children toward HPE.

## Conclusion

Student attitude plays an important role in determining their future actions. It is therefore important that relevant stakeholders understand student attitude and address any pertinent issues. Findings from the current study revealed for the first time Bhutanese upper primary students' attitude towards HPE, which is an addition to the existing knowledge. This also helps to further expand on the limited understanding of the upper primary students' attitude towards HPE at the international level. Finding from this study has practical as well as policy implications. Teachers and schools need to put in more effort to raise the attitude

of the students in terms of participation in HPE classes and provide required resources for the successful conduct of HPE classes. It also has implications for semi-urban schools as well as for the parents. Semi-urban schools need to focus on improving facilities and infrastructure and it is important for parents to model active lifestyle. More such research needs to be carried out at the national level to further validate the current findings.

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# Emission of Extremely High Concentrations of PM<sub>2.5</sub> and Ultrafine Particles during Firewood Combustion

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## Abstract

Firewood still remains a primary cooking and space heating fuel in many rural homes in Bhutan, the combustion of which presents substantial indoor air quality problems for the occupants. Between 2012 and 2013 a team of experts from Bhutan and Australia undertook a major air quality study in rural areas in Bhutan. During the study we observed emission of extremely high concentrations of particles when stoves were operated for cooking/heating. While larger findings of the study have been published in several journals, so far, we have not reported the emission of episodic peak concentrations when fuelwood was burned. This is important since the short-term peak particle concentrations contribute substantially to the total exposure and the associated health risks. Therefore, the aim of this paper is to report extremely high concentrations of fine (PM<sub>2.5</sub> <2.5 μm) and ultrafine particles (UFP <0.1 μm) observed during cooking/heating, when firewood was used as a fuel. Two sets of measurements were done (i) indoor fixed measurements during cooking and heating in two village homes and (ii) personal exposure monitoring for 59 village children, using real-time instruments DustTrak for PM<sub>2.5</sub> and NanoTracer for UFP. The mean UFP and PM<sub>2.5</sub> concentrations (2.0×10<sup>5</sup> particles/cm<sup>3</sup> and 1329 μg/m<sup>3</sup>) observed during heating were 3 and 4 times higher than the mean concentrations measured before the heating. Likewise, the mean UFP and PM<sub>2.5</sub> concentrations (6.8×10<sup>5</sup> particles/cm<sup>3</sup> and 4429 μg/m<sup>3</sup>) during cooking were 64 and 69 times the mean concentrations measured before the cooking. For personal exposure monitoring, a mean UFP concentration of 1.1×10<sup>5</sup> particles/cm<sup>3</sup> was observed corresponding to time spent by children in the kitchen during cooking. This activity contributed to 64% of the daily exposure, even though children spent only 9% the day in the kitchen while cooking. The results reveal (i) a substantial contribution of biomass fuels to indoor pollution levels, (ii) importance of treating peak concentrations separately when average exposure is computed from extended measurements.

**Keywords:** *Firewood, Rural, Combustion, Cooking, Heating*

An estimated three billion people world-wide depend on solid fuels for cooking (Legros, Gitonga, & Rijal, 2011). In rural areas of developing countries, solid fuels are mostly burned in inefficient traditional cookstoves, without proper smoke venting system, and often in poorly ventilated kitchens. The resulting household air pollution (HAP) presents significant health risks to rural population (Balakrishnan, Sambandam, Ramaswamy, Metha, & Smith, 2004). The recent World Health Organization (WHO) report has estimated 4.3 million premature deaths in low and middle income countries from exposure to HAP (WHO, 2014).

While number of global households relying on solid fuels for cooking has decreased by some 21% in the last decade, the population at risk from exposure to combustion products has remained more or less same due to growth in population (Bonjour et al., 2013). The Population and Housing Census reports present a similar trend for Bhutan. The proportion of households using firewood for cooking in rural areas has decreased to 36.7% in 2017 (NSB, 2018) from 56.6% reported in 2005 (OCC, 2006). However, in the last 12 years, Bhutan has seen a 16% growth in total population, with 62.2% living in rural areas (NSB, 2018). In the last decade, several studies have characterized HAP in rural areas in some of the least developed countries, for example (Begum, Paul, Dildar Hossain, Biswas, & Hopke, 2009; Devakumar et al., 2014; Dionisio et al., 2012; Kang, Li, Wang, Zhang, & Cong, 2009;

Li et al., 2012; Morawska et al., 2011; Nia et al., 2016; Singh, Tuladhar, Bajracharya, & Pillarisetti, 2012; Tian et al., 2009). However, most studies have relied on instruments that provide time averaged data, the resulting mean concentrations of which do not give information on time-series concentrations, which is crucial for understanding source contribution and emission characteristics. The short-term episodic peak concentrations make substantial contribution to total exposure (Buonanno, Marini, Morawska, & Fuoco, 2012; Mazaheri et al., 2014). Hence, the use of time averaged concentration from extended measurements will result in inaccurate assessment of exposure (Ezzati & Kammen, 2001).

Between 2012 and 2013, a team of academics from Bhutan and Australia (including the first author of this paper) undertook the first ever quantitative air quality study in rural areas in eastern Bhutan. Our research activities involved mobile assessment of on-road air quality for a highway, assessment of children's personal exposure, characterization of air quality in school environment and a real-world characterization of emissions from biomass stoves during cooking and heating. The findings of the study have been reported elsewhere (Wangchuk, 2017a, 2017b; Wangchuk, He, Dudzinska, & Morawska, 2015; Wangchuk, He, Knibbs, Mazaheri, & Morawska, 2017; Wangchuk, Knibbs, He, & Morawska, 2015; Wangchuk, Mazaheri, et al., 2015). To our knowledge, no quantitative air quality study has been reported in the scientific literature from Bhutan prior to our study.

We used real-time portable instruments to measure particle mass and number concentrations. Our measurements during real-world cooking and heating inside kitchens, and personal exposure monitoring for children revealed peak concentrations of UFP ( $<0.1 \mu\text{m}$ ) and  $\text{PM}_{2.5}$  ( $<2.5 \mu\text{m}$ ), exceeding the upper detection limit of the instrument. The emission of peak particle concentrations corresponded with the time when stoves were operated for cooking/heating and when children spent time inside kitchens during cooking. Therefore, the aim of this paper is to report emission of extremely high concentrations of particles during firewood combustion. This is important since most of the previous studies have reported time averaged concentrations without any mention of episodic peak concentrations during combustion process. For example, studies in Nepal have reported mean 24 hours indoor  $\text{PM}_{2.5}$  concentrations of  $2070 \mu\text{g}/\text{m}^3$  (Singh et al., 2012) and  $656 \mu\text{g}/\text{m}^3$  (Pokhrel et al., 2015), in houses using traditional biomass cook stoves. If the studies have captured short-term peak concentrations when stoves were operated, the resulting concentrations would have been some order of magnitude higher than the reported mean concentrations. Similarly, a study in nomadic tents in Tibet has reported a mean 24 hours  $\text{PM}_{2.5}$  concentration of  $1420 \mu\text{g}/\text{m}^3$  (Li et al., 2012). At the same time, this study has reported that average peak concentration when stoves were operated was five times higher than the daily mean concentration. Therefore, since short-term peak particle concentrations make substantial contribution to daily exposure, this must be emphasized when assessing exposure to air pollution.

## Methods and Methods

### Study area and participants

The study was conducted in the rural villages of Kanglung within the Trashigang district in eastern Bhutan, which is one of the largest and the most densely populated districts in the country. Although villages have access to electricity, the use of firewood in traditional stoves is very common for cooking, as well as indoor heating. This is mainly due to intensive cooking activities, such as cattle feed preparation and distilling local liquor, which cannot be done using standard electric or gas stoves due to the size of the pots needed for such activities.

For indoor monitoring, two houses (H1 and H2) located in different villages ~5 km apart were selected to represent the most common stove types and cooking/heating activities. Both the houses were traditional structures built from mud, wood and stone, except for the walls of the H1, which were strengthened with concrete. H1 used LPG and electricity for cooking meals and a wood fed metal chimney stove for space heating (locally called bukhari) which had an enclosed combustion chamber (Figure 1a). H2 used traditional biomass **cook stove** made of mostly mud for all cooking activities as well as for space heating (Figure 1b). The stove had two open potholes and an open combustion chamber. As in all the village homes, both H1 and H2 relied on natural ventilation, doors and windows.

For personal exposure monitoring, 59 village children attending three primary schools in Kanglung participated in the study. The schools were located approximately 4 to 10 km from each other. The typical school hours were from 8 am to 4 pm on weekdays, and until mid-day on Saturdays. All children walked to schools from their homes in the villages. Children's participation was based on their willingness and consent from the parents, and in consultation with their teachers.



Figure 1: (a) stove used for heating in H1 and (b) stove used for cooking in H2, and (c) personal exposure monitoring of children

## Instrumentation

The instruments used in the study were shipped to Bhutan from the International Laboratory for Air Quality and Health (ILAQH), Queensland University of Technology, Brisbane, Australia. Prior to shipment, all of the instruments were tested and calibrated at ILAQH.

PM<sub>2.5</sub> was measured using a DustTrak aerosol photometer (TSI Model 8520, TSI Inc., St. Paul, MN, USA), that operates on a light scattering technique, where the amount of scattered light is proportional to the mass concentration of the aerosol. DustTrak was tested and calibrated for ambient urban concentrations against the Tapered Element Oscillating Microbalance (TEOM 1405-DF, Thermo Fisher Scientific Inc.), which is a robust reference instrument for PM<sub>2.5</sub> measurements and uses gravimetric detection technique. DustTrak was not calibrated for the biomass emission, therefore, the measured PM<sub>2.5</sub> concentrations represent approximations of the actual values. For simplicity, the DustTrak results discussed in this paper are referred to as PM<sub>2.5</sub> from now on (omitting the term 'approximation'). Prior to each sampling, the instrument was set to a 10 second averaging interval, zero calibrated, flow rate checked, and time stamps synchronized with the local time.

UFP was measured using Nano Tracer (NT, Philips Aerasense, Netherlands), which works by diffusion charging and measures particle number (PN) concentrations up to  $1 \times 10^6$  particles/cm<sup>3</sup> in the size range of 10-300 nm. The instrument operates in two modes: (i) *Advanced* mode, with 16 second sampling intervals allowing for measurement of both PN and mean particle diameter and (ii) *Fast* mode, which allows for the adjustment of sampling intervals down to 3 seconds, but only measures PN. The Advanced mode was used in the present study. Details of design and operational procedures for the NT are available in Marra, Voetz, and Kiesling (2010).

The NT's time stamp was synchronized to the local time using the NanoReporter software prior to each measurement. The two NTs used in this study were run side by side with a TSI model 3787 condensation particle counter (CPC) in order to calibrate the instruments the same way, and ensure the readings from each NT were directly comparable. A correction factor for each NT was computed by using the following equation as described by Mazaheri et al. (2014):

$$CF = \frac{C_{CPC}}{C_{NT}}$$

Where, C<sub>CPC</sub> and C<sub>NT</sub> refer to the concurrent total PN concentrations measured by the CPC and the NT unit, and CF is the correction factor. It should be noted that CPC 3787 has a lower cutoff size of 5 nm in comparison to 10 nm for NT. Particles from 5-10 nm may account for important fraction of total PN concentrations, in which case results of this study could be underestimated.

## Air quality monitoring

### Indoor fixed monitoring

PM<sub>2.5</sub> and UFP were measured in two houses, H1 and H2 in January 2013. Monitoring in the two houses were done to measure particle emissions from metal chimney stove during space heating in family's living room in H1 (Figure 1a) and during liquor distillation (cooking activity) from traditional cook stove inside kitchen in H2 (Figure 1b). The measurements were conducted in three stages, with 45 to 60 minutes of background measurement before the activity, followed by the activity (stove operation), and at least an hour after the activity has ceased.



Two measurements each on different dates were done in both the houses for the same activity. The average duration of stove operation was 5 hours for heating and 2 hours for liquor distillation.

Instruments were placed at 1.5 meters above the floor and at least 3 meters away from the stoves, depending on the size of the space. The standardization of instrumentation location with respect to combustion source is important given potential spatial gradient in concentration. However, in real-world measurements (particularly in houses) it has to be determined by convenience of the occupants. Therefore, location of the instrumentation setup was not standardized in the present study.

### Personal exposure monitoring

The measurements were done between May and October 2013. Personal UFP exposure was measured by securing the NT to child's waist using a dedicated belt (Figure 1c). The sample tube was extended close to child's breathing zone. Measurements commenced when children left school for home and concluded the next day at approximately the same time (24 hours). The children were instructed to keep the instrument charging overnight and while in the classrooms, and to carry it throughout the day except during sleeping, playing and washing. While in the classrooms, the instrument was to be placed in the child's close proximity. All children were trained to maintain their time activity diary for the duration of measurement. A total of six distinct microenvironments/activities have been considered for exposure monitoring: (1) school indoors (2) school outdoors (3) home cooking (4) home sleeping (5) home others and (6) commuting. The consent for the study was obtained from all the children and their parents, and from the school authority.

### Data preparation and analysis

The data were downloaded from instruments after each measurement and checked for anomalies immediately. Of the 59 personal monitoring of children only 48 were used for analyses. For the remaining 11 children there was no complete 24 hours data due to children failing to charge the instrument as instructed and due to occasional malfunction of the instrument. The UFP concentrations were multiplied by the corresponding NT correction factors. The corrected data were grouped according to the 'stages' for indoor monitoring and 'micro-environments/activities' for personal monitoring.

Based on real-time NT concentration data, average UFP exposure for different activities was calculated for each child. The personal UFP exposure was defined as the product of UFP concentration and the duration of exposure (Morawska et al., 2013). Personal UFP exposure (particles/cm<sup>3</sup>) due to specific activity over the total personal monitoring period was derived using Equation 1:

$$\vec{E}_x = \frac{\sum_{i=1}^n \Delta C_{x_i} \times \Delta t_{x_i}}{24 \text{ hours}} \quad (1)$$

where  $\vec{E}_x$  is average personal exposure due to the specific activity (x) for each child,  $\Delta C_{x_i}$  is average UFP concentration (particles/cm<sup>3</sup>) due to the specific activity,  $\Delta t_{x_i}$  is activity duration and  $i = (1- n)$  is the frequency of activity during the day.

For both indoor and personal exposure monitoring, a high UFP concentrations exceeding the maximum NT detection of  $1 \times 10^6$  particles/cm<sup>3</sup> were observed corresponding to

time when stoves were operated and when children spent time inside kitchens during cooking. These values were therefore set to be  $1 \times 10^6$  particles/cm<sup>3</sup> and any analysis involving this data represents a lower bound on the quantity of interest (given the concentration must have been higher than the maximum detection).

## Results and Discussion

Table 1 presents the mean UFP and PM<sub>2.5</sub> concentrations for the background, during the activity and after the activity has ceased for indoor measurements. The mean UFP and PM<sub>2.5</sub> concentrations in H1 during heating with metal chimney smoke were 3 and 4 times higher than the mean concentrations measured before the heating. Likewise, the mean UFP and PM<sub>2.5</sub> concentrations in H2 during cooking (liquor distillation) with the traditional mud stove were 64 and 69 times, respectively, the mean concentrations measured before the cooking. However, it should be noted that background levels were influenced by the neighborhood emissions. Both H1 and H2 were located in the settlement zone and smoke infiltration from adjacent houses was evident at the time of measurement. Further, it can also be seen that concentrations remained elevated even after the activity has ceased, at least an order of magnitude higher than the background level. This was contributed by smoldering firewood combustion. It was observed that after cooking and heating, the flaming woods were disassembled inside the combustion chamber and this promoted smoldering combustion, thereby extending the source emission time. This presents a major difference between use of biomass fuels and gas for cooking and heating. When gas is used source emission stops immediately after the activity has ceased.

A comparison between the activities revealed that mean concentrations for both UFP and PM<sub>2.5</sub> during cooking were over three times higher than the mean concentrations observed for heating. This was expected since traditional cookstove used had an open combustion chamber without a chimney. This means all primary particles emitted during the combustion simply diffused inside the kitchen. Moreover, traditional liquor distillation (a customary cooking activity in village homes in Bhutan) is energy and time intensive, lasting at least two hours compared to cooking meals which can be done at a relatively shorter duration (~30 to 45 minutes for average Bhutanese family). For heating, although the fuel used was also firewood, the enclosed combustion chamber and chimney played a part in discharging most of the emissions outdoor.

Morawska, Ristovski, Jayaratne, Keogh, and Ling (2008) reported mean particle number concentrations (particles/cm<sup>3</sup>) in different ambient environments worldwide ranging from of  $2.6 \times 10^3$  for clean background to  $1.1 \times 10^4$  for urban, and  $4.2 \times 10^4$  for street canyon to  $1.7 \times 10^5$  for tunnel environment, respectively. Surprisingly, the overall mean concentration of  $4.4 \times 10^5$  particles/cm<sup>3</sup> during the activity (when stoves were operated) in this study was nearly three times the concentration reported in the tunnel environment. Likewise, the mean PM<sub>2.5</sub> concentrations of 4429 µg/m<sup>3</sup> in H2 during cooking was comparable with concentrations reported elsewhere for rural homes where open biomass stoves were used (Table 1). For instance, Brauer, Bartlett, Regalado-Pineda, and Perez-Padilla (1995) reported mean cooking time concentration of 5310 µg/m<sup>3</sup> when biomass fuel was used in open fire stove. The measurement in their study was also done using time-series instrument. Further, it can be seen in Table 2 that extended measurements reporting lower mean concentrations for studies which used time-series as well as time average instruments. This is because computing mean concentrations from extended measurement levels the peak concentration



(Manigrasso, Stabile, Avino, & Buonanno, 2013), and as indicated earlier this approach will result in inaccurate assessment of exposure.

Table 3 presents the mean UFP concentrations in different microenvironments/activities measured from personal monitoring of children. The bigger results and discussions on this was reported in (Wangchuk, Mazaheri, et al., 2015). The focus of this section is to highlight peak UFP emissions during cooking time and its contribution to personal exposure. The 'home cooking' presented the highest mean UFP concentration of  $1.1 \times 10^5$  particles/cm<sup>3</sup>, which was one to two orders of magnitude higher than concentrations observed in other microenvironments/activities. This was during the time when children were indoors (inside kitchens) when cooking was done. Again, this extremely high UFP concentration was contributed by biomass fuels during cooking using traditional open cook stoves without chimney. The resulting exposure computed using equation 1 for this activity was  $1.21 \times 10^4$  particles/cm<sup>3</sup> and accounted for 64% of the daily exposure. This was despite the fact that children spent only 9% of the total daily time inside kitchens during cooking. Therefore, this confirms that children living in the villages received intense short-term exposure to UFP during cooking time. Further, the overall mean UFP concentration for H1 and H2 (see Table 1), when stoves were operated was six times higher than the mean concentration observed during cooking time from personal monitoring of children (see Table 3). Although stoves used in the houses where children lived were similar to H2, indoor fixed measurement captured point concentrations (3 m from the stove), and while personal monitoring of children involved mobile measurement during which children moved around in the kitchen. However, it was not known how close and further away children spent their time from the stove. Currently, there are no similar studies from rural areas in developing countries with which this result can be compared.

*Table 1: Summary statistics of UFP (particles/cm<sup>3</sup>) and PM<sub>2.5</sub> (µg/m<sup>3</sup>) for background (prior to activity) during and after the activity.*

House <sup>*</sup>	Parti- cles	Background		During Activity		After Activity	
		Mean	SD	Mean	SD	Mean	SD
H1	UFP	$7.7 \times 10^4$	$4.1 \times 10^4$	$2.0 \times 10^5$	$1.5 \times 10^5$	$8.7 \times 10^4$	$1.9 \times 10^5$
	PM <sub>2.5</sub>	94	57	1329	986	121	204
H2	UFP	$1.1 \times 10^4$	$3.0 \times 10^3$	$6.8 \times 10^5$	$3.5 \times 10^5$	$9.8 \times 10^4$	$1.1 \times 10^5$
	PM <sub>2.5</sub>	64	5	4429	6219	195	124
Overall Mean	UFP	$4.4 \times 10^4$	$2.2 \times 10^4$	$4.4 \times 10^5$	$2.5 \times 10^5$	$9.3 \times 10^4$	$1.5 \times 10^5$
	PM <sub>2.5</sub>	79	31	2879	3602	158	164

\*House 1: heating/metal chimney stove, House 2: liquor distillation/traditional mud stove.

Figure 2 presents time-series UFP concentrations during heating using metal chimney stove in H1 (a), during cooking using traditional mud stove in H2 (b), while (c) and (d) present time-series concentrations measured during personal monitoring from two children. The peak concentration during heating (Figure 2a) was the result of initial ignition of the stove. A small amount of kerosene and readily flammable wood chips were used for ignition. During this activity the combustion chamber was kept open for the air influx necessary for combustion. As a result, much of the initial particle emissions remained suspended in the

space. Once the combustion has progressed the combustion chamber was closed and immediate drop in concentration was observed. Although ignition of cookstove in H2 also involved similar process, peaks can be observed for the entire duration of combustion. This was due to open fire combustion of firewood during cooking.

The time-series concentrations for personal monitoring of children reveal two sets of distinct peaks. This corresponded with the evening cooking time after children arrived home from the school and morning cooking time next day before children left for the school. No distinct peaks were observed when children were at school since cooking was not done in the school campus. All the children carried their lunch pack from homes. This time-series variation in concentrations was demonstrated in all the children measurements.

The important observation to note in all the figures, however, is the peak concentrations exceeding  $1.0 \times 10^6$  particles/cm<sup>3</sup>, which was beyond factory recommended upper detection limit of the NT used for measuring UFP. This was also captured during personal monitoring from most of the children. In such a situation it was difficult to tell what the true peak concentration was, thereby contributing to a certain degree of data uncertainty. This can also potentially lead to malfunctioning of the instrument during extended measurements. Even for PM<sub>2.5</sub>, maximum peak concentrations of  $1.3 \times 10^4$  µg/m<sup>3</sup> during heating and  $3.3 \times 10^4$  µg/m<sup>3</sup> during cooking were observed. While TSI DustTrak 8520 used for this study has a factory recommended upper detection limit of  $1.0 \times 10^5$  µg/m<sup>3</sup>, the concentrations measured in the study were high enough to draw user's attention for data quality and performance of the instrument. Therefore, it is recommended that future studies in similar environments consider using dilution system, so that instruments measure within the recommended concentration range and data quality is not compromised.

*Table 2: PM<sub>2.5</sub> concentrations reported in indoor measurements using biomass fuels and open Cook stoves*

<b>Study</b>	<b>Location</b>	<b>Fuel(s)</b>	<b>AM (µg/m<sup>3</sup>)</b>	<b>Sampling Duration</b>
This study	Kanglung, Bhutan	Biomass	3764 TS	Cooking time
Brauer et al. (1995)	San Jose ´de Solis, Mexico	Biomass	554.7 TA	9 hr
Naeher, Smith, Lederer, Mage, and Grajeda (2000)	Xela, Guatemala	Biomass	5310 TS	Cooking time
(Siddiqui et al., 2009)	Rehri Goth, Pakistan	Wood	2740 TS	8 hr
Li et al. (2012)	Nam Co & Anduo region, Tibet	Dung	1420 TS	24 hr
Singh et al. (2012)	Dang, western region; Dolakha, central region; Ilam, eastern region of Nepal	Wood, dung & agricultural residue	2070 TS	24 hr
Pokhrel et al. (2015)	Rural Bhaktapur, Nepal	Biomass	811 S	24 hr inside Kitchens
Nia et al. (2016)	Tibetan Plateau	Biomass	508 TA	48 hr

AM: Arithmetic Mean, TS: Time-series concentration, TA: Time average concentration

Table 3: Summary statistics for UFP concentrations (particles/cm<sup>3</sup>) in different microenvironments/activities during personal monitoring of children. (N = 48 children).

Activities	Mean	Standard Deviation	Time Spent (%)
School outdoors	$4.8 \times 10^3$	$2.5 \times 10^3$	9
School indoors	$4.1 \times 10^3$	$1.7 \times 10^3$	23
Home sleeping	$7.8 \times 10^3$	$1.2 \times 10^4$	38
Home cooking	$1.1 \times 10^5$	$1.5 \times 10^4$	9
Home others	$1.3 \times 10^4$	$2.3 \times 10^4$	16
Commuting	$2.1 \times 10^4$	$5.9 \times 10^3$	5

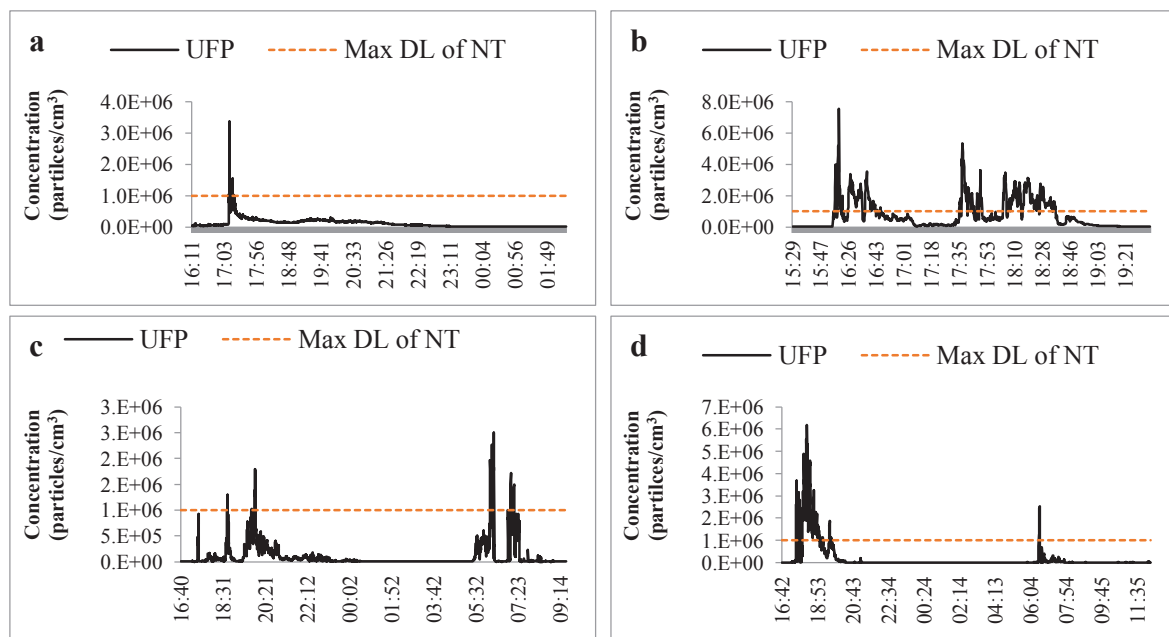


Figure 2: Time-series UFP concentrations (a) during heating using metal chimney stove in H1, (b) during cooking using traditional mud stove in H2, (c) and (d) during personal exposure monitoring of two children. Max DL of NT: Maximum detection limit of NanoTracer. The concentrations in the figures have not been truncated at  $1 \times 10^6$  particles/cm<sup>3</sup> as done for the presentation of results in the text. This was deliberately left to highlight the peak concentrations observed. Further, these figures do not represent simultaneous house and personal exposure measurements

## Conclusion

This study reported extremely high concentrations of fine and ultrafine particles observed during combustion of firewood in rural houses in Bhutan. From indoor fixed measurements, the mean UFP concentrations ranging from  $1.5 \times 10^5$  to  $6.8 \times 10^5$  particles/cm<sup>3</sup> were observed during heating and cooking time. Likewise, the mean PM<sub>2.5</sub> concentrations ranged from 1329 µg/m<sup>3</sup> during heating to 4429 µg/m<sup>3</sup> during cooking. Similarly, personal monitoring revealed a very high mean UFP concentrations ( $1.1 \times 10^5$  particles/cm<sup>3</sup>) during cooking time (when children were present inside kitchens), which was one to two orders of magnitude higher than mean concentrations observed in other microenvironments. Despite children spending only 9% of the time inside kitchens during cooking, this activity contributed to 64% of the daily exposure. These findings clearly highlight (i) the extent to which household fuel combustion contributes to indoor air pollution in rural areas when biomass fuels are used for cooking and space heating (ii) the importance of highlighting peak concentrations when averages are computed from extended measurements. This is crucial during exposure assessments since short-term peak particle concentrations make substantial contribution to health outcomes, and such contributions are not known when only diurnal concentrations are considered. Further, it is recommended that studies focusing on measurements inside kitchens in rural areas use dilution system for data to be more reliable and to prevent instrument malfunction from extreme particle concentrations.

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# A Qualitative Study of the Risk Factors Leading to Substance Use in Bhutanese Youth

Dechen Doma & Ian Wickramasekera II

## Abstract

Substance abuse and dependence among the youth population in Bhutan is already a huge concern for the Bhutanese family system, society and the country as a whole. Youths, who accounts for 60% of the total population of Bhutan are considered the future leaders of the country (National Statistics Board [NSB], 2017). Therefore, there is an urgent need to identify the factors that lead youth to substance abuse and dependence in Bhutan. This study sought to explore an in-depth understanding of the risk factors that are associated with substance abuse and dependence among Bhutanese youth. Interview data were collected through semi-structured interviews from 28 participants adopting a qualitative research methodology. The study revealed that factors such as peer pressure, family environment and easy accessibility played an important role in drug use and addiction among the participants. Other factors such as curiosity and low self-esteem have also contributed to participant drug abuse. To the researchers' knowledge, the present study was the first qualitative study on this topic to be conducted in Bhutan.

**Key words:** *Bhutan, Substance abuse & Dependence, Risk factors*

Drug use has been reported to be a problem in cultures from around the world for many millennia. For instance, there is archeological evidence that cannabis consumption in human beings may date as far back as 7,000 BCE (Crocq, 2007). However, the forms, context, and scope of substance abuse and dependence has changed a great deal over time and it appears to be a problem that is becoming increasingly problematic around the world (Crocq, 2007). The rise in drug use among the youth of the world is particularly alarming. For example, according to UNICEF (2010), 84% of drug users in Bhutan were between the ages of 13 and 24 years old. Furthermore, 43% of drug users in Bhutan were reported to be students. (UNICEF, 2010). Several studies, including a recent one by the Bhutan Narcotic Control Authority (BNCA, 2017), have demonstrated that Bhutanese youth report using a variety of substances including cannabis, opioids, inhalants, and a variety of prescription medications. Twenty-two percent of the high school students reported using cannabis in this study (BNCA, 2017). The use of pharmaceutical opioids was also reported at significant levels (Tshomo, 2017) in recent studies of drug use in Bhutan.

The epidemic of increasing drug use among the young Bhutanese population is a huge concern for the Bhutanese family system, society and the country as a whole. His Majesty, King Jigme Khesar Namgyal Wangchuck in his Royal address to the Nation on the 17<sup>th</sup> National Day, 2007 pronounced "I have always believed that the nation's future is mirrored in the quality of her youth and that is the governments sacred duty to provide a conducive environment for young people to become strong, capable leaders for the future" (as cited in NYP, 2011, p.7). Therefore, there is an urgent need to explore the risk factors that contribute to drug addiction and especially in Bhutan where there has been little in-depth study of the phenomena. The Royal Government of Bhutan has taken various interventions to combat drug addiction such as establishing rehabilitation centers, enacting drug laws, and putting new drug policies in place. Furthermore, the Bhutan Narcotic Control Authority

(BNCA) has taken charge of providing advocacy and education on substance abuse prevention, treatment, and rehabilitation along with operating two treatment centers: Bhutan Institute of Wellbeing, and the Samzang Residential Drug and Alcohol Rehabilitation Centre in Bhutan.

Drug abuse and addiction is not confined to any particular demographic group such as gender or even social economic status (Wawasi & Nderu, 2017). Previous research has identified adolescence and early adulthood as a particularly vulnerable period for the development of substance abuse, when the young people are developing their identity (Wawasi & Nderu, 2017). In this regard, there is no way to identify any one single factor that may lead to drug addiction, as the nature of addiction differs from person to person. A variety of environmental and biological risk factors are thought to increase the chances of drug abuse in an additive way (NIDA, 2014). Environmental factors include the family, peer, and school settings that can facilitate the early use of substances. Biological factors include a person's genetic endowment, which is estimated to account for between 40 and 60 percent of a person's vulnerability to addiction (Drapela, 2006; Wawasi & Nderu, 2017). Similarly, Jêdrzejczak (2005) identified three factors causing addiction: i). Effect of pathological families on young people's behavior; ii) Easy access to drugs; and iii) Influence of groups of people of the same age on youth into taking drugs. Jêdrzejczak's (2005) study was corroborated by Arsenault et al., (2018), who have said that the cause of addiction among the youth is associated with problems in their school, family, and community environment. Likewise, (Lussier et al., 2010; Hawkins et al., 1992) assert that risk factors such as family drug use and easy accessibility of drugs have a higher probability of leading youth into addiction. In addition, easy drug availability in the community increases the probability of developing problematic substance use as young people try drugs out of curiosity and peer pressure (Mesic et al., 2013).

Risk and protective factors may vary from person to person but also depend on the cultural values of the society in which a person is living (Volkow et al., 2016). Bhutan typically had more of a collectivist cultural value until recent times which promoted strong family and community involvement. However, more recent Western and individualistic influences have arisen in Bhutan. Lama Zhenphen reports that many of his clients have difficulty living without parental support or guidance which might have been less typical in Bhutan's past. (Personal communication, May, 14, 2018). Furthermore, many Bhutanese school counselors have reported hearing repeated stories about the role of divorce and parental neglect from young people with drug problems. However, to the author's knowledge, there has been very little research examining the risk and protective factors towards developing substance use in Bhutan. However, a few studies such as Dorji's (2005) *Voices of Bhutanese Youth*, published by the Centre for Bhutan Studies (CBS), indicated that 31.9 percent of Bhutanese youth living with single parents have struggled with drug addiction and serious school difficulties.

## Methods

### Objectives of the study

The purpose of this study was to explore the various risk factors of Bhutanese youth experiencing drug abuse and dependence. The researchers sought to investigate the life histories and narratives of individuals who have experienced the phenomena of drug abuse in the context of Bhutan. The researchers wished to gain an in-depth understanding of the experiences of Bhutanese people who have experienced drug abuse, attended drug treatment, and/or who have had significant interactions with drug users such as counsellors in schools.

### Study Sample

The present study is a qualitative investigation of 28 participants who volunteered to be interviewed about their knowledge of risk and protective factors for developing problematic substance use in Bhutan using a semi-structured interview. The participants included in the study consisted of two groups. The first group was comprised of 14 substance abusers seeking treatment from either the Bhutan Institute of Wellbeing, Samzang Residential Drug and Alcohol Rehabilitation Centre in Bhutan, Drop in centres and a number of schools in Bhutan. All study participants in this group were at or near the termination phase of their treatment. The second group consisted of 14 participants who were counsellors working in government agencies such as schools, hospitals, the Bhutan Narcotic Control Authority, and/or the two major rehabilitation centres. Counsellors were required to have at least five years of experience working with alcohol and drug addiction in Bhutan. All participants were required to have the ability to communicate fluently in English and Dzongkha languages so that they could participate fully with the study.

### Interview Questions

The primary interview question asked of each participant was: "What are some of the factors that lead to drug use and addiction among the youth in Bhutan?" The participants were also then asked questions such as: a) "According to you what are the factors that influence youth to become addicted to drugs? Can you explain in detail?" b) "What are the factors that influence you to take drugs?" c) "How did addiction to drug affect your life?" & d) "Can you describe how you felt after attending the Drug Education (DE) addiction program?"

The interviews were conducted face to face with the 28 participants who were selected for the study. Prior permission for the interview was sought from the counsellors and clients. At the start of each interview, the researcher explained the purpose of the research and the participants were provided with an informed consent form for them to sign. The participants were encouraged to ask questions and were told that they could withdraw from the study at any time with no penalty. The participants were assured of the anonymity of their responses. The length of the interview for each participant was between 25 – 30 minutes. The interview was recorded using a Sony digital voice recorder. The interview was conducted in English and Dzongkha, depending on the preference of the participants.

### Ethical Considerations and Institutional Approval

Approval for the clients in the Drop -In -centre was sought and obtained from the Bhutan Narcotic Control Authority. Approval for the clients from the two rehabilitation center and schools was sought and obtained from the concerned agencies. The researchers followed the research ethics guidelines for approval from the Office of the Vice Chancellor, Royal University of Bhutan (RUB).

## Qualitative Data Analysis

Thematic analysis is defined as an approach to pattern recognition within the data, where emerging themes become the categories for analysis (Fereday & Muir-Cochrane, 2006). The researchers were guided by a six phase approach to thematic analysis established by Braun and Clarke (2006). The data collected were read, transcribed, coded and themes were generated based on the common responses of the participants.

## Results

### Major Themes

Braun and Clarke (2006) state that coding is a process which helps the researcher to identify portions of the data that appear catchy and interesting. The process of coding was done manually after listening to the interviews and by making notes on transcripts of the interviews. The process of coding involved two stages. In the first stage, codes were derived within each of the two groups of participants (drug users vs. counselors). The researchers assigned a key word or phrase to each theme as it emerged and then proceeded to analyze all the transcripts in a systematic way. In the second stage, the researchers repeated the process of coding across the groups, which allowed the researcher to further collapse the codes into themes and categories as they emerged. This stage of coding included organizing and tallying the frequencies of codes across all the groups and looking for patterns and emerging themes. The process of coding enabled the researcher to gain a better insight into the various factors that lead youth to drug addiction. The ideas, themes, and concepts were coded and collapsed to fit into categories.

Deductive and inductive methods of analysis were used for the qualitative data of the study. For example, the inductive approach allowed the researchers to explore new themes that emerged from the data. Similarly, using a deductive approach helped the researchers to explore the factors that lead to drug usage that were already commonly assumed by the participants. Three primary themes emerged from the coding process: (i) Peer pressure ;(ii) Ease of accessibility;(iii) Lack of parental support. Factors such as low self-esteem and curiosity also stood out as less common but significant important factors leading to drug use and addiction among some of the participants. To avoid misinterpretations, syntactical errors accompanying the participant's quotes from the interview have not been corrected and the participant's quotes are reported here verbatim.

### Peer pressure

Peer pressure in this study refers to the social influence that peers can have on each other, although that influence does not necessarily need to be negative. According to Martinet et al., (2017) young people experience peer pressure either directly or indirectly which can result in engaging in risky behaviors such as drug use. The majority of the participants highlighted peer pressure as one of the main contributing factors to substance use among Bhutanese youth. Participants discussed that this factor and attributed it to the need to belong and identify with a group of peers who might have already begun substance use or began using together. For example, one participant (client S25) said, "the factor that influence me to take drugs was mainly my friends, they introduce me to marijuana, when I was in class six". This perception was further supported by client S28, "lots of my friends are drug addicts, among ten friends only one or two must have grown up well rest eight of us became drug addicts" (P28). The majority of the counsellors also highlighted that many young people get attracted to drug use though the influence of their peers who are seen as "Cool".



### **Lack of Parental Support**

A majority of participants also identified a lack of parental support as one of the major risk factors contributing to drug use among young people in Bhutan. Most of the counsellors reported that young people who are abusing drugs often come from broken families. These young people may lack guidance from their parents in terms of advice, care and values. These changes can be attributed to the shift of family dynamics in Bhutan from traditional to nuclear families. There may also be an effect of how outside cultural influences may be shifting Bhutanese society from a collectivist identity to an individualistic culture. Traditionally, the family system in Bhutan used to be based on collectivist society in which all extended family members lived together and where elders played the role of primary caregivers. However, twenty-one participants expressed that their family environment and lack of parental support made them vulnerable to drug use. For instance, one of the participants (counsellor S12) said "I feel, lack of guidance from parents or significant people in their life... not have anyone to advice, care and impart values they become victim of substance use and misuse".

The counsellors also highlighted that the most common comments made by their clients were that they came from a 'broken family', 'single parent', 'lack of parental love and support', and abusive family dynamics. The participants reported that many parents in Bhutan today are working long hours away from home and some parents have even migrated abroad to work. This leaves their children with their relatives or a single parent that may leave some young people at greater risk of negative peer pressure to use drugs and alcohol. For instance, counsellor S9 said, "some parents never stay at home, some mothers spend their time partying and some gambling. Father on the other side drinking and children are left at home ... youth become vulnerable being alone and take drugs to fill in the boredom". To which one of the client participants responded "Sometimes when I don't get love, care and guidance from my parents, and when they ignore me knowing that I abuse drugs, I feel hopeless and sad due to that I prefer to seek solace into drugs" (S19).

### **Easy Accessibility**

Easy accessibility to drugs emerged as the third most common risk factor that participants reported in the study. Some of the clients explained in detail how they were able to access marijuana and other prescription drugs through the porous Bhutanese border with India. For example, counsellor S4 said, "through my experience of working with my clients, it is found out that the proximity to the Indian bordering town has been the greatest factor that influences our students to experiment drugs ... it is cheap and easily available". Some of the clients expressed easy access in terms of getting drugs from their peers. For instance, S23 said, "I can get the tablets easily from my friends and my neighbours." Most clients reported that that drugs like marijuana are abundantly grown within the country of Bhutan and also easily available across the border. These abundantly grown marijuana plants are even said to be illegally exported to India where it is processed and sold back to the Bhutanese. For example, one participant stated (S20) "we get from the border and it costs about Nu 75 per packet". Most of the counsellors reported that marijuana plants are found everywhere growing naturally in Bhutan and it is therefore not easy to avoid these plants.

### **Minor Themes: Curiosity and Low Self Esteem**

In addition to the three themes discussed in the prior sections, themes such as curiosity and low self-esteem emerged as some of the contributing factors that influence youth to drug use and addiction.

#### **Curiosity**

Some participants indicated that curiosity led them to experiment with drugs. For example, one of the counsellors stated that when peers “glorify the use of drugs, they become curious and start as experimental users, which develops into occasional user, and they become regular user and subsequently they become addicted” (S5). Some participants also identified curiosity as the source of their eventual pathway to addiction. For example, informant S 15 said, “nobody taught me, I was really curious and interested in trying new things. My first drug was marijuana, when I was in class four”. Furthermore, when I saw older boys with the “cool factor” I started using different drugs”.

#### **Low self esteem**

Some participants reported that low self-esteem was an important risk factor that makes young Bhutanese people vulnerable to addiction. Some of the counsellors explained that many young people may be taking drugs to cope with low self-esteem. For example, counsellor S2 said, “youth these days take drugs, when they are not able to cope with their studies and compete with their friends”. These ideas were further elaborated by S14; “some youth compare themselves with financially privilege ones and feel miserable and find drug as a solution”.

Some of the clients also expressed a belief that drug usage provided them with a way of coping with their problems. For example, one of the clients said, “throughout my childhood I faced lots of hardship and the only way to comfort my self was using drugs with my friends. Using drugs helps me to forget the pain and hardship” (S22). However, some participants emphasized their use of drugs was not necessarily linked with hardship and poor self-esteem. Some participants reported that they had an easy life overall but still fell victim to substance abuse.

### **Discussion**

The current qualitative study has gathered information from the lived experiences of clients and counsellors on the antecedents to drug addiction in Bhutanese youth. Three major risk factors and two contributing risk factors emerged through thematic analysis. The three major themes were peer pressure, easy accessibility, and family environment. These findings are consistent with findings of related studies carried out elsewhere in the world (Jadidi & Nakhaee, 2014; Morojele & Brook, 2001; Martinet et al., 2017; Wawasi & Nderu, 2017). Similar findings were also reported by other researchers (Foo, Tam & Lee, 2012; Martins et al., 2017) who found that youth preferred to identify themselves with peers when there is a conflict at home, thus leading to higher risk to exploring drugs and antisocial behaviour.

Previous research has been limited in Bhutan, however qualitative analysis of interview data with young offenders in police custody conducted by Dorji (2015) reported peer pressure as one of the leading factor to drug use and crime in Bhutan.

Dorji (2005) also reported that 31.9 % of Bhutanese youth live with single parents and struggle with addiction. Similar studies on urban youth employment in Bhutan (Walcott, 2011; UNDP, 2013) suggest that youth who lack parental support are mostly seen on the

streets caught up with drug abuse and violence. These findings are consistent with findings from Hosseinbor et al., (2012) who reported that that parents play a major role in strengthening self –esteem and confidence in youth. Factors such as poor communication, lack of interaction and problem solving skills within a family affects an individual’s indulgence in drug use (Masood & UsSahar, 2014).

Easy accessibility of drugs through the Bhutanese porous border with India and easy access to drugs like marijuana was also a common contributing factor among all the participants. As, Clark (2013) as aptly observed, “marijuana growing along the road sides, in gardens and vegetable patches, in wasteland, in forest and even in cracks in the pavements or in overgrown gutters on buildings in Bhutan`. Some participants in the interview said, ‘we get our daily dose from the border, and it is easy for us as we know the dealer, who sells marijuana for us’ (S16, S18 & S21). Likewise, drugs like marijuana are abundantly grown within the country and youth can venture into the fields of marijuana and rub marijuana plants out of curiosity along with their peers. The findings from this study is consistent with the findings of Liddle and Rowe (2006), in which the study found out that environmental factors where drugs are readily available can increase the chance of youth getting involved with drug use and addiction.

Similarly, many participants expressed their concern about recent changes in Bhutanese family culture resulting in broken families, single parents, and a lack of a positive environment in their homes. This may encourage youth to go out of their homes and seek solace with peers who are into drug use. These findings are also consistent with the finding from the study carried out by Dorji (2005) that 31.9 percent of Bhutanese youth live with single parents and struggle with addiction. Conversely, relational values are shifting, as elders are not around to provide emotional support. For example, Nuken (2011) explains that the traditional Bhutanese value system and social cohesion seems to be fast fading as an increasing number of young people are finding comfort and pleasure in technology and an emerging ‘party’ culture. The participants also identified risk factors such as curiosity and having low self-esteem as contributing to drug use in Bhutan. These findings are consistent with prior studies such as Rejani (2015). Rejani (2015) discusses that poor academic performance is associated with having low self-esteem, which encourage young people to seek drugs as a way to cope up with pressure.

### **Summary & Recommendations**

The current study provides qualitative insights into the various risk factors for drug use among Bhutanese youth. This study identified peer pressure, family environment, and easy accessibility as the major contributing factors to drug use and addiction among Bhutanese youth. It is also evident from the study that drug use in Bhutan is complex and interrelated with multiple factors contributing to the onset of drug abuse. Thus, interventions to reduce drug abuse in Bhutan could focus on the individual level, family context, and community as a whole.

### **Implications of the study**

The findings from the study are significant because they have implications for policy expectations, drug prevention, and drug rehabilitation. From a policy perspective, the Bhutan Narcotics Control Authority (BNCA) is expected to control and prevent drug use and addiction in the country. The findings from this study may guide BNCA to reconsider their approaches towards prevention and drug treatment with Bhutanese

youths. First, the drugs laws need to be enforced, with interventions such as random and targeted searches by the concern agencies to curb the ease of accessibility of drugs. Second, measures could be taken to target the easy accessibility of drugs like marijuana, which are currently grown widely in Bhutan. In addition, imported drugs are easily available within the country. In reality, this study seems to identify a gap in the enforcement issues that allows for easy accessibility of various drugs in Bhutan. Some possible solutions to this problem might be:

1. The researchers would like to recommend that the Minister of Education consider strategizing and planning increased activities to channel and engage youths to develop positive growth and development.
2. The BNCA could emphasize prevention programs to parents and dropout prevention programs to youth in the community.
3. The researchers would like to recommend that the Ministry of Education could increase education to all teachers on basic courses in guidance and counseling.
4. The researchers would like to recommend that governmental policy makers work to appoint social workers in each school to meet the needs of students at risk of drug abuse and dependence at the miso, micro and macro levels.

### Limitations and Suggestions for Future Research

There are some limitations of the study that should be taken into consideration. This study sample only covered six districts out of the twenty districts in Bhutan with a small sample of participants who were clients and counselors. The views of parents were not sought and these may prove useful to examine in future studies given the three main findings are all related to family environment in some way. The researchers recommend that future studies could be carried out on a larger scale using qualitative and quantitative methods to sample the whole twenty districts of Bhutan, the perspectives of parents and the perspectives of other potential participants such as drop-outs from schools, and other relevant social institutions who may be knowledgeable about the risk factors leading to drug addiction in Bhutan.

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## Short Communication

# Preliminary report of the Cleptoparasitic Bees of the genus *Coelioxys* (Hymenoptera: Megachilidae) from Bhutan

Tshering Nidup

### Abstract

*Coelioxys* Latreille is the globally distributed cleptoparasitic bees of the genus *Megachile* Latreille. This is the least studied group of bees and certainly the first report from Bhutan. This paper reports four *Coelioxys* species, *C. basalis* Smith, 1875, *C. decipiens* Spinola, 1838, *C. confusus* Smith, 1875 and *C. sexmaculatus* Cameron, 1897. This is only the preliminary report and more species are expected to occur in Bhutan.

**Keywords:** *Coelioxys*, bee, cleptoparasitic, *Megachilidae*, *Hymenoptera*, Bhutan.

*Coelioxys* Latreille is a genus of the bee tribe Megachilini cleptoparasitic to the genus *Megachile* Latreille (Michener, 2007). Host bee collects pollen and store for their off-springs but cleptoparasitic bees steal from the host larva. The cleptoparasitic bees parasitize on different families of bee like Apidae, Halictidae and Megachilidae but Apidae has the most genera of cleptoparasites (few genera are *Nomada*, *Oreoparasites*, *Neoparra*, *Neoparasites*, *Paranomada*), Megachilidae with three (*Coelioxys*, *Dioxys* and *Stelis*) and Halictidae with two genera (*Sphecodes* and *Temnosoma*) (Wilson & Carril, 2016). *Coelioxys* Latreille are generally cleptoparasitic on *Megachile* Latreille but *Trachusa* (Anthidiini) and *Hoplitis* (*Anthocopa*) (Osmiini) also serve as the hosts in the rare cases (Michener, 2007).

Genus *Coelioxys* Latreille is a diverse taxon differing from other genera of Megachilidae by having two cubital cells on forewing and lateral tooth on posterior margin of scutellum (Bingham, 1897). Females have posteriorly tapering abdomen often acutely pointed while males are multispinose, strong white stripes across the abdomen, black thorax and often red legs or abdomen (Gupta, 1993; Michener, 2007; Wilson & Carril, 2016). It is divide into 8 subgenera, *Orientocoelioxys* (2 species), *Nigrocoelioxys* (8 species), *Boreocoelioxys* (1 species), *Xerocoelioxys* (2 species), *Coelioxys* (4 species), *Tropicocoelioxys* (4 species), *Schizocoelioxys* (4 species) and *Glyptocoelioxys* (2 species), in North-Western India by Gupta, (1993) which is strictly based on Mitchell (1973). Bingham (1897) reported 10 *Coelioxys* species from Indian subcontinent however Gupta (1993) reported 27 species within the 8 subgenera. Iran has 18 species of *Coelioxys* (Nadimi, Talebi & Fathiopour, 2013) and Japan recorded 10 species (Nagase, 2006).

### Materials and Methods

This paper is based on the series of specimens collected during the inventory of Hymenoptera from 2014-2017, in Bhutan. The specimens are deposited in Sherubtse College Museum. The identifications were done using compound microscope and photographs were taken using the 40 mm micro lens.

## Systematic accounts

### *Coelioxys (Torridapis) basalis* Smith, 1875

**Diagnosis:** Female: Scutellum with strong triangular, lateral downward-bent tooth; ventral & dorsal apical plates acute; dorsal apical plate with fine median longitudinal carina on apical half; ventral plate projected beyond dorsal plate; margin of clypeus with fulvous pubescence; body black with snow-white pubescence including T1-T5; legs with thin white piles; wings hyaline at base, apical half dark fuscous with purple effulgence.

**Materials examined:** 05.x.2015, 1 female, Serbithang, Thimphu (N27°25'13" & E89°39'05", 2331m), coll. Wim Klein; 10.viii.2016, 1 female, Taba, Thimphu (N27°31'02" & E89°38'79", 2379m), coll. Tshering Nidup & Wim Klein.  
Distribution: India, Burma, Tanasserim (Bingham, 1897).



Figure 1: *Coelioxys (Torridapis) basalis* (female)

### *Coelioxys (Schizocoelioxys) decipiens* Spinola, 1838

**Diagnosis:** Female: Scutellum with strong triangular, lateral sharp teeth; dorsal plate of apical segment apically pointed with sharp carina down the middle; ventral plate spoon-shaped & apically rounded, projected far beyond dorsal plate; body black covered with snow-white pubescence including T1-T5 apically; wings hyaline at base, apical half sub-fuscous.

**Materials examined:** 18.viii.2016, 1 female, Yadi, Monggar (N27°17'15" & E91°22'15", 1514m), coll. Phurpa Dorji & Wim Klein; 18.viii.2016, 1 female, Wakpogang, Monggar (N27°15'25" & E91°16'21", 1896m), coll. Phurpa Dorji & Wim Klein;  
Distribution: India, Burma, Tanasserim, Iran and Palearctic region till USA (Bingham, 1897; Gupta, 1993; Nadimi, Talebi & Fathiopour, 2013).



Figure 2: *Coelioxys (Schizocoelioxys) decipiens* (Female)

*Coelioxys (Negrocoelioxys) confusus* Smith, 1875

**Diagnosis:** Female: Lateral tooth sharp & acute; abdomen sharply conical & attenuated apically; dorsal plate of apical segment sharply acute, medially carinate towards apex; ventral plate projected beyond dorsal plate; black; thin white pubescence on clypeus, face, cheeks, thorax laterally & legs; wings hyaline at base, dark fuscous beyond I cubital cell. Male: similar to female but apical segment with 6 tooth; V tergite with sharp lateral tooth.

**Materials examined:** 05.x.2015, 1 male, Serbithang, Thimphu (N27°25'13" & E89°39'05", 2331m), coll. Wim Klein; 09.viii.2016, 1 male, Paro (N27°27'15" & E89°25'23", 2298m), coll. Tshering Nidup & Wim Klein; 12.x.2015, 1 female, Damphu, Tsirang (N27°01'18" & E90°07'16", 1441m), coll. Tshering Nidup & Wim Klein; 05.viii.2016, 1 female, Phuntsholing, Chhukha (N25°52'35" & E89°02'51", 213m), coll. Tshering Nidup & Wim Klein. Distribution: India, Burma, Tanasserim, Sri Lanka (Bingham, 1897; Gupta, 1993).

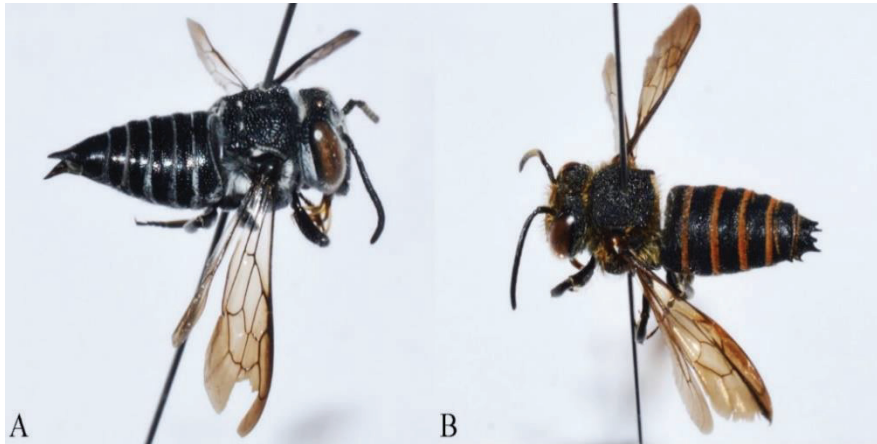


Figure 3: *Coelioxys (Negrocoelioxys) confuses* (A-female, B-male)

*Coelioxys (Negrocoelioxys) sexmaculatus* Cameron, 1897

**Diagnosis:** Female: Apical segment with medial carina thickening towards apex; scutellar spines stout; tarsi with short golden pubescence; black with white pubescence including margins of sternite; wings hyaline at base, fuscous at apex.

**Materials examined:** 09.viii.2016, 2 female, Paro (N27°27'15" & E89°25'23", 2298m), coll. Tshering Nidup & Wim Klein; 19.viii.2016, 1 female, Bumdeling, Trashi Yangtse (N27°39'32" & E91°27'07", 1900m), coll. Phurpa Dorji & Wim Klein.

Distribution: India (Bingham, 1897; Gupta, 1993).



Figure 4: *Coelioxys (Negrocoelioxys) sexmaculatus* (Female)

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