

ACTION RESEARCH SEMINAR

Enhancing teaching and learning practice through reflection

SEMINAR PROCEEDINGS

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Royal Government of Bhutan
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MINISTER

Rethinking Education

Foreword

It is my privilege to write this foreword to the seminar proceedings of the first ever Action Research Seminar conducted by the Ministry of Education. Through the Sherig Endowment Fund, the Ministry of Education supports the improvement of teaching and learning in schools by promoting our teachers to carry out action research. There is no better professional development for a teacher than reflecting on one's pedagogical practices. Action research as a process of systematic reflection by a teacher on the effectiveness of a teaching pedagogy employed to teach a certain topic allows the teacher full autonomy to explore alternative ways in improving teaching and learning practice.

It is encouraging to note that teachers are taking full advantage of the Endowment Fund to not only become professional reflectors through the conduct of action research but contribute to the educational knowledge bank through sharing their original ideas, observations and findings through such platforms as the seminar. It has been observed that each year the number of proposals for the Endowment Fund is increasing and the quality of proposals and reports submitted are improving.

This seminar proceedings are just one of the ways in creating a repository of new knowledge and experience of our teachers. There is no other authentic experience than that of our teachers in our context, in our classrooms, and with our students. It is best that we share it with other teachers. The Ministry of Education will be working towards starting a dedicated journal for our teachers to publish their action research.

I congratulate the teachers who presented their action research reports in this seminar and would like to urge teachers to engage in action research. I would like to commend the Teacher Professional Support Division, as the secretariat of the Sherig Endowment Fund, in ensuring the fulfillment of the objective of the Sherig Endowment Fund.



Jai Bir Rai
(Minister)

Table of Contents

Foreword	i
1. Introduction	1
1.1. Background.....	1
1.2. Objectives of the AR Seminar.....	1
1.3. Speakers	2
1.4. Presentation format	2
1.5. Media proceedings	3
2. Inaugural Session	4
2.1. Welcome Address.....	4
2.2. Address by the Chief Guest	5
2.3. Keynote Address.....	6
3. Action Research Reports	8
3.1. Teaching Grammar using Literary Texts: An Action Research Study with Class Eight Students in Paro	9
3.2. A Study of the Effectiveness of Peer-Assisted Learning Strategy as a Remedial Programme In 7th-Grade Science	25
3.3. The Impact of Motivation on Student’s Academic Achievement and Learning Outcomes in Mathematics	35
3.4. The effects of the use of audio-visual materials in the classroom on students’ learning score in science	47
3.5. How do I Instill the Sense of Innovation and Entrepreneurship Skills in the Minds of Students?.....	55
3.6. The Effect of Using Concept Map on Class IV Students’ Performance in Science..	76
4. Recommendations and Action Plans	87
5. Award of Certificates and Mementos	87
6. Closing Remarks	87
7. Vote of Thanks	88
Annexure 1: Programme Schedule	89
Annexure 2: Speakers and Participants Profile.....	90

1. Introduction

1.1 Background

The Ministry of Education considers research-driven classroom practices important in making curriculum and pedagogical practices current and relevant. In pursuance of building research culture in schools, the Ministry instituted the Sherig Endowment Fund (SEF) for Action Research (AR), with a seed capital of Nu.10 million on 02 December 2013. The Fund was officially launched on 23 August 2016 to enhance the quality of teaching and learning through the promotion of AR based teaching learning in schools.

Annually a minimum of 40 AR proposals are chosen through a stringent review process for SEF support. Schools engage in AR ranging from a few months to a year. After the AR is completed, a comprehensive report is submitted to the Ministry. The reports are reviewed by the AR Technical committee and presented to the SEF board. Thus far, nothing significant had been done after the reports are presented to the SEF board. Upon the recommendation of the AR Technical Committee, the SEF Board on 03 April 2019 supported the need to offer platforms to share findings and experiences from the AR. Similarly, the need for a publication platform or a discussion forum to disseminate the AR findings has also been shared by AR participants. The SEF Board resolved on organizing a national seminar on AR findings for 2019.

The SEF Operational Guidelines restrict the fund usage to AR grants to schools whose proposals are selected. Although, the Teacher Professional Support Division (TPSD) aspires to make AR seminar an annual programme, TPSD budgetary constraints. For 2019, the TPSD was able to mobilize funds to organize the Seminar. TPSD will continue putting efforts to institutionalize and sustain such the programmes.

Selected AR reports and thesis papers relevant to educational policies and practices were presented during the seminar. A keynote speaker was invited for a presentation on a pertinent educational topic. This seminar proceedings is published for sharing the AR findings with schools across Bhutan.

1.2 Objectives of the AR Seminar

1. Share findings of action research through live presentation and publication of proceedings.
2. Promote active engagement in AR by teachers and schools to strengthen reflective and evidence-based teaching learning practices.
3. Build a research culture and a network of AR enthusiasts across schools in Bhutan.

1.3 Speakers

The presentation comprised of:

1. seven Action Research reports by teachers who were granted the Sherig Endowment Fund for the 2018 Academic Year;
2. two Master's thesis by a teacher and vice principal selected from the after-study report session at the MoE;
3. one Keynote Speech.

1.4 Presentation format

Each speaker was given 30 minutes:

1. *20 Minutes*: Introduction, background/literature review, research questions, research methods and data, discussion/conclusions;
2. *10 Minutes*: Question & Answer session.

1.5 Media proceedings



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[Home](#) / [News](#) / Sherig Endowment Fund recipients shared their research for the first time
October 1, 2019 [News](#) [Leave a comment](#) 665 Views

Decentralisation of schools is a complex concept and has a mixed impact. This is what the research on Implementation of School-Based Management (SBM) on Decentralisation Reforms in Central Schools has concluded. Sharing his findings at the 1st Action Research seminar, vice-principal of Khangku Middle Secondary School, Karma Tshering, said that the research, which was based on the auto-ethnography, recommended that central schools should set a clear vision and academic goals for the school. “It should focus on teaching and learning activities, including resources-intellectual, social, spiritual and financial,” he said. “The central schools should have genuine participation and capacity building of stakeholders, which are teachers, community and parents.” Kezang Tshering said that it also recommended impact study for central school reforms on governance, school leadership and management, including teacher professionalism and student learning outcomes. A form of decentralisation or school-based management in the Bhutanese education system was initiated with the establishment of several Central Schools, including few other autonomous schools. “The primary goal was to address four key issues like access, equity, quality and system efficiency. These were supposed to be realised through the empowerment of central schools with certain level of autonomy including the current school budget,” Kezang Tshering said. The division also aspires to make seminar an annual Programmeme although the office today is faced with budget constraints. The seminar papers would be also published in the form of seminar proceedings and issue to schools across Bhutan. “Central Schools have distributed leadership, however, principal holds the ultimate decision-making authority and staff lacks leadership quality,” he said. “It has also become additional workload for teachers, which has led to lose of focus from instructional roles and responsibilities.” The one-day seminar, themed enhancing teaching learning through reflective practice, saw nine other speakers that had researched on various topics through Sherig Endowment Fund (SEF). The SEF was launched in 2016 to enhance quality of teaching and learning through promotion of action research. A minimum of 40 action research proposals are selected through a stringent review process for SEF annually. Research duration ranges from a few months to a year. After the research is submitted to the ministry, no significant action was taken and the research reports remained idle. This is why, according to the Teacher Professional Support Division (TPSD) press release, the technical committee of SEF recommended the need to support and create a platform to share the findings and experiences from the action research for the first time. The papers from action research reports and thesis papers relevant to education policies and practices were presented at the day-long seminar that ended yesterday. “Similarly, the need for a publication platform or a discussion forum to disseminate the findings have been shared by the participants from many participating schools. The SEF board meeting resolved on organizing a nation seminar on findings,” press release. The division also aspires to make seminar an annual Programmeme although the office today is faced with budget constraints. The seminar papers would be also published in the form of seminar proceedings and issue to schools across Bhutan. Other research included impact of use of audio-visual materials on learners’ achievement and interest in science subjects, the effect of using concept map on Grade four students’ performance in science, and instilling the sense of innovation and entrepreneurship skills in the minds of students, among others. Some of the participants expressed disappointment over not having a single research on the Dzongkha although there was a proposal, but none of them were selected. “We should’ve also given importance to the Dzongkha when the government is trying to promote Dzongkha,” a participant said.

Yangchen C Rinzin

2. Inaugural Session

2.1 Welcome Address

Ms. Tashi Lhamo, Chief Programme Officer, Teacher Professional Support Division, Department of School Education, Ministry of Education, Thimphu.

Hon'ble Sherig Lyonpo, Dasho Secretary, Director Generals, President of Paro College of Education, Directors, guests from RUB, BCSEA, DEOs/TEOs, distinguished moderators, presenters, Chiefs from Ministry of Education and dear teacher participants.

A very Good Morning and a warm welcome to the first Action Research Seminar themed "Enhancing Teaching and Learning through Reflective Practices". The Ministry of Education instituted the Sherig Endowment Fund (SEF) in 2013 to enhance research culture in schools. Till 2016, the fund was managed by the Policy and Planning Division of MoE and in 2017, Teacher Professional Support Division was entrusted to manage the fund as a professional body. We have the SEF Board which provides necessary directives to the SEF Technical Committee. Every year about 40 Action Research proposals are selected by the Technical Committee for SEF support and they are given Nu. 20,000 each. However, it is a different issue whether we need funds to conduct AR.

According to Pollard and Tann (1987) "Action research presents an opportunity for teachers to become uniquely involved in their practice" and they believe that "critical reflection and systematic investigation" of teaching practice should be an integral part of classroom life." Therefore, educationists worldwide recommend teachers to be researchers. However, in Bhutan research is a term that is yet to take root in our schools because teaching is a demanding job. And teachers complain that they have no time to do research. Having said this, it is encouraging to report here that every year the number of AR proposals is increasing, so are the quality of the proposals.

For the first time, we are organizing this seminar to create a forum for our teachers to share their AR findings and learn from each other. This would motivate our teachers to conduct research and then build a network of researchers across schools in the country. We plan to publish the AR reports and share them with schools. Today we have seven AR presenters and two teachers who would present on their Master Thesis. The seven AR presenters are the seven best AR reports of 2018. The two teachers who would present on their Master thesis were found relevant for the seminar.

Today among us we have Dr. Dorji Thinley, President of Paro College of Education as the keynote speaker for the Programme. He is one educationist who promotes research and we are blessed that we have a practicing researcher as the keynote speaker. We have Dr. Kezang Sherab from Paro College of Education, who is also a pioneer in AR in our country, as one of the moderators. In fact, under his supervision, many teachers are conducting AR in schools today. We have Dr. Sonam Chuki from Royal Education Council who is also a well-known educationist. We have seen her moderating seminars and workshops on many occasions and we are glad that today she is one of the moderators.

Let me stop here and let the show begin. I hope you all have an enriching day and next year we hope to see many action researchers presenting in this forum.

Thank you!

2.2 Address by the Chief Guest

His Excellency Jai Bir Rai, Minister of Education

In the expanse of the next 10 years, what would the generation of children be like?

I write hundreds of emails to all teachers asking feedback on our education system and the curriculum, but they reply, “Thank you Lyonpo for your concern, we will do our best.” So far there has been only one feedback received from a primary school teacher.

Teachers are researchers, and as such we should constantly be looking at what pedagogies to try, how to improve teaching, how to contextual teaching, and have a critical mind to question. For example, we have taught “apple is red” but apple can also be green. We have never taught about it, rather taught as it was prescribed. Teachers must do research and teach critical thinking and critical analysis skills to our students.

How do we understand our learners and their potential, how do we address their learning needs, what do we teach? The 21st-century generation is critical, they have access to information at the click of a button, so how do we teach these generations? Do teachers need to change their pedagogy to suit this generation of learners? Teachers can share how they address these with us and others through research and publication.

Your research need not be of high quality but it should be original, it should focus on your thoughts, observation, ideas, practice, and review the literature available on our education system and how we could improve our education system. With 10,000 teachers, we should be able to do research and create this education knowledge bank.

As a Minister of Education, my responsibility is to provide the necessary support, technically only teachers are the best people who can prove the education system, because teachers best know the problems and how to solve it to improve the quality of education.

For the 21st century, we should not be just teachers but educationists. We can only become one by not doing the same thing every time, but relearn from what we do. The beauty of anything is exploration. You may not remember how much you studied, what books you studied, but you will surely remember the research you did, and your research findings.

We will publish your research papers and upload it online on the MoE website. We will also support you through the Sherig Endowment Fund. The initiatives to improve the quality of education must come from teachers, principals, and Dzongkhag/ Thromde Education Officers.

I would like to urge you all to continue carrying out Action Research and enhance teaching-learning practices in schools.

Tashi Delek!

2.3 Keynote Address

Dr. Dorji Thinley, President, Paro College of Education, Royal University of Bhutan

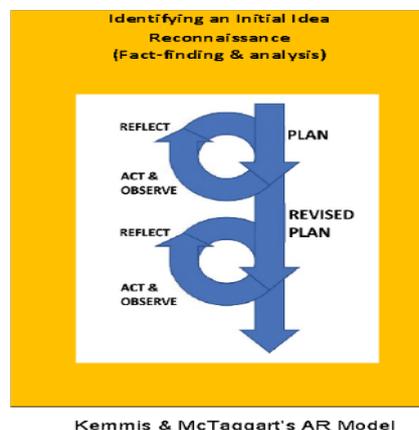
Dr. Dorji Thinley made it known to the gathering that his keynote address was not a speech as such but a presentation about action research. Thus, the following points on AR were presented.

The power of AR ...

- The school-based curriculum reform of the 1960s influenced the growth of action research as a method of inquiry to improve pedagogical practice.
- Schools engage in quality teaching when teachers are able to generate theories, insights, and perspectives as opposed to being passive consumers of knowledge.
- Schools engage in quality teaching when teachers research their professional actions as opposed to being only researched upon by others.
- Schools are powerful when teachers are able to construct/produce knowledge to produce change and enact change to produce knowledge.
- Schools value action research because it is participatory in nature and it emphasises change and generation of knowledge. It empowers the classroom practitioner.

Where teachers continually seek ...

- In a thinking school, teachers continuously ask questions and look beyond the limits of curriculum and textbooks. Here, teachers create an environment where students engage in rich, deep, and meaningful learning.
- In a thinking school, teachers are relentless seekers of knowledge and they never stop learning using time-tested tools of inquiry, research, scholarly habits, and other creative ways of organizing knowledge and using it to improve their practice.
- Action Research in education is a popular method of inquiry that helps a teacher to reflect deeply on their practice and seek ways to improve it.



Dr. Dorji Thinley gave a brief explanation on the Kemmis and McTaggart's AR model

Some points to consider ...

- That this academic forum is continued as a rich and meaningful annual professional event for teachers and that overtime the concept be replicated in the Dzongkhags.
- That an action research network is created for teachers across the country to foster a culture of sustained professional discourse and growth.
- That a periodical focused on educational innovation be published that provides a knowledge platform for teachers across the country.
- That 'Accomplished' and 'Distinguished' teachers be encouraged and supported to be at the forefront of knowledge generation and management for improving or innovating pedagogical practices (teaching, learning, and assessment) in Bhutanese classrooms.
- That action research projects focus increasingly on improving learning, teaching, and assessment in the specific disciplines so that reliable bodies of empirical knowledge are available as springboards for change and innovation.

3. Action Research Reports

3.1. Teaching Grammar using Literary Texts: An Action Research Study with Class Eight Students in Paro

Tshering Tshomo¹; Ugyen Choden²; Kezang Sherab³; Pema Zangmo⁴

(1. Gaupel LSS, Paro; 2. & 3. Paro College of Education; 4. Wochu LSS, Paro)

Abstract

The school English curriculum framework in Bhutan mandates the teaching of grammar to be integrated with the teaching of literary texts. This has become an issue as teachers find it difficult to integrate. A pre-survey using a questionnaire and a class test was administered to 76 Class Eight students (one student was absent) to examine their perceptions on using literary texts to learn grammar and test their grammar knowledge. Based on the findings of the pre-survey and the pre-test, this action research was designed to adapt and implement Ellis's (2002) practice and conscious-raising approaches to grammar teaching, Celce-Murcia and Olshtan's (2014) a discourse-based approach to teaching second language grammar and Larsen-Freeman's (2014) a three-dimensional grammar framework to effectively teach both content of the text as well as the grammar. After six months of intervention, a post-survey using the same questionnaire and a post-test (n=77) were conducted to explore if there were any differences in students' perceptions and test scores. To further validate students' quantitative responses, semi-structured interviews were conducted with students (n=6) and teachers (n=2). Findings showed that the intervention strategies have made an impact on students' understanding of both content of the literary texts and grammar. Recommendations for further improvement of teaching grammar in context and future research are also provided.

Keywords: ESL, Literary Texts, Grammar Instruction, Teaching and learning, grammar in context.

Research context

English is the medium of instruction in the Bhutanese education system ever since the modern education was introduced in the early 1960s. From the social linguistics perspective, a language is considered to be the second language as it is used along with the nation's national language in schools and colleges, for business transactions and official use (Saville-Troike, 2006). English language plays a pivotal role in the Bhutanese education system, thus the Ministry of Education (MoE) emphasises on a periodic review of the English curriculum. The Curriculum and Professional Support Division (CAPSD now changed to Royal Education Council) revised the English curriculum in 2006.

The current English curriculum mostly consists of modern literary genres; essays, poems, and short stories focusing on four strands (Reading and literature, Writing, Listening and Speaking, and Language). Teachers are expected to integrate all these strands with the literary texts provided for every class level. Recent studies have shown that teaching grammar has become an issue in the Bhutanese schools (Sherab, et. al. 2017; Tshomo & Sherab, 2017).

Teaching language using literary text emerged with the emergent of the communicative language teaching approach. Literary texts are considered effective materials to develop students' communication skills through critical, analytic, and interactive activities (Kramsch, 1985). In the process of learning language, students are expected to learn the grammar structures of the target language subconsciously. The linguist like Karshen (1982) in favour of the communicative approach believe knowing the rules subconsciously enhances students' usage of language by creating infinite sentences. Grammar is referred to as a systematic form of language.

It is a dynamic system of rules for students to learn through authentic ways in which meanings are encoded into wordings where the structure of words, phrases, clauses, and sentences are used to structure a meaning of a communication (Celce-Murcia, Briton & Snow, 2014; Harmer, 2001; Larsen-Freeman, 2014)

Situational analysis

English language teachers are expected to teach grammar in context with the literary text. There is a lack of research into this new system of teaching grammar in the Bhutanese context. However, limited research indicates that it is mostly ignored (Tshomo & Sherab, 2017) and this has become debatable in the schools (Sherab, et. al. 2017). These researches and also anecdotal evidence from more than ten years of English teaching experience indicate that grammar is taught in isolation to prepare students for the only examination. As English teachers, we have failed to make the teaching of grammar through literary texts meaningful and effective. If this issue is not addressed, it is likely that our students will be weak in grammar and hence perform poorly both in their overall English language development and also likely to negatively impact their learning in other subjects.

Earlier research by Tshomo and Sherab (2017) has found that the teachers and students positively perceived the use of literary texts in the ESL classroom. However, it was found that too much focus on the content of the text and the other four language skills made it challenging for the teachers to focus on teaching grammar. Existing literature indicates (Kacar & Zengin, 2013; Odetallah, 2013) that the teaching and learning of grammar in English lessons are considered important and core-essence of the language learning. There is a lack of literature in the Bhutanese context to show how grammar could be best taught in context. Therefore, this action research was intended to find ways to improve the teaching of grammar in context.

Literature review

Literature supports the idea of teaching grammar in context since learning the rules should be a natural process allowing the students to apply correctly. For instance, Mart (2013) highlights that learning grammar in isolation limits students to infer grammar functions in sentences, and this results in ineffective communication. Therefore, literary texts can be considered one effective material for teaching grammar in context as it provides authentic form and application of the grammar topics. Similarly, Ellis (2002) states that the students should be made capable of demonstrating correct metalinguistic knowledge since knowing it could help them apply the syntactical rules correctly in their communication. In line with Ellis's concept of teaching and learning grammar, a study by Groeneveld (2011) indicated

that teaching a form and usage of grammar through literary texts like stories and folktales is one effective way to enhance students' knowledge on grammar and its usage in their communication. For instance, Groeneveld (2011) used an anecdotal version of 'Alice in Wonderland' to teach the concept of demonstrative pronoun where students had to describe the usage of grammar rules using the text. The study concluded that students improved their knowledge of the targeted concept and also enjoyed the lesson.

Kacar and Zengin's (2013) study with the pre-service teachers demonstrated the importance of grammar practice in developing communicative ability and fluency. It was suggested that a contextual grammar course with a strong conceptual basis could benefit the students to learn and use grammar effectively. For instance, Odetallah (2013) used the story 'Alice in the wonderland' to teach regular and irregular verbs. It was found that the story provided multiple exercises on various grammar topics and the active involvement of students in learning the culture and the target language.

Limited research in the Bhutanese context (Sherab, et. al. 2017; Tshomo & Sherab, 2017) and also anecdotal evidence indicates that teaching of grammar in context to literary texts have been a challenge for several reasons. Firstly, the Bhutanese education system is content-oriented and is highly focused on performance in the examination (REC, 2009; Sherab, 2013). So, teachers focus on syllabus coverage and preparation for examination than the appropriate implementation of such innovative Programme. Secondly, earlier research has shown that English language teachers are not adequately trained to teach grammar in context to literary texts (Sherab et al. 2017). Hence, it is being neglected.

Existing literature suggests several approaches to teaching grammar in context to literary texts: 'practice' and 'consciousness-raising' approach (Ellis, 2002), 'a discourse-based' approach (Celce-Murcia & Olshtan, 2014), 'a three-dimensional grammar framework' (Larsen-Freeman, 2014), 'a language-based' approach (Lazar, 1993), and 'teacher feedback on errors' approach (Frodesen, 2014). Each of these approaches is examined to evaluate if it is appropriate and applicable to the Bhutanese context.

According to Ellis (2002), 'practice' and 'consciousness-raising' are vital for students to have ample opportunities to practice the grammar structures and rules practically in their daily communication. Students are also encouraged to explore grammatical generalisation from the given situations. In a nutshell, practice is behavioural and consciousness-raising is concept forming.

A discourse-based approach to teaching second language grammar states that cohesion is regarded as the most important component of the grammar (Celce-Murcia & Olshtan, 2014). These authors comment that "through the appropriate use of cohesive devices, textual cohesion facilitates discourse coherence i.e., how individual sentences or utterances are connected to form a meaningful whole" (p. 427). In a discourse-based language classroom, essays, cloze passages, error detection, and correction exercises can be used as assessment tools.

Larsen-Freeman (2014) underpins a conceptual framework called 'a three-dimensional grammar framework' to help students learn grammar. It takes a form of a pie chart with three dimensions of structure or form, semantics or meaning, and use or pragmatics. The structure or form dimension gives information on constructed and sequenced lexicogrammatically, morphosyntactic, and phonemic patterns. The meaning or semantic

dimension deals with the information on grammatical meanings and examples. Lastly, use or pragmatics dimension deals with the use of language in a context where students distinguish the grammatical features from a similar structure and also, make students look for its usage in text.

A language-based approach to using literary text involves integrating language and literary texts (Lazar, 1993). The texts are seen as a resource to develop and study linguistic features of the texts where students develop grammatical knowledge through activities such as predicting, making interpretations, improvising role plays with dialogues and cloze passages developed from the content of the text.

Frodesen (2014) suggested teacher feedback on errors in student writing as an approach to successful teaching of grammar in context to literary texts. The guidelines that a teacher can use could include:

1. providing an error analysis checklist to the students at the beginning of the session;
2. using indirect feedback to correct errors; and
3. providing feedback on frequently appearing errors.

Research questions

This action research aimed to answer the following research questions:

Overarching question:

How can we effectively teach grammar to Class Eight students in context to literary texts?

Sub-questions:

1. What is the level of students' perception of the general practice of English lessons, teaching grammar using literary texts, teaching grammar in isolation, and the importance of grammar?
2. Were the mean differences between pre- and post- surveys significant?
3. How can ESL teachers help their students learn grammar rules from literary texts to apply in speaking and writing?
4. Would teaching grammar in context to literary texts help students use grammar rules accurately beyond the classroom situations?
5. Is there a significant difference between pre-test and post-test scores of the students?

Action plan

Baseline data for this action research was collected through a census pre-survey questionnaires (N=76) from all class eight students except for one who was absent that day, semi-structured interviews with students (n=6) and other English teachers (n=2) of the school, and a class test in the beginning of the academic year. These teachers had 10-18 years of English teaching experience. These data collection methods helped the students to easily reflect on the grammar lessons from the previous year. These tools also explored the grammar teaching and learning practices in the school along with teachers' and students' perceptions of these practices.

After the baseline data collection, intervention strategies were administered to the students for six months starting from April (July was excluded due to summer vacation). In between the intervention stage, the second-class test was conducted in June. Post-intervention data were collected in November through post-survey questionnaires (N=77), post semi-structured interviews with students (n=9), and a final class test.

Baseline data analysis and findings

The questionnaire was based on a five-point Likert type scale ranging from 1= Strongly disagree; 2= Disagree; 3= Neither agree nor disagree; 4= Agree; 5= Strongly agree. There was a total of 28 items that measured students' perceptions on the general practice of English lessons (6 items), teaching grammar using literary texts (8 items), teaching grammar in isolation (8 items), and general perception on the importance of grammar (6 items). The scores for each of the items under each theme have been computed to generate an overall mean and standard deviation. Pseudonyms PG, YD, PP, AM, CY, and TW are used to hide students' identities. Similarly, Pseudonyms Tr. A. and Tr. B. is used for teacher participants.

General practices in English lessons

Findings from the baseline data showed that English lessons were all about reading stories, essays, and poems. Activities used by the teachers in their English lessons helped students to practice and improve four language skills (Reading, Writing, Listening and Speaking) and grammar as shown by a higher overall mean (M= 4.07; SD= 0.47).

Student pre-perception on learning grammar through literary texts

Students were doubtful about the effectiveness of learning grammar through literary texts (M= 3.72; SD=0.48). In alignment with these survey findings, all the six student participants mentioned in their semi-structured interviews that their teachers never used literary texts to teach the concepts of grammar. Students had a preconception that learning grammar infused into literary texts could confuse them. For instance, PP preferred learning grammar in a separate class. She said, "...separate, to get rid of confusion- Confusion between text and grammar." In contradiction, TW asserted that "I don't think so. Because we will be able to remember the grammar rules if grammar and text were taught together. It can help learn grammar easily."

Teaching and learning grammar from other grammar sources

Students neither agreed nor disagreed about teachers using separate grammar lessons and learning grammar from a grammar builder text provided by the school helped them learn grammar (M=3.43; SD=0.49). The survey questionnaire specified the text but, in an interview, teachers and students revealed that the teachers used neither grammar builder text provided by the school nor the literary texts. Rather, teachers used other materials from the Internet and the library to teach grammar concepts. For instance, PP mentioned that "Our English teacher taught us grammar and gave exercises from grammar tree books. This book gave us some meaningful definitions and questions." Tr. A. also confirmed that "I usually borrow worksheets from Google and sometimes I also use Grammar Tree Books for exercises and information."

Although teachers used other grammar materials, students tried to find the application of grammar learned in literary texts. PP explained in her interview, “I look at how pronouns and nouns are used while reading short stories, essays, and poems.” TW also commented, “I look at when and how punctuation marks are used in short stories, essays, and poems.”

Students’ perception of the importance of learning grammar

Students neither agreed nor disagreed that learning grammar is important ($M=3.78$; $SD=0.48$). However, findings from the semi-structured interviews showed that the students liked studying grammar concepts to improve their language and avoid communication gaps. For instance, AM emphasised, “I love learning grammar. It helps to improve my language.” Similarly, PP agreed, “Yes, I like studying grammar because if there is a problem with the sentence then there is [are] high chances of communication gap.”

Teachers’ perception and challenges of teaching grammar in context with literary texts

As per the mandate of the Ministry of Education (MoE), English teachers are supposed to teach grammar in context to the literary texts, however, the teachers are confused about how to do it. For instance, Tr. A argued, “There has been an instruction from the Ministry to teach or infuse grammar with the text we are teaching I would like to say that, for me teaching grammar infusing with texts is quite a difficult task.” This argument is further substantiated by Tr. B, “I think teaching grammar in context is a little difficult for higher grades.”

Findings from the baseline data corroborates with earlier study that teachers consider teaching grammar in context to the literary texts as one of the biggest challenges (Sherab, et al. 2017). According to Tr. A, “My major challenge is when teaching the text, students are supposed to look at two things. Their focus is diverted. They will have to firstly look at the content of the story and grammar concepts simultaneously. In the process, the focus is being lost.”

Discussing the difficulties associated with teaching grammar in context, Tr. B also highlighted, “The focus is being lost. The focus is neither on the text nor on the grammar. The attention is diverted. So, I think, if we teach grammar in isolation then there is a focus.” Also, findings from the baseline data include that selecting an appropriate text for teaching a specific grammar concept was a challenge for the teachers. Tr. B declared, “Sometimes, it so happens that you know we have to wait for the text where the examples are appropriate to the grammar topics we are supposed to teach.”

It is apparent from the findings that these teachers did try to teach grammar in context to literary texts but they have a perception that the strategy of teaching grammar in context with literary texts further confused the students as well as the teachers themselves. For instance, Tr. A clarified, “It isn’t that I did not teach grammar infusing with literary texts. I tried but looks like it did not work for me. So, I went back to the method we were taught [during my schooling], teaching grammar in isolation, the method I was quite comfortable with.” Therefore, these teachers recommend for professional development Programme for English teachers which could enhance the skills to teach grammar in context with the literary texts.

Teacher interviews indicate that they did want to infuse grammar lessons into their normal lessons using literary texts but failed. The reason could be their limited skill and knowledge on infusing grammar into literary texts. They considered syntactical rules significant in language learning and made their best effort in teaching them through grammar materials but not with literary texts in their normal lessons. Such practice of teaching grammar rules is ineffective since it limits students to infer grammar usage to communicate effectively (Mart, 2013). Linguists such as Krashen (1982), Savignon (1997), and Lightbown and Spada (1999) assert simply teaching syntactical forms neither enhance the second language learning nor communicative competence.

Intervention phase

To overcome the above-mentioned challenges of teachers in teaching grammar in context to literary texts, three intervention approaches were designed. These three approaches were designed by adapting Ellis's (2002) practice and conscious-raising approaches to grammar teaching, Celce-Murcia, and Olshtan's (2014) a discourse-based approach to teaching second language grammar and Larsen-Freeman's (2014) a three-dimensional grammar framework. These scholars' approaches were blended in a content (literary texts) based classroom in teaching the concept of grammar. Also, the idea of Lazar's (1993) a language-based approach was borrowed to test students' usage of the concept taught. Finally, to provide the feedback to the students on grammar learning, we followed Larsen-Freeman's (2014) guidelines.

During the intervention stage, we taught grammar topics reflected in the curriculum standards and also those frequently occurring incorrect grammar topics. According to the standards, some of the grammar topics that students of class eight should be able to learn and use are; relative pronouns, correlative conjunctions, passive and active sentences, phrasal verbs, direct and indirect speeches, and adverbial clauses. In addition to these suggested topics, we also taught tenses and prepositions since students frequently committed errors while using them.

Intervention strategies were carried out for about six months (April to October) to teach various grammar topics through different literary genres: The short stories- *Which Way?*, *The Nest*, *The magic Brocade* and *A Red Sweater*; biography- *Gandhi and the Salt March*; essay- *Prayer flags blowing in the wind*; and poems- *Drop a Pebble in the Water*, and *Mending a Wall*. These literary genres were selected to teach both content and targeted language topics.

Teaching the grammar concept through the literary texts involved introducing the target language through examples extracted from the texts. Then students drew inferences on its usage through the examples. Once the students were able to evaluate the usage of the grammar topic, they used the target language in a different context. After the completion of the tasks, students presented their work to the class and the teacher along with the whole class evaluated the given responses. Further, an extended activity was provided to test students' learning through exercises like cloze tests, transforming the sentences, creating dialogues, filling gaps, and combining the sentences.

Intervention strategies

Step 1: Select the right text to teach the target language

While teaching the literary genre, we selected a grammar topic that could be taught using the text. Since we were trying to integrate grammar teaching with literary texts, we made sure that the texts had ample examples of the target language to allow students to acquire enough knowledge and practice from its repeated occurrence. We were mindful that the chosen texts were relevant to students' language proficiency, provided the authentic example of the target language, and stimulated numerous activities to practice them both in and outside the classroom.

Step 2: Design activities to teach the target language

Ellis' (2002) consciousness-raising in teaching grammar and Larsen-Freeman's (2014) three-dimensional grammar framework guided us to design activities to teach the grammar topics from literary text. As an introduction to each lesson, we gave brainstorming activities to explore students' prior knowledge of the grammar topics. Students were given sentences with the target language and asked to discuss and share the meaning, form, and function of the given examples.

In the lesson development stage, as an information input to grammar topic, some rules and new ideas on the topic were presented. Activities such as discussing and sharing elements of short stories, constructing dialogues, role plays, creating comics, writing summaries, explaining figurative languages, and answering analytical and critical questions were generated for students to use the target language along with the content of the texts. They wrote two or more sentences that contained the grammar topic discussed and explained the forms, meanings, and functions of their sentences which helped to infer and use the language correctly.

As a follow-up to the activities for the lesson development, students explained and presented their sentences containing the grammar topic. We helped the students with the errors in the sentences by aligning the grammar rules and corrected with inferences. Feedbacks from Frodesen (2014) guidelines (refer to literature review) were provided on errors committed.

Step 3: Evaluation

To evaluate the grammar knowledge taught and learned, exercises like cloze test, gap filling, restructuring sentences, joining sentences, and editing were designed. These tasks were given either as extended learning activities or homework. This helped us to check students' knowledge and made students practice what they have learned. All the activities and exercises designed above for teaching grammar topics aligned with the content of the literary texts. This helped us to teach not only the content of the text but also practice grammar.

To carry out the intervention process successfully critical friends observed the lessons twice in that entire six months. The observers used an observation checklist while observing the lessons. The checklist consisted of five sections- consciousness-raising in teaching grammar, a discourse-based approach to teaching second language grammar, a three-dimensional grammar framework, feedback on the errors, and a language-based

approach. The observation checklist was to check our way of teaching the grammar topic, evaluating students' learning, providing feedback, and checking the relevancy of texts to teach the grammar topic.

Post Intervention data findings

The findings of the post-intervention data are categorised based on the five research questions. The research questions are answered through data collected from student survey questionnaire (similar to the baseline), observation checklists, teacher diary, and test scores of three tests administered at three different phases. Semi-structured interviews with students tried to explore students' opinions on their grammar lessons that were taught using literary texts. Pseudonyms used to refer to these students are YW, YD, PP, NC, KB, TW1, SJ, NS, and TW. Also, data were collected through teachers' diary and test scores. Throughout the intervention stage, teachers kept a diary to record the strengths and challenges of the lessons and recommendations for future lessons. A total of three tests were conducted- firstly before the intervention phase in the beginning (baseline), secondly in the middle of the process, and finally at the end of the year (post-intervention).

Data from all these sources were triangulated to provide answers to each research question:

What is the level of student perceptions on the general practice of English lessons, teaching grammar using literary texts, teaching grammar in isolation, and the importance of grammar?

Pre- and post-survey findings and post-semi-structured interviews with nine students answer the above research question. The means and standard deviations of two surveys conducted before and after intervention strategies are shown in Table 1.

Table 1: Mean and SD of pre- and post-survey

Theme	Pre-survey		Post-survey	
	M	SD	M	SD
General practice of English lessons	4.07	0.47	3.83	0.45
Teaching grammar using literary texts	3.72	0.48	3.97	0.47
Teaching grammar using grammar teaching and learning materials	2.68	0.59	2.60	0.68
General perception on importance of grammar	3.78	0.49	3.91	0.50

The overall post-survey means are just above average except for the teaching grammar using grammar teaching and learning materials (below average) indicating that the level of student perceptions on the four themes is high. However, the teacher's diary (dated 16 May 2018) indicated one room for improvement that needed teachers to work harder to make grammar teaching using literary texts meaningful and effective to the students.

Were the mean differences between pre- and post- surveys significant?

Paired samples t-test were produced to check if there were any significant differences between the pre- and post-surveys among the four themes. The mean difference between general practice and teaching grammar using literary text was significant ($p < .05$). The

mean for students' perception on a *general practice of English lesson* could have probably decreased because the English lessons during the intervention period included practices not only on four language skills and grammar knowledge as reflected in the questionnaire but also on activities such as creating comic books, enactments, and singing. This was confirmed by YW "I have studied English since class PP but I never did a presentation, debate, role plays, comic and singing in my English lessons. I would like to ask my teacher to continue doing the same for future students too as it improves our confidence to use the English language."

On the other hand, students' perception of *teaching grammar using literary texts* has increased with a significant mean difference ($p < .05$) after the intervention phase. This could be because in the beginning students were sceptical about the benefits of learning grammar through literary texts. However, at the time of post data collection, they were familiar with the benefits of learning grammar through literary texts. For instance, PP's pre-perception that learning grammar would be confusing if taught with literary texts has changed after the intervention phase, "I thought it would be confusing to learn grammar with literary texts since my previous teachers used grammar texts to teach grammar. But it was not. Literary texts help us to get lots of grammar examples and use them."

Increased mean difference between the pre- and post-surveys showed no significant difference ($p > .05$) for third ($p = .54$) and fourth ($p = .16$) themes. Since the beginning, they found learning grammar in isolation has not helped them to use grammar in their communication. NS asserts, "I could understand grammar more easily when taught through literary texts with explanation. I cannot understand grammar when it is taught separately through grammar builder text."

Also, grammar is considered important by the students to converse confidently and to learn the rest of the subjects. For instance, YW said, "It is important to learn and know correct grammar rules. We need it in our daily lives even for job interviews and for the next grade level." Additionally, TW1 affirms, "Since all the other subjects are in English, it is important to know and understand grammar usage correctly." They further emphasised that if grammar is not used accurately, it could create a communication gap. One of the students (SJ) stressed, "Just knowing how to communicate is not enough. We have to know the correct form of grammar if not it can cause a huge communication gap. If grammar is wrong, the whole meaning of the sentence will be changed."

How can ESL teachers help students learn grammar rules from literary texts to apply in speaking and writing?

Learning grammar through literary texts could be effective if teachers design an appropriate task for the students. Findings from both the observation checklist and teachers' diaries showed that teachers should firstly select the literary text that could give ample examples and opportunities for students to practice the target language. According to the observation checklists recorded by the critical friends, literary texts gave opportunities for students to learn grammar topics and also draw inferences on its usage. Drawing inferences on the usage and errors could help students use the target language learned correctly in their speaking and writing. Therefore, in follow-up activities, teachers need to design some tests and activities based on the content of the literary texts that require students to use the target language learning. For example, a grammar topic

'adverbial clauses' was taught through Mahatma Gandhi's biography '*Gandhi and the Salt March*' written by *Gerald Gold*. This text had ample adverbial clauses used that could serve as authentic examples for students. The procedures followed were:

- Step 1: Students were given some examples of adverbial clauses related to Gandhi's life;
- Step 2: In groups, they were asked to provide their inferences on rules and functions of highlighted adverbial clauses in the example;
- Step 3: Then some sentences related to the content of the text were given to each group to identify the errors and to correct them using the inferences they have drawn;
- Step 4: Students wrote a paragraph using adverbial clauses on the lesson they have learned from Gandhi's life;
- Step 5: A cloze test was given to check whether they could use words such as 'since, after, when, while, and until' to convert the sentences into adverbial clauses;
- Step 6: Five pairs of sentences that needed to be converted into adverbial clause using joining words given in brackets were provided as homework.

As mentioned above findings suggest that learning grammar through literary texts helped students understand the content of the texts easily. Since students were learning both content and grammar together, the teachers focused on one concept at a time because it could be challenging for teachers to teach and students to comprehend if multiple and advanced concepts were taught at once.

However, our experiences show that it is stressful for the teachers to teach grammar through literary texts even though the students enjoyed and were able to apply the rules learned (Research Diary, 11 October 2018). The following are some of the challenges that teachers face while teaching grammar in context to literary texts:

- finding a relevant target language or grammar topic from the given texts;
- extra effort from teachers and time-consuming in preparation of activities to integrate both content and grammar topics after the selection of target language as exercises and activities have to be newly generated;
- as English is a second language, teachers have to refer to several grammar references for correct use of grammar rules which is time-consuming.

Would teaching grammar in context to literary texts help students use grammar rules accurately beyond the classroom situations?

Students were embarrassed about making grammar errors in their communication. Grammar accuracy indicated their intellectual and academic status. According to YW, "When grammar rules are not learned, we land up using broken English. This is embarrassing in front of other ...my friends tease me when I use broken English. They say I have not learned anything at school." Comparatively use of literary texts for learning

grammar has boosted students' confidence and how to use them consciously. Since grammar structured used in literary texts were authentic, students learn from literary texts and also communicate confidently beyond their classroom situations. Further KB mentioned, "Last year, I was not able to communicate with tourists due to my grammar structures. But this year, I am comfortable interacting with tourists since I am aware of structures and how it works."

The findings from the interviews further affirm that literary texts not only helped students understand the content of the texts but also developed their language structures. This also helped them to use grammar correctly in their communications. For instance, NS asserts, "After learning grammar from literary texts, I was able to progress much more. We were able to cover and comprehend the content of the literary texts easily. We learn content and grammar at the same time." PP assured that "When we get a chance to use the grammar, we use the ideas we got from the story. We are able to understand the rules and apply them in our conversations." SJ further confirmed that "I enjoy learning grammar through literary texts since it helps me to communicate effectively avoiding broken [incorrect grammar] English."

Is there a significant difference between pre-test and post-test scores of the students?

Three class tests were conducted to test whether students could apply the grammar topics learned correctly. The first test was conducted at the beginning of the year, the second was in the middle of the intervention process and the third one was at the end of the intervention. The tests had a similar pattern and a total score of 25.

Students' grammar test scores have improved with every test and the mean differences were significant. The mean of the second test was higher than the first test and the mean for the third test was higher than the second test. Students have achieved higher scores with every test which is an indication that teaching grammar in context helped students score more in grammar tests (see Table 2).

Table 2: Paired Sample Test of Students' Test Score

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	test 1 - test 2	-4.653	3.464	.408	-5.467	-3.839	-11.398	71	.001
Pair 2	test 1 - test 3	-6.870	3.932	.467	-7.800	-5.939	-14.723	70	.001
Pair 3	test 2 - test 3	-2.207	3.179	.365	-2.934	-1.481	-6.053	75	.001

Discussion and conclusion

Krashen (1982) and Ur (2011) recommended that real mastery and internalisation of grammar in a natural process could be achieved through students' extensive exposure to comprehensible input. According to Krashen's proposed model of second language acquisition, the input must be comprehensible and a little higher than the students' level ($i+1$). In line with this, literary texts could be one input that has features of Krashen and also expose students to extensive usage of grammar since there are texts at varied levels consisting of a variety of sentences with accurate grammar use.

However, simply exposing students to grammar information input (teaching grammar technically without its functional aspect) would not help students acquire correct grammar. They should be taught how grammar works in the sentences. Therefore, they should be aware of the grammar components in the sentences. It is significant to know both form and meaning, and function of grammar structures. In contrast to Krashen's hypothesis, participants of this study revealed that consciously learning grammar helped them with their communication skills. Students are at the stage of learning and they try to apply the rules learned in their communication and this finding is compatible with Ellis' (2002) conscious-raising model of grammar teaching.

In teaching the grammar concepts, teachers can be mindful of what and when to teach since the concept taught would not be beneficial if the students are not ready to learn the new structure. This aligns with Pienemann's (1984) teachability hypothesis that states teaching and learning grammatical structure is a developmental sequence where students will be able to acquire new grammar concepts if they have mastered the preceded concept.

Students' readiness to learn the grammar concepts could also be determined through the errors they commit. If students are found committing frequent grammatical errors in their speaking and writing, teachers should understand that students are experimenting with new structures and need to guide them. This might help them learn and apply those grammatical structures accurately and correctly in their communication.

Prior research has shown that literary texts provided opportunities to improve and practice students' four language skills (Tshomo & Sherab, 2017). Also, the texts provide lots of grammar examples and their usage. Therefore, when the texts could cater to a variety of communicative activities, it could provide students with opportunities to learn and acquire grammar structures. The texts enable the students to familiarise themselves with the form and meaning of grammar structures and their functions. These two processes enable students to apply the acquired grammar consciously in their communication.

Students should be able to first learn the structures before applying them extensively in their daily conversations. The researchers assume that the beginners (students of classes PP-II) acquire language simply by getting exposed to language extensively and use them without considering too much focus on the structures. Once they have acquired fluency over the language, they need to know the form and meaning of grammar structures to apply them in their communication. This could apply to the students at an intermediate level (classes IV-VIII).

Corroborating to Tshomo and Sherab (2017), the findings of this action research indicated that most of the teachers who taught grammar using the grammar-related texts were taught for examination purpose. Teachers mostly followed traditional grammar teaching that involved the presentation-practice-production (PPP) process. According to Ur (2011), this form of teaching grammar is a common experience of many teachers and could make students perform well in tests but not in language production. It does not help students in producing an accurate form of grammar in their communication and as a result, students make several errors in their production of language.

Simply focusing on form and conscious raising is not enough, students should be able to use these forms meaningfully in their communication. Larsen-Freeman (2014) stresses on practicing grammar through communication situations rather than focusing on accuracy-focused drills. Students would be able to do this if they were exposed to activities that needed the transfer of knowledge to communicative situations. Literary texts help teachers to create a variety of such communication situations to practice their grammar knowledge. Following the guidelines that we implemented in this study helps ESL teachers and students teach and learn grammar for examination purposes as well as use grammar accurately for their communication.

Bhutanese students who learn English as a second language do not use the language frequently outside their classroom context. It is rather used in formal situations when required. They would be mostly communicating in their native language or national language. Thus, they do not get enough time to drill on the grammar they have learned. Ur (2011) posits that grammar in such a situation is learned with best results through systematic explanation and drills using communicative input such as stories and fun activities.

Grammar teaching has been quite challenging for a long time in the field of second and foreign languages. Different strategies have been adopted to teach grammar structures for ESL and EFL students. To name some of the popularly used approaches, it started with the grammar-translation method to audiolingual to cognitive and finally to communicative (Terrell, 1991). Aligning to Terrell (1991), the findings of this action research confirm that acquiring and learning language exposed to communicative input is not sufficient. Students do learn from them by drawing analogy and noticing the use of language. However, in the process of drawing analogy, students might apply the wrong form of language structure because of overgeneralization. Therefore, there is a need to familiarize and expose students to various forms and functions of grammar structures.

Thus, the findings of this study suggest teachers of lower classes to focus only on one form of grammar concept from one text since these students would not be able to acquire multiple concepts at a time. If students are at intermediate or advanced levels then the teachers could teach varied concepts from one text. They would be able to learn and know the function of multiple grammar concepts from just one text.

Recommendations

While teaching grammar in context with literary texts, the focus of teaching and learning is both on content and grammar language. In the process of doing so, multiple tasks need to be designed and requires time for teachers to prepare the lesson before teaching the

students. Teachers need to learn adequate grammar knowledge referring to various sources and design the activities aligned to literary texts as mentioned in the intervention stage. They need to put in the extra effort. However, the effort is worth it since students learn grammar significantly when infused with literary texts.

Future researchers could experiment with these strategies with controlled and treatment groups to find how literary texts could help in learning and acquiring language accurately. The researchers could also carry out longitudinal studies to find accurate results. Teachers could have a longer intervention phase for valid and reliable findings.

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3.2. A Study of the Effectiveness of Peer-Assisted Learning Strategy as a Remedial Programme In 7th-Grade Science

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Abstract

Designing effective teaching-learning methods for a learner demands a teacher to be aware of what works better for an individual in a classroom. The effect of Peer Assisted Learning Strategy (PALS) on students' performance and learning satisfaction was investigated in this study. The pre-test/ post-test tests were devised for both the experiment and control groups to measure their performance levels in science before and after PALS and No-PALS. The second method involved the experiment group to answer a survey questionnaire using a 5-point Likert scale to address how PALS enhance students learning satisfaction and contribute to other students' learning satisfaction. While the pre-test/post-test data showed a change in mean marks, rating scores on questionnaires indicated the effectiveness of PALS, suggesting that PALS can have a positive impact on students' performance and learning satisfaction.

Keywords: Peer-assisted learning strategy, remedial Programme, science, 7th grade, effectiveness.

Introduction

The term peer learning refers to many different strategies that can be used in teaching and learning to help learners. Teachers today struggle to provide remedial and supplementary programme, as an intervention measure. PALS is used to provide academic support. Peer learning is defined as the acquisition of knowledge and skills through active helping and supporting status equals or matched companions (Topping, 2005). It involves people from similar social groupings who are not professional teachers helping each other to teach and learn. Although, remedial programmes help students who are having problems with concepts but students resent being forced to participate in the remedial lessons and Bhutan it has been felt that Science was being taught in a way it should not be taught and right approaches have not been in the focus (Rinchen, 2001). This suggests that the teachers teaching Science in grade 7 need to grow and change as practitioners.

The purpose of the paper is to determine the effectiveness of PALS as a remedial programme in 7th grade Science. By using the Quasi-Experimental method, the data was collected by pre-test/post-test exam (the post-test questions were different from the pre-test questions, but the same in the content) and were devised for both the experiment and control groups. Further to validate their learning satisfaction, students were asked to answer survey questionnaires.

Literature Review

Theoretical perspective

The theoretical perspective underpinning this study was informed by Vygotsky's sociocultural theory and social constructivist pedagogy. Vygotsky (1978) posited while both biological and social forces play a role in knowledge building, learning is essentially an interactive, social process that involves the use of language. It highlights the active role students play in obtaining knowledge and the social construction of knowledge, which can be achieved through practical work and experiential learning. Another feature of this theory is the proposition that the potential for cognitive development is limited to a 'zone of proximal development'.

The person can learn only that which is within their development level. It further indicates that the 'zone of proximal development' is created only when learning awakens a variety of internal development processes that can operate only when the child is interacting with people in his environment and cooperating with peers.

The idea that knowledge is constructed via social discourse is integral to the process of peers learning from each other, reflecting the notion that social interaction facilitates more learning than that which would occur by students learning on their own (Vygotsky, 1978). By interacting with others, students get the opportunity to share their views and thus generate a shared understanding related to the concept.

Peer-assisted learning strategy

Many students in the Bhutanese classroom find science difficult and challenging. Therefore, science teachers try to create a conducive environment to help their students meet this challenge. One way to achieve this is by allowing students to learn and study together in pairs.

Prior studies found PALS as an effective supplementary remedial intervention in classrooms as together they can relate to each other better. PALS is defined as the acquisition of knowledge and skill through active helping and supporting status equals or matched companions (Topping, 2005). Research indicates that by a wide margin PALS students performance levels in comparison to non-PALS students (Fuchs, Fuchs, Mathes & Simmons, 1997; McMaster, Fuchs & Fuchs, 2007) and also a very strong positive effects of tutoring were seen on student performance and progression (Parkinson, 2009).

PALS as remedial learning

PALS is not a much more experienced individual teaching the information, but the spread of this information via the learners' peers who have only recently learned this information, and the assistance being provided by the said peers too. However, there needs a close monitor to see the correctness of what pairs are doing, especially with weaker students, even if their help is not requested by the pair, who may be erroneously convinced that they are already correct (Topping, Watson, Jarvis & Hill, 1996). Peer learning strategies further provide ways for the teacher to take a step back and let the students do the teaching and talking for a little while (Wessel, 2015). PALS is one method that can improve teaching and learning, provides a safe learning environment to promote learning and retention of knowledge. Students feel more comfortable asking questions to another

student and in small or large group discussions, the students themselves have to hash out the different points that are brought to the table (Wessel, 2015).

Empirical research

Previous studies have identified many benefits of PALS in students learning. These benefits include significantly greater progress (Fuchs et al. 1997), keeping students actively involved and “on-task” (Fulk & King, 2001), effective supplement to conventional teaching methods (McMaster et al. 2007) scientific thinking and doing increased dramatically (Diana, 2017), and can learn practical skills in how to teach and give critical feedback (Wessel, 2015), PALS makes use of one of the greatest resources in schools, the students themselves (McMaster et al. 2007). While there had been ample of research carried out on the effectiveness of PALS in reading (Fuchs et al. 1997; McMaster et al. 2007; Diana, 2017; McMaster, Fuchs & Fuchs, 2006) and mathematics, research on effectiveness in science is very limited. However, Greenwood et al. (1990), as cited in (Topping, 1996) established that PALS does consume organisational time in designing and effecting appropriate peer selection and matching, and it may also necessitate some adaptation to curriculum materials and can be designed to apply in science.

Action research question

How can I improve the grade 7 students’ performance in Science using PALS?

Methodology

Participating students

Respondents were selected using the purposive probability sampling method. In this method, the participants were chosen deliberately according to the predetermined purpose (Maxwell & Smyth, 2010). The sample was stratified based on the assessment procedure in grade 7. However, a sample drawn from the assessment tends to include only students from grades 7A and 7B (n=58). As the researcher wanted to make a comparison between the PALS and No-PALS for the performance level in Science, 7A (n=30) was randomly selected as the experiment group (where PALS was administered) and 7B (n=28) as the control group (No-PALS was administered).

Instruments

Pre-test/post-test tests - The first instrument used to collect data was a quasi-experimental method, which has administered the pre-test/post-test design (same levels of thinking, Appendix B). The pre-test/post-test (the post-test items were different from the pre-test items, but the same in the content) was devised for both the experiment and control groups to measure their performance levels in science before and after PALS and No-PALS.

Questionnaires

This second data collection method was used to find out how PALS enhances students learning satisfaction and contribute to other students’ learning satisfaction. This method involved the experiment group to answer a survey questionnaire using a 5-point Likert scale with the following ratings: Strongly agree=5; Agree=4; Neither=3; Disagree=2; Strongly disagree=1 (Appendix A).

Results and discussion

Pre-intervention: Baseline result

It was observed that the students in my class resent being forced to participate in the remedial programme even though they scored very low in Science tests. To address the gap between high achievers and low achievers and to make remedial programme enjoyable, the researcher felt students were likely to learn more from peer-led sessions than from teachers. The baseline/ pre-test data was taken from the class test on chapter 5 (Classifying Materials). The pre-test result indicates that both the classes (experiment and control) performed very low with a mean of 38 and 33, the pass percentage of 33.3%, and 21.4% respectively. These data serve as a benchmark for the remedial programme and the basis for forming a pair for PALS.

Intervention: Scaffolding through application of PALS

A split list procedure was used to form a reciprocal pair for the experiment group (PALS) based on the assessment data (Baseline data). In this procedure, the entire class is ranked on ability and split in half (Fulk & King, 2001). The student with the highest marks was paired with the highest-ranking student of the lower marks. Adapting the 9 general guidelines for beginning to implement class-wide peer tutoring (Fulk & King, 2001), the researcher designed PALS for two times in a week for a month (August 4th week to September 3rd week). The researchers taught the students to grow accustomed to the roles of tutor and tutee and provided sample scripts for students to practice the roles. The tutor and tutee reciprocated the roles and the teacher monitored and provided feedback. This supported Vygotsky's notion of 'how expert scaffolding from peers or near-peers enables new knowledge to become meaningful' (Vygotsky, 1978).

Coaching and practicing phase

After the coaching phase, either a quiz or test questions were given to tutees by tutors to practice what they have learned. This method made them comfortable asking questions to another student rather than to a teacher.

Partner reading and paragraph shrinking

During the instruction, the tutors teaching style covered various scaffolding strategies. Each student in a pair took turns to read the text. Each student took a turn to reread and the first reader restated the main idea of the paragraph in ten words. After five minutes, the students switched roles and restated the main ideas in the second paragraph. This method encourages 'interacting with people in their environment' and 'enables cooperation with their peers' (Vygotsky, 1978).

Predict, read, clarify, question, and summarizes

It is believed that the participants might never have truly grasped a concept until they had to explain it to another, embodying and crystallizing thought into language (Topping & Ehly, 2001). In this method, both the tutor and tutee were asked to skim and scan the text glancing at the diagrams. After reading, both the tutor and the tutee were asked to underline the sentences provided in a worksheet, and then they were to discuss the underlined sentences to clarify. Later, the pair designed a question and asked each other as a follow up to summarize the lesson.

Collaboration: Inter PALS pair competition to design mnemonics for first twenty elements. This intervention stresses collaboration and cooperation rather than competition. It helps those who face difficulty in remembering the long list of elements.

Post-intervention findings

The question that the researchers tackled was on how to improve the grade 7 students' performance in Science using PALS. To answer this question, students were treated with an intervention programme for a month and conducted the test before and after PALS and No-PALS. The summary of the test result is presented in Table 1.

Table-1: Pre- and post-test performance before and after PALS and No-PALS.

Groups	Pre-test		Post-test		Difference
	Mean	SD	Mean	SD	Mean
Experiment	38.00	17.50	49.40	16.30	11.40
Control	33.00	14.10	38.00	14.70	5.00

From this result, it is clear that the experiment group was little over 6 marks greater on average than the control group. The experiment group had an average difference of 11.40 and the control had an average difference of 5.00. The experiment group had a higher standard deviation SD of 17.50 and 16.30 respectively, whereas the control group had an SD of 14.10 and 14.70 respectively. The experiment group having a higher SD tells that the test result is more spread out or dispersed than the control group.

Table-2: How PALS enhance students learning satisfaction

Items	Mean	SD
I. Professional Manner	4	0.6
Tutor showed genuine interest and concern	4	0.5
Tutor listened carefully to what I said	4	0.6
Tutor made me feel comfortable and at ease	4	0.5
Tutor treated me in a respectful/professional manner.	4	0.7
II. Knowledge	4	0.5
Tutor is knowledgeable about subject/material	4	0.5
Tutor uses instructional delivery strategies used throughout the PALS session	4	0.6
Tutor is knowledgeable about PALS policies and procedures	4	0.4
III. Effectiveness/ Students learning satisfaction	5	0.5
During the PALS session, the time and effort were well spent.	5	0.5
During the PALS session, I got the help that I needed	5	0.5
After the PALS session, I have a better understanding of the science lesson	5	0.5
After the PALS session, I feel better prepared to succeed in a science lesson	4	0.5
After PALS session, I have more confidence in my ability to retain the knowledge	4	0.5
Overall, The PALS session personally rewarding.	5	0.6
I would recommend this Programme to others	5	0.3

Note: Strongly Agree=5 Agree=4 Neither=3 Disagree=2 Agree=1.

Questions related to the professional manner, knowledge, and effectiveness were asked to the students (Table 2). The open-ended questions (Appendix A) were also given for students' aspects of the PALS. The data collected helped the teachers to evaluate students learning satisfaction to improve instruction.

Data triangulation

A comparison between the two methods help to gauge the effectiveness of PALS on students' performance and learning satisfaction. Table 3 illustrates how this method could be used to obtain and triangulate the pre/post-test data and students' learning satisfaction. The pre/post-test data uses the class test as an indicator of students' performance. A questionnaire is administered to the experimental group, and several questions were included in areas such as: a professional manner, knowledge, and effectiveness. Statistical analysis was conducted to calculate the mean and standard deviation of both the pre/post-test and learning satisfaction. While the pre/post-test looked at the students' performance before and after administering PALS and No-PALS, the experimental group included in the questionnaire is drawn on how they thought about the learning satisfaction after the PALS. The rise in the mean from 38 during pre-test to 49 in the post-test indicates the effectiveness of PALS (Table 2). The rating scores on questionnaires also indicate a clear benefit to a better understanding of the Science lessons as noted by five participants, "we want to continue and we gained a lot of knowledge" (Please comment on any aspect of your PALS session, Appendix). The questionnaire also indicates 100% of students' learning satisfaction (Figure 1).

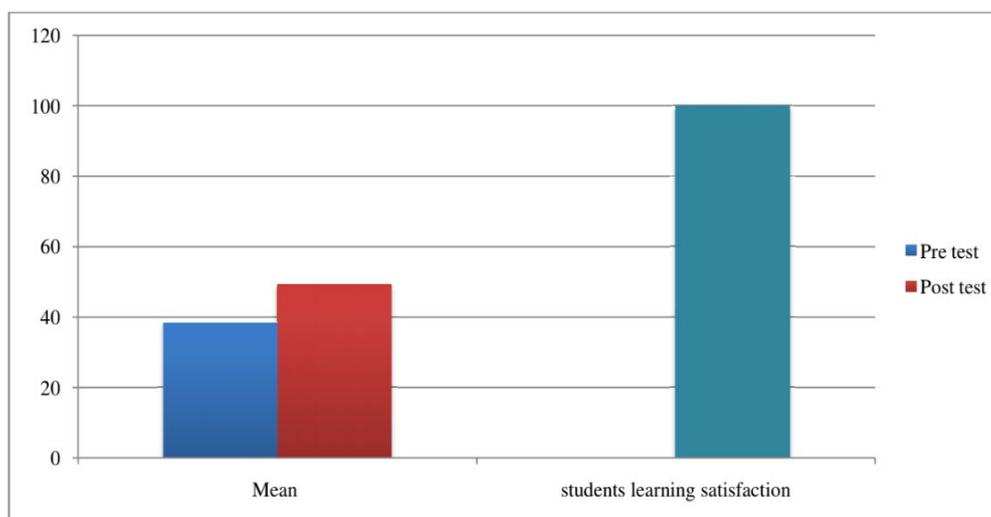


Figure-1: Triangulation of data from pre/post test performance and students learning satisfaction.

Discussion

Due to design limitations in a short period and small sample size, this study cannot offer a definitive statement about the effectiveness of PALS. Nevertheless, these findings indicate ways in which the PALS approach can be improved for students in grade 7 Science as a remedial programme. It is clear that the intervention did have a positive impact on students' performance and learning satisfaction (Figure 1), the mean marks both before and after did not have vast differences due to tutors' least experience (professional manner and knowledge) during peer tutoring (Table 1).

More time for intervention and pre-teaching by the tutors might be necessary for greater performance in the post-intervention test. It would also be helpful to do more research on different strategies for forming reciprocal pairs and methods of scaffolding through the application of PALS.

Table-3: Pre/ post-test performance and learning satisfaction by experiment group

Test	Mean	Students learning satisfaction
Pre-test	38	-
Post-test	49	100

Conclusion

While the limited time frame (4 weeks of 6 lessons) and methods for intervention may not have achieved a vast difference in the mean before and after PALS, the fact that students' learning satisfaction gained was a form of positive impact in itself and it was an effective strategy as a remedial programme. Notably, each participant in the experimental group reported a strong recommendation for future use. Twenty-six out of thirty participants expressed they would recommend this programme to others and want to continue. Overall, this study indicated they learned not only about the subject matter but also grew more confident in their ability to retain the knowledge gained from PALS.

Appendix A

Questionnaire How does PALS enhance students learning satisfaction and contribute to other students' learning satisfaction?

Circle which best describes your answer

I. Professional Manner					
Tutor showed genuine interest and concern	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
Tutor listened carefully to what I said	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
Tutor made me feel comfortable and at ease	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
Tutor treated me in a respectful/professional manner	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
II. Knowledge					
Tutor is knowledgeable about subject/material	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
The tutor uses instructional delivery strategies used throughout the PALS session.	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
Tutor is knowledgeable about PALS policies and procedures	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
III. Effectiveness/Learning Satisfaction					
During the PALS session, the time and effort was well spent.	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
During the PALS session, I got the help that I needed	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
After the PALS session, I have a better understanding of the science lesson	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
After the PALS session, I feel better prepared to succeed in a science lesson	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
After PALS session, I have more confidence in my ability to retain the knowledge	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
Overall, The PALS session personally rewarding.	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
I would recommend this Programme to others	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
Comments (Please comment on any aspect of your PALS session)					

Appendix B

Levels of thinking for pre/post-test items

Qs	Remembering	Understanding	Applying	Analysing	Evaluating	Creating	Total
Pre-test							
Q1	IX	i, ii, iii, iv, v,x	vi, vii, viii				10
Q2	i, ii, iii,iv, v						5
Q3				i,ii,iii,iv,v			5
Q4		b	c		a		3
Q5		A B C D					4
Q6				3			3
Total	6	11	7	5	0	0	30

Post-test

Q1		1,2,4,5,6,7,9,10	3,8				10
Q2	1, 2,3,4,5						5
Q3				1,2,3,4,5			5
Q4	1(3)		2(3)				6
Q5		1,3,4	2				4
Total	8	11	7	5	0	0	30

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3.3. The Impact of Motivation on Student's Academic Achievement and Learning Outcomes in Mathematics

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Abstract

The purpose of this study was to examine the impact of motivation on student's academic achievement and learning outcomes in mathematics. It delved into the students' motivation level in learning mathematics. This study was carried out with 37 class VI students of one of the primary schools under Trongsa *dzongkhag*. The data was collected through achievement test scores and a descriptive survey questionnaire that broadly categorized three motivation domains: effort, self-efficacy, and worry. Descriptive statistics were used to analyse the data. The analysis of student survey questionnaires indicates that students' overall motivation level towards learning mathematics was high as indicated by the increase in motivation domains. The result also indicated a gain in student's academic achievement and learning outcomes in mathematics. The findings also show a significant positive correlation between student motivation and academic scores of the students. It was recommended that the teachers motivate the students in the process of teaching and learning mathematics. Not only will this ensure an increase in student's academic achievement and learning outcomes in mathematics but also break the belief trait of students and parents about mathematics as being a tough and boring subject.

Keywords: Academic achievement, motivation, learning outcome, mathematics, reinforcement, students

Introduction

As the country emphasises technological and industrial development, science and related subjects are given importance. One subject that plays a vital role across all the scientific endeavour is mathematics.

In the process of achieving technological advancement, we need excellent performance by our students in mathematics at all levels of schooling. However, learning mathematics has always been seen as tough by the students in Bhutanese classrooms. Generally, many Bhutanese students hold the belief that mathematics is either boring or challenging which has even resulted in acceptance and toleration of low performance in mathematics by the parents (Drukpa, 2015). This belief is likely to have a negative correlation that students will not gain from the learning experience and are at risk of failing in life ahead. It was observed that the students' level of motivation and interest tends to fall in learning mathematics that ultimately results in low achievement in mathematics.

The problem has become apparent particularly after having known the level of students' interest and standard of learning mathematics in our classrooms. Moreover, the discussion with the critical friend and other colleagues have also revealed similar observations and as a problem to students in achieving the learning outcomes in mathematics. For instance, a study by Lhamo (2009) indicated that a significant number

of Bhutanese students tend to be suffering from low self-esteem in learning. In such a circumstance, motivation as suggested by Pajares (1996) leads to high self-esteem, indicating a clear predictor of students' academic performance in mathematics (Alliman-Brissett & Turner, 2010; Mousoulides & Philippou, 2005). A study by Güvendir (2013) found out that students having high motivation in learning mathematics achieved a high standard of mathematical education. Moreover, the studies (Hannula 2006; Middleton & Spanias 1999; Singh, Granville, & Dika 2002) have also established that the key role in mathematics education is students' motivation and that mathematical achievement is related to both intrinsic and extrinsic motivational factors.

With the belief that mathematics is either boring or tough for Bhutanese students, even the academically better off students were observed performing significantly low. The mathematics achievement of class VI students conducted by the BCSEA (NEA, 2003), demonstrated to be "disappointingly low". The problem has become apparent especially for children with low motivation in learning mathematics.

Thus, as an immediate and practical solution to the problems, this action research (AR) was conducted to determine if motivation influences students' learning in mathematics. In doing so, this study emphasized keeping the students primarily focused on understanding their motivation level towards learning mathematics. Moreover, this study also embraced a variety of reinforcement strategies and mathematical games as intervention strategies to motivate students' learning mathematics and evaluate how these reinforcement strategies help students in motivating and achieving learning outcomes in mathematics subsequently.

Reconnaissance

Situational analysis

Sherubling Central School is in Trongsa *Dzongkhag*. It was established in the late 1960s and the school has six catchment areas. The school has 685 students (313 males and 372 females) studying from classes PP-VIII. Most of the students come from diverse socio-economic and parental educational backgrounds. The school has 28 teachers (17 males and 20 females). The class sizes are approximately 25-36 students.

It was found that the class VI students in the school performed disappointingly low in mathematics as compared to other subjects in the previous year's examination. Specifically, the students could not do well in mathematical word problems as reported in the school Student Progress Report of 2017, the overall pass percentage of the class VI students in mathematics was 87.4 percent.

This AR was carried out with 37 (17 males and 20 females) class VI students. The critical friend was involved in a series of three self-reflective cycles involving planning a change; acting, and observing what occurs; reflecting, and then planning further actions as Maxwell (2003) pointed out avoided "too close to the action" (p.4). This is mainly to narrow the gap between the desired quality of outcomes and current learning standard as highlighted in the report by (NEA 2003)

Competence

Teacher-researcher I

The researcher graduated with a B.Ed (Primary General) from Samtse College of Education. He has been teaching class VI mathematics for four years. His disposition towards learning from research enabled him to carry out the AR. He has publications in both national and international journals and presented papers at national and international conferences.

Teacher-researcher II

She has M.Ed in curriculum and instruction from Rangsit University, Thailand. She has been teaching for eleven years. She has taught class VI mathematics for the last ten years. She is fluent with the procedure of AR since she has been conducting AR.

Critical friend

The critical friend to the researchers is undergoing M.Ed in Educational Leadership and Management at Paro College of Education. He has 22 years of experience in teaching primary classes. He knows AR as he has attended a research module during his training and is currently carrying out research for his Master's Degree. He has published his research work as well as presented his research papers at several conferences.

Literature Review

Mathematics learning standard in Bhutan

According to the nationwide diagnostic assessment studies known as Annual Status of Student Learning (ASSL) conducted by the Education Initiatives and the Royal Education Council (REC) in 2008, 2010 and 2011, "the level of learning of all grade 4, 6 and 8 students in Bhutan were found to be lower than average international level" when compared to an international benchmark such as Trends in Mathematics and Science Study (TIMSS) and Programme for International Student Assessment (PISA) (ASSL 2008, p.24; ASSL 2010, p.27; ASSL 2011, p.24). Moreover, the National Education Assessment (2003) study on a benchmark of Bhutanese student's achievement in numeracy and literacy conducted by the BCSEA also demonstrated that the mathematics achievement of class VI students was "disappointingly low" with even the "academically better of children performing poorly" (p.89).

The study conducted by REC and the iDiscoveri Education, India (2009) discovered that a "big gap between the current and the desired state in quality of outcomes and the process exist with many students performing below expectation of their grade level on both basic and advanced academic skills, basic communication skills and analytical skills" (p.7). existed, Further, the report also highlighted that a "majority of the students are not gaining from the learning experience and are at risk in failing ahead" (p.50). However, the lack of implementation supports schools; inadequate content knowledge and intellectual preparedness of teachers and lack of resources among others were revealed as the major causes of the above problems (pp.54-55).

Motivation and Mathematics

Motivation is a complex psychological construct that attempts to explain behaviour and the effort applied in different activities (Watters & Ginns, 2000). Motivation involves extrinsic rewards that occur outside the learner's control and intrinsic goals in their desire to achieve a particular target. While physical reward, punishment, social pressure, higher social expectations, homework, and classroom competition are items of extrinsic motivation (Moore, 2001), intrinsic motivation includes factors such as attitude, interest, value, needs, and the desire to become competent (Moore, 2001; Pintrich & De Groot, 1990). In extrinsic motivation, the environment is the central controlling mechanism and the person's motivation is regulated by the outside rewarding mechanisms that s/he considers as a reward (Newstrom & Davis, 2002; Wu, 2003). However, intrinsic motivation is regulated by the individual. A person is intrinsically motivated to act by the feelings or the action itself in doing the activity (Deci, 1972).

In learning mathematics, it can be arduous but motivation can energize children to invest the effort and utilize the strategies necessary to be successful (Froiland, Oros, Smith, & Hirschert, 2012). Many researchers (Gelman & Greeno, 1989; Hannula, 2006; Middleton & Spanias, 1999; Singh, Granville, & Dika, 2002; Walker & Guzdial, 1999) have revealed that in mathematics education, student motivation plays a key role and mathematical achievement is related to both intrinsic and extrinsic motivational factors.

A study by Lepper and Henderlong (2000) indicates that the intrinsically motivated students are not discouraged by more complex problems and they spend more time-on-task, tend to be more persistent, and are confident in using different, or more challenging, strategies to solve mathematical problems. Moreover, intrinsically motivated students are more likely than their peers to use effective mathematics strategies such as estimating, visualizing, and checking (Montague, 1992). However, a study by Middleton, Littlefield, and Lehrer (1992) found that students' intrinsic motivation to learn mathematics is highly influenced by the strategies and tasks designed by the teachers.

Moreover, most of the social-cognitive models of motivation assume that students' motivation is influenced by classroom interactions, activities, reinforcement practices, and culture (Pintrich, 2003). Therefore, the teacher's instructional practice has a crucial role in facilitating students' motivation. Within mathematics education, there is a relation between different aspects of teachers' instructional practices and students' motivation in mathematics. Specifically, the use of reinforcement strategies in the lesson can be a motivating factor for managing student behaviour and maximizing the learning outcome. Programme instructions can be used to make reinforcements effective (Skinner, 1968). In addition to other strategies in classroom teaching, having good strategies of reinforcement to motivate can attract attention and boost the interest of the students in learning (Newcomer, 2009). Therefore, it is apparent that a teacher must make instruction interesting in learning mathematics, using various strategies and material which will make the learning of mathematics, active, investigative, adventurous and motivated as much as possible.

Research question

Is there an impact of motivation on student's academic achievement and learning outcomes in mathematics?

Intervention strategies

The following intervention strategies were used in the teaching and learning of mathematics. The intervention strategies were further modified in its applications based on the understanding of the baseline data and the situation.

1. Reinforcement

The idea of reinforcement in learning gained popularity when B.F Skinner put forward his operant conditioning theory (McLeod, 2007). Reinforcement is the main element in his idea of stimulus-response association, which then became a broadly applied principle in teaching and learning. The use of reinforcement strategies in the classroom can be a motivating factor for managing student's behaviour and maximizing learning outcomes. This AR used tangible reinforcement such as tokens, stickers, marks, certificates and written comments, and intangible reinforcement such as verbal comments, cheers, and games as intervention strategies.

2. Games

One of the best strategies to improve achievement in mathematics is incorporating the use of games in the subject as students are motivated to involve more in learning through game playing (Lach, 2007). Similarly, Gallenstein (2005) also added, "children need to be presented with situations to be solved through games and activities that challenge their minds" (p. 37). This AR used math games such as board games, card games, fraction spinner games, place value partners and dice games to teach the various concepts.

3. Real-life application in Mathematics

The strategy practiced incorporating real-life applications into the subject to improve mathematics achievement. Without real-world applications, students can find mathematics too difficult to relate to, boring and abstract. According to Farren (2008), many students expressed that math was boring, difficult, and hard to relate to because of the lack of real-world application in instruction (p. 3). Real-world application brings life to mathematics, and students can make sense of and relate to the subject. Gallenstein (2005) expressed that, "teachers need to connect science and mathematics knowledge to real-life situations for children to have a greater appreciation for the content" (p. 38). Farren (2008, p.5) added to this by reporting that several students who received instruction including how math related to the real world said they became more interested and motivated in math even though it wasn't one of their favourite subjects. The students were made to reflect on the daily application of mathematics concepts from simple addition and subtraction to complex probability and estimation. The addition or subtraction concept used by shopkeepers to estimation concept used while their mother prepares tea enough for their family members or adding sugar for a perfect taste.

4. Differentiated instruction in Mathematics

Another strategy to improve motivation and performance in mathematics is differentiated instruction. According to Grimes (2009), differentiated instruction is a teaching method used to meet the diverse needs of learners. Implementation of differentiated instruction provides instruction for individuals or groups of students to benefit both those who find mathematics concepts difficult and those who find it easy.

Research Design and Methodology

This AR study employed a mixed-method quantitative research design to examine the impact of motivation on academic achievement and learning outcomes in mathematics of class VI students.

Instrument

To ensure reliable results of the AR study, the research used an adapted survey questionnaire to collect data on student's motivation levels for academic performance. The questionnaire consists of nine items to measure effort, eight items for self-efficacy, and five items for worry. The 22 Likert type survey questionnaire with the three possible responses of often 3, to never 1 and midpoint of 2 as sometimes used in our study was adapted from relevant literature by O'Neil and Schacter's (1997). The adapted items were submitted to two subject experts for content validation and contextual applicability and proved to be valid for contextual implementation. The reliability of the instrument was established through a pilot test involving 30 participants from the focused class. The internal consistency (Cronbach alpha 0.89) for all the test items was obtained indicating the items were valid for implementation.

Data collection procedure

The survey questionnaire on the student's motivation level for learning mathematics was administered thrice (baseline, during the intervention and post-intervention) mainly to check the student's motivation level during the span of the study. Besides, the survey questionnaire, data on achievement tests in the subject content area was also obtained. The study also tried out a variety of reinforcement strategies and mathematical games as an intervention strategy to motivate students in learning. The AR study employed a combination of both documentation of participants' achievement test results and survey questionnaires.

Data analysis

The data obtained from the students' survey questionnaire and achievement test were analysed using descriptive statistics.

Results

Students' motivation level in learning mathematics

Table 1. shows the mean scores in all three domains of motivation in learning mathematics across the baseline, during an intervention, and post-intervention. The subtotal mean for motivation in baseline (M=1.86; SD=2.22, during intervention (M=2.31; SD=2.04) and post-intervention (M=2.53; SD=1.78). As shown in the table, the subtotal mean for

motivation in learning mathematics increased from 1.86 (baseline) to 2.53 (post-intervention). Thus, the students' motivation level in learning mathematics indicated to be high.

Table 1. Motivation level scores across baseline, during intervention and post-intervention

Motivation domains	N	Baseline		During Intervention		Post-intervention	
		Mean	SD	Mean	SD	Mean	SD
Effort	37	1.91	.82	2.18	.82	2.51	.56
Self-efficacy	37	1.67	.70	2.32	.62	2.67	.62
Worry	37	2.00	.70	2.43	.60	2.43	.60
Subtotal		1.86	2.22	2.31	2.04	2.53	1.78
Level		'M'		'H'		'H'	

Note- level of motivation: Low (L): 0-1, Medium (M) 1-2, High (H): 2-3

Comparison of achievement test result

Table 2 shows the students' test mean score of baseline, during an intervention, and post-intervention. The test score of the baseline (M=8.48; SD=4.19), during intervention (M=11.02; SD=4.46) and post-intervention (M=13.39; SD=3.88). The test mean score at each time of series was increased by 2.45 on average. The increase in the mean at each series of times indicates the achievement of student's learning outcomes in mathematics.

Table 2. Achievement test score

Time	N	Mean	SD
Baseline	37	8.48	4.19
During intervention	37	11.02	4.46
Post intervention	37	13.39	3.88

Relationship between motivation and student's achievement in mathematics test

Pearson correlation analysis was conducted to examine the relationship between the score of survey motivation domains and student's achievement test results of the post-intervention. As shown in the Table 3 the significant positive correlation is established, effort (.351) with the significant level ($p < .05$), self-efficacy (.688), worry (.868) and overall motivation level (.868) with the significant value ($p < .01$).

Table 3: Correlations on motivation domains and student's achievement test in mathematics

Motivation domains	Achievement test
	Correlational Index
Effort	.351*
Self-efficacy	.688**
Worry	.868**
Overall motivation level	.868**

*. Correlation is significant at the 0.05 level (2-tailed).

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

Discussion

This AR had two main findings. Firstly, the overall students' motivation level towards learning mathematics was found to be high as indicated by the increase in their motivation domains: efforts, self-efficacy, and worry. The probable reason attributed to the increase in the students' motivation level in learning mathematics could be of having intervention strategies strongly incorporated with reinforcement aspects such as games, reinforcements, encouraging and constructive written feedbacks, and teaching the subject with real-life application. This finding was consistent with the finding of the study by Newcomer (2009) who concluded that having good strategies of reinforcement can attract attention and boost the motivation of students in learning mathematics. With the use of reinforcement in the intervention strategies, the finding also agrees with the finding by Lach and Sakshuag (2005) who established that students were more motivated and more involved when learning could take place through game playing. Farren (2008) also added to this by reporting that several students who received instruction including how math related to the real world became more interested and motivated in math even though it was not one of their favourite subjects.

The other plausible reason attributed to the rise in the student's overall motivation level could be due to the techniques used by the teachers in the lesson other than just reinforcements. Other techniques such as giving students reasons to be motivated, telling students exactly what teacher wants to accomplish, having students set short term goals, use spoken and written praises, use tests and grades judiciously, capitalize on the arousal of suspense, discovery, curiosity, exploration, control, and fantasy, occasionally do the unexpected, whet the appetite, use familiar materials for examples, use unique and unexpected contexts when applying concepts and principles, make students use what they have previously learned, minimizing the attractiveness of competing motivational system and minimize any unpleasant consequences of student involvement.

Secondly, this AR study revealed the increase in the student's academic scores and learning outcomes in mathematics with the increasing student's motivation level in learning mathematics. This finding agrees with the finding by Froiland et al. (2012) who found that motivation can energize the children to invest the effort and utilize the strategies necessary to be successful in learning mathematics. Similarly, studies by Gelman and Greeno (1989), Hannula, (2006), Middleton and Spanias (1999) have also concluded that student motivation plays a key role in achieving the student's academic scores and learning outcomes in mathematics.

The other plausible reason to account for such an increase in the student's academic scores could be the enjoyable and supportive learning environment created by the teacher and with clear instructions provided, these might have perhaps assisted and motivated the student who lacked the motivation to excel at par with the other better-performing students. As such learning environment comforts the students in psychological wellbeing and increases the level of motivation in learning (Slavin, 1995). Moreover, planned instructions can make reinforcements clear and effective (Skinner, 1968).

Besides the two main findings of this AR, it has also established a significant positive correlation between the scores of the student's overall motivation level and the student's achievement test scores. The students who achieved higher academic scores and

learning outcomes obtained higher overall scores for motivation. This correlational finding supports the findings of Middleton and Spanias (1999) whose study also concluded that success in mathematics is a powerful influence on the student motivation to achieve.

Recommendations

The finding of this AR has revealed that overall students' motivation level in learning mathematics was found to be high in the post-intervention as compared to the baseline. The gain in the motivation level for learning mathematics was indicated by the motivation domain, efforts, self-efficacy, and worry. The raise in these domains were due to the intervention strategies firmly incorporated with reinforcement aspects in it. Therefore, mathematics teachers and teachers, in general, are encouraged to use the teaching strategy strongly incorporated with reinforcement aspects to raise the students' motivation level in learning mathematics and other subjects.

The finding of this AR revealed a significant positive correlation between students' overall motivation level and academic scores in mathematics. This positive correlation has the potential to inform and break the belief trait of our students and parents considering mathematics as a tough or boring subject. Moreover, it has also the potential to raise the overall level of Bhutanese students' attitude towards mathematics from medium (Drukpa, 2015) to exhibit a positive and high level of attitude towards mathematics. Therefore, mathematics teachers are recommended to motivate their students in the process of teaching and learning mathematics. This will ensure an increase in the student's academic achievement and learning outcomes in mathematics.

Limitations

The finding of the AR did not stress the variance of motivation domain rather the analysis based on the scores of overall scores of the three domains of motivation. It would be interesting if future research could examine the correlational study on each domain with the academic achievement of the students.

The findings of this AR are limited to only the class VI students of the focus school. Generalizing the findings to the rest of the students in the schools of Bhutan might not be appropriate. In the future, the study could be conducted to investigate the impacts of motivation on strands of English and other subjects like STEM subjects to expand the findings and its generalizability.

Conclusion

This AR examined the effects of students' motivation in achieving learning outcomes in mathematic. This AR revealed that the overall student's motivation level towards learning mathematics was found to be increasing with reinforcements being incorporated in the intervention strategies efforts. As established in the study, a significant positive correlation between the scores of survey motivation level and academic scores of the students has positive effects on achieving the students' academic scores and learning outcomes in mathematics subsequently. Therefore, a motivating classroom environment helps students' psychological wellbeing, thus increasing the student's academic achievement and learning outcomes in mathematics.

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3.4. The effects of the use of audio-visual materials in the classroom on students' learning score in science

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Abstract

This experimental study was conducted in one of the central schools in Pema Gatshel to pilot the effectiveness of the use of audio-visual materials in improving learners' achievement scores in science. The study adopted a one-group pre-test post-test quasi-experimental design. The findings, in general, indicated that there was a statistically significant increase in the mean marks of Physics and Chemistry when audio-visual materials are used to complement the traditional teaching. The study, however, also found that the use of audio-visual materials in teaching Biology did not have any effect on learner's achievement scores. The overall result from the study indicated that schools should have audio-visual facilities to complement traditional teaching to make the teaching-learning process interactive and improve learners' achievement scores.

Introduction

The performance of Bhutanese middle secondary students in science across the nation has not been as expected. Records of examinations reveal that the science mean mark for Bhutan Certificate of Secondary Education (BCSE) in the last five years has gone as low as 45 (Bhutan Council for School Examinations and Assessment (BCSEA), 2014; BCSEA, 2015; BCSEA, 2016; BCSEA, 2017; BCSEA, 2018). The highest recorded mean ($M=52.49$) in BCSE science was in 2013 (BCSEA, 2014). Science, according to Quarcoo-Nelson et al. (2012), is regarded as the bedrock of modern-day technology. Poor performance in science not only affects the fulfilment of the Education Ministry's vision to provide quality education and foster 21st-century skills of innovation, creativity, enterprise, and universal human values of peace and harmony (Ministry of Education, 2014), but also the nation's economy. It has become a matter of concern for the nation and the King as the Royal address during the 3rd Convocation of the Royal University of Bhutan (2009) declared,

"... in all the countries where progress has been strong in the areas we strive to develop, the strength of the education system has been in Math and Science. In fact, in India, the favourite subject for most students in Mathematics. In Bhutan, Mathematics is one of our main weaknesses— most students do not like Math, and the majority score less than 50%. We have similar weaknesses in Science ..."

This conveys a crystal message that it is time now to ask ourselves – is our education system doing good enough?

The Ministry of Education in recent years has been investing a huge portion of its financial resource to equip in-service teachers with 'Transformative Pedagogy' and 'English for Effective Communication' to improve the curriculum delivery practices. However, not much has been done to improve the curriculum delivery tools in schools as traditional classroom

set-ups are still prevalent in schools. In such a classroom, blackboard and chalk are the commonest visual aids (Shabiralyani et al., 2015), and teachers a mere source of audio. Researches have claimed that a lack of tools to engage and promote interactive classes demotivate teachers (Wangdi, 2016). Above all, the learners of today's world are digital natives (Idris, 2015) and provisions of audio-visual materials by teachers create an accepting learning environment, which stimulates effective learning.

To teach scientific concepts is normally difficult in a classroom that consists of learners of both fast and slow learning abilities. The traditional method of teaching makes it worse by causing misconceptions in the learners (Ashaver & Igyuve, 2013). To address this problem, many schools are already investing resources to equip the classrooms with audio-visual facilities. Many studies have reported the potential benefits of the use of audio-visual materials in the teaching-learning process. In the study done by Quarcoo-Nelson et al. (2012), they observed higher learning outcomes in terms of achievement scores when appropriate audio-visual aids are integrated into the curriculum to complement the traditional method of teaching. The use of audio-visual aids in the classroom teaching is also found to be effective in teaching scientific ideas and concepts (Ouellette, 2004) and improving the performance of students with special needs and slow learning abilities (Osokoya, 2007). Also, the use of audio-visual aids in the teaching and learning process provokes the interest of learners (Shabiralyani et al., 2015) and increase retention. Despite the enormous benefits of audio-visual materials in teaching and learning, there is a paucity of information about its use in the Bhutanese context. Therefore, this study attempted to pilot the use of audio-visual materials in the teaching of science and investigate their effectiveness in improving the learners' achievement scores in science. The objective of the study can be expressed in the following questions:

1. Do using audio-visual materials in teaching improve learners' achievement scores in science?
2. What type of audio-visual materials should be used in teaching science?

According to the above research questions, the hypothesis of this study was developed as 'use of audio-visual materials in the classroom does improve the learners' achievement score in science'. The negative counterpart of this hypothesis was the null one.

Methodology

Design

This study used a one-group pre-test-post-test quasi-experimental design (Edmonds & Kennedy, 2017) (Figure 1) to pilot the effectiveness of the use of audio-visual materials in the classroom on learners' achievement score in science.

Group	Pre-test	Treatment	Post-test
1	O1	Audio-visual aided lessons	O2

Figure 1. Pre-test and Post-test Design (One-Group)

Participants

Thirty-two grade nine students from one of the central schools in Pema Gatschel were selected to participate in the study using Edmonds & Kennedy's (2017) non-probabilistic purposive sampling. In this sampling, the researcher selects the participants based on previous knowledge of the population and the specific research purpose using personal judgment in selecting the sample (Fraenkel et al., 2012). The selection of participants was done using their midterm examination scores in science. Those whose scores were less than 50 out of 100 were selected to participate in the study.

Instrument

The instruments used in this study were subject achievement tests designed by the respective subject teachers. Each subject achievement test used in the pre-test and post-test consisted of ten items and they were rated out of ten. The instrument was checked by three avid researchers for face and content validity.

Procedure

During the first round of teaching, lessons in science - Physics, Chemistry, and Biology, were taught using traditional teaching-learning materials such as chalk and chalkboard, charts, diagrams, and giving short notes. Then the pre-test was administered separately for each subject. After the pre-test, the lessons were taught using audio-visual materials to complement the traditional teaching method. The students received this treatment for ten sessions, each of which lasted approximately 50 minutes. The audio-visual materials used during the treatment consisted of animated videos and PowerPoint presentations. Following the end of the treatment Programme, the post-test was administered separately for each subject.

Data analysis

To determine if the use of audio-visual materials improves learners' achievement scores in science, paired-samples *t*-test was performed including effect-size calculation following Edmonds & Kennedy's (2017) guidelines. Before conducting the analysis, the assumption of normally distributed difference scores was examined. Data from students who were absent during either pre-test or post-test were not included in the analysis.

Result

To test the hypothesis that the use of audio-visual materials in the classroom does improve the learners' achievement score in science, a dependent samples *t*-test was performed. Before conducting the analysis, the assumption of normally distributed difference scores was examined. The assumption was considered satisfied for all the three subjects – Physics, Chemistry, and Biology. The skewness and kurtosis levels for all subjects were less than 2 and 7, respectively, which are the maximum allowable values for a *t*-test (West et al., 1996). Further, the Shapiro-Wilk test ($p > .05$) for all subjects (Table 1) and visual inspection of their histograms, normal Q-Q plots, and box plots confirmed that the difference scores were approximately normally distributed (Meyers et al., 2013).

Table 1. Test of normality for Physics, Chemistry, and Biology Shapiro-Wilk

	Statistic	df	Sig.
Physics	.975	34	.605
Chemistry	.929	36	.075
Biology	.977	30	.745

The results showed that the post-test mean ($M=7.245$; $SD=3.37$) for Physics and ($M=8.23$; $SD=3.18$) for Chemistry was statistically significantly higher than the pre-test mean ($M=3.02$; $SD=3.74$) for Physics (Table 4) and ($M=3.73$; $SD=4.46$) for Chemistry (Table 4).

Table 2. Descriptive statistics of the pre- and post-test result for Physics

	Mean	N	SD	S.E. Mean
Post-test	7.25	32	3.37	.594
Pre-test	3.01	32	3.74	.661

Table 3. Descriptive statistics of the pre- and post-test result for Chemistry

	Mean	N	SD	S.E. Mean
Post-test	8.23	26	3.18	.623
Pre-test	3.73	26	4.46	.874

The mean difference was 4.23 and 4.50 for Physics and Chemistry, respectively. Cohen's d was estimated at 1.41 for Physics and 1.09 for Chemistry, which is > 0.8 and is a large effect (Cohen, 1992). Thus, the null hypothesis of use of audio-visual materials does not improve student's achievement score in science was rejected as $t(31) = 7.959$, $p < 0.001$ for Physics (Table 4) and $t(25) = 5.590$, $p < 0.001$ for Chemistry (Table 5).

Table 4. Dependent t-test result for Physics

	Mean	SD	SE Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Post-test-Pre-test	4.23	3.00	.531	3.143	5.309	7.959	31	.000

Table 5. Dependent t-test result for Chemistry

	Mean	SD	SE Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Post-test-Pre-test	4.50	4.11	.805	2.842	6.158	5.590	25	.000

Table 6. Descriptive statistics of the pre- and post-test result for Biology

	Mean	N	SD	S.E. Mean
Post-test	5.33	30	3.23	.590
Pre-test	5.97	30	3.15	.574

However, there was no statistically significant difference between the mean of post-test ($M=5.33$; $SD=3.23$) and the pre-test ($M=5.97$; $SD=3.15$) for Biology (Table 6) and therefore, the null hypothesis was accepted in this case as $t(29) = -1.219$, $p = .233$ (Table 7).

Table 7. Dependent t-test result for Biology

	Mean	SD	SE Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Post-test-Pre-test	-.633	2.85	.520	-1.696	.430	-1.219	29	.233

Discussions and conclusion

Do using audio-visual materials improve learners' achievement scores in science?

The result revealed that the use of audio-visual materials has significantly improved learners' achievement scores in Physics and Chemistry. There was a significant increase in the post-test mean ($M=7.245$; $SD=3.37$) for Physics and ($M=8.23$; $SD=3.18$) for Chemistry as compared to the pre-test mean ($M=3.02$; $SD=3.74$) and ($M=3.73$; $SD=4.46$) for Physics and Chemistry, respectively. Cohen's $d > 0.8$ for both Physics and Chemistry indicated that the use of audio-visual materials in teaching has largely increased the mean of students' achievement scores. This is because the incorporation of audio-visual materials in curriculum delivery enhances the engagement of student's visual sense organs, which contributes towards 83% in learning (Xin, 2017). According to Dale (1996) and Fillmore (as cited in Quarcoo- Nelson et al., 2012), teaching should be carried out in a way that learners use their visual and auditory sense organs as 85% of their learning is absorbed through these senses. Also, the use of audio-visual resources by the teachers

creates a unique learning situation in which students can learn effectively as their natural reactions are driven towards the provided materials (Katherine, 2009). Thus, the use of audio-visual materials enhances the provocation of learners' interest in the subjects and helps teachers to explain scientific concepts easily (Shabiralyani et al., 2015).

It is an undeniable truth that a classroom consists of students with both fast and slow learning abilities. The use of audio-visual materials is effective in teaching ideas and concepts (Ouellette, 2004) and it can improve the performance of students with special needs and slow learning abilities (Osokoya, 2007).

Nevertheless, the result showed just the opposite effect in Biology in comparison to Physics and Chemistry. There was no statistically significant difference ($p=.223$) between the post-test and pre-test means. This has occurred because the post-test could not be administered immediately after the second round of teaching with audio-visual materials due to inevitable circumstances. Another attribute of this cause was the vastness in the content as pre-test and post-test were administered on different topics.

What type of audio-visual materials should be used in teaching science?

According to Tairu (as cited in Bello & Goni, 2016), audio-visual materials in the teaching and learning process can be categorised into audio, visual, and audio-visual materials. The use of any one of them substantially enhances the learning ability of the students, develops higher motivation to learn science and better ability to explain the scientific concepts (Barak et al., 2011). For instance, the use of animated cartoons has significantly increased students' knowledge and understanding of specific science concepts (Dalacosta et al., 2009). For this study, teachers mainly used animated videos on relevant topics and PowerPoint presentations for displaying pictures and illustrations. In conclusion, this study does not specify the type of audio-visual materials to be used in teaching. Teachers can choose them for their subjects based on needs and availability. However, it should be noted that audio-visual materials borrowed or downloaded from other sources should be edited and made free of extraneous information. Making use of content-specific audio-visual materials not only enhances learning outcomes but also lessens the weaknesses of verbalism (Ashaver & Igyuve, 2013). This is to say that a teacher's language and communication barrier in teaching can be overcome by the use of audio-visual resources in teaching.

Limitations and implications for further research

This study was carried out on a small scale and used a limited population. Therefore, its finding cannot be used to generalise the effect of the use of audio-visual materials in teaching science in a larger scale. Given the findings presented in this paper, it opens the way for further research. Therefore, the following areas of further research are suggested to permit greater confidence in results:

1. replication of the study with subjects other than ones employed in this study;
2. replication of the study with different grade levels;
3. replication of the study with samples from different schools.

Recommendations

Based on the findings of the study, the following recommendations are made to ease the implementation of audio-visual aided lessons.

1. Schools should have a separate audio-visual room so that teachers would not have to carry equipment as they walk into the class.
2. Teachers should be given hands-on training to use the latest equipment rightly and safely.
3. Develop audio-visual lesson packages in concordance with the curriculum to curtail the lesson preparation time for teachers.

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3.5. How do I Instil the Sense of Innovation and Entrepreneurship Skills in the Minds of Students?

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Abstract

The action research carried out at Thragom Lower Secondary School is intended to provide an overview of innovation and entrepreneurship skills in students by enhancing entrepreneurship and vocational skills in the minds of the students. Interventions implemented to boost innovation in the students included providing catalogue and articles to students and teachers on unemployment issues in Bhutan, giving a talk on the importance of innovation and entrepreneurship skills to students, encouraging students to learn by doing and organizing an exhibition in the school. Data were collected and interventions were applied to sixty-five students of Classes VII and VIII and ten teachers. The findings and reactions from the respondents, in general, were positive.

Introduction

Bhutan is a small country with a population of only 7, 74,870 (NSB, 2016). However, like many other countries around the world, Bhutan also faces problems and challenges. Youth unemployment is one of the serious and growing concerns. The number of unemployed graduates is increasing every year.

The prime aim of the tertiary education in Bhutan is to fulfil the human resource requirements in the civil service sector. However, the Royal Civil Service Commission of Bhutan has adopted the principle of small, compact and, efficient civil service structure. This has resulted in much lesser absorption of graduates in government jobs and this means that majority of our graduates need to be taking non-government jobs (National HRD Advisor Series, 2014: Ministry of Labour & Human Resources).

The country's economic development and growth can be achieved through innovation and entrepreneurship skills in the Bhutanese youth and this can be done in every school. Students should not only be educated to get a decent job in the future but they should also be educated to invent and create a job by themselves. The country's rapid growth of unemployment can be solved by instilling a sense of innovation and entrepreneurship skills in the young students of the country.

This research intends to instil a sense of innovation and entrepreneurship skills in students through the integration of various methods and strategies. This indeed will help to reduce the unemployment rate in the future.

Aims and objectives

The broad idea of conducting this study is to help educators and stakeholders to:

- instil a sense of innovation and entrepreneurship skills in the minds of the students;
- make students aware of the current youth unemployment scenario;
- encourage innovation in education;

- equip students to overcome the unemployment challenges;
- acquaint the importance of entrepreneurship skills.

Reconnaissance

Situational analysis

Until the introduction of modern education in the 1950s - the only form of formal education available in Bhutan was monastic education. While monastic education continues to be an important part of the national culture, western education has been promoted and expanded since the inception of the First Five Year Plan in 1961 to address the basic educational needs, and develop human resources required for the socio-economic development of the country. Within four decades, the government has been able to expand the modern education system from about 11 schools before the First Five Year Plan in 1961 to 447 schools and institutes in 2004, spanning from community primary schools to tertiary institutes.

The objectives of the primary education in Bhutan are not only to equip the students with basic literacy and numeracy skills but also to impart knowledge of the country's history, geography, and traditions. Also, functional skills such as fundamentals of agriculture, health and hygiene, and population education have been incorporated in the primary school curriculum. Over the years, value education is also being given special attention to the educational Programme. All of these are being provided within the framework of the new system of activity-based learning, which has been adopted uniformly across the country.

Educational practices of Thragom Lower Secondary School

Thragom Lower Secondary School was formally established as a primary school in 1963. It was temporarily closed in 1971 and reopened as Thragom Primary School in 1990. It was then upgraded to lower secondary school in 2011 with boarding facilities. Thragom is 49 km from Trashiyangtse Dzongkhag Administration. There are 134 students, 12 teachers, eight non-teaching staff, and eight support staff. Students from different villages and three feeder schools come to study in Thragom LSS after completing class III and VI.

Students of the school are not aware of unemployment issues in the country. Students think that they are educated to get a job in the future and are not aware of the rapid growth of unemployment. Some teachers are also not aware of the importance of entrepreneurship education for students. This research study looks forward to instilling innovation and entrepreneurship skills in the students of the school.

Competence

All the researchers are keen to research the problems faced by the students and the youth in the country. The team members are B.Ed graduates from Samtse College of Education who are currently teachers in Thragom Lower Secondary School. The team studied Educational Research Module in the College and researched during the teaching practice session. In the previous year, the same team completed an action research related to classroom issues faced by the students in the school.

Literature review

Different scholars and educationists have forwarded multi-concepts of entrepreneurship and vocational education and all of them are different from each other (Lautenschlager & Haase, 2011). Johansen and Schanke (2012) studied different forms of entrepreneurship and vocational education existing in the education system of Norway. In the beginning, he argued that entrepreneurship is one of the topics in the subjects like social studies, later he concluded that entrepreneurship education was a subject being offered in many other subjects in the higher secondary schools. Thus, to enhance analytical thinking, stimulate creativity, reflection, increasing the abilities of self-business and its management ideas were proposed.

Encouraging entrepreneurship is particularly important to face challenges related to the alarming youth unemployment rate in Bhutan. Entrepreneurship and self-employment offer pathways for young people to emerge from unemployment. Entrepreneurship education plays a crucial role in the development of entrepreneurs and the enhancement of entrepreneurial activities in every economy. The outcome of this study will enable a deeper understanding of entrepreneurship and vocational skills.

What one means when one discusses entrepreneurship in education differs significantly. Some mean that students should be encouraged to start up their own company. This leans on rather a narrow definition of entrepreneurship viewed as starting a business. Others define that it is not at all about starting new organizations, instead, it is about making students more creative, opportunity oriented, proactive, and innovative, adhering to a wide definition of entrepreneurship relevant to all walks of life. This report takes the stance that a common denominator between the differing approaches is that - all students can and should train their ability and willingness to create value for other people. This is at the core of entrepreneurship and is also a competence that all citizens increasingly need to have in today's society, regardless of career choice. Creating new organizations is then viewed as one of the many different means of creating value (Lackeus, 2015).

Entrepreneurship means focusing more broadly on personal development, mindset, skills, and abilities, whereas the term entrepreneurship education has been defined to focus more on the specific context of setting up a venture and becoming self-employed (QAA, 2012; Mahieu, 2006). Youth in Bhutan should be encouraged to take up innovation and entrepreneurship skills for their better career options in the future. Building innovation and entrepreneurship skill help to develop one of the pillars of Gross National Happiness i.e. sustainable development in the country.

Rob Chernow, Senior Vice President of Entrepreneurship, The Ewing Marion Kauffman Foundation said, "While the key concepts of entrepreneurship can be taught at any time in a person's life, the attitudes and values associated with becoming a successful entrepreneur are more likely to develop if they are explored and nurtured at a young age. Teaching children about entrepreneurship offers a career path, but more importantly, students learn of the economic and social benefits that entrepreneurs provide to their families, to their communities, and their country." Educators in elementary schools and high schools are very isolated, so the first thing to do is talk about the ways the world has changed. Teachers are so passionate about preparing their young people, but unfortunately, it is in the way they were prepared. They think that if kids get a degree they

will be prepared for the world. Getting a degree is not only the way they should be prepared. They must be prepared for a better career path.

Formal qualifications do not always help young people when it comes to solving problems, rising to challenges, assessing opportunities, or taking risks. Even managing a small project can be a real achievement for someone who has never before faced such a challenge. And opportunities for networking can open the eyes of young people who lack a wide range of contacts or the possibility to compare their situation with others (Vassiliou, 2013, p. 4).

Since entrepreneurship education is about developing the ability to act in an entrepreneurial manner, attitude and behaviours are perhaps more important than knowledge about how to run a business. In short, entrepreneurship education means developing a culture which is through, for, and about entrepreneurship. Such competencies are best acquired through people-led inquiry and discovery that enable students to turn ideas into action. They are difficult to teach through traditional teaching and learning practices in which the learner tends to be a more or less passive recipient. They require active, learner-centred pedagogies, and learning activities that use practical learning opportunities from the real world. Furthermore, since entrepreneurship education is a transversal competence it should be available to all students and be taught as a theme rather than as a separate subject at all stages and levels of education (European Union, 2011).

Entrepreneurship, at its root, is about creating value. At its best, it is about creating value for other people, as well as for the entrepreneur. It is about creative problem solving; about spotting new opportunities; about successfully navigating shifting sands; and about getting things done. Entrepreneurship involves many of the skills our young people and our world will need in the coming years (Richard & Richardson, 2017). So, should instilling a sense of innovation and entrepreneurship skills in Bhutanese youth become a central part of our children's education? Should teachers in Bhutan educate students for an alternative career in the future?

Action research question

How do I instil a sense of innovation and entrepreneurship skills in the minds of students?

Methodology

Since this research was on "How do I instil the sense of innovation and entrepreneurship skills in the minds of students?" students participating in the study were from Classes VII and VIII. Data was gathered by asking questions and recording their views about entrepreneurship.

Central question

What are the students' attitudes towards innovation and entrepreneurship skills in school?

Sub questions

1. How does instilling innovation and entrepreneurship education help career development?
2. Why is entrepreneurship education necessary for the students?

3. What are the ways to instil innovation and entrepreneurship skills in schools?
4. How can innovation and entrepreneurship education help reduce Bhutan's unemployment rate?

Method of data collection

The data for this action research was collected in three forms:

- Open-ended surveys;
- Interview; and
- Visual analysis.

The open-ended survey was conducted with students of Classes VII and VIII and a few teachers. Students' participation in the survey was voluntary and they were told that their participation in the study will not affect their grades in any way. The survey was a paper survey that addresses the students' and teachers' knowledge of entrepreneurship education and the ways to instil innovation and entrepreneurship skills in students. The open-ended surveys addressed the following topics.

1. What is their current knowledge of entrepreneurship education in the school?
2. How do they feel about learning by doing?
3. How do they feel about starting their own business in the future?
4. What are the risks they have taken in life and the lesson taught?
5. What are their reasons for a person not getting a job after completing a degree?
6. How can they overcome these challenges in life?
7. What do they feel about vocational studies and business studies?

The interview was arranged with a group of students and teachers, the main purpose of the interview was to know their views on entrepreneurship education in schools and its importance. The interview addressed the following topics:

1. What does innovation and entrepreneurship skills mean?
2. How does instilling innovation and entrepreneurship education help in the career development of the students?
3. Why entrepreneurship education is necessary for the students?
4. What are the ways to instil innovation and entrepreneurship skills in students?
5. How can innovation and entrepreneurship education help to reduce Bhutan's unemployment rate?

The visual analysis is a qualitative research methodology that relies on the use of an artistic medium to produce and represent knowledge. In this research, the students came up with a short movie story based on how to deal with unemployment crises and the kind of things about entrepreneurship skills that students must remember so that they can cope with the problems in the future.

Interventions

To implement the findings, the following types of interventions were made available:

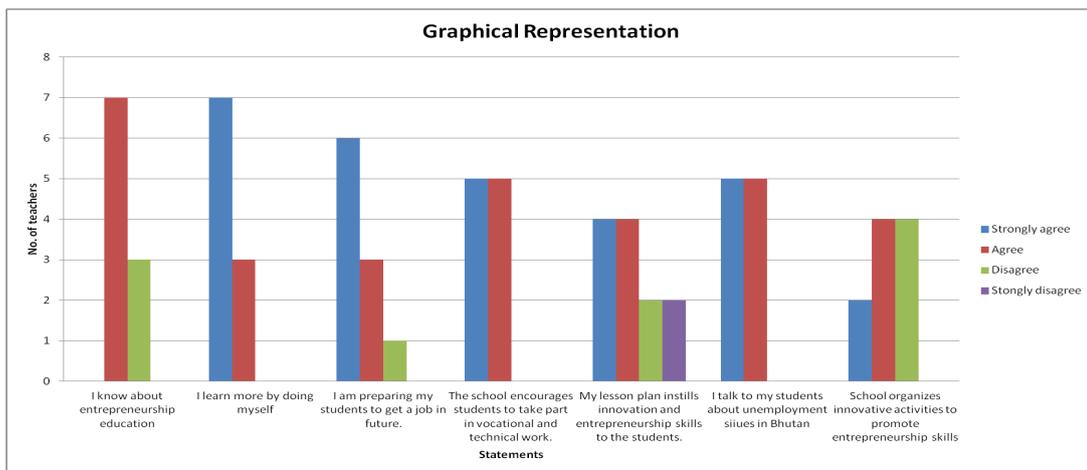
1. provided catalogue and articles to students and teachers on unemployment issues in Bhutan;
2. talked on the importance of innovation and entrepreneurship skills to students;

3. used video, audio, and movies to educate students on the importance of entrepreneurship;
4. encouraged students to learn by doing;
5. organized club activities, science or group exhibition in the school to boost innovation in young minds;
6. sought support from the school administration.

Data analysis

Interpretation and analysis of pre-data

Tool 1: Questionnaires (Teachers)



This survey was carried out in August 2018. There were 10 teacher respondents. The response to the survey indicates that many of them were aware of entrepreneurship education and they incorporated it in their lesson plans. But a few were still unaware of the entrepreneurship education. They were just preparing the students to get a job. However, it is important to keep some alternative options for the students in the future if they do not get a job. The graph shows that school encourages students to take part in vocational and technical works but the school needs to organize more innovative activities to promote entrepreneurship skills.

Interpretation and analysis of pre- and post-data

Tool 1: Questionnaires (Students)

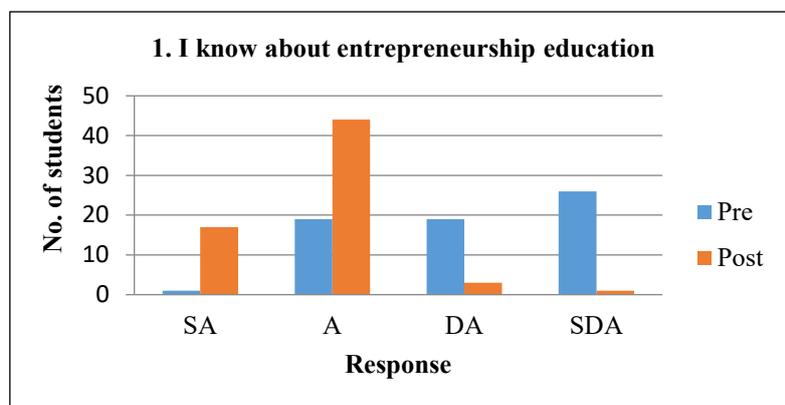


Figure 1: Knowledge about entrepreneurship education

The above figure indicates the number of students who agree and disagree about entrepreneurship education. In the pre-data, there were only 1 who strongly agrees about entrepreneurship education similarly 19 who agree and there are 19 students who disagree about entrepreneurship education. This means most of the Classes VII and VIII students of Thracom LSS were not sure about entrepreneurship education as seen from the baseline data. However, the post-data indicates there are a greater number of students who strongly agree and support entrepreneurship education.

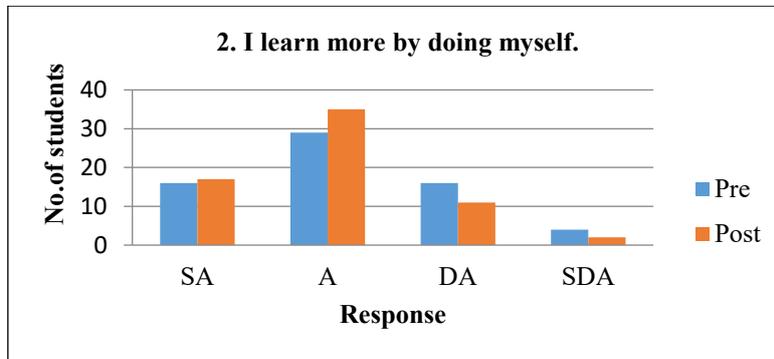


Figure 2: Learning themselves

The above graph shows that in the baseline data, around 16 students have strongly agreed, in post-data, there are a maximum number of students who strongly agree. Coming to the post- data maximum of the students agree about learning themselves. So, it shows that students learn more by doing things by themselves. In other words, students are aware of entrepreneurship education and have to give hands-on experience.

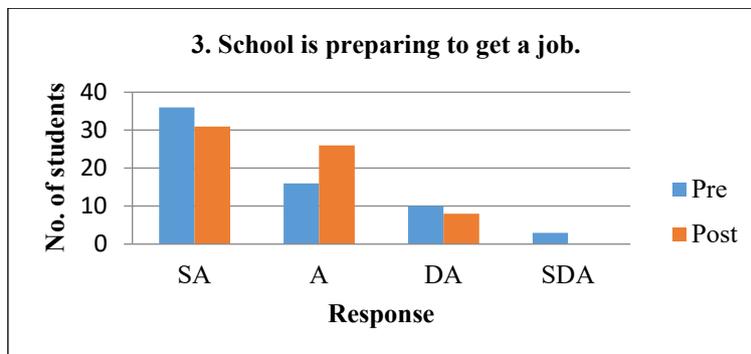


Figure 3: School preparing students to get a job

According to the baseline data, more students disagree on the statement that ‘School was preparing to get a job’, a few students tend to agree with the statement. However, in the post-data, the number of students who agree with the statement increases which indicates that the interventions have brought impacts on the students’ learning.

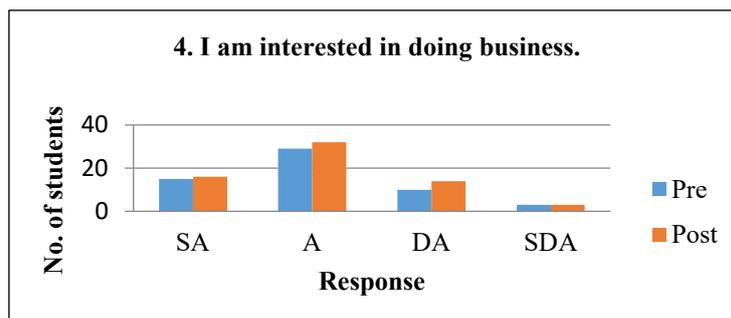


Figure 4: No. of students interested in doing business

The above graph shows the number of students who are interested in doing business. By looking at the baseline data and post-data, it shows a vast change in student's responses as in the baseline a smaller number of students strongly agreed but increased in the post-data. All these changes were brought about by the intervention the researchers employed.

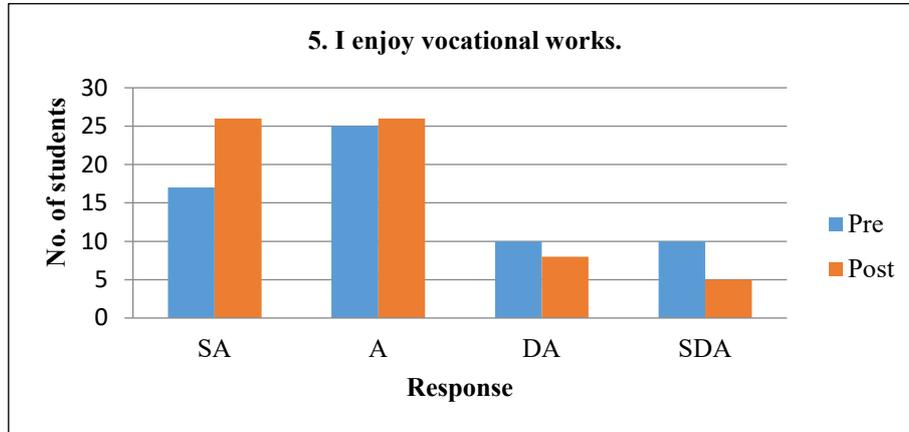


Figure 5: No. of students who doing vocational works

The above graph shows the number of students who enjoy doing vocational works. In the baseline data, more students strongly agreed with the statement whereas in post-data there is a change in student's response, where more students strongly agree with the statement. Therefore, it shows that for the first time, when students were given the work they were not interested in - they were more reluctant to participate in vocational education, but after the implementation of research interventions, they became more active in learning the vocational skills instructed to them.

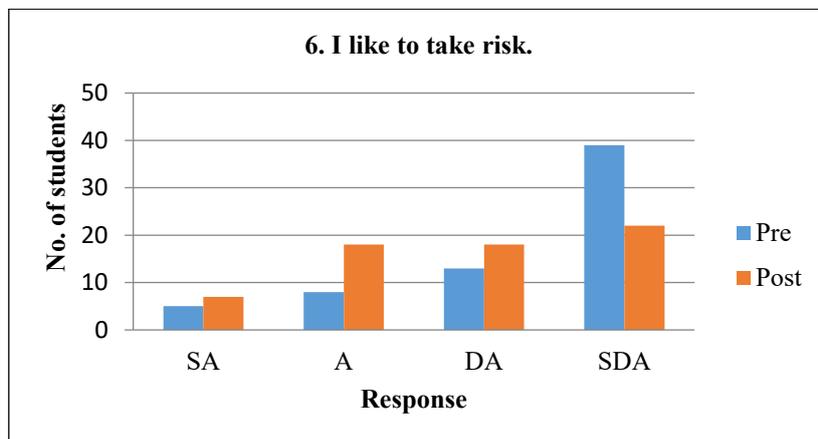


Figure 6: No. of students like risk-taking

The above graph shows the comparison between the baseline and post-data on the statement, 'I like to take risk'. It is seen from the graph that in the baseline data a greater number of students agreed whereas in the post-data there were lesser students who are with the statement. The change must have come from the interventions employed.

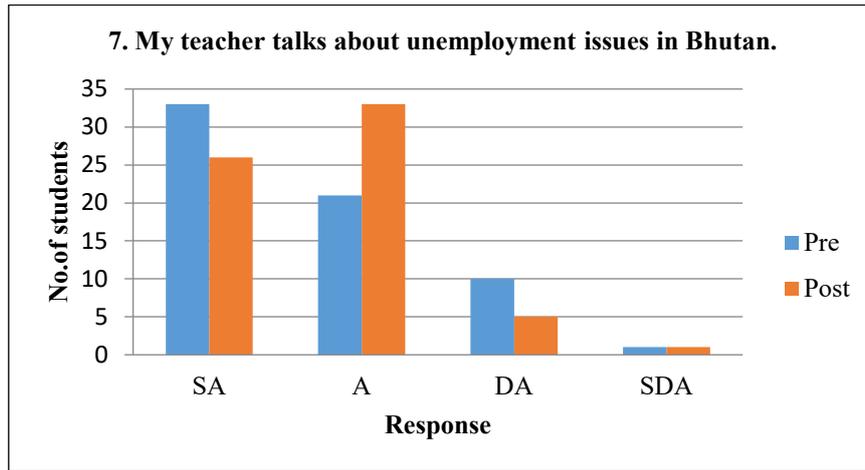


Figure 7: Teacher talking about unemployment issues

The above graph shows the data collected for the statement, “My teacher talks about unemployment issues in Bhutan”. Compared to the baseline data, most of the students strongly agree with the statement. This all happens because of the intervention researchers have employed.

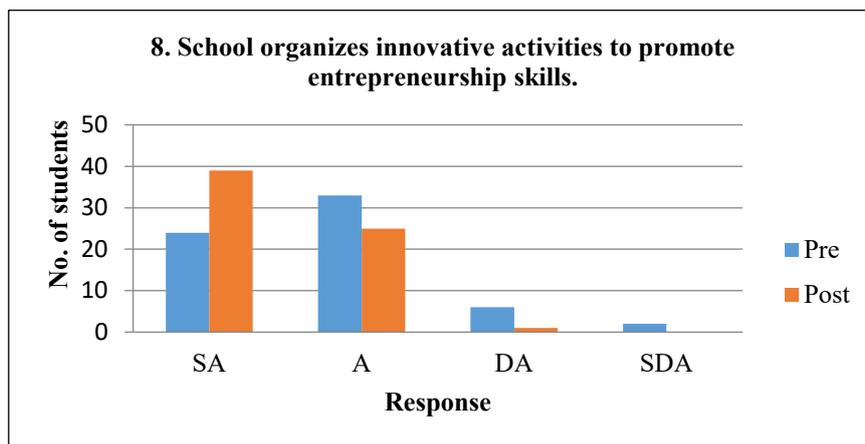


Figure 8: Innovative activities in school

The above graph shows the comparison between the baseline and post-data on the statement “School organizes innovative activities to promote entrepreneurship skills.” It can be seen from the graph that in the baseline data only 24 students strongly agreed but in the post-data, it increases to 39 students. The change has come from the intervention used such as science exhibition, where students were asked to come up with their models or project based on the entrepreneurship skills taught in vocational club and during other sessions.

Tool 2: Interview question (Pre-data)

- 1. Do you think entrepreneurship education is important for you? If so why or why not?**

The interview was carried out in August 2018. The focused group was class VII and class VIII students. There were 65 student respondents. All the students were aware of the importance of entrepreneurship education. From among the 65 students, 28 students think that entrepreneurship education is just for giving knowledge. Whereas 37 students think that entrepreneurship education creates employment opportunities for them in the future.

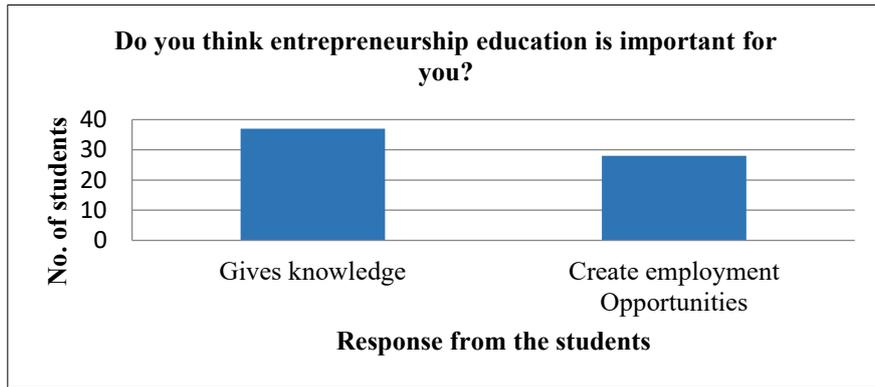


Figure 9: Importance of entrepreneurship education

2. What will you do if you do not get a job after completing your degree?

Out of 65 students, 22 students preferred to do farming if they did not get any jobs in the future. 11 students wanted to become shopkeepers, 8 were planning for weaving business, 3 students were keen to work on their carpentering and painting skills, 4 students preferred to become monks and a few were into other things like driving, playing football and doing labour work. Among the 65 students, 13 decided to stay home idle which is not a very good sign of improvement. They must do some work and earn a living.

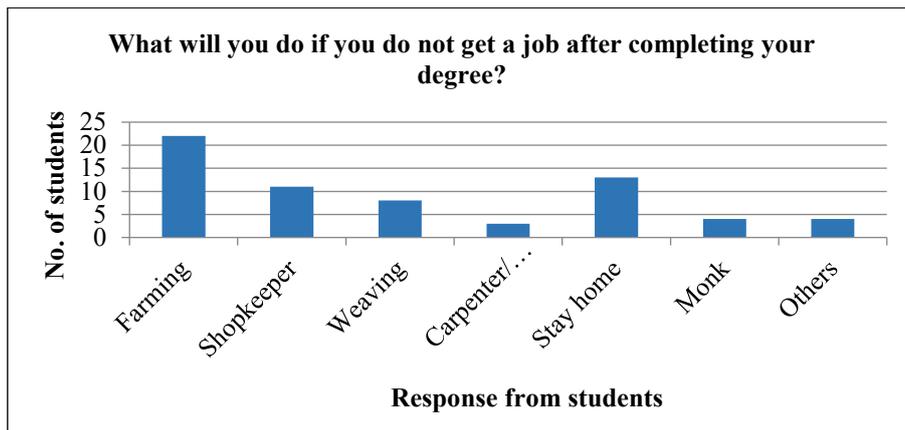


Figure 10: Job choices of students

3. Do you think taking risks is important in our life? Why?

Out of 65 students, 17 students were willing to take risks. They believe that risk-taking is the opportunity for a better future. If they take risks now it would help them in the future. But 48 students were not willing to take risks. They believe risk-taking is dangerous and it might affect or hurt them.

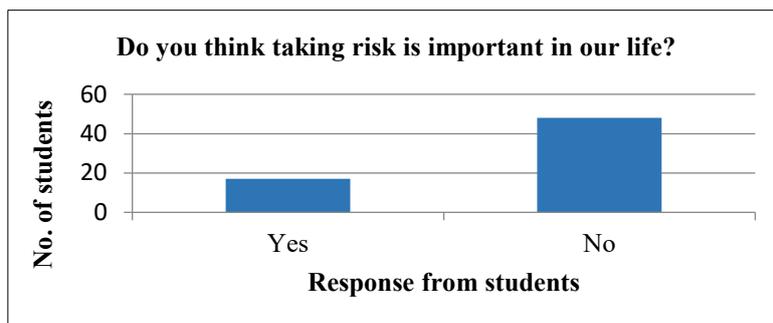


Figure 11: Risk-taking in life

4. What do they feel about vocational studies and business studies?

Out of 65 students, 12 students feel that vocational studies and business studies were mainly to provide job opportunities for them in the future. 24 students feel that vocational studies and business studies are there to give them the knowledge and teach them skills that might be helpful to them in the future. But, 29 students have no concrete idea of what they feel about vocational studies and business studies. They know about entrepreneurship education but are unable to give reasons for how they feel about vocational/technical studies and business studies. They lack the knowledge on it.

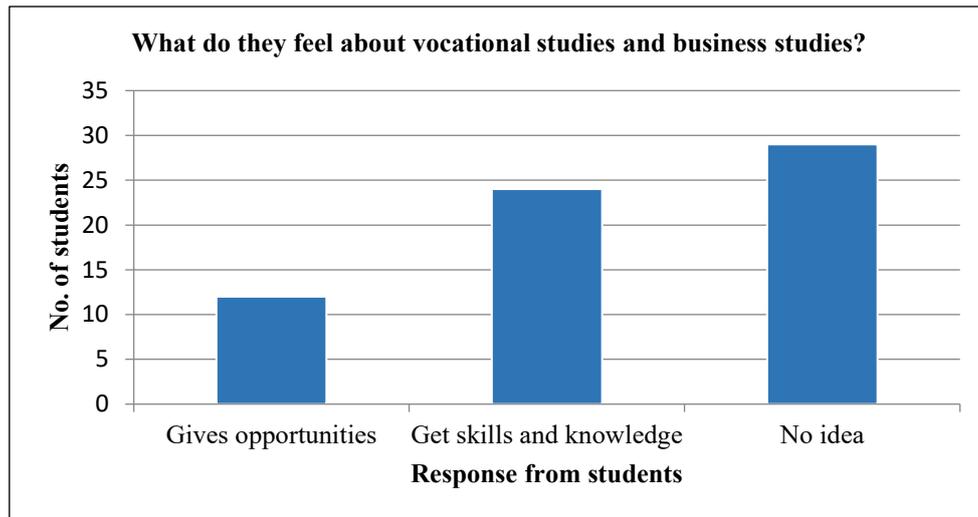


Figure 12: Student feeling about vocational & business studies

Intervention Strategies

After going through the pre-data, the team came to know that both students and teachers were little aware of entrepreneurship education but they lack the knowledge on the importance of it. Many students had no idea about the importance of vocational and business studies. They consider entrepreneurship education as less important in their life. Even teachers were educating students just to get a job. From that day onwards, the researchers decided to educate the students and teachers on the importance of entrepreneurship education. The talks on the importance of such skills were shared, provided catalogue and articles to students and teachers on unemployment issues in Bhutan, and encouraged students to learn by doing. The school organized an exhibition in the school to boost innovation in young minds. Students came up with different innovative ideas and the ideas were put into action.

Videos, audios, and movies were used to educate about the importance of entrepreneurship to students and encouraged students to come up with a video on the importance of vocational skills in their life. The video was shown to every student and teacher in the school. It helped the students to build innovative skills, motor skills, and personal development skills. The school administration provided full support to put the interventions into action.

Interpretation and analysis of post-data

Tool 2: Interview question (Post-data collection)

Tool 1: Questionnaires (Teachers)

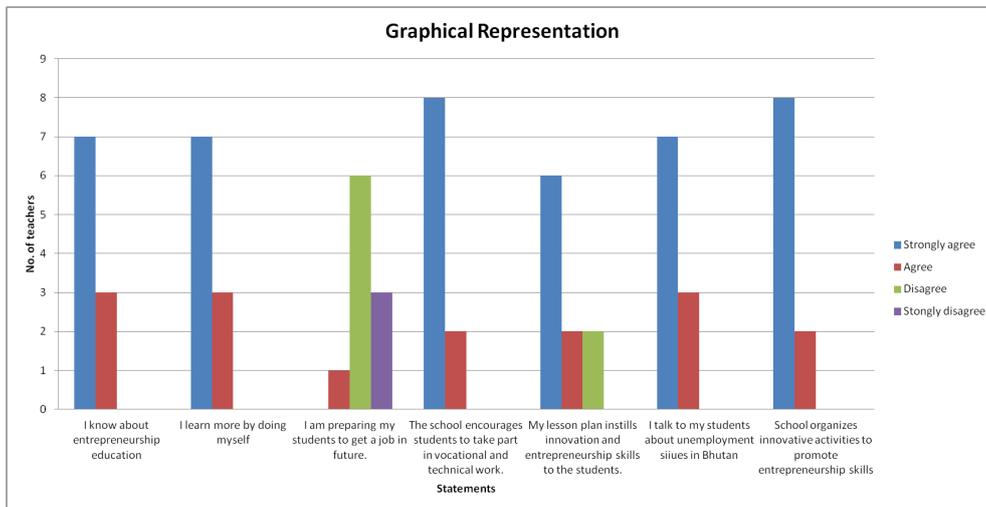


Figure 13

This survey was carried out in September 2018. There were 10 teacher respondents to the survey questionnaires. Unlike pre-data results, the post-data shows that all of the respondents are aware of entrepreneurship education and they incorporate it in their lesson plans. It was found that they were not just preparing the students to get a job but also creating a job and career alternative for the future. It is very important to keep some alternative options for the students for their future. The graph clearly shows that school organizes innovative activities to promote and encourages students to boost their vocational and technical skills.

Interview question (Post-data)

Do you think entrepreneurship education is important for you? If so why or why not?

The interview was carried out in September 2018. The focused group was classes VII and VIII students. There were 65 student respondents. All the students were aware of the importance of entrepreneurship education. 25 students thought that entrepreneurship education is for giving knowledge. 40 students thought that entrepreneurship education creates employment opportunities for them in the future.

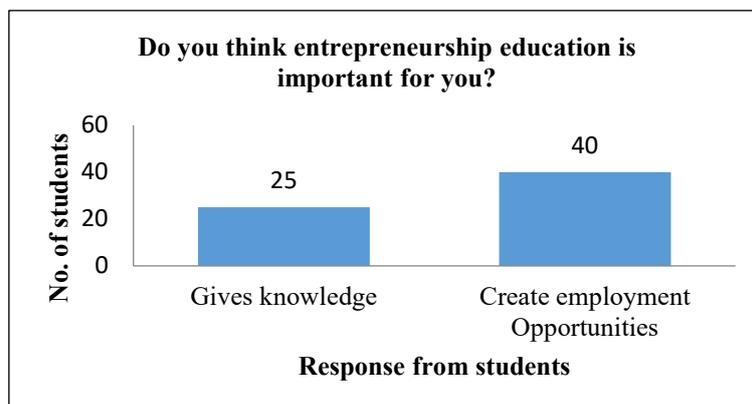
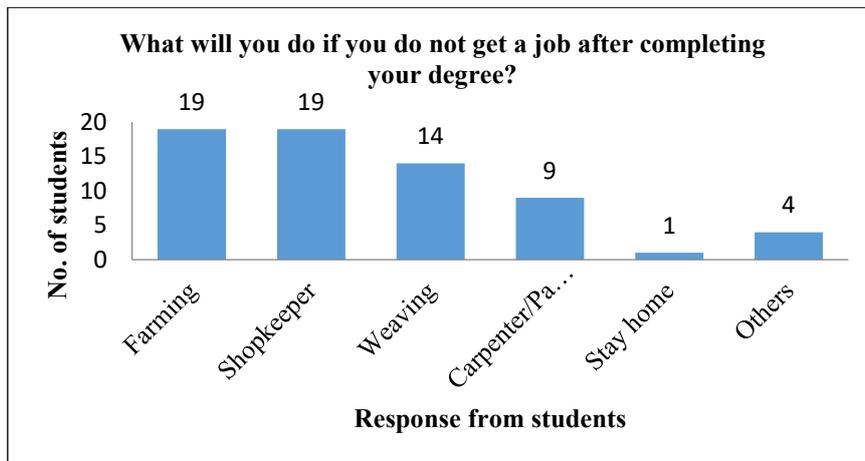


Figure 14: Importance of entrepreneurship education

Unlike in pre-data, students were now more aware of entrepreneurship education. They believe that it gives them the knowledge and also it creates opportunities for them in the future.

What will you do if you do not get a job after completing your degree?

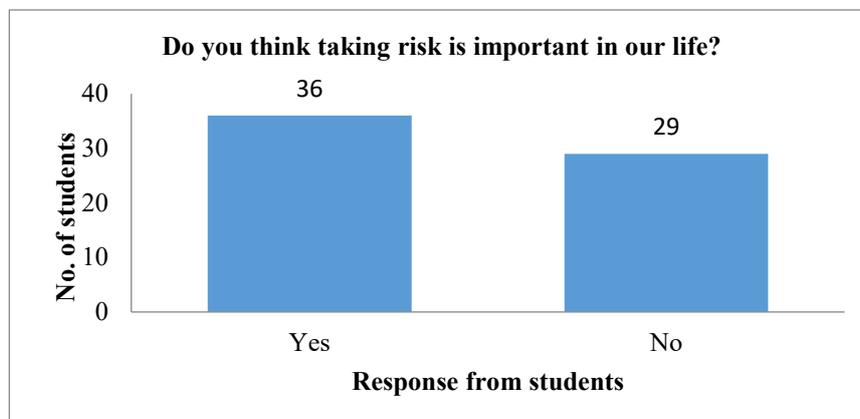
Out of 65 students, 19 students preferred to do farming if they did not get any jobs in the future. 19 students want to become shopkeepers, 14 of them were planning for weaving business, 9 students were very keen to work on their carpentering and painting skills, few were into other things like playing football. From 65 students, only 1 of them decided to stay home idle which is a good reduction compared to 13 of them in the pre-data collection.



From the graph, we can see that many students are keen to take up entrepreneurship and business studies. Every school needs to provide the right guidance to the students.

Do you think taking risks is important in our life? Why?

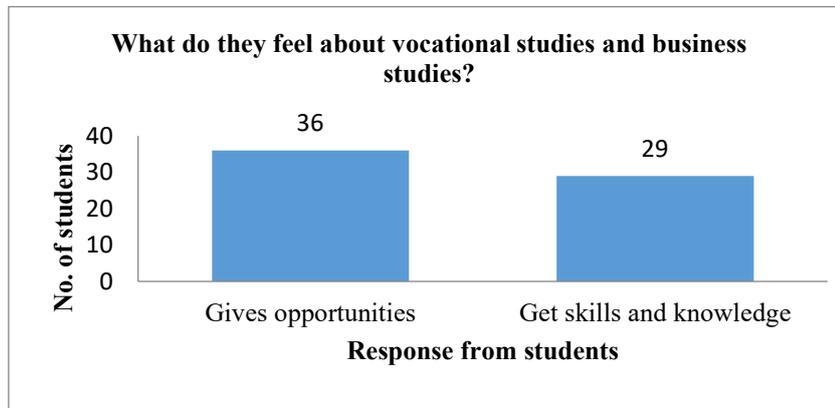
Out of 65 students, 36 students were willing to take risks. They believe that risk-taking is the opportunity for a better future. If they take risks now it would help them in the future and know that to do business one has to take risks. But 29 students were not willing to take risks. They believe that risk-taking is dangerous and it might affect or hurt them.



Every teacher needs to prepare their students for challenges they might face in the future. Students must learn to take challenges, risks, and know how to solve problems related to their life. Schools must have separate sessions for educating students on unemployment issues and opportunities in entrepreneurship education.

What do they feel about vocational studies and business studies?

Out of 65 students, 36 students say that vocational studies and business studies help to provide job opportunities and job alternatives for them in the future. 29 of them believe that vocational studies and business studies are to give them the knowledge and teach them skills that might be helpful to them in the future. Unlike in the pre-data, every student was aware of vocational studies and business studies. They were equipped with the basic knowledge on entrepreneurship education.



Teachers were passionate about preparing their young people, but unfortunately, they were unprepared. They think that if kids get a degree they will be prepared for the world. Getting a degree is not only the way they should be prepared. They must be prepared for a better career path. Educators in elementary schools and high schools are very isolated, so the first thing to do is talk about the ways the world has changed.

Tool 3: Visual analysis

Students came up with a short movie titled “*Nge ge rewa – The venture beyond books*” and screened to the students and teachers. The purpose of the movie was to educate students and teachers on the importance of entrepreneurship education, the advantage of technical and vocational skills, and the current scenario of youth unemployment issues in Bhutan.

The short movie helped students and teachers in many ways like:

1. students and teachers were aware of the importance and advantage of entrepreneurship education;
2. provided knowledge and skills on vocational and technical skills.
3. encouraged to have a career alternative pathway;
4. students and teachers were aware of the current scenario of unemployment issues in Bhutan.
5. boost interest in entrepreneurship education.



Intervention

After the analysis of post data, research findings prove that students and teachers were now more aware of entrepreneurship education. They believe that it gives them the knowledge and also it creates opportunities for them in the future. Students were aware of vocational studies and business studies. They are equipped with the basic knowledge of entrepreneurship education and its advantages.

Many students were ardent to take the entrepreneurship and business studies as alternative subjects. They believe that risk-taking is the opportunity for a better future. If they take a risk now it would help them in the future and if one wants to do business then one has to take risks. Even in the case of the qualitative data, students gave positive responses saying it is important for schools to instil a sense of innovation and entrepreneurship skills in the mind of students. The following were the reasons:

1. provides knowledge on entrepreneurship skills;
2. importance of innovation and entrepreneurship skills for students;
3. creates job opportunities/alternatives ways of living in the future;
4. overcome unemployment issues in Bhutan;
5. enhances physical development and psychomotor development;
6. prepare the students for a better future;
7. Learning by doing;
8. innovation in learning.

Results

The country's economic development and growth can be achieved through innovation and entrepreneurship skills in Bhutanese youth and this can be done in every school. Students should not only be educated to get a job in the future but they should also be educated to invent and create a job by themselves. The country's rapid growth of unemployment can be solved by instilling a sense of innovation and entrepreneurship in the mind of the young students of the country.

This research proved that schools must instil the sense of innovation and entrepreneurship skills to our young students through using various strategies like use of video, audio and movies, articles and catalogues, talks/session on entrepreneurship and

its importance, unemployment issues and opportunities in entrepreneurship education and develop skills to overcome different the challenges in future. This indeed will help to reduce the unemployment rate in the future. This research on entrepreneurship education helped students and teachers in:

1. creating awareness on the current issues of youth unemployment;
2. personal development with various skills;
3. encouraging youth to take up vocational activities;
4. providing career options.

Recommendation

School must instil the sense of innovation and entrepreneurship skills through the following suggestive activities:

1. provide catalogue and articles to students and teachers on unemployment issues in Bhutan;
2. talk on the importance of innovation and entrepreneurship skills to students;
3. use video, audio, and movies to educate on the importance of entrepreneurship to young students;
4. encourage students to learn by doing or activity-based teaching and learning;
5. organize club, science, or group exhibitions in the school to boost innovation in young minds.

Conclusion

Pre-data depicts that both students and teachers were aware of entrepreneurship education but they lack the knowledge on the importance of it. Many students had no idea about the importance of vocational and business studies. They consider entrepreneurship education as less important in their life. Even teachers were educating students just to get a job.

So, it offered with the responsibility to educate the students and teachers on the importance of entrepreneurship education. Fostered talks and sessions on the importance of entrepreneurship skills, provided catalogue and articles to students and teachers on unemployment issues in Bhutan, and encourage students in “learning by doing”. School organized a group exhibition in the school to boost innovation in young minds. Students came up with different innovative and creative ideas. It provided children with the opportunity and space to apply the skills learned to solve challenging problems and develop skills such as oral communication, public speaking, research, teamwork, planning, goal setting, or technological and online literacy.

Entrepreneurship means focusing more broadly on personal development, mindset, skills, and abilities, whereas the term entrepreneurship education has been defined to focus more on the specific context of setting up a venture and becoming self-employed (QAA, 2012, Mahieu, 2006). The research team suggests that the students be encouraged to take up innovation and entrepreneurship skills to better their career options in the future. Building innovation and entrepreneurship skills help to develop one of the pillars of Gross National Happiness i.e. sustainable development in the country. Therefore, every school should work to “*Instil the sense of innovation and entrepreneurship skills in the minds of students*”.

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Appendix 1

Tool 1: Questionnaire

Pre data collection (Students)

(Note: SA- Strongly Agree, A- Agree, SDA- Strongly Disagree, DA- Disagree.)

SN	Statements	SA	A	DA	SDA
1	I know about entrepreneurship education.	1	19	19	26
2	I learn more by doing myself.	16	29	16	4
3	School is preparation to get a job.	36	16	10	3
4	I am interested in doing business	16	29	10	10
5	I enjoy vocational works.	17	25	10	13
6	I like to take the risk.	5	8	13	39
7	My teacher talks about unemployment issues in Bhutan.	33	21	10	1
8	The school organizes innovative activities to promote entrepreneurship skills.	24	33	6	2

Post data collection (Students)

SN	Statements	SA	A	DA	SDA
1	I know about entrepreneurship education.	17	44	3	1
2	I learn more by doing myself.	17	35	11	2
3	School is preparation to get a job.	31	26	8	0
4	I am interested in doing business.	16	32	14	3
5	I enjoy vocational works.	26	26	8	5
6	I like to take the risk.	7	18	18	22
7	My teacher talks about unemployment issues in Bhutan.	26	33	5	1
8	The school organizes innovative activities to promote entrepreneurship skills.	39	25	1	0

Tool 1: Questionnaire

Pre-data collection (Teachers)

SN.	Questionnaires (pre-data)				
	Statements	SA	A	D	SD
1	I know about entrepreneurship education	0	7	3	0
2	I learn more by doing myself	7	3	0	0
3	I am preparing my students to get a job in the future.	6	3	1	0
4	The school encourages students to take part in vocational and technical work.	5	5	0	0
5	My lesson plan instils innovation and entrepreneurship skills to the students.	4	4	2	2
6	I talk to my students about unemployment issues in Bhutan	5	5	0	0
7	School organizes innovative activities to promote entrepreneurship skills	2	4	4	0

Post-data collection (Teachers)

SN.	Questionnaires (post-data)				
	Statements	SA	A	D	SD
1	I know about entrepreneurship education	7	3	0	0
2	I learn more by doing myself	7	3	0	0
3	I am preparing my students to get a job in the future.	0	1	6	0
4	The school encourages students to take part in vocational and technical work.	8	2	0	0
5	My lesson plan instils innovation and entrepreneurship skills to the students.	6	2	2	0
6	I talk to my students about unemployment issues in Bhutan	7	3	0	0
7	School organizes innovative activities to promote entrepreneurship skills	8	2	0	0

Appendix 2

Tool 2: Interview

Pre data collection (Students)

Do you think entrepreneurship education is important for you? If so why or why not?

Gives knowledge	Create employment Opportunities
37	28

What will you do if you do not get a job after completing your degree?

Farming	Shopkeeper	Weaving	Carpenter/Painter	Stay home	Monk	Others
22	11	8	3	13	4	4

Do you think taking risks is important in our life? Why?

Yes	No
17	48

What do they feel about vocational studies and business studies?

Gives opportunities	Get skills and knowledge	No idea
12	24	29

Post- data collection (Students)

Do you think entrepreneurship education is important for you? If so why or why not?

Gives knowledge	Create employment Opportunities
25	40

What will you do if you do not get a job after completing your degree?

Farming	Shopkeeper	Weaving	Carpenter/Painter	Stay home	Others
19	19	14	9	1	4

Do you think taking risks is important in our life? Why?

Yes	No
17	48

What do they feel about vocational studies and business studies?

Gives opportunities	Get skills and knowledge
36	29

3.6. The Effect of Using Concept Map on Class IV Students' Performance in Science

Ugyen Phuntsho Thingh; Sonam Jamtsho
(Rameychen Primary School, Wangdue)

Abstract

The poor performance in science at the primary level in Wangdue Dzongkhag has been a concern. This study investigated the effectiveness of composite use of concept maps, traditional methods and, 21st-century pedagogy on student's achievement in selected topics in science. The study was conducted to determine an effective method to enhance student understanding in science. There are three groups involved in the study i.e. control group, experiment group 1, and experimental group 2. The treatment took 5 weeks using the topic "electricity and magnetism", and "Force". The sample of the study consists of thirty class IV students each group consisting of 10 participants at Rameychen Primary School. The control group was taught using traditional and 21st-century teaching methods, the experimental group 1 was taught using concept map while the experimental group 2 was taught using both the traditional and 21st-century teaching pedagogy and concept map. The mean of the pre-test scores were; control group = 5.4, experimental group 1 = 5.8 and experimental group 2 = 6. This result shows that the entry-level performance for all the groups was not significantly different. The mean of the post-test results (control group= 6.45, experimental group 1 =10.10, experimental group 2 =10.90) showed that there was a significant effect on the use of both the traditional and 21st-century pedagogy, and concept map teaching method. The experimental group 2 performed better than both the control group and experimental group 1 in the post-test score. The t-test shows a significant difference between the three groups. The result supports that when students are taught using both the traditional and 21st-century pedagogy and concept map teaching strategy, they achieve better scores. This study, therefore, offers an encouraging solution to the improvement of student performance in science at the primary level.

Keywords: Concept map, traditional method, 21st-century pedagogy, experimental group, achievement.

Introduction

Science is a new subject in Class IV and the students' poor understanding of the subject has an adverse effect on their overall performance. The performance of students in Science has been persistently below school expectations. For students in Class IV, scientific concepts involving complex relations are new because they do not study science in Class III and below.

The strategies commonly used in the classrooms have not sufficiently eased the learning process of the subject. The knowledge level of the students in science is not coherent with the demand of the subject matter hence, the majority of them engage in rote learning to pass the examinations without understanding.

Every country often changes and redesigns the school curriculum to include new teaching methods and techniques to help students develop scientific concepts better (Aboagye, 2009). According to Vanides, Yin, Tomita, and Primo (2005), a concept map is a graphical representation of the relationship among terms. Concept maps provide students to think about the connection between the terms being learned, organize their thoughts, and visualize the relationship between key concepts in a systematic way (Rinchen, 2009).

From the literature survey conducted, there does not seem to be any study on the use of concept maps to test its effectiveness on the understanding and achievement of students in science at the primary level. It would be even more interesting to carry out a comparative study on the effectiveness of traditional and 21st-century pedagogy teaching strategy, concept map teaching strategy, and a combination of both strategies on student's performance.

Reconnaissance

Situational analysis

Rameychen Primary School is located in Phobjekha Gewog, Wangdue Dzongkhag in Bhutan. It is 69 kilometers away from Wangdue town. It is one of the remotest schools in Wangdue Dzongkhag with 197 students and 8 teachers.

Participants

Class IV students participated in the AR. There are 27 students altogether all from nearby villages. The analysis of the annual school result report shows that Class IV students' overall performance is poor due to their low achievement in science. According to the science teacher, Sonam Jamtsho, "students are unfamiliar with the new subject and the scientific terms, and due to the abstract nature of science, young students are less motivated, due to their lack of prior scientific knowledge their performance is comparatively poor in science than in other subjects." Science in lower classes is a basic foundation for the students to develop scientific knowledge and prepare themselves for higher education. Therefore, we decided to conduct action research on improving Class IV students' achievement in science.

Competence

Ugyen Phuntsho Thingh, teaches in Rameychen Primary school. He studied "Introduction to Educational Research" in his PGDE as one of the modules and has completed a conventional research on Students' attitude towards chemistry in Tendruk Central School. He has attended Action Research Workshop for three days conducted by the Wangdue Dzongkhag.

Sonam Jamtsho has a BSc in Physics and Mathematics from Sherubtse College, Royal University of Bhutan. He studied "Introduction to Research Methods in Education" as one of the required modules for his PGDE. He has researched the "disruptive behaviour of Class XI students".

1. Literature review

The literature recommends concept maps as a task to monitor student's thinking and understanding. According to Vanides et al (2005), a concept map is a graphical

representation of the relationship among terms. Concept maps provide students to think about the connection between the terms being learned, organize their thoughts and, visualize the relationship between key concepts in a systematic way (Rinchen, 2009).

Concept map

Rote learning contributes very little to the knowledge structure of the learner and therefore cannot promote reflective thinking more critical and abstract manner (Singh & Moono, 2015). If students can see a clear organized picture of a broad unit covering various concepts, then they would build a deeper understanding and appreciation of these concepts (Singh & Moono, 2015).

For making science learning more meaningful and for better students' achievement in science, there is a need to explore and adopt more effective delivery techniques. According to Capper (1996), one powerful way of organizing knowledge is through the use of concepts. Concept mapping is one strategy that may be used to enable students to think about the connection on what is being learned, organize their thoughts, visualize relationships between key concepts in a systematic way and be able to reflect on their understanding. Concepts play a crucial role in guiding the production of knowledge and meaningful learning (Novak, 1977). Meaningful learning is there for the formation of viable relationships among ideas, concepts, and information (Otor, 2011).

Science curriculum

The science curriculum framework focuses to provide an overview of the science education in Bhutan. According to the Bhutan National Education Framework (2011), the curriculum is divided into five key stages starting from pre-primary to Class XII. The first key stage which encompasses pre-primary to Class III learns EVS in Dzongkha whereby learners will be developing their observation skills using their senses to gather and record information, identify patterns, and talk about their ideas. They communicate their ideas and observations orally, by drawing, or singing in Dzongkha dialect. However, as they complete Class III their learning becomes inconsistent. The learning of science in English has an adverse effect on student's performance and interest in science.

Action research question

The specific research questions addressed in this paper are:

1. How can Class IV students' performance be improved in selected topics in science using concept maps?
2. What is the effect of using concept maps in students' achievement in Class IV sciences?

Methodology

Data is collected from students in Rameychen Primary school. The study used both qualitative and quantitative methods. The findings were confirmed through constructive feedback from critical friends.

Study population

The sample consists of thirty (30) Class IV students at Rameychen Primary School consisting of both male and female. The participants were put into three (3) homogeneous groups of 10 each for the control group, Experimental group 1 and Experimental group 2. The students were of the age range of 10-12 years old.

Data collection

The data was collected through the class test and observation. A set of Teacher Constructed Science Achievement Test and observing participant in action (field notes and Diaries) were used for collecting data.

Observation of student's presentation and discussion: The tutor kept records of students conduct and behaviour in the course of a session, such as the number of questions raised, frequency of clarifications sought, volunteering to do presentations, taking initiatives in the group work, any sort of misbehaviour, peer interaction and interaction with the teacher.

The achievement test items consisted of multiple choice and descriptive questions related to the selected topic (Force and Electricity & Magnetism). Each multiple-choice question had four options with one correct answer. The structured questions required own expression of conceptual understanding. The pre-test questions served to ascertain the equivalence of ability and the post-test to determine the effect of the treatment on the two chosen topics. The results of the pre-test and post-test were analysed.

Intervention plan

Two instructional strategies were used. The experimental group 1 and experimental group 2 received the concept map instructional treatment, while the control group and experimental group 2 were taught using the traditional and 21st-century pedagogy. A concept map is a tool that presents the relationship between a set of connected concepts and ideas.

All three study groups were taught the same content material. Each time either experimental group 1 or control group met, the experimental group 2 was in attendance. Each group was met three times per week for four weeks. The content covered was from the Class IV science textbook.

In the traditional teaching, the main methods used were lecture, note-taking session, discussion, question, and answer methods. The control group and experimental group 2 were given an introductory lesson on the first day, which included the unit objectives of the sub-topic given above and some other questions which were designed to instil motivation. The succeeding days consisted of regular class discussions, paper and pencil activities, informal assessments, and textbook exercises.

The basic elements of concept mapping were introduced to the experimental group 1 and 2. The lesson was taught by defining a concept map first and the actual steps that are followed in constructing concept maps.

General procedure for constructing a concept map: The students were introduced to the following general approach to construct concept maps concerning the chosen topics:

Contextualization: Involved defining the context for the concept map. This was done by constructing a focus question for each of the topics;

Brainstorming phase: In this phase, students were asked to write the term they knew in the topic on a small piece of paper;

Layout phase: In this phase, students were asked to connect concepts with linking words using lines with arrows to show the relationship between concepts. These linking words in between concepts helped to illustrate how the domains of knowledge were related to one another;

Final phase to construct concept map: During this stage, students were asked to put their concept map into a permanent form. It is important to recognize that a concept map is never complete. It depends on what domains of knowledge one is looking for. The steps that are stated above were just meant to serve as a guide to explore even more complex concept map structures.

The concepts were arranged according to Novak and Gowin (1984) scoring scheme as;

Main concept —————> General concept —————> sub concept —————> examples

Action plan

Plan/weeks	July - 2018				Remarks
	First week		Second week		
1. Baseline data 1	Observation of students' discussion and presentation	Reflection by students on the proceedings of a particular class.	Critiquing an article	Question/ answer	Researcher keeps notes of daily proceedings
	July 2018				
2. Analysis of baseline data 1	Third & Fourth week – July 2018				
	August first week		September first week		
3. Intervention strategies	Scaffolding	Concept mapping	Reflective writing skill	Peer and group interaction	Researcher keeps notes of daily proceedings
	September – 2018 Fourth week				
Post data collection	Observation of students discussion	Understanding of the students of a particular class	Question & Answer (unit test).		Critical friends will be involved during the post data collection.
	October - 2018				
Analysis of post data	Analysis and report writing	Analysis and report writing	Analysis and report writing	Analysis and report writing	

Baseline result

Analysis of pre-test scores using frequency tables

The data was collected from the mid-term examination science paper conducted in June 2018. The pre-test results were analysed using frequency tables, mean and standard deviation. Table 1 shows the result of analysis of pre-test scores generated from the SPSS.

Table 1. Pre-test scores using frequency tables

		Statistics		
		EXP1	CO	EXP2
N	Valid	10	10	10
	Missing	0	0	0
Mean		21.4500	21.8000	21.7000
Median		20.5000	20.0000	20.5000
Mode		11.00 ^a	14.00	16.00 ^a
Std. Deviation		9.94555	9.27122	9.67299

The overall statistical table shows that the average mean score of the pre-test score for the control group (CO), experimental group 1 (EXP 1), and Experimental group 2 (EXP 2) were 21.45, 21.8 and 21.70 respectively. There is no significant difference in the mean score of the groups. The background knowledge of the students is the same. In other words, the students entered the study on equal strength (Refer to Figure 1). This means that the groups were suitable for study when comparing the effect of concept maps on their achievement with the traditional and 21st-century pedagogy teaching strategy on teaching the topics Force and, Electricity and Magnetism.

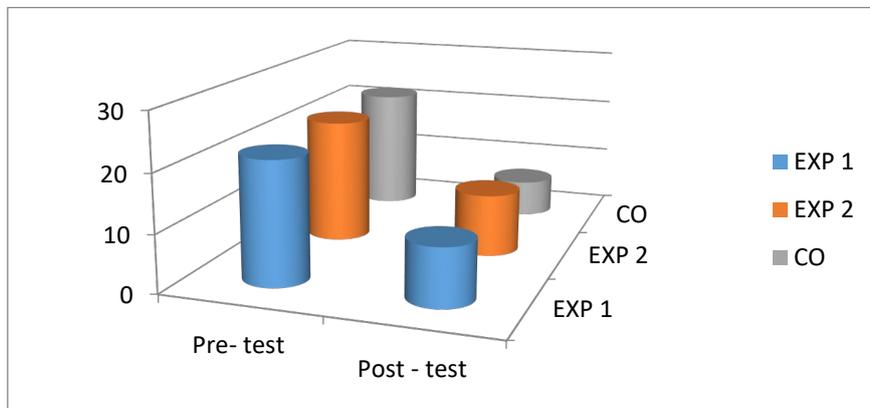


Figure 1. Mean score of the pre-test and the post-test

Post-test result

Analysis of post-test scores using frequency tables

Table 2. Statistical data for the post-test scores

		Statistics		
		EXP 1	CO	EXP 2
N	Valid	10	10	10
	Missing	0	0	0
Mean		10.1000	6.4500	10.9000
Std. Deviation		4.58136	2.94816	4.70106
Sum		101.00	64.50	109.00

Interpretation of post-test scores using frequency tables

The overall statistical Table 2 shows that the average mean score of the post-test score for the control group (CO), experimental group 1 (EXP 1), and Experimental group 2 (EXP 2) were 10.10, 6.45 and 10.90 respectively. The experimental group 1 and 2 have done significantly better than the control group. The result suggests that combining the traditional and 21st-century teaching pedagogy, and concept mapping strategy brings about significant results as opposed to exclusively using the concept map methodology. The result strongly supports that when students are taught using both the concept map teaching strategy and traditional teaching strategy, they achieve the best scores.

Table 3. T-test for the post-test score

T - Test	EXP 1 & CO	EXP 2 & CO
P =	0.05	0.022

Table 3 shows that the P-value between the experimental group 1 and the control group is 0.05 and for the experimental group 2 and control is 0.002. There is a significant difference in both the data. In EXP and CO the data is more than a 95% significant difference and 5% of chances that the given set of data is not significant. Also, in EXP 2 and CO the given set of data shows a 98% significant difference and 2% of chances that the data is random. The result strongly supports that the students taught with concept map, traditional, and 21st-century teaching strategies achieved better results.

Results and discussion

The study reveals that the students had a homogeneous understanding of the scientific knowledge in the pre-test. The mean scores obtained in the pre-test for the control group, experimental group 1 and experimental group 2 were 21.8, 21.45, and 21.7 respectively. The results imply that the pre-test mean scores were not significantly different.

The mean score from the results clearly show that the combination of concept mapping, traditional and 21st-century teaching pedagogy is more effective than the concept map alone and the 21st-century teaching pedagogy and traditional methods. It is better to combine traditional and 21st-century teaching pedagogy and concept map strategy in teaching science for the students to have a better understanding and comprehension of scientific knowledge at the primary level. The mean scores of the post-test results (control group=6.45, experimental group 1=10.1, and experimental group 2=10.9) confirms the statement given above.

Limitation

Although the True experimental design employed in the study enabled data collection on many variables, there were increased chances of sampling errors. The author has collected data from Class IV students in science subjects and left other subjects which would be further enriching to carry out further research.

Conclusion

From the study findings, it is clear that the combination of traditional and 21st-century teaching strategy and concept mapping strategy brings better results in students' performance in science.

Recommendations

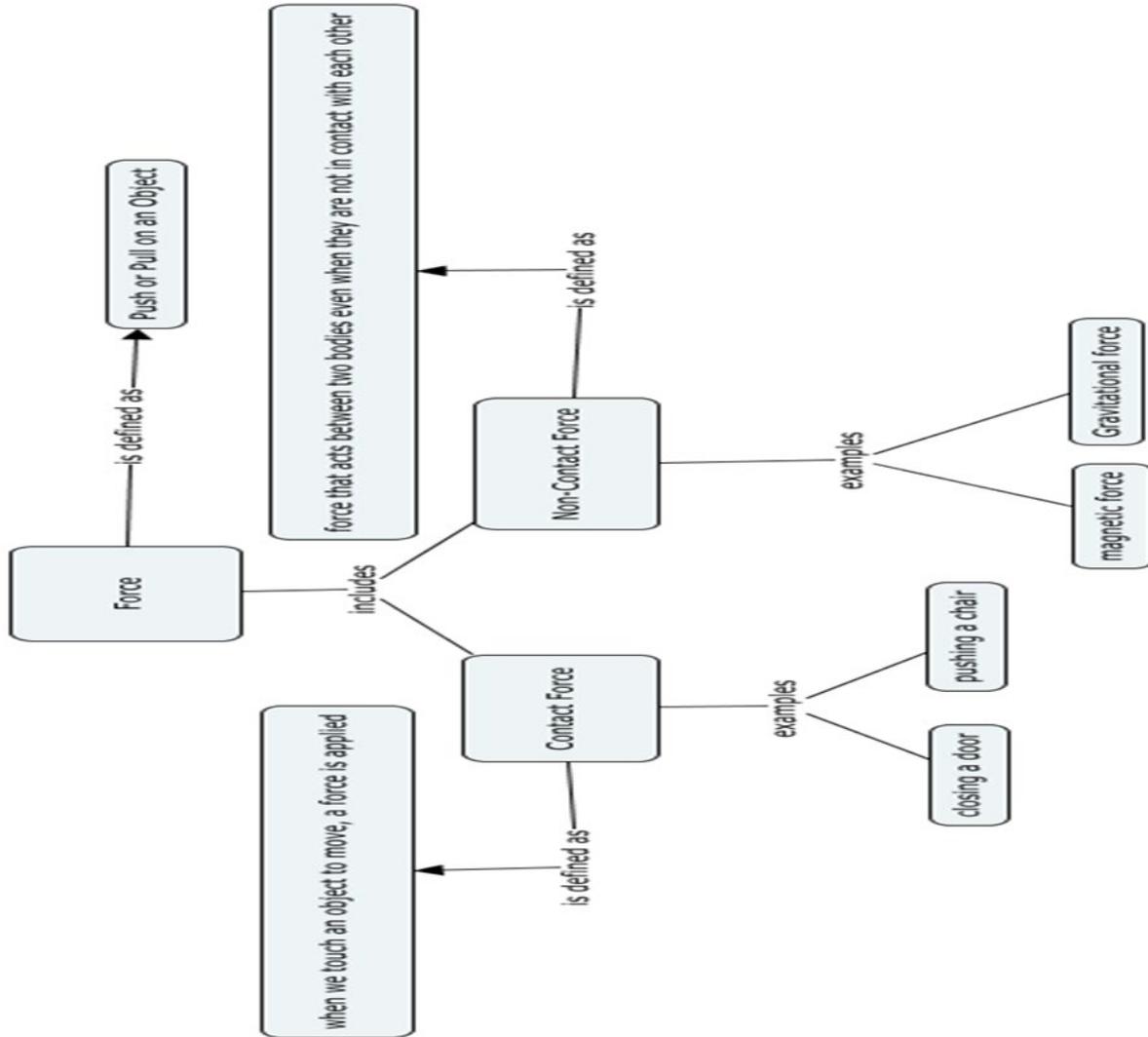
It is recommended based on the study for the improvement in teaching and learning of science:

- concept map teaching model should be incorporated in the curriculum to supplement existing methodologies to enhance students understanding and linking of concepts;
- the 21st-century pedagogy and traditional method and concept map teaching methods should be used together to teach science at the primary level.

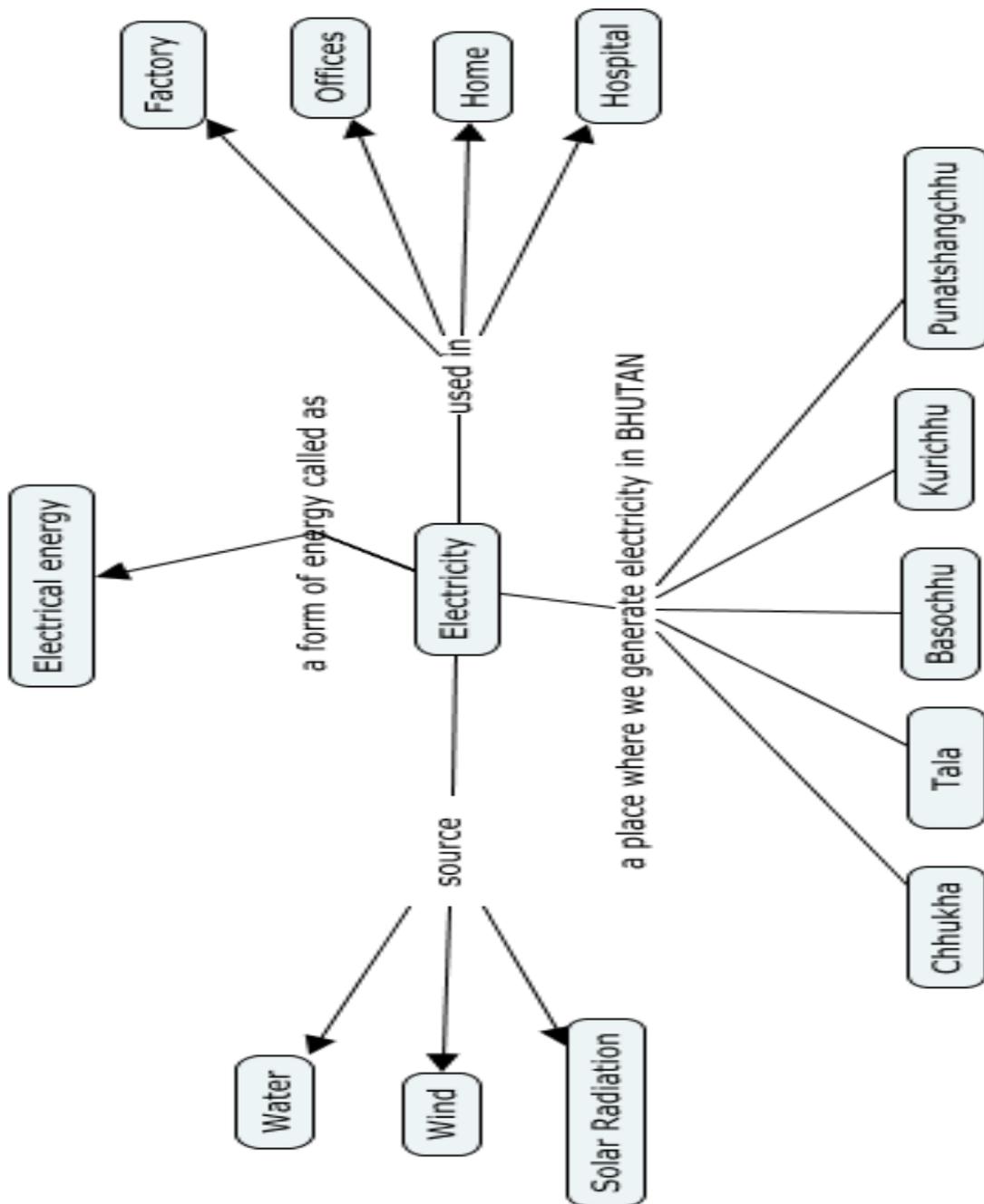
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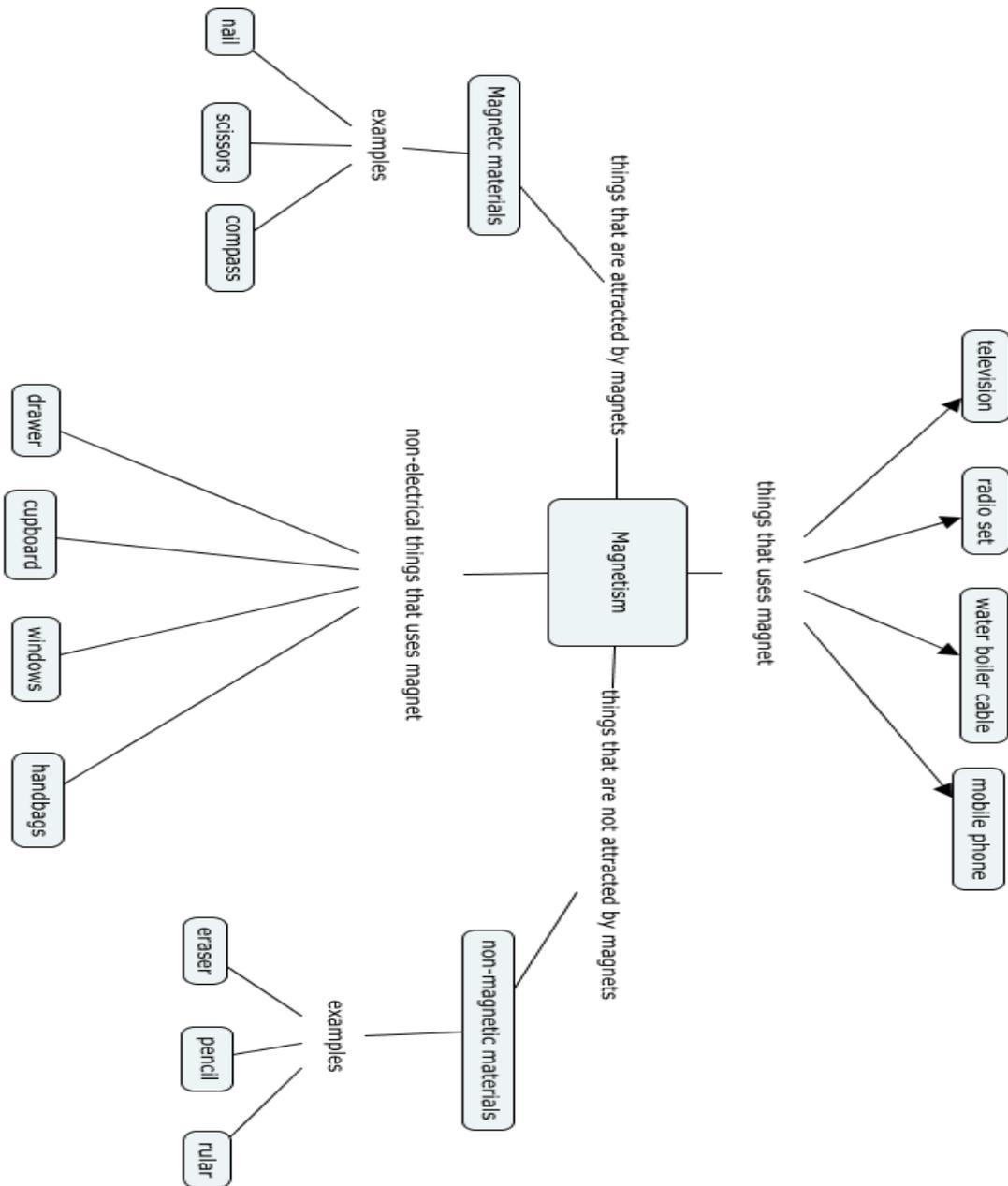
APPENDIX 1



APPENDIX 2



APPENDIX 3



4. Recommendations and Action Plans

- 4.1 The participants and speakers appraised the Sherig Endowment Fund for enabling teachers to carry out action research.
- 4.2 The Ministry of Education should carry forward supporting action research among teachers to encourage teachers to become scholarly educators.
- 4.3 Decentralize and strengthen action research to schools and clusters through the strengthened implementation of the Action Research Guidelines.
- 4.4 A periodical or journal that is simple, non-intimidating, and comprehensive should be instituted for teachers to share their action research with other colleagues.
- 4.5 Action Research Seminar should be made an annual event to promote scholarly culture among teachers.

5. Award of Certificates and Mementos

All the presenters were awarded certificates and mementos by Dasho Karma Yeshey, the Hon'ble Secretary, Ministry of Education.

6. Closing Remarks

The Hon'ble Secretary, Ministry of Education

Today's research presentation is varied ranging from teaching practice, reflection, policy, new policy, and its implementation, how to lead a good life. What is it based on? It is based on skills for livelihood and school management.

"Children can be scientists." Teachers lead students to participate. For example, teachers can put students to find out which toilet paper flushes well, which toothpaste is the best. Students try and experiment on their own to find out the toilet paper that flushes well, the toothpaste that is the best. The mudguard used in vehicles is an invention of a driver.

Action Research is situated in the profession, one being in that is Action Research. Therefore, teachers can carry out action research because you are situated in the profession. This presentation is highly useful for professional development. For professional development action research is important.

Publication will be useful to share your work with others. It not only allows the sharing of research works but also allows for constructive criticism and exchange of ideas among interested right and like-minded aspiring teachers. We expect more action research to be presented next year. We will explore for publication platform for the dissemination of your action research.

The Bhutan Professional Standard for Teachers will seek the bearing of research on a teacher's career development. It is not going to be the case of the past now where teachers teach, learners learn. Now we need creativity, capable, competent, teachers with good manners. Our teachers should be addressing wholesome education to develop good human beings. Our current model of education is the CAP model (Cognitive, Affective, and Physical).

7. Vote of Thanks

Yuden, Deputy Chief Research Officer, REC on temporary placement with TPSD

Hon'ble Dasho Drungchen, Respected Director General, Esteemed Speakers and Ladies, and Gentlemen.

On behalf of the Organising Team, the Teacher Professional Support Division, may I take this privilege to propose the Vote of Thanks to close this wonderful; enriching day of celebrating knowledge creation and knowledge-seeking through Action Research and conventional research.

We would like to thank his Excellency Sherig Lyonpo for sharing his aspirations for education and expectations from the education system particularly, our teachers. We would like to thank His Excellency for assuring continued support to this endeavour of conducting action research by our teachers with the zeal of becoming scholarly educators.

We would like to thank the president of Paro College of Education, Dr. Dorji Thinley for highlighting the importance of the Sherig Endowment Fund for empowering teachers through the provision of Action Research by teachers. His address on its own was a stimulating session on Action research for many of us gathered here today. Thank you, Dr. Dorji Thinley for sharing the secret to creating a sense of autonomy, independence, and knowledge power, which is Action Research.

Thank you, all the speakers, for sharing your research works with us today. We are inspired by your hard work, encouraged by your findings and these have stimulated a new synapse development in our brains. Thank you for creating that spark in us.

We are indebted to the guidance and blessing of the Hon'ble Drungchen and Director General for us to hold this seminar.

Thank you also to other divisions of the MOE for extending their support in arranging the logistics for today. We thank all the participants for being here and participating in the seminar. We sincerely hope that all present here will go back with a very happy heart, wanting to open a page and write down the spark that is created in you.

This is the first seminar, which would mean that there will be a second, third, and many more Seminars in the future. We hope our teachers will push us to have not just one day but 2-3 days of a seminar from the many action research that they would carry out and share their learning with other members of the education fraternity.

There have been many recommendations made by our guest of honour, HE Sherig Lyonpo, and Dr. Dorj Thinley during his keynote address. This only means that we have the potential and mandate to work hard to create such platforms and opportunities for our teachers to lead and contribute to educational reform.

With this we wish you a very pleasant evening, those traveling far have a safe journey back and all the very best to all the teachers in applying action research in your practice.

Thank you all for sharing your time with us.

Kadrinche la!

Annexure 1: Programme Schedule

08:45	_____	Arrival of guests and participants
09:00	_____	Arrival of Chief Guest
09:00 - 09:05	_____	Zhabten
09:05 - 09:15	_____	Welcome and introductory note
09:15 - 09:30	_____	Address by Chief Guest
09:30 - 10:00	_____	Keynote address
10:00 - 10:30	_____	Speaker 1: Dumcho Wangdi
10:30 - 11:00	_____	<i>Tea break</i>
11:00 - 11:30	_____	Speaker 2: Ugyen Wangmo
11:30 - 12:00	_____	Speaker 3: Tshering Tshomo
12:00 - 12:30	_____	Speaker 4: Migme Tshering
12:30 - 01:00	_____	Speaker 5: Kencho
01:00 - 02:00	_____	<i>Lunch break</i>
02:00 - 02:30	_____	Speaker 6: Ugyen Phuntsho Thingh
02:30 - 03:00	_____	Speaker 7: Ugyen Phuntsho
03:00 - 03:30	_____	Speaker 8: Kezang Tshering
03:30 - 04:00	_____	<i>Tea break</i>
04:00 - 04:30	_____	Speaker 9: Chhimi Wangmo
04:30 - 05:00	_____	Closing ceremony
		Awarding of certificates and memento
		Vote of Thanks

Annexure 2: Speakers and Participants Profile



His Excellency Jai Bir Rai
Minister
Ministry of Education,
Thimphu



Hon'ble Dasho Karma Yeshey
Secretary
Ministry of Education,
Thimphu



Dr. Dorji Thinley
President
Paro College of Education,
Paro



Tshering Tshomo
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Vision

An educated and enlightened society of GNH, built and sustained on the unique Bhutanese values of *tha dam-tshig ley gju-drey*.

Mission

1. Develop sound educational policies that enable the creation of knowledge-based GNH society.
2. Provide equitable, inclusive and quality education and lifelong learning opportunities to all children and harness their full potential to become productive citizens.
3. Equip all children with appropriate knowledge, skills and values to cope with challenges of the 21st century.

Ministry of Education
Royal Government of Bhutan
Thimphu: Bhutan