



**THE EFFECTIVENESS OF EXPERIENTIAL LEARNING
APPROACH ON SCIENCE LEARNING ACHIEVEMENT
FOR GRADE 6 BHUTANESE STUDENTS**

**BY
CHIMI SELDON DORJI**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT
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Asst.Prof. Athip Thumvichit, Ph.D.
Examination Committee Chairperson

Techameth Pianchana, Ph.D.
Member

Asst.Prof. Nipaporn Sakulwongs, Ed.D.
Member and Advisor

Approved by Graduate School

(Prof. Suejit Pechprasarn, Ph.D.)

Dean of Graduate School

November 20, 2024

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Chimi Seldon Dorji
Researcher

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Abstract

The goals of this quasi-experimental study were to investigate the effectiveness of experiential learning in learning science of grade 6 Bhutanese student's before and after experiential learning was implemented and to evaluate learning satisfaction toward the use of experiential learning in science instruction. Forty students participated in the experiment over the course of four weeks in one of Bhutan schools. Tests for learning achievement were used to gather the quantitative information (pre-test and post-test). The qualitative information was gathered through semi-structured interview.

A descriptive statistical examination of the achievement test results for the sample group showed that all students had increased from the pre-test to the post-test in 100% of cases. It was evident that experiential learning had improved students' learning, as evidenced by the mean (\bar{x}) difference of 10.18 between the pre-test ($\bar{x} = 7.18$) and post-test ($\bar{x} = 17.36$). The data obtained from the semi-structured interview demonstrated that students expressed positive satisfaction with the way they learned science through experiential learning. Through experiential learning, students were able to deepen their interest in science and were both motivated and happy to learn it. This finding suggests using experiential learning as one of the instructional strategies to improve student's performance academically and enthusiasm in science.

(Total 132 pages)

Keywords: Experiential Learning, Learning Achievements, Learning Satisfaction, Grade 6

Student's Signature Thesis Advisor's Signature

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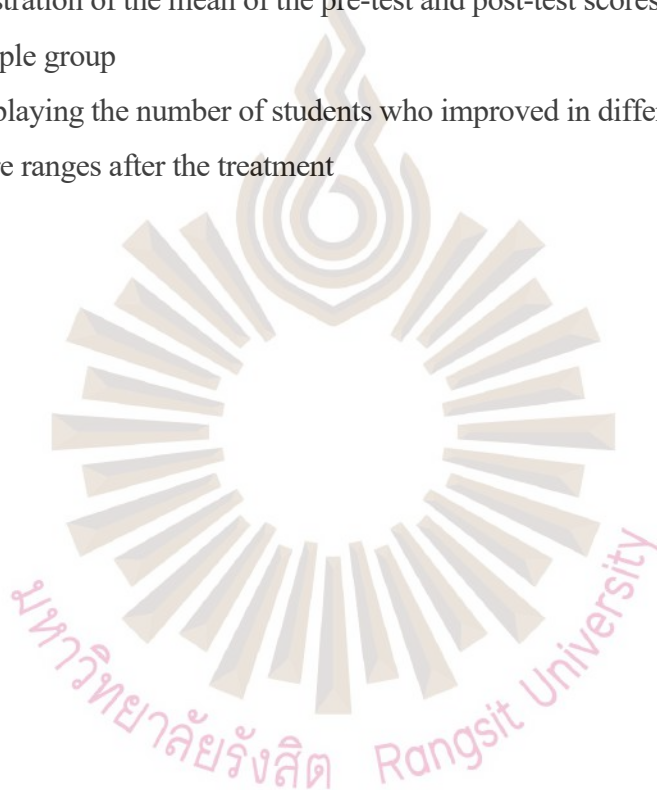
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ABBREVIATIONS

Abbreviations	Meaning
RGOB	Royal Government of Bhutan
NAPE	New Approach to Primary Education
REC	Royal Education Council
NSC	National School Curriculum
NNCS	New Normal Curriculum in Science
NNC IG	New Normal Curriculum Instructional Guide
STEM	Science Technology Engineering and Mathematics
UNICEF	United Nations Children's Fund
DCRD	Department of Curriulum and Research Department
IOC	Item Objective Congruence
SD	Standard Deviation
MOE	Ministry of Education
CDEO	Chief District Education Officer



CHAPTER 1

INTRODUCTION

This chapter describes the background and the rationale of the study, objectives of the study, research questions, research hypotheses, scope and the limitations of the study were also discussed. It also provides the operational definitions and the expected outcomes of the study.

1.1 Background and The Rationale of The Study

Carruthers (2017) defines science as a process of acquiring knowledge through discovery experimentation, investigations, testing as well as experiencing things by learning by doing. It can help us understand ourselves and our world, to recognize how it works and where we fit within it. Without learning by doing the child won't have any access to learning. Without learning by doing the child won't have any access to learning. Walden University (2019) found out that science is the systematic study of the structure and behavior of the physical, social, and natural worlds through observation and experimentation. It's key to innovation, global competitiveness, and human advancement countries.

On the other hand, science instruction gives students access to a multitude of knowledge and data that will help them gain a general understanding of how and why things function the way they do (Centre for Education in Science & Technology, 2024). Science is incredibly fascinating and exciting to many students. Students that study science are able to construct questions based on what they already know and what they hope to learn in the future, as well as an air of curiosity. Pupils who do well in science classes are probably going to become very good critical thinkers.

Education plays a vital role in shaping a nation's future, as it equips individuals with knowledge, skills and values necessary for personal and societal development. Bhutan has made commendable progress in terms of the school education. Science education in a developing country is crucial in the developmental process. Bhutan, like other developing countries, places great importance in institutionalizing a relevant and challenging science curriculum for all of its school aged children (Childs, Tenzin, Johnson, & Ramachandran, 2012). Education is seen as a legitimate investment in the empowerment of its citizens and the nation's transformation. Therefore, the Royal Government of Bhutan (RGoB) continues to accord highest priority to the education sector in the nation building process (Bhutan Education Blueprint-Rethinking Education, 2015).

In order to adapt basic scientific curriculum to Bhutanese setting and to encourage the teaching of science based on Bhutan's natural and social surroundings, the "New Approach to Primary Education" (NAPE) was introduced in 1986 (DCRD, 2011). In particular, science education has and still does play a major part in socioeconomic growth. Numerous curriculum revisions and modifications have been made over time to keep up with the world's rapid development (REC, 2018). In the school curricula, science as a subject, therefore, has been accorded high priority, any decline in the quality of science education in the school system is of great concern for the Ministry of Education (MoE). In the drive to keep the school curricula abreast of the changing times and space, the science curriculum reform has been initiated in the 10th five-year plan to update and consolidate the existing science curriculum from classes PP to XII (Chhoeda, 2021)

In the past, students were expected to obey instructions without active participation in the classroom. Students' critical thinking, engagement and capacity to apply knowledge in real-world contexts were all hindered by conventional method. Nonetheless, this had established the groundwork for curriculum revision and systemic change in Bhutan's educational system. The progressive education movement emerged in early 20th century as limitation to traditional learning which emphasis on experiential learning, student-centered approaches, and the integration of subjects to

promote critical thinking and practical skills through experiential learning. In essence, the NAPE marked the dawn of child-centered learning in Bhutan (Childs et al., 2012).

Owing to the changing demands of the changing times, the education system in Bhutan has come under increased public scrutiny and debate for the system's inability to provide the necessary knowledge and skills to meet the new challenges. This establishes the urgency for ambitious review and reform actions in the education system at the earliest (Bhutan Education Blueprint Rethinking Education, 2015). Students in Bhutan are introduced to science right from primary class, but it is an integrated science until class eight. People from different social classes in Bhutan claimed that the localized primary science curriculum is out of date and has shallow material. In order to improve the quality of learning, the localized elementary science curriculum was changed in 2001, primarily with the goal of adding relevant content which aspired to provide learning experiences organized with better coordination, consistency, coherence, and progression (Dorji, Jatsho, & Choden, 2022)

Moreover, it is envisioned to provide learning experiences that are more enriching, challenging, and relevant to learners' developmental appropriateness. The students' experience in the classroom, interactions with the students and teachers, students' understanding about the subject and the curriculum matters will strongly determine students' perception about science. Understanding students' perception towards science is important and necessary for both the students and teachers for effective teaching and learning process (Nidup et al., 2021).

Similarly, learning is a result of active interaction between a learner with teachers and the surrounding world to which they belong. Learning by doing means learning from experiences resulting directly from one's actions. In other words, it is a method by which students make the most of their education through active participation (Mekonnen, 2020). REC also states that learning by doing refers to gaining knowledge from firsthand experiences brought about by one's own actions. Stated differently, it's a technique where pupils actively participate to maximize their educational experiences (Science Curriculum Framework, 2022).

Teaching science is to create a more engaging and effective learning environment that deepens students' understanding, encourages their active participation, and equips them with the skills and mindset necessary for scientific inquiry and exploration. It is believed that learning is enhanced when the learners accept responsibility for their own learning. (Tenzin & Maxwell, 2008). Realizing the need to make the curriculum more relevant to the national and global context, a new approach pedagogy 'Experiential Learning' was introduced to cater the emerging needs which required change from rote learning to activity-based learning and student-centered learning called Experiential learning.

Experiential Learning is the process of learning by doing. By engaging students in hands-on experiences and reflection, they are better able to connect theories and knowledge learned in the classroom to real-world situations (Kent State University, 2022). The goal of experiential learning is for students to obtain both conceptual understanding and practical expertise by having them reflect on what they have done. It provides enriching learning experiences that allows students to develop sound scientific knowledge, enhance fundamental science process skills to promote scientific values and attitudes to cultivate scientific literacy (Bates, 2015).

According to Dewey (1916), a prominent progressive educational philosopher, education should be centered on the learner's experience and should promote the development of their social, emotional, and cognitive abilities. The learner centered approach promotes experiential learning through first-hand experiences. Students engage in hands-on activities, experiments, and real-world applications to gain practical knowledge and skills (Childs et al., 2012). Dewey emphasized the importance of experiential learning to connect the curriculum to real-life experiences to enhance students' understanding and enable them to apply their knowledge in meaningful ways.

Furthermore, New Normal Curriculum (NNC) is grounded on the principles and practices of Competency Based Education vital in fostering resilient capabilities in learners. The competency-based approach driven by digital technologies lends greater opportunities for experiential learning contextualized to the learner's physical, social,

political, economic, spiritual and cultural setting (Curriculum Development Center, 2021).

Through the use of the New Normal Curriculum Instructional Guide (NNC IG), knowledge-based textbook instruction can be replaced with process-based, competency-based, and experiential learning. According to Royal Educational Council New Normal Curriculum, teachers must adopt the roles of facilitators, guides, assessors, researchers, and motivators in addition to knowledge transmitters (REC, 2021). The National School Curriculum which has been implemented in 2021, has been designed to facilitate the development of transversal skills, social and emotional competencies through real time and experiential learning approach (NSC, 2021).

A philosophical perspective known as pragmatics places a strong emphasis on the applicability and usefulness of knowledge. The pragmatic ideal, which holds that people learn via interactions with their environment, is in line with experiential learning in a real-time situation when it comes to cognitive development in the NSC. The focus of pragmatic techniques is on experiential learning, in which students actively participate in real-world scenarios to create meaning and hone their problem-solving abilities. It implies that learning ought to be centered on problem-solving and practical experiences (Tenzin, 2023)

Based on the constructivist approaches, learning experiences in NSC underscore providing authentic tasks, social interactions, and opportunities for students to actively construct their knowledge. Through the real time experiential learning approach, the social aspect of constructionism is emphasized by encouraging learners to collaborate and share their creations with others. In the collaborative process, learners engage in discussions, receive feedback, and reflect on their own and others' ideas, fostering a deeper understanding of the subject matter. The journey of school curriculum in Bhutan has emerged as a promising approach to education, emphasizing holistic development, experiential learning, and a connection to nature and culture (National School Curriculum, 2022).

Students in the past were expected to follow instructions without questioning or active engagement. They were expected to memorize information provided by teachers, focusing on factual recall rather than critical thinking and problem solving skills. Thus, students' performance was evaluated through memorization of information rather than assessing their understanding, practical skills. (Dorji, 2014). Teachers would deliver lecture through textbooks while students remained passive recipients of knowledge. This traditional approach limited student critical thinking and engagement as well as their ability to apply knowledge in practical situations. This has resulted in students' poor performance in science which laid the foundation for later curriculum reforms in transforming Bhutan's education system (Tenzin & Maxwell, 2008).

The journey of school curriculum has successfully shifted the focus from rote memorization to active learning experiences. This approach promotes a student-centered learning environment, allowing pupils to actively participate in their education and take ownership of their learning journey. The journey of school curriculum has brought about transformative changes in Bhutanese schools, enhancing the educational experience for students. Its emphasis on holistic development, experiential learning, and a connection to nature and culture has resulted in engaged, environmentally conscious, and culturally aware individuals (Tenzin, 2023).

On the other hand, the Bhutan government's current top objective is to replace knowledge and textbook-based learning with competency-based learning through open source and experiential learning, in line with the global trend toward competency-based learning as education for the twenty-first century. In the new normal education, human interaction and well-being are priority. As Bhutanese education embrace this exceptional opportunity to transform education, it is necessary to prioritize the development of the whole person through experiential learning, not just the acquisition of academic knowledge (New Normal Curriculum Instructional guide, 2021).

For the purpose of uplifting the sanctity of true science, experiential learning encourages active engagement with the material, which can lead to better retention and understanding of the scientific concepts in science. When students are directly

involved in learning, they are more likely to remember and apply what they have learned (Rabgay, 2018). When teachers follow a traditional teaching “schedule,” there are often students who are unable to access the material because they lack an understanding of previous skills. Students' critical thinking and involvement, as well as their capacity to apply knowledge in real-world contexts, were restricted by the traditional approach.

So, this study is to find out the effectiveness of experiential learning in teaching science as experiential learning promotes learner-centered approach through first-hand experiences. When students engage in hands-on activities, experiments, and real-world applications they gain practical knowledge and skills. The importance of experiential learning to connect the curriculum to real-life experiences enhances students' understanding and enable them to apply their knowledge in meaningful ways. Experiential learning redefines the nature and role of science practical work further improving the quality of science teaching in science education.

1.2 Research Objectives

1.2.1 To investigate the effectiveness of experiential learning in learning science of grade 6 Bhutanese students.

1.2.2 To find out learning satisfaction of grade 6 students after using experiential learning approach in learning science.

1.3 Research Questions

1.3.1 Did experiential learning approach improve grade 6 Bhutanese students learning achievement in science?

1.3.2 What was the learning satisfaction of grade 6 students after using experiential learning approach?

1.4 Research Hypothesis

After implementing experiential learning, grade 6 Bhutanese students' learning achievement in science improved.

1.5 Scope of The Study

1.5.1 Location of the study

The research was conducted in one of the primary schools of Bhutan under Thimphu district, located in the Western part of the country. The school consisted of classes from Pre-Primary till grade 6. (Refer to Appendix I).

1.5.2 Population

The total population for the study comprised of 151 students from four sections of grade 6 students in one of the schools in Bhutan. The students age ranged from 11-14 years old with mixed genders and mixed abilities groups. The target school consisted of classes from Pre-Primary to grade 6.

1.5.3 Sample

The researcher used a cluster random sampling to select a section of sample population from the total population of four sections of grade 6 students. Therefore, one section was chosen with 40 students out of four sections consisting of mixed genders and mixed abilities group chosen for the purpose of the study with a mixed gender student population.

1.5.4 Content of the Lesson

This study involved the researcher teaching a chapter 9 Classification of Animals from the Department of Curriculum and Research Development's grade 6

science book (DCRD). This chapter were divided in to four sections. The researcher taught all the topics. Before the chapter was taught, a pre-test was given, and after the chapter was taught using Experiential Learning, a post test was given.

Table 1.1 Table of content for the lesson

Lesson Plan	Topic	Periods	Time	Activities
Plan 1	Reptiles & Amphibians	2	Week I	Campus tour
Plan 2	Fishes	2	Week II	Art based activity
Plan 3	Birds	2	Week III	Mindful listening
Plan 4	Mammals	2	Week IV	Quiz

1.5.5 Time Frame

The research study took four weeks to complete. The researcher taught two lessons (if the topics are short) in a week. Each lesson consisted of 90 minutes; therefore, the researcher took 2 periods of 45 minutes in one week to cover up the lesson. The class had a period of 45-minutes. In eight sessions stretched over four weeks, the researcher taught science through experiential learning.

1.6 Conceptual Framework of The Study

The study consisted of two variables; independent and dependent variables. The independent variable was experiential learning approach and dependent variables were learning achievement and students' learning satisfaction. With the approach used, students learning achievement and their reaction towards experiential learning were expected to improve.

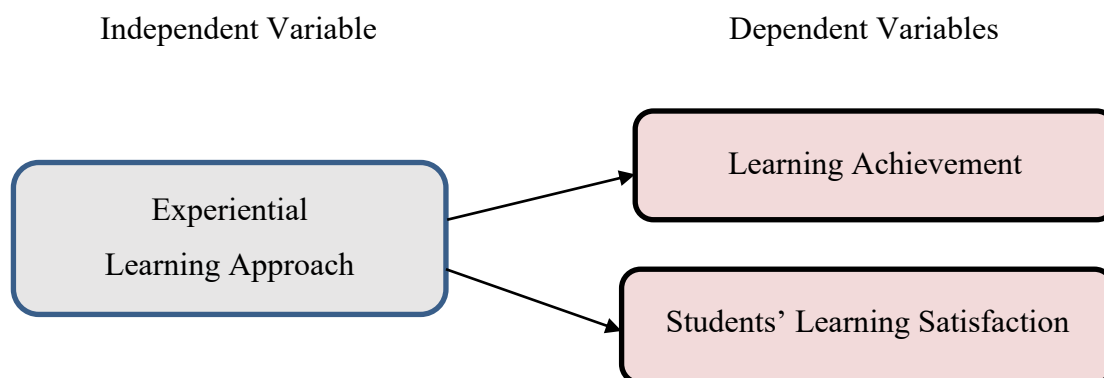


Figure 1.1 Illustration of the Independent and dependent variables

1.7 Limitations of The Study

1.7.1 The study represented a small number of grade six students from one of school's in Thimphu. As a result, the findings may not be extended to all Bhutanese grade 6 students' performances.

1.7.2 Students had just eight periods to learn science through Experiential Learning, which was not enough for them. More time was given to students for them to learn more efficiently.

1.7.3 The study focused on using experiential Learning to teach one chapter which is Classification of Animals in the classroom. As a result, it may be impossible to display all the scientific curriculum's outcomes.

1.7.4 The study focused only on one section lacking controlled group to compare with other sections.

1.8 Operational Definitions

Experiential Learning Approach in this study, refers to a cognitive process in which a person constantly engages with and adapts to their surroundings. Knowledge is not just acquired through instruction; it is also created by experience. As students switch between modes of action, reflection, feeling, and thinking, conflicts, disagreements, and differences propel their learning. The grade six students was taught

using this teaching learning approach. The research participants, self-engaged in the learning experience through different activities on each content taught to them by letting them participate and interact in group activities, art-based activity, role play, campus tour and quiz games.

Concrete Learning is when a learner gets a new experience, or interprets a past experience in a new way.

Reflective Observation the learner reflects on their experience personally. They use the lens of their experience and understanding to reflect on what this experience means.

Abstract Conceptualization happens as the learner forms new ideas or adjusts their thinking based on the experience and their reflection about it.

Active Experimentation is where the learner applies the new ideas to the world around them, to see if there are any modifications to be made. This process can happen over a short period of time, or over a long span of time.

Science Learning Achievement in this study refers to students' scores gained in the learning achievement tests before and after the experiment. The participants were administered with pre-test and post-test to compare their learning achievement. The pre-test were conducted before the intervention of experiential learning approach whereas post-test were conducted after the intervention of experiential learning approach. The students learning achievement were assessed and evaluated to find out the improvement in learning achievement in science using experiential learning approach by comparing the pre-test and post-test results from the data collected during the tests.

Learning satisfaction in this study refers to the containment and overall satisfaction of student's reaction towards learning science using experiential learning approach. The student's reaction can be interest, enjoyment and active participation

with the use of experiential learning approach during science lesson. The level of students' learning satisfaction were analyzed based on the data collected from semi-structured interview.

Science refers to the subject of this research as science. The participants were taught the subject materials using an experiential learning technique. The study focused on chapter 9 of Bhutanese Grade VI science, 'Classification of Animals'. The chapter was broken down into four sections, namely; 1) Reptiles and Amphibians, 2) Fish, 3) Bird and 4) Mammal.

Grade 6 Students refers to the Bhutanese students studying in 6th standard ages between 11 to 15 years old and are the study's research participants.

1.9 Significance of The Study

1.9.1 The study would have a positive effect on the learning achievement of Grade 6 students by utilizing experiential learning approach.

1.9.2 The outcomes of this study would give science teachers an alternative in using experiential learning as one of their effective instructional strategies.

CHAPTER 2

LITERATURE REVIEW

This chapter discusses the concept of science (definitions), Science Curriculum in Bhutan, Experiential learning approach, definitions, concepts, principle features, benefits and challenges and implementation. Next, it presents the learning theories which supports experiential learning approach. The discussion of literature related to the study are also presented. This chapter concludes with a summary of literature review.

2.1 Science as Subject

Science is the study of the universe and the things around us via experimentation and a observation (Twinkl Teaching Resources | Education Videos | USA, 2022). It is the process of learning about the natural world through observation and experimentation (What is Science? NGSS, n.d.) It is also a process of discovery that allows us to link isolated facts into coherent and comprehensive understandings of the natural world (University of California, Berkeley, 2022). According to Nasa (2019), science is curiosity in thoughtful action about the world and how it behaves. Science consists of observing the world by watching, listening, observing, and recording. Finding out what exists in the cosmos and how things function now, historically, and probably going forward is possible through science.

Scientists learn about the natural world through investigations, which produces evidence that helps answer questions. Experiments and natural world observations can be a part of investigations. As stated by Walden University (2019), science is the systematic study of the structure and behavior of the physical, social, and natural worlds through observation and experimentation. It's key to innovation, global competitiveness, and human advancement. It's important that the world

continues to advance in the field of science. The Science Council (2019) defines science as the methodical, evidence-based pursuit and application of knowledge and understanding of the natural and social worlds. Science changes over time, partly as a result of shifts within society at large.

Science also involves a lot of communication with other people and develops patience and perseverance in children. The quest to find answers to their countless “why” questions pushes children to form their own opinions. While it’s easy to go along with another child’s answer, it can take children further as they explore the world around them and tackle some of its challenging questions. Future depends on nation’s educators using hands on and minds on student engagement strategies to make science interesting, exciting, and inspiring (Walden University, 2019). In this day of instant and global information access, it has become increasingly important for science educators to help students develop science process skills instead of focusing solely on the memorization of a body of facts. Teaching strategies that science educators use to promote student engagement include hands on experiments, collaborative learning and experiential learning.

In order to get children interested in science subjects, teachers must assist them in seeing themselves as a learner actively participating in hands on activity. It is about creating experiences & opportunities for children to see science in application instead of just reading about it in a textbook. Science is different from many other ways of learning because of the way it is done. Science relies on testing ideas with evidence gathered from the natural world. Science helps to satisfy the natural curiosity, it can lead to technological advances, as well as helping us learn enormously about the important and useful topics, such as our health, the environment, and natural hazards (Understanding Science, 2022).

Beyond the potential scientific breakthroughs, there are individual benefits to learning science, such as developing our ability to ask questions, collect information, organize and test our ideas, solve problems, and apply what we learn. Further, science offers a powerful platform for building confidence, developing communication skills,

and making sense of the world around us—a world that is increasingly shaped by science and technology. Science as a subject at schools; it ensures the next wave of progress in all of the fields that affect our daily lives. Science helps our understanding of the world around us (Homden, 2017).

Without science, the modern world would not be modern at all. Still, we have so much to learn. The goal of the learning sciences is to better understand the cognitive and social processes that result in the most effective learning and to use this knowledge to redesign classrooms and other learning environments so that people learn more deeply and more effectively. The reality is that engaging with science is an integral part of our daily lives. Moreover, for the safety and wellness of human society, it is necessary to engage with scientific information. We are faced with the necessity of examining scientific evidence on topics ranging from conservation to public health and make decisions that impact not only our families but those around us (Designing Effective Science Communication, n.d.).

Additionally, science creates a sense of curiosity that enables learners to comprehend and formulate questions in light of newly acquired knowledge. Many students pursue new scientific interests because they believe science to be fascinating and interesting. It's wonderful that science can instill in kids the idea that they can contribute to finding solutions to the world's issues. The ability to reason logically and solve issues is ingrained in science (Importance of Science Education in Schools, 2022).

2.2 Science Curriculum in Bhutan

The Bhutanese science Education was started in early 1960s with the introduction of modern education in Bhutan. In those days, Bhutanese education system did not have her own local curriculum like today. Bhutanese science curriculum was borrowed from India. However, in 1976 the Department of Education drafted the country's first curriculum. The curriculum was developed incorporating the country's culture and traditions (Wangdi & Utha, 2020). In 1986 another landmark

history took place in Bhutanese education system with the establishment of a new division called Curriculum and Textbook Development Division (CTDD, 2020).

The Bhutanese science curriculum is one of the channels for achieving national aspirations of science education. The education system is also challenged in meeting the quality education that is comparable to the international standards (REC, 2021). Thus, Bhutan has recognized the need to align its education system with the demands of the 21st century. The transformative journey of the Bhutanese school curriculum as it transitions from a traditional, content-based approach to a competency-based education system. The shift towards competency-based education aims to empower students with the knowledge, skills, and dispositions necessary to thrive in an ever-changing global landscape (Tenzin, 2023).

As Bhutanese education is inspired by the goal of producing nationally rooted and globally competent citizens, the science curriculum aspires to augment the quality of scientific literacy underpinned by the global scientific trend enriched by the principles of Gross National Happiness (REC, 2018). Bhutanese students are therefore expected to use and apply scientific knowledge and skills to explain physical and natural phenomena, design and conduct scientific inquiry, and analyze, interpret, and relate the scientific data to the appropriate context by the end of their science education. The Bhutanese science curriculum is intended largely to provide certain ideals and principles including, scientific inquiry, contextualization, logical progression of ideas; or developmentally age-appropriate learning experiences (Dorji et al., 2022).

Bhutan has implemented a number of curricular revisions to better meet the evolving demands of the country. Launched in 2014, the Bhutan Education Blueprint represented a major advancement in curriculum reform to address 21st-century concerns (Ministry of Education, Bhutan, 2014). This curriculum blueprint prioritized competency-based learning, learner-centered education, and curricular integration of Bhutanese values, culture, and identity. The reformed science curriculum aimed to provide a clear statement of what learners are expected to achieve as a result of

science education. It desired to provide well-coordinated, consistent, and coherent learning experiences or learning content that is enriching, challenging, and relevant to learners' developmental appropriateness (Dorji et al., 2022).

In the fall of 2019, the Royal Education Council (REC) started the reform of the science curriculum in Bhutan in response to the shifting dynamics of science education from a conventional(traditional) based approach to integrative STEM education. The Bhutanese science curriculum was revised from the perspective of the science, technology, engineering, and mathematics (STEM) educational method in order to improve the content and application of 21st-century abilities (National School Curriculum, 2022). Therefore, the reformed science curriculum aspires to augment the spirit of STEM education in Bhutan.

As a follow-up to the findings from the needs assessment, the science curriculum was reformed and implemented in phases. The reformed science curriculum from fourth to sixth grade was implemented in 2013, while the reformed science curriculum from 10th and 12th grade was implemented in 2017. At the core of the reformed science curriculum, the aim was to provide a clear statement of what learners are expected to achieve as a result of science education. It aspired to provide learning experiences organized with better coordination, consistency, coherence, and progression (Science Curriculum Framework, 2017).

Given the nature of the education system and its complexity a practical and far-reaching transformative approach is required to be put in place to address the numerous challenges in education. This entails the requirement of the education system to rapidly adjust to the fast-changing needs, promote acquisition of high competencies, interpersonal skills and collaborative efforts that can be applied to a variety of work situations to be work ready and globally competitive in all aspects. (Bhutan Education Blueprint-Rethinking Education, 2024).

As stated in Anatolian Journal of Education (2021) scientific knowledge accelerates technological development in the country and is therefore, accorded great

importance as an area of learning in the formal education system. The result of study also suggest that knowledge of science is indispensable for every citizen as it is one of the means to help people understand and make sense of the workings of the universe and the natural world around them. The wellbeing and lifestyle of people and of the natural world are greatly affected by the knowledge, skills and values of science that an individual hold (Nidup et al., 2021).

Learning is generally confined in the classroom, which negates experiential, exploratory, creative, and innovative ways of learning. Therefore, Bhutanese curriculum is rationalized to facilitate real time experiential learning and inspire them to generate knowledge and create ideas in solving problems and be productive individuals. The science education has been accorded great importance ever since modern education was instituted in the country. Ideally, the Bhutanese science curriculum is intended to focus more on the scientific process with the special attention to disciplinary core ideas (REC, 2012) The new curriculum demanded a paradigm shift from lecturing to an experience of the individual child exploring and learning.

2.3 Science Instruction

We are surrounded by technology and the products of science every day. As children grow up in an increasingly technologically and scientifically advanced world, they need to be scientifically literate to succeed. Teaching the scientific method to students is teaching them how to think, learn, solve problems and make informed decisions. These skills are integral to every aspect of a student's education and life, from school to career (Importance of Science Education in Schools, 2022). Science education can offer a rich context for developing many 21st-century skills, such as critical thinking, problem solving, and information literacy especially when instruction addresses the nature of science and promotes use of science practices.

Science education gives students the opportunity to gain a better knowledge of how and why things function. Science can teach children about the world that surrounds them. Science plays a significant role throughout our day. Science can also create curiosity

that helps students understand and formulate questions on the information they have accumulated. A lot of students find science exciting and fascinating, and consequently, explore new areas of interest in science. Engaging young students with exciting material and experiences motivates them to learn and pursue the sciences throughout school (Importance of Science Education in Schools, Asian School, 2021).

Teaching science to students prepares them to think, learn, solve problems and make informed decisions. Science is one of the most important subjects in school due to its relevance to students' lives and the universally applicable problem-solving and critical thinking skills it uses and develops (Sindhu, 2023). Primary Science teachers needed to modify their perspective of student science learning, change their teaching strategies and thereby their roles. The process of teaching learning in science was no longer construed as transmission of scientific facts and figures, but of providing opportunities for learners to generate and construct their scientific ideas with a series of learning activities, such as observation, measurement, investigation, recording, communicating, and so on (Tenzin & Maxwell, 2008).

The goal of a teacher is to help students to learn, grow and succeed. Primary science teaching becomes more meaningful and relevant when students can connect scientific concepts to real life situations. By incorporating real world applications, teachers can show students how science impacts their daily lives. Science teaching also involves fostering collaboration and communication among students. By actively engaging in conversations, students develop their communication skills and deepen their understanding of the subject matter (What Makes for Great Primary Science Teaching? n.d.).

As a teacher, it's crucial to adapt instructional strategies to meet the diverse needs of students. By providing students with personalized learning experiences, it ensures that every student has the opportunity to succeed and thrive in science. In general, primary teachers effectively engage students and encourage learning by supporting students to construct new ideas, share new thinking, generate and record data and collect evidence to challenge and sometimes change existing ideas and understandings. Teachers don't merely deliver the curriculum. They develop, define it

and reinterpret it too. It ultimately shapes the kind of learning in young people (Fitzgerald & Smith, 2016).

While fostering student interest in science is an important component of the teachers' role, determining if and how students are making sense of information, in particular how they are constructing understandings, is equally important. Effective science teaching relies on understanding students' pre-existing ideas about science concepts and supporting students to develop more scientific understandings. In order to ensure meaningful and consistent science learning opportunities at the primary level, primary teachers must be supported to confront their existing ideas about science and science teaching and learning if they are to begin to articulate the problematic nature of the perceptions, they use to define their practice (Australian Journal of Teacher Education, 2016).

Therefore, it is very important to have a method to teach children science effectively. To ascertain reliable achievement tests, the researcher will be incorporating Bloom's Taxonomy. According to Bloom's Taxonomy, learning is a sequential process. We must comprehend a notion before using it in the real world. There are a number of reasons why a teacher would want to use Bloom's taxonomy. Initially, it can be used to increase one's understanding of the educational process (Armstrong, 2010). Originally introduced in 1956, Bloom's Taxonomy was a concept created by Mr. Benjamin Bloom that defines different levels of intelligence including Remembering, Understanding, Applying, Analyzing, Evaluating and creating are the six levels of learning (Master Soft, 2021).

2.4 Experiential Learning

2.4.1 Definitions and Concepts

Learning by doing. This is the basis for the experiential learning. Experiential learning focuses on the idea that the best ways to learn things is by actually having experiences. Those experiences then stick out in mind and help retain information and

remember facts. Lifelong learning requires the ability to learn from life experiences. As the name suggests, experiential learning involves learning from “experiences” (Western Governors University, 2020). Experiential learning is a learner-centered approach where students learn by experiencing and reflecting on their experiences. It originated from pragmatic educational thinking in the early 20th century and gained prominence in the 1970s with a focus on living experiences (What Is Experiential Learning? n.d.).

Experiential learning is the process in which students can “learn by doing”. It’s an interactive form of learning that allows for first-hand experiences and tangible results. Learning through experience promotes a deeper level of understanding as compared to surface level learning such as memorizing lessons from a textbook (Tan, 2022). Published in 1984 by psychologist David Kolb, the Experiential Learning is defined as “the process whereby knowledge is created through the transformation of experience.” experiential learning is the process of learning through experience. Experiential learning is also referred to as learning through action, learning by doing, learning through experience, and learning through discovery and exploration, all (Northern Illinois University, 2012).

According to Simond Fraser University, Experiential learning may be defined as the strategic, active engagement of students in opportunities to learn through doing, and reflection on those activities, which empowers them to apply their theoretical knowledge to practical endeavors in a multitude of settings inside and outside of the classroom (Bates, 2015). By encouraging hands-on experiences, students will have a firmer grasp of concepts and how things work. Experiential learning also pushes them to be more reflective about their actions and be more creative in finding solutions to a problem (World Academy Singapore, 2022).

Experiential learning is a philosophy and methodology in which educators purposefully engage with students in direct experience and focused reflection in order to increase knowledge, develop skills, and clarify values (Association for Experiential Education, 2012).It involves a number of steps that offer student a hands-on,

collaborative and reflective learning experience which helps them to “fully learn new skills and knowledge”. Although learning content is important, learning from the process is at the heart of experiential learning. During each step of the experience, students will engage with the content, the instructor, each other as well as self-reflect and apply what they have learned in another situation.

Experiential learning is a task in which students independently engaged or involved in all aspects of conceptual design, planning, organization and evaluation. The results are that students acquire knowledge, develop skills and qualities. And the students’ experiences, the teacher acts as motivator for the learner. Experiential activities are usually organized in a cycle where, at the beginning, students use their own experiences to solve problems and at the end of the day, students can use them. Knowledge and experiences have been learned in order to solve the real issues of life and society in a flexible, active and creative manner (Giac, Gai, & Hoi, 2017).

Experiential learning focuses on learners reflecting on their experience of doing something, so as to gain conceptual insight as well as practical expertise (Western Governors University, 2020). Kolb’s experiential learning model suggest four stages in this process:

- 1) Concrete experience; the learner has a hands-on experience connected to the learning outcome.
- 2) Reflective observation; the learners reflect and reviews the experience from a range of different perspectives.
- 3) Abstract conceptualization; the learner analyses and connects the experience to previous learning and develops new ideas about the content being taught.
- 4) Active experimentation; the learner acts on their new ideas by experimenting in an experiential setting.

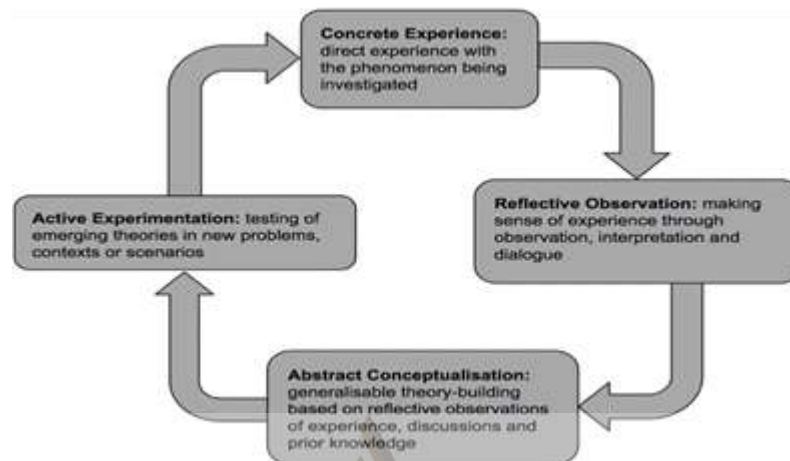


Figure 2.1 Experiential Learning Cycle David Kolb Model

Source: Kolb, 1964

Experiential learning can be used to support students to undertake learning in a variety of campus-based, project-based, work integrated and community contexts. It is beneficial to identify experiences that students will have an interest in. These experiences should be structured to require the learner to take the initiative, make decisions and be accountable for results, including learning from natural consequences, mistakes and successes (The University of Queensland, 2021). Examples of experiential learning activities include: science experiments, field experience or field trips, role playing, art activity, group activities, peer activity, simulations, labs, journaling, interactive games, work integrated learning and so on.

2.4.2 Role of Teachers in Experiential Learning

In the process of experiential learning, the role of the teacher is very important, the teacher is not just a guide, but plays the role of an encourager, facilitator and advocate for the students as a scaffolding. The teacher facilitates student interaction with hands-on experiences, i.e. self-directed educational activities. Here, the teacher adapts to the needs of the students and gives the freedom to create knowledge for themselves. Experiential learning is one of the best methods to teach students how things happen in the practical environment of the new world. Develops a unique

thinking sense to grasp concepts easily, it provides opportunities to apply data and ideas to a real-world situation, helping them develop new skill (Lisha, 2022).

In experiential learning, the teacher guides rather than directs the learning process where students are naturally interested in learning. Teachers help learners to organize and connect their reflections to the subject knowledge base. They often teach by example, modelling and encouraging critical thinking (Experiential Learning and the Teacher's Role, 2018). The teacher as facilitator also means facilitating the transfer of knowledge to the real world. In this role, teachers adopt a warm and affirming style to draw out learners' interests and intrinsic motivation. With this approach, teachers often work one on one to personalize the experience based on the student's own life context.

The student plays an active role in the experience, followed by reflection as a method for processing, understanding and making sense of the experience. Although no longer front and center, the teacher plays a more crucial role than ever before to orchestrate learning in their classroom (Suryani & Widyastuti, 2015). Learners also have to demonstrate their knowledge in different ways every day, they make connections based on past experiences from different perspectives.

Teacher observation is very important in the experiential learning process. Teacher's gather information and make sense of what is happening in the classroom environment. Teachers should carefully monitor student activity and correct the mistakes if necessary. The teacher needs to select the appropriate experiences to meet the needs of the student. Teachers should consider each individual as unique. Students differ in their ability's tendencies and attitudes. They have their own strength and weakness. There are talented students, average students and slow learners in a class room. Teachers should consider them equally and respond their needs (Role of Teacher in Experiential Learning Process, 2022).

Additionally, the teacher encourages student participation and makes suggestions on how students should proceed with the activity. Teacher needs to recognize, encourage spontaneous opportunities for learnings to student. Also

participate, experiment and find solutions to challenging situations. It helps learners understand the connections between one context and another. Designed learning experiences, including opportunities to learn from natural outcomes, mistakes, and successes. Teachers try to fully understand and communicate each method. Therefore, they choose hands-on classes that include experimental methods. Children learn by completing real life situations and tasks. In this way they can gain their own experiences and better understand the content of the course. It is a process of learning through experience or learning through practice. It teaches students how experience can emphasize learning. Students acquire knowledge by performing tasks that generate a new experience. (Lisha, 2022).

2.4.3 Elements of Experiential Learning

Instruction is designed to engage students in direct experiences which are tied to real world problems and situations in which the teacher facilitates rather than directs student progress. The focus of experiential learning is placed on the process of learning and not the product of learning (UC Davis, 2011). According to Association for Experiential Education (2014), experiential learning has the following elements;

1) Experiences

The experiences are carefully chosen for their learning potential (i.e., whether they provide opportunities for students to practice and deepen emergent skills, encounter unpredictable situations that support new learning, or learn from natural consequences, mistakes, and successes).

2) Reflection

Reflection on learning during and after one's experiences is an integral component of the learning process. This reflection leads to analysis, critical thinking, and synthesis.

3) Conceptualization

Throughout the experiential learning process, the learner is actively engaged in posing questions, investigating, experimenting, being curious, solving problems, assuming responsibility, being creative, and constructing meaning, and is challenged to take initiative, make decisions and be accountable for results.

4) Application

Learners are engaged intellectually, emotionally, socially, and/or physically, which produces a perception that the learning task is authentic (Center for Teaching & Learning, n.d.)

2.4.4 Benefits of Experiential Learning

The world that we live in today is dynamic and ever changing. The process of learning is also evolving. Experiential learning can allow students to immediately apply things they are learning to real world experiences. This helps them retain the information better. Experiential learning often involves working in a team, so learning in this setting allows students to practice teamwork. Students are more motivated and excited about learning in experiential settings (Bleich, 2018). Students build on what they already know and are provided with opportunities to make connections between new concepts and existing ones.

The benefits of experiential learning are multifaceted and extend across diverse domains, including education, professional development, and personal growth. For learners, the hands-on nature of experiential learning promotes deeper understanding and retention of knowledge. By actively participating in activities that directly relate to the subject matter, they can internalize concepts and apply them in practical situations (Ali, 2019). Through the observation of learners navigating obstacles and working together in experiential activities, educators can get a comprehensive picture of the strengths, areas for growth, and learning styles of their students.

Experiential learning has been shown to be very engaging for pupils and improve long-term memory when done well. In addition, it fosters deeper comprehension and the development of digital era competencies including knowledge management, critical thinking, problem-solving, and enhanced communication (Bates, 2015). Experiential learning can be good for helping people explore their own strengths when learning new things. Students could find it difficult to understand ideas

that have no bearing on the "real world." Students get the chance to apply concepts and facts in a real-world setting where they are also actively involved through experiential learning. The material comes to life for the student when they engage with it (Stuart, 2019).

Experiments are exciting and fun for students, and they will be passionate about learning. Students using the experiential learning are able to spend time reflecting about what they are experiencing and learning. This is valuable as they are able to better retain information when they can think about what's happening to them. Students can greatly benefit from learning that helps them prepare for the real world. Experiential learning is focused on using real situations to help students learn, so they are then better prepared for their future. It nurtures a sense of autonomy and self-efficacy, empowering learners to take ownership of their learning journey (Western Governors University, 2020).

In addition to improving students' knowledge and abilities, experiential learning aims to stimulate their emotional interest. Experiential learning provides an avenue for students to explore their curiosity, make mistakes and learn from those mistakes in a low-risk environment. Students who actively participate in the learning process may find that learning is more fulfilling for them. Through practicing experiences, students learn more quickly. When students experience more as a student, it can help them become more mature. The experiences in the learning process create a sense of relevance. Through real-world experiences, individuals can hone these skills in authentic contexts, preparing them for success in academic, professional, and personal pursuits (Alicia, 2021).

Errors are a part of experiential learning. Students discover that some methods are more effective than others when they work on experiments. They throw away the ineffective techniques, but the act of trying something and then giving up on it really contributes significantly to learning. Instead of being afraid of errors, students learn how to grow from and remember them. Students collaborate in groups on the majority of experiential learning activities. Students gain greater experience working

in teams by collaborating on these activities, utilizing the individual talents of each team member. As a result, the students gain leadership, critical thinking, and situational flexibility skills (Envision, 2015).

The Invictus International School (n.d.), states that experiential activities emphasize hands-on learning, and so students are always guided through focused coaching. Post activity, reflection, and feedback are integral. The analysis helps students unpack why their solutions did not work. It also helps them to gain a better understanding of their own responses to learning. For students who fear mistakes, experiential learning is a gentle, guided approach to let them know that mistakes are part of the learning process (What Is Experiential Learning and How It Benefits Your Child, n.d.)

The positive effect of experiential learning has actual implications for teachers who are thinking of implementing this method. Teachers who are considering incorporating experiential learning into their classes can ensure their students' success by equipping them with the necessary knowledge to complete the task. This is because, according to experiential learning, knowledge is developed through the process of turning practice into understanding (Kong, 2021). Moreover, as technology evolves and the world becomes more connected, it's more important than ever to teach transferable skills such as leadership, problem-solving, innovation and more to our children. Overall, experiential learning is a powerful tool for teaching important life skills and helping students make a deeper connection with the knowledge they gain in the classroom (Tan, 2022).

2.4.5 Drawbacks of Experiential Learning

Nonetheless, there are some challenges faced while using experiential learning approach. Despite its transformative potential, experiential learning is not without its challenges. Experiential learning is useful for examining how individuals learn, but it is not very effective in examining learning that takes place in larger social groups. The importance that non-reflective experience has in the learning process is

not sufficiently addressed by experiential learning. Learning preferences could change over time. (Cherry, 2022).

One of main challenges of experiential learning in conducting practical activities is insufficient facilities. Schools do not have enough laboratory spaces for the number of students enrolled in the practical classes (Nooghabi, Iravani, & Fami, 2011). Experiential education programs can be expensive, particularly those involving travels, which may be out of reach for some students. Experiential education programs can be time consuming, requiring students to balance their academic with their experiential activities (The Benefits and Limitations of Experiential Education for Students, 2023).

Some experiential education activities, such as outdoor education, may involve risks that could potentially harm students. Not all students may have access to experiential education opportunities, particularly those who attend schools with limited resources or who have other responsibilities that prevent them from participating. Certainly, experiential learning approaches require a considerable restructuring of teaching and a great deal of detailed planning if the curriculum is to be fully covered. Indeed, there are circumstances where it is impractical, too dangerous, or too expensive to use real-world experiential learning (Theories of Learning: Experiential Learning in Online Learning Environments, n.d.)

Implementing experiential learning initiatives may require significant resources, time, and logistical coordination. Educators and may encounter resistance to change or skepticism about the effectiveness of hands-on learning approaches. Furthermore, assessing the impact of experiential learning activities and measuring learning outcomes can present inherent complexities (Ali, 2019).

Overall, the disadvantages of experiential learning include difficulties in empathy development, inadequate support and resources, and limitations in practical experience (What Are the Disadvantages of Experiential Learning in Students, n.d.).

However, it is important to consider the limitations of experiential education and ensure that all students have equitable access to these opportunities.

2.4.6 Teaching Science through Experiential learning

Learning is done through actions, when individuals perform or do, they discover and absorb. It represents an alteration in the behavior as a result from the experience. When people learn, their behaviors would change as they obtain information and experience (Solomon, 2014). Kolb (1984), defines individual learning as "the process whereby knowledge is created through the transformation of experience". Individuals differ in their learning style. It depends on how people learn based on ability to comprehend and retain information. Learning styles will be influenced by their previous learning experiences, culture and the society they live in. There are many ways of looking at learning styles, one of the learning styles is Kolb's experiential learning style (Understanding Adult Learning Styles, n.d.).

Experiential learning comprises of learning activities, both inside and outside the classroom that are designed to actively engage students to learn by doing, and then reflecting on the process and experience and actively creating their own understanding. Experiential learning activities can be designed and incorporated into any learning environment, from kindergarten, through school and tertiary education as well as adult education (Barton, 2019). The teacher becomes more of a facilitator when designing experiential learning activities. Research has proven that students of all ages learn better during initiatives that involve applying concepts in practice, in order to solve real world problems, actively make decisions, and then reflect on the outcomes or consequences of their learning actions and decisions (Experiential Learning in and out of Classroom, 2019).

Affective engagement is also an important part of science learning, contributing to the development of a more purposeful and positive learning environment. Students participate in an activity, then apply what they have learned to new circumstances. Through these ways, they can improve their critical thinking,

problem-solving, and emotional intelligence in addition to learning new information. Through the promotion of a better knowledge of concepts and their real-world applications, experiential learning goes beyond rote memorization (How experiential Learning Works, 2019).

Experiential learning is a dynamic educational approach that emphasizes hands on, immersive experiences as a primary means of learning. It is rooted in the idea that individuals learn best through direct experiences that engage their senses, emotions, and intellect. Unlike traditional passive learning methods, experiential learning actively involves participants in the learning process, allowing them to apply knowledge in real world contexts (Ali, 2019).

Experiential learning activities are designed and carried out in ways that offer each learner the chance to engage in the manner that suits them best as per their preferred learning styles. Experiential learning is a process in which new data is comprehended by the learner and transformed by the means of an experience. This method investigates particular components such as skills, techniques and the environment, which will ensure that the learner gains knowledge that is relevant to those particular components (Kolb, 2006).

An "atmosphere" that a teacher creates to improve a student's learning capacity is another term for true experiential learning. Experiential learning is an organizational learning strategy that, when properly designed, organized, and executed, can gradually improve both the teaching and learning styles of teachers and students. Building on a learner's strengths and utilizing their talents, experiential learning aims to support the full development of the individual (Pherson-Geyser, Villiers, & Kawai, 2020).

To ensure that learning is maximized, it is critical that teaching and learning styles align. Educators can design learning exercises that relate with the way participants take in information and tailor the learning intervention that is in line with Kolb's four stages. Teacher support participants to learn more efficiently and effectively by

combining learning styles. Learners must understand the reasons why different teaching styles are used in order to understand their own learning. Specifically, that means that for learning to occur, individuals must be able to reflect on their experience and abilities to synthesize their acquired knowledge to make sense and meaning so that they are able to apply these skills (Luisi, Rodgers, & Schultz, 2019).

In a real-world scenario, activities and learning experiences should be developed in ways that build up on each stage of the experiential learning cycle and take the participants through the whole process in sequence make it a wholesome learning experience. In experiential learning, teachers modify their lesson plans to meet the type of experiences, children need despite having lots of advantages, experiential learning also has few disadvantages however compared to the drawbacks, children benefit more.

2.5 Learning Theory Related to Experiential Learning

The understanding of how children acquire knowledge has influenced teaching learning processes in the classroom significantly. The role of teachers has changed from the person imparting information to a person facilitating the construction of knowledge. Teaching science has also been influenced by the changing psychological ideas about teaching and learning (Agarkar, 2019). According to National University (2022), every learner has a unique way of learning, every student learns differently. Teachers can help students stay more interested and succeed in the classroom and beyond by incorporating theories of learning into their teaching methods provide teachers with tools they can utilize to better meet the diverse academic needs of their students.

Twentieth century educational psychologists came out with theories of learning that explained the way children acquired skills and knowledge. Educational psychologists have developed theories of learning based on three paradigms - behaviorism, cognitivism and constructivism. Behaviorists believe that the behaviors of learners are a response to their past, and behavioral modification is the main purpose of education. According to cognitivists, the behaviors of learners is the result

of his/her cognition. On the other hand, constructivist believe that learners construct their own knowledge, and the objective of education is to provide opportunities to gain knowledge (Influence of Learning Theories on Science Education, 2019)

As the learning theory moved from behaviorism to constructivism, classroom interaction also witnessed changes. Numerous principles of behavioral learning theories can be found in the practice of adventure and other forms of experience-based learning. The principle that behavior changes according to its immediate consequences is perhaps the most important in both classroom and non- classroom learning environment (Dochy et al., 2012). The following part will describe the related learning theories of experiential learning.

2.5.1 Experiential Learning Theory

The theory was proposed by psychologist David Kolb. Experiential learning theory draws on the work of prominent 20th century scholars who gave experience a central role in their theories of human learning and development. According to Kolb, this type of learning can be defined as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combinations of grasping and transforming the experience" (The David Kolb Theory of How Experience Influences Learning, n.d.). The focus of Experiential Learning Theory is experience, which serves as the main driving force in learning, as knowledge is constructed through the transformative reflection on one's experience (Baker, Jensen, & Kolb, 2002).

Experiential learning theory offers something more substantial and enduring. It offers foundation for an approach to education and learning as a lifelong process that is soundly based on intellectual traditions of social psychological, philosophy and cognitive psychology (Kolb, 2014). According to experiential learning theory students cycle through the four different learning modes of concrete experiences, reflective observation, abstract conceptualization and active experimentation. Learners immersed in particular experiences

and reflect their experiences to develop new skills, attitudes or ways of thinking (Fromm et al., 2021).

Through experience, learners can have a firsthand grasp of the events occurring around them. Experiential learning can be good for helping learners explore their own strengths when learning new things. The theory addresses how learners can play to their own strengths as well as developing areas in which they are weakest (May-Varas & Mead, 2022). With the use of analysis and evaluation of real-world experiences, students gain new knowledge through this action-based learning process. Kolb's experiential learning theory focuses on experience, encompassing perceptual, contextual, and emotional elements that affect learning. It adopts a more comprehensive approach (Nguyen, 2022).

The experiential learning theory works in four stages-concrete learning, reflective observation, abstract conceptualization, and active experimentation. The first two stages of the cycle involve grasping an experience, the second two focus on transforming an experience. Kolb argues that effective learning is seen as the learner goes through the cycle, and that they can enter into the cycle at any time (Experiential Learning Theory, 2020). In other words, experiential learning involves retrospectively assessing what is useful and what needs to be remembered after participating in an experience, and then accumulating them for use in future activities.

Kolb argued that in order to learn, one must first acquire abstract concepts that one may subsequently apply flexibly in a variety of contexts. In light of this, experience is transformed into knowledge (Growth Engineering, 2021). As such, it's experience that helps us to gather information, build our knowledge and develop new skills. And this can only happen when we're playing an active and engaged role in a learning process (Clope, 2023). Indeed, when we have the chance to participate, reflect, and ask questions, learning events take on greater significance.

According to Dewey, he believed that receiving practical experience is just as important as acquiring theoretical knowledge in education. He had a holistic approach to education, seeing it as an ongoing process that allows students to integrate their

critical thinking abilities with concrete outcomes and blends knowledge with real-world experiences. According to this perspective, learning happens when students have meaningful experiences that advance their development as individuals (Main, 2023).

In Piaget's terms, learning is the result of the dialectic processes of integrating new experiences into pre-existing concepts and adapting preexisting concepts to novel experiences. When an individual and their surroundings work together harmoniously, learning happens. ELT proposes a constructivist theory of learning whereby learners generate and reconstruct social knowledge in their own personal knowledge. This is in contrast to the "transmission" concept, which propagates prior, established ideas to the student and forms the basis of much of the current educational practice (Kolb, A. & Kolb, D., 2018).

2.5.2 Constructivism

Constructivism is a paradigm of learning that highlights how students actively construct their own understanding. Learners consider their experiences and integrate new information into their schemas as opposed to absorbing information passively (McLeod, 2023). According to constructivism learning theory, the learner constructs new knowledge as part of a group or independently, based on prior knowledge and experiences, by participating in a situation rather than passively absorbing information. Based on Piaget, learners develop their own knowledge of the world through their experiences and interactions with their environment. In this view, learning is not just about acquiring information but also constructing meaning and understanding through exploration and discovery (Marougkas, Troussas, Krouska, & Sgouropoulou, 2023).

By fostering an environment of active learning and discovery, constructivism helps learners develop a deeper and more meaningful understanding of the world. A constructivist approach to education views learners as active, competent, capable, and powerful. It tends to motivate learners to learn by 'doing', which leads to retention,

critical thinking and engagement (Main, 2021). Additionally, John Dewey, who believed that education should be centered around the learner and their experiences. Dewey believed that learning should be interactive and that students should be encouraged to explore and discover new information on their own.

Robo Wunderkind (2022) believes that education can be a fun and engaging process, and both constructivism and constructionism agree that this is the best way to go ahead. If done right, it alters the way we think for the better and lets us explore new horizons (Constructivism: Why Learning through Experience Is the Best, n.d.). During their life individuals tend to draw on their experiences of their interaction with people, places, situations and environment. Students especially when moving ahead from their adolescent towards young adulthood are prone to absorbing experiences which occur as part of their daily life (Mughal & Zafar, 2011).

Constructivism affirms that knowledge is best gained through a process of action, reflection and construction. Piaget focuses on the interaction of experiences and ideas in the creation of new knowledge. Vygotsky examines the value of learning with peers and the ways in which culture influences the adaptation and assimilation of information. Dewey emphasizes inquiry and the integration of real world and classroom activities. The constructivist relies on the learners to be in control of their own acquisition of knowledge and encourages the instructor to serve as a facilitator (Brau, 2020).

Constructivist learning is often associated with hands on, experiential activities. This is in keeping with Vygotsky's belief that learners learn best by doing and experiencing things for themselves. Additionally, constructivists believe that learning should be scaffolded, or supported, in order for students to be successful (Lane, 2022). The constructivist method places a strong emphasis on the value of pupils creating their own knowledge as opposed to merely taking classes and memorizing what they are taught. It also acknowledges the importance of experience in learning, emphasizing that for kids to learn well, they must have opportunities to explore and engage with their surroundings.

Piaget proposed that children learn through their own active exploration and experimentation with their surroundings. They do this by making mental models or representations of what they observe, which they then use to understand and explain new situations. Similarly, Vygotsky believed that learning is a social process, where people learn from each other through interaction and collaboration (Vygotsky's Constructivist Theory of Learning, 2022). Another approach of Vygotsky's is to provide opportunities for students to engage in problem-solving activities with more knowledgeable peers or adults.

2.5.3 Pragmatism

Pragmatism is a philosophical approach that measures the truth of an idea by experimentation and by examining its practical outcome. Every continuous experience or activity is educative and all education, in fact, resides in having such experience. Pragmatists firmly believe that old and traditional education is dead and lifeless. Education is a continuous reorganizing, reconstructing and integrating the experience and activities of race. Activity, experiments, and firsthand experiences are the only ways to acquire true knowledge (Pragmatism in Education, n.d.).

Pragmatic method is an activity-based method. The essence of pragmatic method is learning through personal experience of the child. To a pragmatist education means preparation for practical life. To the pragmatist "education is not so much teaching the child things he ought to know as encouraging him to learn from himself through experimental and creative activity". Learning by doing makes a person creative, confident and cooperative (Sharma, 2018). According to pragmatists, this methodology focuses on giving students a great deal of autonomy as well as alternatives to their existing learning environments.

According to Pierce (2016), experience is what gives us the capacity to think about supposedly external objects and progressively deepen our comprehension of them. Though it doesn't have content derived from ideas, practical requirements, or anything else non-sensory, experience serves as the foundation for knowledge. Such

encounters are only means of communication with the outside world (Legg & Hookway, 2008).

Pragmatism links to a reflective practitioner paradigm whereby students are asked to think critically about what they do. Further, learning is influenced by self-discovery. It centers on deliberate human investigation. As problematic situations arise and are acknowledged, inquiry is seen as an ongoing process that acknowledges the qualitative aspect of human experience (Klockner, Shields, Pillay, & Ames, 2021). Public policy scholars Ansell and Geyer (2017) note that “pragmatists emphasize that learning is an ongoing process of problem-solving, deliberation, experimentation, sedimented over time as experience, identity, habit, skill and knowledge”.

Under a pragmatic philosophical lens, students' learning is framed by their work experience and professional context in addition to their primary subject area of interest. Their work serves as a means of experiential learning that they are encouraged to "try on" both inside and outside of the classroom. One is encouraged to be adaptable, integrated, reflective, and critically thinking (Pragmatism as a teaching philosophy, 2021). Pragmatism emphasizes classroom environments which foster transformations in thinking and these transformations in thinking can often be observed in the quality of student's learning.

Experience is not merely something undergone, but also, and always, something actively done. Dewey's Experience and Nature suggests that a human being, like any other organism, continually interacts with its natural surroundings, and this observation serves as the starting point of pragmatic naturalism (Kaag, 2009). Overall, Dewey held the pragmatist view that the worth of something is determined by its impact on every day, lived experience. Likewise, Dewey believed that the significance of art was found in its impact on everyday experience. Dewey also believed that the power and significance of education lay in its impact on every day, lived experience. Moreover, he was greatly concerned that formal education was disconnected from everyday experience (Pugh, 2011).

In a unique way, Dewey emphasized that learning and experience are mutually reinforcing, or at least they ought to be. Learning is a way to expand and enrich experience, just as experience is a way to expand and enrich learning. According to Dewey, a student's experience gives their learning a foundation and gives it meaning. In this statement, Dewey clarifies that knowing a subject is neither an end in and of itself nor just a way to facilitate an experience that is far off. Rather, the subject matter must actively contribute to the vitalization and transformation of the present, everyday experience. An effort has been made to define and, in the end, operationalize what it means for subject matter to vitalize and transform immediate, everyday experience in the construct of transformative experience (Transformative Experience, 2011).

2.6 Related Research and Studies

Research on science teaching and learning plays an important role in helping all students become proficient in science and making science education more equitable and inclusive. The process of research is the essence of the scientific enterprise and of scientific inquiry. Science education builds on the best of research in both worlds' science and education. By engaging in continual inquiry into teaching and learning, we can promote scientific literacy for students in the 21st century (The Role of Research on Science Teaching and Learning | NSTA, n.d.). Different approaches view everyday experiences as opportunities to conduct research that yields findings to improve teaching practices and student learning;

Learners can not only study in books but also apply in practice. Through experiential learning, learners can derive experience and make the most of their knowledge and skills. Traditional learning methods place a lot of emphasis on the teacher, experiential learning methods, on the other hand, focus on the student. Learners have the opportunity to look at the problem from many angles and perspectives and come up with suitable solutions without being imposed. This process consolidates knowledge and helps shape and improve new skills, abilities, behaviors,

and new thinking (Research on the effect and effectiveness of experiential learning for university students, 2022)

Barrett (2007) carried out research in experiential learning in context, method and knowledge to find out experience occurs in the aesthetic realm, and knowledge gained from aesthetic experiences is always situated and contextualized. The want to work with materials, to think and feel via their handling, is the source of the continuity of the artistic experience with everyday activities. The crucial phrase for comprehending the interplay between experience, practice, and knowledge is "aesthetic experience," which is best understood as "sense activity" rather than as it is traditionally described in eighteenth-century narratives.

In a 2009 study, Wurdinger and Carlson found that in order for students to experience things firsthand they must create, design, build, and test them personally to determine their worth. Through a pattern of inquiry and testing their theories against reality, experiential learning enables students to become more adept problem solvers. There is a big difference between learning a teaching approach by heart and putting it into practice in a classroom. They contend that experiential learning is first and foremost a learning process and secondly, that it may occur outside the classroom. Educators that view experiential learning as a process understand that students do not need to leave the classroom to learn experientially it can be considered working together in small groups to solve a problem, giving presentations to a classmate in classroom and reflecting on the process. Teachers should concentrate on engaging students in problem solving process, no matter where it occurs, because it is a vital life skill that students should acquire.

A study by Nweke, Abonyi, Omebe, and Njoku (2014) claims that when the experiential teaching method is used in the classroom, students are divided into small groups and given meaningful tasks to complete. The teacher circulates among the groups to encourage students to interact with the materials and help them make sense of them, which results in meaningful learning. What matters most is that the application of the experiential teaching technique takes into account the learners' prior

experiences. Based on the ideas that children learn best when they are completely engaged in their work, when they are interacting with one another, when they complete tasks independently, when they experiment, and when they make decisions based on the quality of the evidence they have gathered, these are the foundational ideas of the experiential learning.

Rooted in the work of Dewey, Piaget, Vygotsky, and Hahn (2014), experiential learning is an overarching term used to classify several different forms of learning approaches, including problem and inquiry-based learning. Yet at the center of each is a focus on a lived experience upon which learners can reflect, think and act. The nature of experiential learning is fairly well understood and agreed upon. Experiential learning, much like professional development, is a process of change within the individual. For each learner it is unique as they draw upon their own past experiences as a foundation to engage with the new (Girvan, Conneely, & Tangney, 2016).

Giac (2017) figured out that experiential learning is oriented towards strong personal learning experiences and capacity development. Positive outcomes are only achieved through experiential learning when the learner experiences a shift in their knowledge, behaviors, and attitude, as well as a change in their judgement, emotions, and knowledge and ability. In the learning activities, learner engagement includes proactive, intellectual, emotional, and sensory engagement. To maximize learning results, experiential learning places a high value on fostering the link between abstract concepts and particular educational activities. Teaching is not just about forming knowledge for students but more importantly, it is about how to apply knowledge into practice, is through learning activities that shape students' abilities to transform the process of learning into the process of developing creative thinking.

Give students the opportunity to interact more directly with the course material through experiential learning, as per the findings of Bradberry and De Maio (2018). This is one of the most effective strategies to establish active learning. A professional and fruitful learning environment is fostered by the pedagogical approach known as experiential learning. Through active engagement and critical reflection on

the subject matter being studied, learners are required to actively develop their own knowledge through a series of exercises. Participating in experiential learning programmes helps students get experience outside of the traditional classroom, which helps them develop knowledge, skills, and values.

Burch et al. (2019) in their study found out the importance of experiences, stating that the experience does more than the transferring of facts. It changes the way the student will think from that moment forward. Experiential learning occurs when students actively process an experience that leads to new knowledge, skills, or insight. Experiential learning activities may significantly assist in this process since students are given the opportunity to develop their own associations between new material and previous knowledge. Similarly, experiential learning exercises allow students time and opportunity to interface with multiple learning dimensions while making comparisons of old and new knowledge. Experiential learning activities may, therefore, allow students more opportunities to process information, make connections, consider previously held emotional states and skills, and opportunities to apply new knowledge.

According to study conducted by Hulaikah, Degeng, and Murwani (2020), experiential learning makes learners memorize what they hear and what they do. It can facilitate the learners to make a link between theory and real-world applications, motivations and retentions of learning. Learners participate in concrete experience (do), reflect on that experience and other information (reflect), develop theories based on experiences and knowledge (think) and formulate a conclusion or solve a problem (apply). It is important to emphasize the role of experience in solving problems. The students mainly believed that experiences are the source of their knowledge to analyze and solve the problem through the combination of theories and practices.

Acquiring experience involves seeing and responding to circumstances. It encompasses conceptual anticipation as well as perceptual actions. It requires both object, event, and situation evaluation as well as knowledge. People do learn from their experiences, experiential learning has become the method of choice for learning and personal development (Kolb, 2014). Through common aspects of their everyday

life, experiential learning helps learners put concepts into a holistic vision that is sustained. A learner needs to be prepared to learn and intellectually engaged for an influence to be successful. Its relationship improves retention of knowledge (Pherson-Geyser et al., 2020). The fundamental goal of experiential learning is knowledge transformation. The process of making a new or revised interpretation of the meaning of an experience, which guides subsequent understanding, appreciation, and action is known as transformative learning.

It is widely acknowledged, according to Weinstein (2021), that experiential learning is a methodical approach to applied learning that is sparked by students' ability to draw significant lessons from a variety of experiences both within and outside of the classroom that support lifetime learning. Effective experiential learning promotes "the continuity of experience," which means that stimulating learning opportunities continuously pique students' curiosity and inspire them to push past predetermined boundaries. In order to learn how to interpret experiences effectively, students must be extremely driven to understand the core, or important meaning, of each life experience. This may rely significantly on the intellectual and emotional maturity that many students need to develop.

Varman (2023) states that experiential learning exposes children to experiences where they can explore, play and become familiar with the materials and concepts that could lead to lifelong learning of the concept. In the most productive studies, children have a significant role in the exploration and participation in the activities. In addition, children were encouraged to solve problems and be reflective, the activities needed their participation and required them to perform a physical task as part of the learning process. Organizing experiential activity in teaching science is to provide opportunities for students to observe and experiment and discover and explore science. The purpose of teaching science through experiential learning is to connect students to practical situation to learn in, by and for the real life.

The inaugural issue of experiential learning marks a milestone in the growing awareness and use of experiential learning as a platform in education. An increasing number of educators are experimenting with incorporating experiential learning into their practices as learner-centered, experiential education has become more and more popular in the twenty-first century. Students gain a deeper, more meaningful knowledge of the material and how things work in the real world through experiential learning, which gives them the chance to explore ideas firsthand (Kolb, A. & Kolb, D., 2017). In conclusion, it is evident that experiential learning significantly affects academic success and interest.

The studies and research in this area demonstrates that experiential learning is a successful teaching approach. Additionally, it helps students in positioning learning as a continuous process in which students bring their own knowledge, ideas, beliefs, and practices at different levels to their understanding and interpretation of new information (Bartle, 2015). Experiential learning also generates or enhances personal interest in a subject and exposes students to a variety of viewpoints and a range of outcomes related to particular situations. Most importantly, experiential learning gives students the possibility of learning from natural consequences, mistakes, and successes.

2.7 Conclusion

It has become increasingly important for Bhutanese teachers to allocate more time for their students to engage in self-learning and activity-based learning. In such circumstances, it will be necessary for teachers to ensure that students increase personal efforts and depend less on the teachers to direct their learning. With the introduction of concepts such as a child-friendly school, child-centered teaching and learning, child-centered pedagogies, and constructivist strategies into the Bhutanese education system, it is opportune for teachers to reflect on their role in the school system. They need to ask themselves if they are moving towards giving more independence for students to learn. Teachers are at the heart of the education system, and they play a most important role in ensuring quality learning. Nothing can

substitute for an effective teacher in a student's learning. Teachers can improve instruction and encourage students to learn better (Sherab & Dorji, 2013).

The implementation of experiential learning within schools may hold many advantages. Through common aspects of their everyday life, the concepts become real for the learners through experiential learning. In order to foster maximum intelligence, teachers can create their own experiences in the classroom by utilizing experiential learning and the learners' prior knowledge. Experiential learning places the attention on the learners. Experiential learning also encourages teaching that diverges from the traditional approach to pragmatic learning. The main objective of experiential learning is to enhance the learning experience of the learner. Prior experience is a fundamental part of learning and what is brought into the classroom. The variety of student experiences enhances the learning environment and the methods of instruction when using experiential learning. Using the same guiding concepts that are taught in the classroom, these tactics help the students apply the experiences they have had before joining the classroom (Pherson-Geysler et al., 2020).

When catering to a vast number of learners with different styles, it is good to be well-equipped with the necessities to shift from traditional methods to experiential learning. Experiential learning is a great tool for teaching science concepts and skills. In order to prepare all children for life outside the classroom, educators frequently find themselves in a difficult situation. While providing kids with a solid academic foundation is important, they also need to give equitable and real-world experiences. Attaining this fine balance can be challenging. The knowledge and experience students need to find fulfilling jobs and succeed in the workforce can be given by educators through experiential learning, though. Experiential learning, which typically includes activity-based learning, is a powerful game-changer that helps individuals develop new skills, gain confidence, enhance problem solving abilities, gain a deeper understanding of the subject matter, and improve knowledge retention (The Future of Learning: 9 Key Benefits of Experiential Learning for Educators, Students, and Organizations | Riipen, n.d.).

Considering that learning from experience or learning by doing is an important key to reach the success in education, experiential learning develops the student's autonomy. By experiential learning, the students are faced with unknown situations and tasks in a real context. To finish those tasks, the students need to realize what they know, what they do not know and how to learn. This demands the students to reflect on their previous knowledge and go deeper into it by reflection; this is how the transfer of previous learning into new contexts takes place. Finally, those skills make students learning throughout their life, as autonomous students. In order to successfully face the problems and substantial changes occurring not only in society but also in the psychological structure of its players, education is a process that is constantly evolving. Its structure, vision, aims, and methods are all regularly adjusted. With less emphasis on memorization and mechanical learning, experiential learning is a good substitute for traditional education because it directly capitalizes on abilities and attitudes linked to problem solving and critical thinking (Gorghiu & Santi, 2016).



CHAPTER 3

RESEARCH METHODOLOGY

The general process for carrying out the study is described in this chapter. It describes the research design, the study's population, samples and participants as well as the demographic profile of the individuals, the data collection instruments used and their validity and reliability.

3.1 Research Design

A research design is defined as the overall plan or structure that guides the process of conducting research. It is a vital step in the research process and acts as a guide for the procedures and methods to be followed during the study, including data collection and analysis. To make sure that the goals of the study are fulfilled and the findings are accurate and dependable, a well-designed research study is necessary (Alam, 2023). The researcher followed mixed mode of research methodology in which a researcher combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and validation (Schoonenboom & Johnson, 2017).

Johnson and Christensen (2017) refer to the mixed methods research study meeting the relevant combination of set of quantitative, qualitative, and mixed methods validities in each research study. The overall goal of mixed methods research, of combining qualitative and quantitative research components, is to expand and strengthen a study's conclusions. Ultimately, mixed methods research is about heightened knowledge and validity. One can use mixed methods to examine different aspects of a single research question, or one can use separate but related qualitative

and quantitative research questions. In all cases, the mixing of methods, methodologies, and or paradigms will help answer the research questions and make improvements over a more basic study design. Fuller and richer information will be obtained in the mixed methods study.

Pretest and post-test procedures were used in this research to gather quantitative data on learning achievement and semi-structure interview and questionnaire were used to gather qualitative data on students learning satisfaction. The study's research design is presented in Figure 3.1 below.

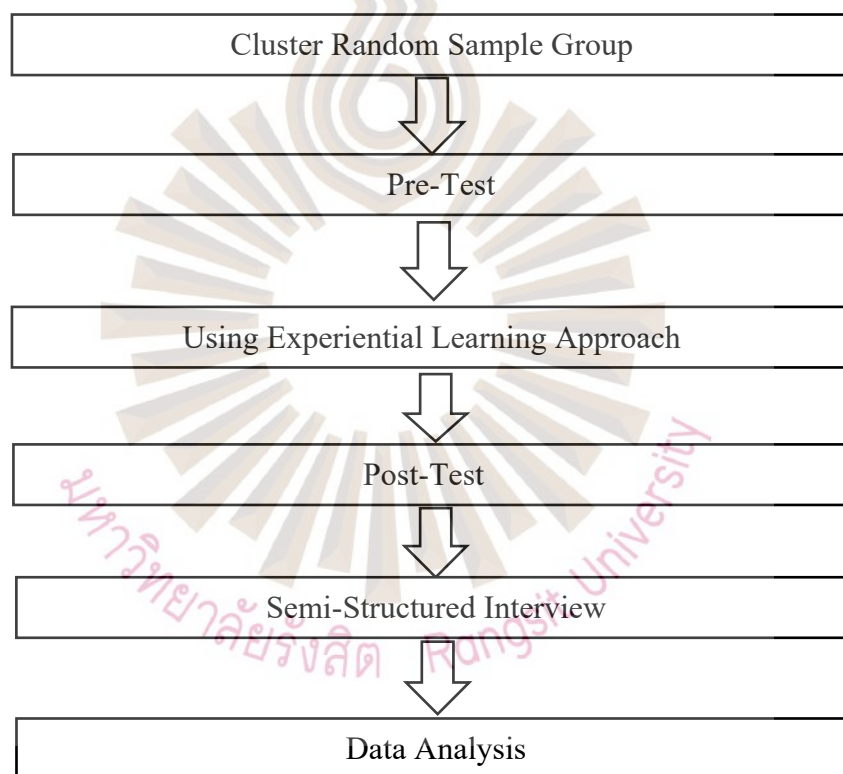


Figure 3.1 Research design of the study

3.2 Population and Sample of The Study

The population of the research included four sections of grade 6 students in one of the schools in Thimphu. Since the research school consisted of more than one section of grade 6, the researcher used one of the section's research participants.

Therefore, one section was chosen with forty students with mixed abilities in learning and gender. The age of the learners ranged from 11-14 years.

Table 3.1 Demographic profile of the research participants

Gender	Male	Female	Total
Number of the students	18	22	40
Age group	11-14	11-14	-

3.3 Research Instruments

The researcher adopted mixed methods design for this research. The researcher used qualitative and quantitative tools in this study to reduce inadequacies and to improve the research outcome. Lesson planning, achievement tests and semi-structure interview acted as the primary data gathering devices. The information was gathered from the learning achievement test which was used for the sample group before and after the treatment, while the structured interview was conducted with the sample group after the post-test.

3.3.1 Lesson Plans (An Intervention Instrument)

For this study, the researcher designed four lesson plans of 45 minutes each incorporating experiential learning approach to teach the topic ‘Classification of Animals’ lessons in a week. The topics were divided into sub topics which were relevant to experiential learning approach. Each lesson plan were used to teach two sessions lasting 90 minutes. The research participants attended two sessions in one week.

Due to limited time bound for a month, the researcher limited herself to four different types of experiential learning activities. These experiential learning activities employed with the topic appropriateness and context. The study lasted for four weeks. (See the Appendix C for Lesson Plans).

Table 3.2 List of Topics

Time	Topics	Experiential Learning Activities
Week 1	Reptiles & Amphibians	<p>Campus Tour</p> <p>Concrete: Students goes out to observe animals (frog, lizard, toad, etc.) they see around in the campus or if not show the pictures and videoclips of animals belonging to reptiles and amphibians on smart screen.</p> <p>Reflection: Students will be asked to reflect what they saw and ask to remember what character does these animals possess.</p> <p>Abstract Conceptualization: Ask to note down few characteristics of reptiles and amphibians they have learnt.</p> <p>Application: Students will be able to identify animals belonging to reptiles and amphibians in nature and would be able to sort out the differences among them.</p>
Week 2	Fishes	<p>Art Based Activity</p> <p>Concrete: Teacher will provide the students with paper to draw picture of any fish they like and label their parts on the diagram drawn.</p> <p>Reflection: Teacher will ask children to think about the characteristics of fish and how fish body look like.</p> <p>Abstract Conceptualization: Students list down the characteristics of fish they know.</p> <p>Application: Students can identify different types of fish and know the characteristics of fish.</p>

Table 3.2 List of Topics (Cont.)

Time	Topics	Experiential Learning Activities
Week 3	Birds	<p>Mindful Listening</p> <p>Concrete: The students will carry out mindful listening activity where they will listen to sound of birds which teacher will play from this link Nature Birds Noises for a minute.</p> <p>Reflection: Students will be asked to identify the sounds of birds they heard asking questions like does all the bird makes same sound?</p> <p>Abstract Conceptualization: Students will be asked to list down the characteristics of bird they know and list the names of different birds they know.</p> <p>Application: When they see the birds in nature or their surroundings, they will be able to identify and will have the idea about bird characteristics.</p>
Week 4	Mammals	<p>Quiz</p> <p>Concrete: Students will be divided in groups to play the quiz games about Mammals displayed on smart screen.</p> <p>Reflection: Students will be asked to answer the quiz questions by reflecting on the characteristics of mammals.</p> <p>Abstract conceptualization: Students will be able to list down the characteristics of mammals and they know which animals now belong to mammal group.</p> <p>Application: They know animals like cats, dogs, cows, even human suckle their young ones with milk. They can classify which animals belongs to different group of animals under the classification of different animals.</p>

Source: Researcher

3.3.2 Quantitative Data Collection Instrument

The quantitative data collection was collected through learning achievement test.

Pretest and Post Test

The learning achievement test was developed based on the learning outcomes outlined in the Royal Education Council's (REC, 2020) curriculum framework. Pretest and posttest were given to students before and after the use of experiential learning approach in the teaching of science to assess their degree of learning achievement. The paired sample t-test was used to analyze the learning accomplishment scores from the pretest and posttest using the appropriate software application. Based on the mean, standard deviation, and significant value, a comparison was made. The test questions comprised of 5 marks multiple choice answer questions, 5 marks true or false answer questions, 5 marks fill in the blank questions and 5 marks short answer type questions for the pre-test and the post-test on the topic "Classification of Animals". (The learning achievement test questions are attached in Appendix D)

3.3.3 Qualitative Instrument

Semi-structured Interview

In order to find out the students' learning satisfaction towards experiential learning approach in learning science, the researcher included 40 participants divided into five groups for the interview, each student from chosen group had a face-to-face interview with the researcher after the treatment of the approach. The structured interview questions consists of 5 questions which the researcher framed. All the structured interview questions were categorized into four themes; joy in learning, class participation, unity and cooperation and performance improvement of experiential learning in students' learning for analyzing the data (The semi-structured interview questions will be attached in Appendix E).

3.4 Validity and Reliability of Research Instruments

3.4.1 Validity

For this study to evaluate the validity of the instruments, three experts, one from Thailand and two from Bhutan, who are experienced science teachers, conducted the content validation. In relation to the research topics, they assessed the instruments' linguistic features, applicability and content coverage. The researcher made the necessary instrument adjustments based on the advice and ideas of the three specialists. The validity of the instruments was evaluated using the Item Objective Congruence Index. Rovinelli and Hambleton (1977) developed the index of item objective. The following criteria for validating the IOC index vary from -1 to +1;

+1 will indicate that the items are in line with the study's goals.

0 will indicate that the items are unclear or uncertain in relation to research objectives.

-1 will indicate that the items are unrelated to the goals (See Appendix B for Validity Report by Experts).

The Item Objective Congruence Index (IOC) was used to determine the validity of the instrument to make sure that it met the objective's criteria. The results of the items were scored on a scale from -1 to +1. The items were considered to have met the stated objectives if the rating was "+1". The item were considered unclear if the rating was "0". Additionally, if the item receives a "-1" rating, it did not fulfil the stated aim. IOC will be determined using the $IOC = \frac{r}{n}$ where 'r' represents the average of the scores of individual experts and 'n' represented the number of experts who validated the items. The range of 0.67 to 1.00 is regarded as accurate and appropriate for test item values. However, a value less than 0.67 is unacceptable and should be changed in accordance with the experts' suggestions.

Experts validated all the instruments used in this investigation and was given them score above 0.67, indicating that the items was appropriate for the study. The

semi structure interview, questionnaire and lesson plans all received a +1 on the IOC scale. The learning achievement test questions was rated above 0.67 (Refer to Appendix B for Validity Report by Experts).

3.4.2 Reliability

According to Middleton (2019), reliability refers to how consistently a method measures something. If the same result can be consistently achieved by using the same methods under the same circumstances, the measurement is considered reliable. The scores should remain the same when the instrument is administered repeatedly at different times, and it should remain consistent.

For the confirmation of the reliability of the learning achievement test questions, researcher conducted a pilot test with 28 students from grade VII from one of the schools in Thimphu, Bhutan, to assess the reliability of the achievement test, which consists of 5 marks multiple choice questions, 5 marks true and false questions, 5 marks fill in the blank questions and 5 marks short answer type questions.

The reliability test items' Kuder-Richardson coefficient. (KR-20) was used to calculate them. The result obtained was 0.80 (Refer to Appendix F for Reliability Result) which showed the reliability for the test items for the further use.

3.5 Data Collection Procedures

3.5.1 Seeking Approval

The researcher sought authorization to conduct the study from Rangsit University research and development institute. After that, the researcher sent the approval letter to Bhutan's Ministry of Education Officer (MoE). The researcher sought authorization from the Chief District Education Officer (CDEO) after getting the MoE approval letter (Refer to Appendix A).

Before the beginning of the data collection, the researcher asked the permission from the Principal, Class Teacher and Subject Teacher (Refer to Appendix G). To guarantee their legal and ethical rights, research participants signed permission form. Because the research participants are under the age of 18, their parents also signed the permission form.

3.5.2 Anonymity of the Participants

The participants learning satisfaction and learning achievement records were kept anonymous and secret. The identities of the study participants were not revealed. To maintain confidentiality, the study's participants were not identified by name; instead, numbers will be used (student 1, student 2...).

3.6 Data Analysis

3.6.1 Analysis of Achievement Test

The sample group's learning outcomes before and after the usage of experiential learning were compared using the data from the pre-test and post-test scores. The researcher used a sample T-Test to compare the results or the pretest and post-test in order to determine the effectiveness of experiential learning in teaching science. Computing software (SPSS) was used to determine the mean, standard deviation and significance value (p) of the pre-test and post-test (Refer to Appendix J).

3.6.2 Analysis of Students learning Satisfaction

A semi-structure interview was used to collect data. Semi-structured interviews will allow to better understand not just the interest but also their learning satisfaction. The data were analyzed using coding system to develop themes and patterns.

CHAPTER 4

RESULT AND DATA ANALYSIS

The researcher gives a quantitative and qualitative analysis of the use of experiential learning for grade 6 students in this chapter. Semi-structured interviews and learning achievement tests (pre-test and post-tests) were used to gather the information.

The findings were described in line with the objectives of the study and are graphically shown through representations like tables.

4.1 Analysis of Students' Learning Achievement

To determine the level of learning after using experiential learning as learning interventions in science, quantitative data were gathered by pretest and post-test. The pretest and post-test, which were given to 40 grade 6 Bhutanese students before and after the intervention in science, had 20 different questions: 5 multiple choice questions, 5 true/false questions, 5 fill in the blanks and 5 short answer questions. To assess the efficacy of using experiential learning in a Bhutanese classroom, the research participants' pretest and post-test scores were compared using a paired sample t-test. Based on the mean, standard deviation, and significance level (P-Value).

4.1.1 Analysis of Quantitative Data

The first research question of the study was: To what extent will students' learning achievement in science improve as the results of experiential learning? Quantitative data from the pre-test and post-test were gathered and evaluated. By comparing the sample group's pre-test and post-test results, the comparison was conducted "within the group."

4.1.1.1 Pre-test and Post-test raw score analysis

The learning outcomes of Grade 6 Bhutanese students before and after the treatment were compared using the data gathered from the pre-test and post-test scores, as shown in Table 4.1

Table 4.1 Pre-test and Post-test Raw Scores

Student Number	Pre-test (20)	Post-test (20)	Improved Score	Percentage of Difference (%)
Student 1	8	19	11	55%
Student 2	10	20	10	50%
Student 3	10	19.5	9.5	48%
Student 4	7	18	11	55%
Student 5	3	16	13	65%
Student 6	2	13.5	11.5	58%
Student 7	6	18	12	60%
Student 8	4	16.5	12.5	63%
Student 9	5	17	12	60%
Student 10	6	19	13	65%
Student 11	7	18.5	11.5	58%
Student 12	8	20	12	60%
Student 13	9	19	10	50%
Student 14	6	17	11	55%
Student 15	2	15.5	13.5	68%
Student 16	3	15	12	60%
Student 17	6	19	13	65%
Student 18	8	18.5	10.5	53%
Student 19	10	19	9	45%
Student 20	15	20	5	25%
Student 21	5	14	9	45%
Student 22	6	15	9	45%
Student 23	7	18	11	55%
Student 24	1	9.5	8.5	43%
Student 25	13	20	7	35%

Table 4.1 Pre-test and Post-test Raw Scores (Cont.)

Student Number	Pre-test (20)	Post-test (20)	Improved Score	Percentage of Difference (%)
Student 26	9	17	8	40%
Student 27	6	16	10	50%
Student 28	9	19	10	50%
Student 29	4	16	12	60%
Student 30	10	19.5	9.5	48%
Student 31	4	12.5	8.5	43%
Student 32	6	17.5	11.5	58%
Student 33	5	20	15	75%
Student 34	12	19.5	7.5	38%
Student 35	6	15.5	9.5	48%
Student 36	12	20	8	40%
Student 37	11	19	8	40%
Student 38	2	11	9	45%
Student 39	10	17.5	7.5	38%
Student 40	14	20	6	30%

The progression of each learner is shown in table 4.1. The scores on the pre-test and post-test varied from 1 to 15 points, with 5 being the lowest and 15 being the highest. Student 33 demonstrated the greatest improvement with a difference of 15 marks, while student 20 demonstrated the least improvement with a difference of 5 marks.

Table 4.2 Comparison between pre-test and post-test within the sample group

Group	Pre-test		Post – test		Mean Difference	T	P-Value
Sample Group	\bar{X}	SD	\bar{X}	SD	17.36 – 7.18	29.67	.01
	7.18	3.44	17.36	2.59	= 10.18		

Significance level (p): <.05-significant

4.1.1.2 A comparison of pre-test and post test mean score

The pre-test and post-test scores of the sample group were carried out using descriptive statistics analysis. The comparison results between the pre-test and post-test in terms of mean and standard deviation were clearly displayed in table 4.2. The outcome showed that the mean score on the pretest was 7.18 while the mean on the post-test was 17.36, representing a mean difference of 10.67. This result provided significant support for the use of experiential learning in science learning. According to the above table, the standard deviations for the pre-test and post-test were 3.44 and 2.59 respectively. The difference in standard deviation was 0.85 higher than the pretest, indicating that the learners' scores were out of the mean, which ultimately explains the variation in the treatment's degree of influence on the students. A paired t-test in the table also displays a significant value of .01 which indicated the significance of the test.

The data revealed that the post-test scores of the sample group were comparatively higher than the pre-test scores. Likewise, the mean difference of the post-test was found significantly higher than the pre-test shown on Figure 4.1

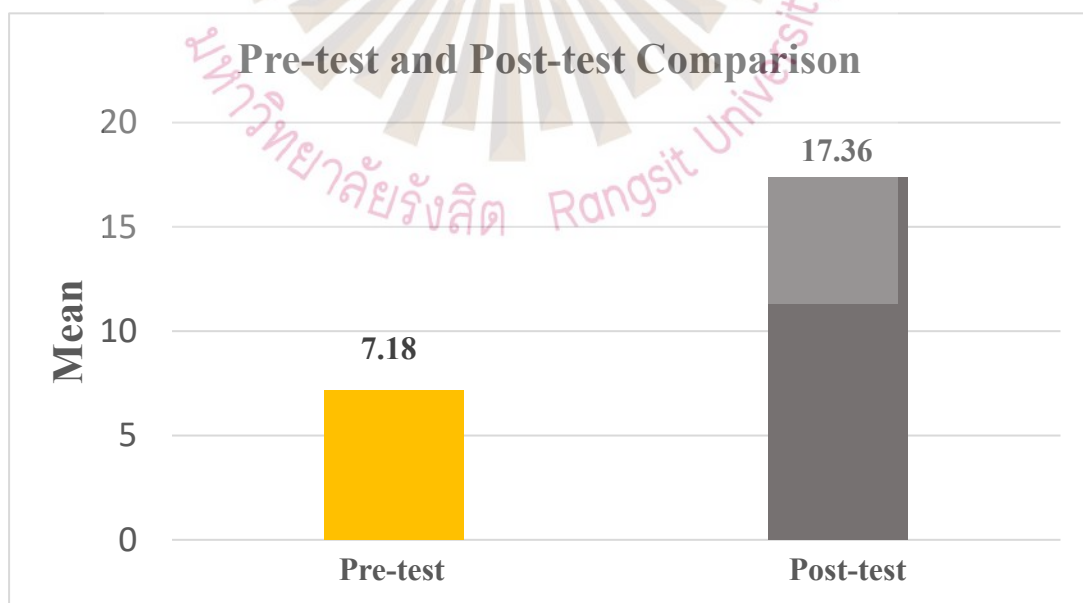


Figure 4.1 Illustration of the mean of the pre-test and post-test scores of the sample group

Figure 4.1 shows an orange bar for the mean pre-test score and a black bar for the mean post-test score. The comparison showed that the pre-test's mean was much lower than the post-test mean. Thus, there would be a very clear sign that experiential learning has improved achievement.

The number of the students who improved in various score ranges following treatment is shown in the diagram below. To determine which score most students fall in and vice versa, the score range of students was expressed in percentages.

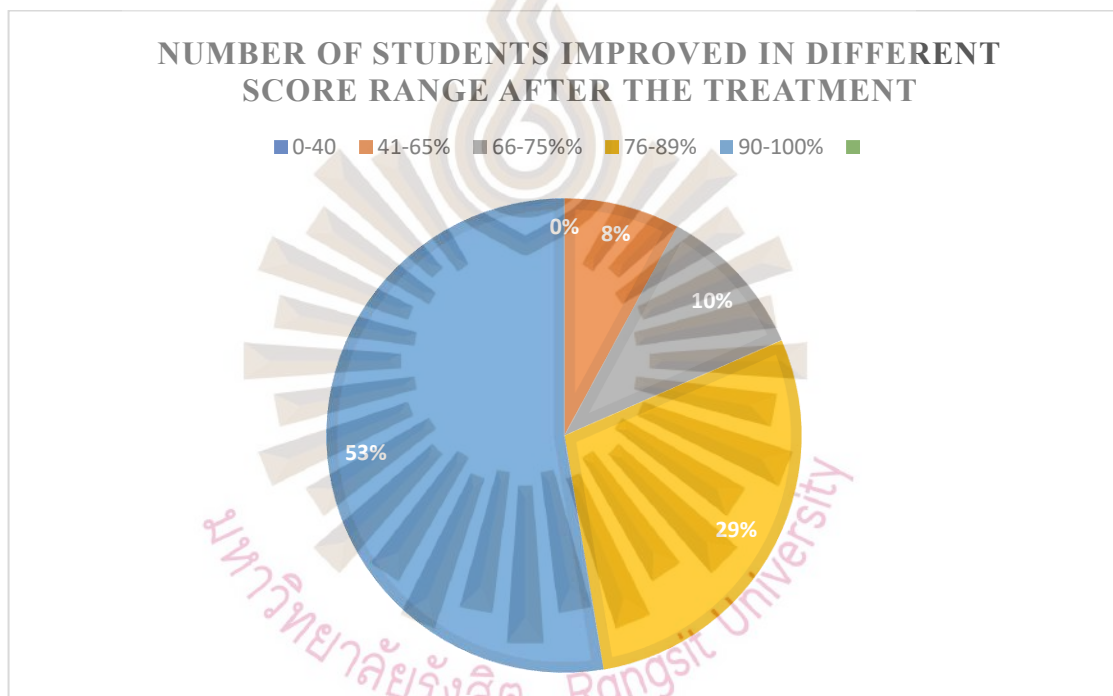


Figure 4.2 Displaying the number of students who improved in different score ranges after the treatment

A maximum of 20 out of 40 learners improved their scores within the range of 90 to 100%. Eleven out of 40 learners improved their scores in the range of 76 to 89%. Four out of 40 learners improved their scores in the range of 66 to 75%. Three out of 40 learners improved their scores in the range of 41 to 65% and there were zero learners whose scores ranged from 0 to 40%.

In conclusion, this chapter covered the data analysis of the pre-test and post-test, which clearly showed that experiential learning improved the science learning achievement of 6 grade children. The students also expressed support for experiential learning. The information gathered through structured interviews showed that the students had a positive view of learning science. Therefore, the pre-test and post-test analysis and semi-structure interview revealed the important outcomes for experiential learning in science. The next section will discuss the results and the study's major findings along with recommendations and suggestions for further research.

4.2 Qualitative Data Analysis

The second research question was: What was the learning satisfaction of grade 6 students after using experiential learning in science? To further address the study's second objective, qualitative data was gathered using semi-structured interview.

4.2.1 Semi-Structured Interview

A semi-structured interview was one of the tools the researcher used to look at how learners perceived their learning. In order to get detailed information in a conversational approach, semi-structured interviews are frequently utilised by researchers who want to go deeper into a subject and fully comprehend the responses that are given. (Harrel & Bradley, 2009). At the conclusion of the study, 40 interviewees were divided into groups of five. The research participants were divided into groups of 1, 2, 3, and so on to preserve their privacy. The students were given the freedom to express themselves to discuss about the topic in groups. The researcher conducted semi-structure interview to obtain a clear understanding of students' learning satisfaction towards experiential learning approach in learning science. Hence, in order to find out the students' satisfaction using an experiential learning approach in teaching science with the learners, 25 students were chosen randomly after the intervention. The interview consisted of 5 questions categorized under four themes which was framed by the researcher. The data were then analyzed using a thematic analysis technique.

Braun and Clarke used thematic approach to examine the data (thematic analysis, 2006, as cited in Maguire & Delahunt, 2017). The following themes for semi-structured interview were used by the researcher for the interview process: 1) Joy in learning 2) Improved class participation and interaction 3) Unity and cooperation and 4) Performance improvement on students learning. The themes are discussed as follows:

4.2.1.1 Joy in learning

According to the responses transcribed based on questions interviewed, learners revealed that they enjoyed the chapter ‘Classification of Animals’ with the use of experiential learning. Almost every learners mentioned liking the subject and enjoyment and the fun they had while learning. Most of the learners expressed their joy in carrying out the activities using experiential learning approach. The experiential learning promoted enjoyment in learning as students learned through hands on experience. Participants loved fun learning, as they were satisfied with what they did, it helped in retaining the information learnt. Therefore, experiential learning approach activities meant for improving their interest in learning science. To find out what would improve their desire to learn the observer noticed students enjoying the sessions during the campus tour.

“We enjoyed the class as we did fun activities like drawing fish, listening to birds sound through meditation activity and discovering animals in the locality by exploring the environment as well as doing quiz activity.” (Group 1, personal communication, May 15, 2024).

“We felt like I could learn better than ever using experiential learning as it made everything more fun to learn and the listening activity we did made it extra fascinating.” (Group 2, personal communication, May 15, 2024).

“We enjoyed the class as the classes was filled with all sorts of mixed fun emotions as we could learn science in unique yet in a fun way.” (Group 3, personal communication, May 15, 2024).

“We enjoyed the science class by going out to see the animals(reptiles) we were taught about during school campus tour and being with friend to help each other around.” (Group 4, personal communication, May 15, 2024).

“We feel good about the experiential learning because it helped me learn and understand more about the topics by carrying out quiz activity which challenges our brains.” (Group 5, personal communication, May 15, 2024).

4.2.1.2 Improved class participation and interaction

The children talked about how participating in experiential learning activities gave them the opportunity to participate and interact with each other to promote collaboration as they worked in groups. They were able to discuss the ideas in groups to collaborate on topics they were presented to discuss and jote down in their worksheet. Interaction is needed in the classroom activity. It helps students in students learning process by being communicative. Students were motivated to take part in activities associated with outdoor activies since they get chance to explore their ideas by observing the nature around them.

“We enjoyed the quiz the most while participating in classroom activities.” (Group 4, personal communication, May 15, 2024).

“We learn better through experiential learning since it helped us learn better being interactive with more activities in it making lesson more interesting to learn.” (Group 5, personal communication, May 15, 2024).

“While participating in classroom experiential activities, I enjoyed drawing fish the most because I could draw its parts, label it and colour it which made me retain information while participating in the class.” (Group 3, personal communication, May 15, 2024).

“We enjoyed the quiz the most while participating in classroom activities as we found out whether we were able to name the animals given on screen correctly or not.” (Group 2, personal communication, May 15, 2024).

“We think the use of experiential learning will help me learn science better because we learn science mostly through actions and experiments whereby we get chance to interact with our friends to learn better and also can participate more in the class.” (Group 1, personal communication, May 15, 2024).

4.2.1.3 Unity and Cooperation

Unity and cooperation creates a supportive and inclusive classroom atmosphere. Students feel valued, leading to a positive learning environment where they were more willing to participate. Students worked as a team to discuss questions and present findings. They worked together to complete the topic. They had to share their opinions with the team to come up with a successful result. This helped students to unite and cooperate with each other.

“We stayed together because we shared personal beliefs and viewpoints and accepted personal accountability for our actions. To succeed, each member was able to collaborate with the others. We had a squad that was ready.” (Std 8, G10, Std15 & Std23, personal communication, May 15, 2024).

Students came to understand how important it was to function as a cohesive team. Furthermore, the field visits allowed students to see the advantages of teamwork in the future.

“To make a journey exciting and fun, we must work together, show respect for one another, and assist one another. Working as a team will now be my pastime.” (Std 6, Std 13, Std 30, personal communication, May 15, 2024).

According to the aforementioned results, the experiential activities encouraged students to support unity, cooperation, and teamwork in order to have a

successful educational experience. Students bond over shared experiences, creating lasting connections beyond the classroom. When students come work as a team, they accomplish much more than they can individually. Unity creates a sense of community, where each student feels valued and supported.

4.2.1.4 Performance Improvement

The majority of children who took part in the interview claimed that their performance had improved as a result of the experiential learning. Students felt that participating in a range of activities in a science class would improve their performance. It was simpler to remember the information and identify the crucial components in a constructive and engaging way thanks to the various experiential learning activities.

“The use of experiential learning helped me become better in science subject as this type of learning have improved the way of my studying and performance in test.” (Student 1, from Group 1, personal communication, May 15, 2024).

“It helped me learn science better because it involves experiences and I find it easier to learn science through experiences.” (Student 9, from Group 2, personal communication, May 15, 2024).

“Yes, the use of experiential learning improved me in learning science better because it was like a revision to me so I can perform better in my exams.” (Student 14, from Group 3, personal communication, May 15, 2024).

“Using experiential learning helped me learn science better since it makes everything extraordinary and easier to learn so we can perform better in life.” (Student 19, from Group 4, personal communication, May 15, 2024).

The experiential learning activities helped improve students performance in test resulting in better performance in results. It also made children generate interest in science subject learning acquiring various skills in learning science through interaction, communication and knowledge and information. The excerpts from the theme of the effectiveness of experiential learning demonstrated how many students had the chance to work with friends, which allowed them to feel comfortable enough to freely share what motivated them to participate in the lesson.



CHAPTER 5

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

This chapter contains the conclusion to the findings of the study presented in chapter 4. It is followed by discussions of the findings and recommendations for future studies and research.

5.1 Conclusion

This study was guided by two research questions:

- 1) Did experiential learning approach improve grade 6 Bhutanese students learning achievement in science?
- 2) What was the learning satisfaction of grade 6 students after using experiential learning approach?

The data were collected and analyzed from the learning achievement test (pre-test and post-test scores) and semi-structured interview.

5.1.1 The Result of Learning Achievement Analysis

To answer the first question; Did experiential learning approach improve grade 6 Bhutanese students learning achievement in science? The researcher used the scores of pre-test and post-test and the scores were analyzed using descriptive statistical analysis for the sample group to see the difference in the level of achievement.

The mean scores for the pre-test and post-test were 7.18 and 17.36 respectively. The mean differences between the pre-test and post-test were 10.18. Not

only did the result of the analysis unveil that the mean score of the post-test was higher than the mean score of the pre-test as shown in Table 4.2 on chapter 4 but also indicates that the students performed better in the post-test as compared to the pre-test.

The study concluded that teaching grade 6 students science through experiential learning significantly improved their learning achievement. The initial research questions and the initial hypothesis, which stated that the experiential learning would increase grade 6 Bhutanese students' learning achievement in science, had been tested with a successful outcome.

5.1.2 The Result of Semi-Structured Interview

What was the learning satisfaction of grade 6 students after using experiential learning in science? was the second research question that was addressed in the semi-structured interview with individual students. After applying thematic analysis to evaluate the data, it was evident that students were satisfied with their learning experiences when they learned science through experiential learning approach. The classroom atmosphere created dynamic conversations and group interactions, which made the teaching-learning process pleasurable for the students. The majority of students reported that the lessons allowed them to experiment and explore the information they had learnt. A platform that allowed for the integration of art, real-world applications, and experiential learning was created as a result, and it helped kids do better academically in science.

The results also showed that experiential learning enhanced students' comprehension of science, increased their knowledge of the subject, enhanced their teamwork and comprehension skills, and showed them that learning was enjoyable. The students showed increased participation and full engagement in all of the activities they completed. Their active participation allowed the researcher to complete the lessons on schedule. The researcher was certain, after assembling the data from the structured interview, that 6 grade Bhutanese students had a positive attitude towards experiential learning when it came to learning science. Positive answers from the

interview data thus supported the semi-structured question's conclusions. The results lend additional credence to the second research question and hypothesis.

5.2 Discussion

The study aimed to study the effectiveness of experiential learning approach on science learning achievement to grade 6 Bhutanese students' learning achievement. It also investigated their learning satisfaction towards this strategy. The findings showed that experiential learning approach was effective in teaching and learning science for grade 6 Bhutanese students, and it exhibited positive learning satisfaction. These findings are presented in detail to answer the research questions proposed in the study.

5.2.1 Students' Learning Achievement

With sample group of 40 children, a pretest and post test were conducted before and after experiential learning to compare the learning achievement of grade 6 students. This was demonstrated by the learning achievement test results, which showed a mean difference between pretest and post test scores of the sample group of 10.18. The results of the students are in figures in Figure 4.1 in Chapter 4. All students improved academically after receiving experiential learning with a 2-tailed significance level of .01 indicating significant improvement. Even the low performers were able to obtain post test scores that were close to the mean, which narrowed the gap between high and low achievers.

The above finding was in line with research done by Kolb (2014), who discovered that experiential learning promoted lifelong learning which is often conceived as a process of learning from direct life experiences which is crucial for kids' academic development. In addition, experiential learning also promotes a holistic process of learning that can aid in overcoming difficulties of learning from experiences. It must be inferred by a process of learning that questions preconceptions of direct experience, tempers the vividness and emotion of experience with critical

reflection in students. According to Abbatiello (2014), the provision of greater space, autonomy, and ease of mobility at the location allowed students to engage and contribute more. Comparably, Sigmom (2014) came to the conclusion that students were engaged in real-life scenarios that were constrained in a traditional classroom setting and that experiential learning sparked curiosity and independent learning that created strength. Fagerstam (2012) added to this by pointing out that kids' motivation to learn is increased and the process of learning outdoors is accelerated. Active participation in the outside activities was observed even among the shy students.

Additionally, the results were consistent with Kolb's (1984) experiential learning theory, which emphasises learning by doing that is, students participating actively in the learning process and gaining knowledge in tangible, abstract, reflective, and active ways as a result of their experiences. Furthermore, the results of the focus groups and reflection by the students demonstrated that the campus tour helped them acquire a variety of life-long abilities. The results showed improvements in the students' knowledge outside of the classroom as well as in their leadership, presenting, social, and communication abilities, all of which encouraged learning. The results corroborated those of a 2011 study by Mirrahimi, and Usman, which showed that learning outside in a natural setting improved social and problem-solving abilities as well as sharing, communication, teamwork, self-awareness, self-regulation, and self-confidence.

Experiential learning provided opportunities to improve communication skills and self-assurance. It also helped in acquiring and strengthening decision making skills to solve and respond to challenges the world is facing. Besides the skill acquisition, the art, listening through mediation also facilitated in developing bonds and closer relationships with each other which enhanced students' knowledge both locally and globally. This corroborates the findings of Pyke (2015) who stated that an outdoor activity provides a wide range of activities that acclimate each student's learning styles, difficulties and played to their individual strengths. Educational campus tour provides hands-on experiences and simultaneously building understanding, develop skills and enrich positive learning relationship with peers, teachers and the community (Fagerstam 2012).

Lanier (2017) provided evidence for this claim, stating that experiential learning strengthened cultural knowledge, expanded students' personal worldviews, and improved learners' academic performance and learning environment. Positive relationships may result from socially conscious activities combined with lots of opportunities to engage with peers, teachers, the neighbourhood, and the outdoors (Abbatiello, 2014). Experiential learning that takes students to a unique learning environment which was not possible inside the classroom. It provided students with direct experiences and increased their knowledge and understanding of the society in which they live.

5.2.2 Students' Learning Satisfaction

The instrument used to achieve the study's second objective were through semi-structured interview. The responses from the interviews provided through supplements to the questionnaire's findings.

At the end of the experiment, a semi-structured interview was held. Thematic analysis was used to examine the data that had been gathered. The data gathered from the semi-structured interview provided excellent support for the findings. The findings showed that students had a very positive learning satisfaction towards experiential learning in learning science. Positive outcomes included motivation, curiosity, enjoyment, enjoyable interactions, greater classroom involvement, and academic accomplishment. Based on the findings of the interviews, every student said they found the lessons interesting and enjoyable. "When science is taught in an engaging way, we are more inclined to learn it. Because it felt like a fun learning experience rather than a conventional one, we found it easy to understand". Students that were interviewed stated that they felt more confident since they could contribute to the discussion. This research is backed by Dyson (2009) results showing children learn more effectively when they involve in doing things and thinking about what they are doing engaging themselves in active learning process.

Another outcome of the interview was the willingness to participate in activities. According to Baden (2013), experiential learning is crucial in education, as it offers hands-on, practical experiences that enable individuals to develop their skills and knowledge more engagingly and interactively. In recent years, experiential learning has become a significant aspect of education. As students participated in variety of learning experiences not only can they write but they can improve their performance potential as well. Experiential approaches appear to be more effective in developing skills that students seek, such as communication skills, the ability to work in teams, and workplace literacy. Experiential learning serves as a means of advancing adult development by pushing learners to new heights of cognitive, perceptual, behavioural, and symbolic complexity while also testing their capacity to deal with moral complexity (Lewis, 2021).

Students were observed actively participating in the activity, raising questions, answering them, and elaborating on ideas and common misconceptions. They were observed respecting each other's viewpoints and offering assistance to one another when working in groups. Similarly, Thomas (2017), claimed that the process of making sense out of their experiences, sharing their observations with others, and hearing their teachers' framing are all important elements of expanding social and cultural boundaries. For the children, who have mostly limited their social connections to school, peers, extended family, and retail work situations, the planned encounters that take place outside of the classroom represent unfamiliar territory. Students use experiential learning to use sociological concepts to understand these contexts. Through experiential learning, students have the ability to value knowledge derived from their own experiences and to understand that knowledge is socially created.

According to the students' accounts, the experiential activities helped them build relationships with their peers, gain trust and a perspective of the teacher as a resource rather than just a teacher, most importantly showcase their strengths and knowledge from their own experiences and what they had learned from the lesson. All students were engaged in various experiential activities to maximize their learning. Like this, Arnold (2006) claimed that active involvement with individual, group

activities, and real life situations improves student motivation, behaviors, and understanding of abstract concepts. Student should be given opportunities and encouraged to participate in experiential activities so that it can positively correlate with students achievement scores. It is imperative that the learning activities' purpose and method are in constant alignment with the students' knowledge and the anticipated objectives. Putting the needs of the students first will increase their motivation, interest, and retention of the information. Experiences must, however, be used to foster future development because they are not always instructive.

Thus, the use of experiential learning had thereby increased both retention and learners' drive to study, which had ultimately improved test performance when used in science instruction. Students' ability to recall, comprehend, apply, analyse, evaluate, and create the six levels of Bloom's taxonomy has also improved as a result of it. Experiential learning in the classroom and ongoing student participation in learning activities may have contributed to the formation of the friendly and encouraging environment. Incorporating diverse experiential learning activities into scientific instruction can positively influence students' attitudes towards the application of experiential learning methodologies. Throughout the activity, the students' keen curiosity was observed, which was one sign of their motivation. The information above clarifies the benefits of experiential learning for students' overall learning in the classroom.

5.3 Recommendations

5.3.1 Recommendation for Practice

This study aimed to evaluate the effectiveness of experiential learning in science teaching for Bhutanese sixth graders. To improve science teaching and learning throughout the world, the following suggestions have been made based on the study's findings.

- 1) The learning outcomes of the students were improved through experiential learning in the classroom. The study's findings demonstrated that the post

test measure of learning achievement was higher than the pre-tests. As a result, it is strongly advised to incorporate experiential learning into regular classroom teaching.

2) All teachers should implement experiential learning to increase students' academic progress and engagement, regardless of the subject, grade level, or size of the class.

3) When learning science through experiential learning, learners had a positive sense of learning pleasure. It is therefore strongly advised that experiential learning be included into regular classroom instruction.

4) Furthermore, when undertaking research in a related field, Bhutanese scholars could refer to this study as a guidance.

5) The Science Curriculum Officer may design hands on learning activities that would help students understand, relate to, evaluate, and retain science concepts.

5.3.2 Recommendation for Further Research

1) Analogous studies with greater sample sizes and longer time frames could be conducted at different grade levels to corroborate the results.

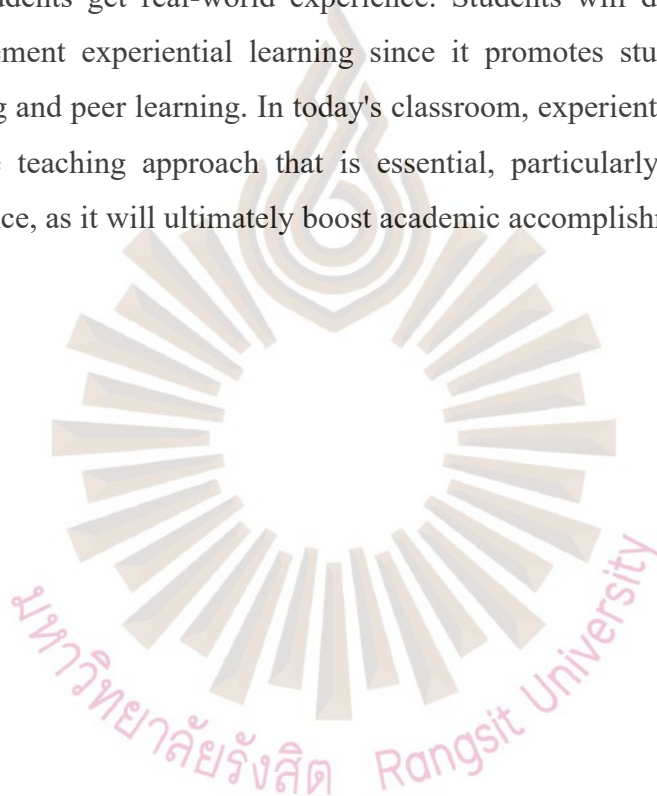
2) In this study, a restricted set of experiential learning activities covering a narrow range of subjects were employed. This could lead to additional research being done on science-related themes and experiential learning activities.

3) Further research might be carried out to determine the relationship between experiential and project work in boosting students' learning, as the students admit that experiential learning can be employed as project work.

4) Longer term studies can be carried out to increase the reliability and significance of the results.

5) Lastly, additional research may be conducted to ascertain how variables such as age, gender, and method of study affect the experiential learning approach applied in diverse learning environments, hence facilitating more efficient learning for students.

Science is a vast field of study that demands experimentation and experiential learning in order for students to fully understand. Additionally, studying and teaching become tedious when using traditional instructional methods. Thus, it has been discovered that helping students learn more about the science subject can be accomplished with a method that includes experiential learning activities. Learning becomes engaging and fun through experiential learning, which makes it much easier to learn, retain, and recall. By experimenting with their studies and learning from their errors, the students get real-world experience. Students will do better in exams if schools implement experiential learning since it promotes student participation in active learning and peer learning. In today's classroom, experiential learning is often a very effective teaching approach that is essential, particularly when teaching and studying science, as it will ultimately boost academic accomplishment.



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The logo of Rangsit University, featuring a stylized flame or sunburst design in the center, surrounded by a circular arrangement of radiating lines. The text "มหาวิทยาลัยรังสิต" and "Rangsit University" is written in a semi-circle below the logo.

APPENDIX A
LETTER OF APPROVAL

มหาวิทยาลัยรังสิต Rangsit University



དཔལ་ལྷན་འབྲུག་གཞུང་། ཤེས་རིག་དང་རིག་ཚུལ་གོང་འཕེལ་ལྷན་ཁག།

Royal Government of Bhutan
Ministry of Education and Skills Development
Department of School Education



DSE/SLCD (05)2024/ 5 08

April 24, 2024

Chief Dzongkhag/Thromde Education Officers
Paro and Wangdue Dzongkhags
Thimphu and Samdrupjongkhar Thromdes

Subject: Approval to collect data for research studies.

Dear Sirs/Madams,

The Director of the Master of Education Program in Curriculum and Instruction at Suryadhep Teachers College, Rangsit University in Thailand, has approached the Department of School Education seeking permission for the following five M.Ed candidates to collect data for their research study:

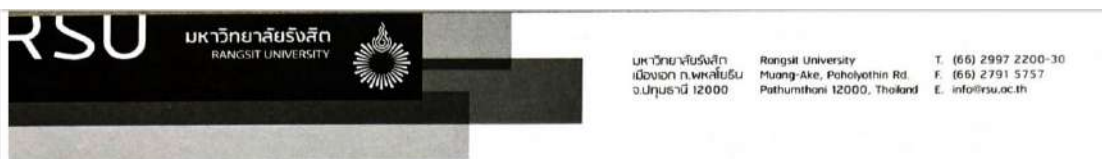
Candidates	Research title	Location
Tshering Dolkar	The use of Bar Model Method for addition and subtraction word problem achievement of grade 4 Bhutanese students	Dewathang Primary School, Samdrupjongkhar Thromde
Chimi Seldon Dorji	The effectiveness of experiential learning approach on science learning achievement for grade 6 Bhutanese students	Jigme Losel Primary School, Thimphu Thromde
Pema Choden	The effectiveness of virtual field trips on learning achievement of social studies for grade 6 Bhutanese students	Dechencholing Higher Secondary School, Thimphu Thromde
Kuenzang Namgay	The development of English reading comprehension skill using flipped classroom with poems among grade 6 Bhutanese students	Gaselo Primary School, Wangdue Dzongkhag
Chimi Selden	The effectiveness of using differentiated instructions on science learning achievement for grade 5 Bhutanese students	Taju Primary School, Paro Dzongkhag

The Department of School Education is pleased to accord approval to collect data as proposed, considering the positive impact of the research to elevate teaching methods at the primary level. However, the researchers are requested to avoid any disturbances to the normal instructional hours.

Hence, you are kindly requested to allow the researchers to conduct the data collection for their research project please.

(Karma Galay)
Director General

- Cc: 1. Dasho Dzongdag/Thrompoen, Paro, Wangdue Dzongkhags and Thimphu, Samdrupjongkhar Thromde for kind information.
2. Director, Master of Education Program in Curriculum and Instruction, Suryadhep Teachers College, Rangsit University, Thailand for kind information
3. Chief Program Officer, School Liaison and Coordination Division, DSE for kind information



Director General
 Department of School Education
 Ministry of Education
 Thimphu, Bhutan

Date: April 12, 2024

Subject: Request for Permission to Collect Data for Master of Education Thesis

Dear Sir, /Madam,

Master of Education Program in Curriculum and Instruction, Suryadhep Teachers College would like to request your permission for five Master of Education candidates to collect data for thesis in Bhutan in the period of May 3, 2024 to June 15, 2024. The details of the candidates are shown as follows:

Name	Research title	Research School
MISS CHIMI SELDON DORJI	THE EFFECTIVENESS OF EXPERIENTIAL LEARNING APPROACH ON SCIENCE LEARNING ACHIEVEMENT FOR GRADE 6 BHUTANESE STUDENTS.	Jigme Losel Primary School, Thimphu Thromde, Thimphu

Thank you for your kind consideration.

Truly yours,

Assistant Professor Nipaporn Sakulwongs, Ed.D.

Director of Master of Education Program in Curriculum and Instruction
 Suryadhep Teachers College, Rangsit University

Muang-Ake, Paholyothin Road, Lakhok, Pathum Thani 12000 Thailand Telephone: Number: +66-868846226

Telephone: +662997-2222 ext. 1275

The logo of Rangsit University, featuring a stylized flame or sunburst design in the center, surrounded by a circular arrangement of rays. The text "มหาวิทยาลัยรังสิต" and "Rangsit University" is written in a semi-circle below the logo.

APPENDIX B

VALIDITY TEST RESULT OF THE RESEARCH INSTRUMENT

มหาวิทยาลัยรังสิต Rangsit University

Details of three expertise who validated the instruments

Three Experts are:

- 1) **Expert 1** : Dr. Gary Torremucha Associate Professor Rangsit ; Teaching and Learning, Educational Technology Rangsit University, Thailand.
- 2) **Expert 2**: Mrs. Kinley Wangmo, Teacher I, M.Ed/B.Ed, Rinchengang Primary School, Wangduephodrang, Bhutan.
- 3) **Expert 3**: Tshering Pem, Teacher II, M.Ed/B.Ed, Jigme Losel Primary School, Thimphu, Bhutan

Instruments

- 1) Four Lesson Plans
- 2) Learning Achievement Test
- 3) Semi- Interview Questions



Consent Form for Disclosure of Validator's Name in Research Paper

To
The Graduate School
Rangsit University
Thailand

I, Gary Torremucha, a professor of Rangsit English Language Institute, Rangsit University, hereby give my consent to the researcher Ms. Chimi Seldon Dorji (6510236), a student of Master in Curriculum and Instruction, Suryadhep Teachers College, Rangsit University to disclose my name as a research Instrument validator in her thesis paper titled "The Effectiveness of Experiential Learning Approach on Science Learning Achievement for Grade 6 Bhutanese Students". I respect the terms and regulations of the Graduate School, thus I also give my consent to the Graduate School, Rangsit University to contact me in the case of any clarification regarding my consent.

Gary Torremucha



Signature

Date: 23rd July 2025



มหาวิทยาลัยรังสิต Rangsit University

Consent Form for Disclosure of Validator's Name in Research Paper

To
The Graduate School
Rangsit University
Thailand

I, Tshering Pem, a teacher of Jigme Losel Primary School, hereby give my consent to the researcher Ms. Chimi Seldon Dorji (6510236), a student of Master in Curriculum and Instruction, Suryadhep Teachers College, Rangsit University to disclose my name as a research Instrument validator in her thesis paper titled "The Effectiveness of Experiential Learning Approach on Science Learning Achievement for Grade 6 Bhutanese Students". I respect the terms and regulations of the Graduate School, thus I also give my consent to the Graduate School, Rangsit University to contact me in the case of any clarification regarding my consent.

Tshering Pem



Date: 23rd July 2025



Consent Form for Disclosure of Validator's Name in Research Paper

To
The Graduate School
Rangsit University
Thailand

I, Kinley Wangmo, a teacher of Rinchengang Primary School, hereby give my consent to the researcher Ms. Chimi Seldon Dorji (6510236), a student of Master in Curriculum and Instruction, Suryadhep Teachers College. Rangsit University to disclose my name as a research Instrument validator in her thesis paper titled "The Effectiveness of Experiential Learning Approach on Science Learning Achievement for Grade 6 Bhutanese Students". I respect the terms and regulations of the Graduate School, thus I also give my consent to the Graduate School. Rangsit University to contact me in the case of any clarification regarding my consent.


Kinley Wangmo

Signature
Date: 23rd July 2024


มหาวิทยาลัยรังสิต Rangsit University

IOC FOR LESSON PLAN

Item No	Attributes	Expert 1	Expert 2	Expert 3	Average	Congruence
1	Lesson plan 1	+1	+1	+1	+1	Congruent
2	Lesson plan 2	+1	+1	+1	+1	Congruent
3	Lesson plan 3	+1	+1	+1	+1	Congruent
4	Lesson plan 4	+1	+1	+1	+1	Congruent
Overall Average		+1				Congruent



IOC FOR ACHIVEMENT TEST QUESTIONS BY EXPERTS

SI No	Item Test No	Expert 1	Expert 2	Expert 3	Average	Congruence
SECTION I PART A						
1	Multiple Choice Question 1	+1	+1	+1	+1	Congruent
2	Multiple Choice Question 2	+1	+1	+1	+1	Congruent
3	Multiple Choice Question 3	+1	+1	+1	+1	Congruent
4	Multiple Choice Question 4	+1	+1	+1	+1	Congruent
5	Multiple Choice Question 5	+1	+1	+1	+1	Congruent
PART B						
6	True or False Question 1	+1	+1	+1	+1	Congruent
7	True or False Question 2	+1	+1	+1	+1	Congruent
8	True or False Question 3	+1	+1	+1	+1	Congruent
9	True or False Question 4	+1	+1	+1	+1	Congruent
10	True or False Question 5	+1	+1	+1	+1	Congruent
PART C						
11	Fill in the blanks Question 1	+1	+1	+1	+1	Congruent
12	Fill in the blanks Question 2	+1	+1	+1	+1	Congruent
13	Fill in the blanks Question 3	+1	+1	+1	+1	Congruent

SI No	Item Test No	Expert 1	Expert 2	Expert 3	Average	Congruence
14	Fill in the blanks Question 4	+1	+1	+1	+1	Congruent
15	Fill in the blanks Question 5	+1	+1	+1	+1	Congruent
SECTION II						
16	Short Answer Question 1	+1	+1	+1	+1	Congruent
17	Short Answer Question 2	+1	+1	+1	+1	Congruent
18	Short Answer Question 3	+1	+1	+1	+1	Congruent
19	Short Answer Question 4	+1	+1	+1	+1	Congruent
20	Short Answer Question 5	+1	+1	+1	+1	Congruent
Overall Average						Congruent

IOC FOR SEMI-STRUCTURED QUESTIONNAIRE BY EXPERTS

SI No	Items	Expert 1	Expert 2	Expert 3	Average	Congruence
1	Do you like experiential activities to learn science?	+1	+1	+1	+1	Congruent
2	Did you enjoy the teaching method? How?	+1	+1	+1	+1	Congruent
3	How did you feel about using Experiential learning to learn science?	+1	+1	+1	+1	Congruent
4	What did you enjoy the most while participating in classroom activities?	+1	+1	+1	+1	Congruent
5	Do you think the use of experiential learning will help you learn science better? Why or why not?	+1	+1	+1	+1	Congruent
Overall Average		+1				Congruent

Adapted from Tshering Pem, 2022



LESSON PLAN

LESSON PLAN 1

Class: VI

No of students: 30

Subject: Science

Session: 1 & 2

Date:

Time: 90 minutes

Topic: Reptiles & Amphibians

Teaching Strategy: Group Presentation

Teaching Learning Materials: Chalk, chalkboard, projector screen, laptop, posters of animals, chart, papers and markers.

Lesson Objectives: By the end of the lesson, a child will be able to:

- Classify animals into reptiles based on their characteristics.
- Classify animals into amphibians based on their characteristics
- Identify the differences and similarities between reptiles and amphibians.

LESSON INTRODUCTION- 10 Minutes

Exchange greetings. Make the classroom comfortable for teaching and learning by introducing myself.

Learner's prior knowledge.

- Learners know different animals such as spiders, snakes, earthworms, dogs, cats, lizards, crocodiles, etc.
- Learners have seen common reptiles such as snakes and lizards and amphibians such as frog and toads in real life settings or through television.

Ask the following questions to inquire about the learner's prior knowledge:

- Name some animals you know.
- How are these animals different from each other?
- Name the animals shown in picture below:

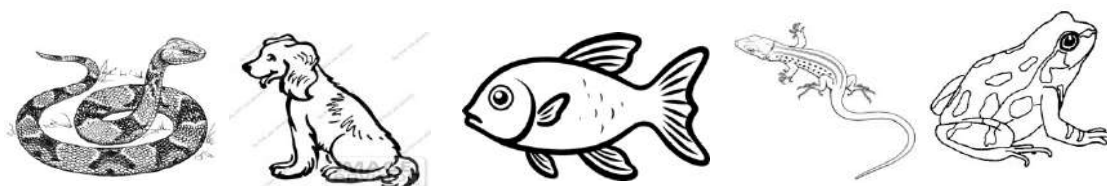


Figure: Types of Animals

Source: <https://unsplash.com/s/photos/animals-black-and-white>

- From the above list, identify the animals whose bodies are covered with fur.
- Identify the animals whose bodies are covered with dry scales.
- Name the animal which can live both on land and in water.
- Name the animal whose body is covered with moist skin.

After the discussion around learners' responses, the teacher introduces the lesson topic "Reptiles and Amphibians" to the class.

LESSON DEVELOPMENT

Lesson Input 20 minutes

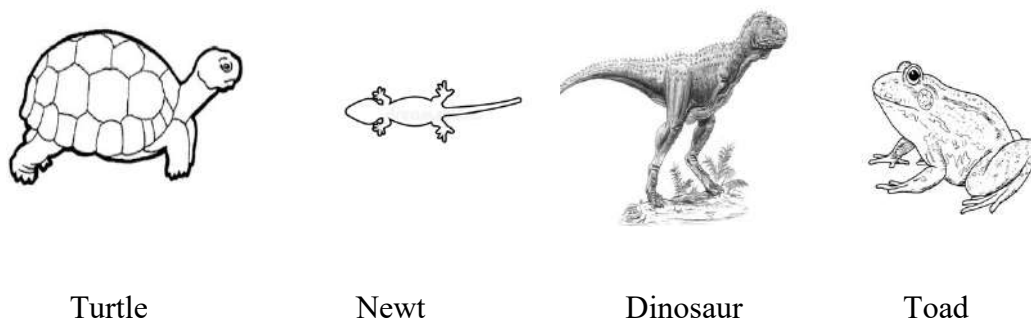
Lesson Description:

This lesson aims to provide learners with a comprehensive understanding of reptiles and their classification based on their characteristics. Learners will be introduced to the unique features of reptiles (*Scaly skin, cold-blooded nature, ability to lay eggs*) with suitable examples, and develop appreciation for the diversity of reptiles on earth.

This lesson also intends the learners to gain scientific concepts of amphibians and their classification based on their characteristics with suitable examples. Learners will be introduced to the unique features of amphibians (*Scaly skin, cold-blooded nature, ability to lay eggs, ability to dwell on both land and in water*) and develop appreciation for the diversity of amphibians on earth.

To initiate the lesson teacher explain the concept of reptiles and amphibians to the students:

- ✓ Name three animals that lives only on land.
- ✓ Name those animals which have dry scales on their body.
- ✓ Does a snake lay egg or give birth?
- ✓ Have you seen a frog? What does the skin of frog look like?
- ✓ What helps a frog to swim in water?



Turtle

Newt

Dinosaur

Toad

Fig: Reptiles & Amphibians

Source: <https://www.shutterstock.com/search/reptiles>

From the above list, identify the animals whose body are covered with scales?
Identify the animal whose body is covered with moist skin?

Learning Experiences

This lesson comprises of experiential learning activity. In the activity, learners carry out experiential learning activity to investigate the reptiles and amphibians found inside the school campus guided by the teacher through an outdoor learning activity (campus tour) in their school campus, and record their findings in the sheet given to them. The approaches encourage self-reflection and evaluation, which enables learners to take responsibility for their learning and enhance their skills and knowledge continually. Have learners explore, gather scientific information on characteristics of reptiles, and amphibians with their examples by watching the videos in the following video links, which will be displayed on projector screen in the class.

<https://rb.gy/thyj2c> <https://rb.gy/1ltvod>

In between ask questions like: **(Active experimentation)**

- Why are people afraid of reptiles, especially snakes?
- Why do reptiles have scales on their body?
- Why are reptiles classified as cold-blooded animals?
- Why are frogs, toads, newt and salamander animals are classified as amphibians?

Activity I: Campus Tour - 30

Learners carry out experiential learning activity to investigate (**Concrete experience**) the reptiles and amphibians found inside the school campus, and record their findings in the worksheet structured below followed by answering the questions:

(Reflective Observation)

Classification of animals	Animals found in the area	Characteristics of the animals
Reptiles		
Amphibians		

Source: <https://lessons.rec.gov.bt/lesson/19d14dc3-18d4-4cef-8faf-0fe5f6ac91ad/>

Teachers divide students into 5 groups consisting of mixed abilities and gender.

Teacher explains the guidelines to the learners to make sure they are aware about what they are supposed to do during campus tour.

Monitoring: Teacher will take children out for campus tour and will guide them.

Provide necessary help when needed.

Later after the activity teacher ask the following questions like:

- Define reptiles & amphibians.
- Why do reptiles have scales on their body?
- Why do chameleons change their skin colours?
- Why are you advised not to touch the brightly coloured reptiles?

Follow up of the Activity: 5 minutes (Abstract conceptualization)

After the activities teacher ask following questions:

- Define amphibians.
- What are the differences between frog and snake?
- Name the amphibians found in Bhutan (**Active Experiment**)

LESSON CLOSURE- 5 mintues

Summarize the lesson. Give them homework to fill up the table below:

Distinct Features	Differences		Similarities
	Snake	Lizard	
Limbs	<i>E.g. Absences of limbs</i>	<i>Presence of limbs</i>	<i>Both Lays eggs</i>
Body Shape			
Tail length			
Examples			

Source: <https://lessons.rec.gov.bt/lesson/41c9dc22-1076-4612-9d92-2c81f3f0554b>

Assessment and Evaluation Criteria (Check List)

Areas of assessment	Yes	No	Remarks
Learners can name three reptiles animals and three amphibians animals			
Learners can identify the characteristics of reptiles and amphibians animals			
Learners can state the similarities and differences between reptiles and amphibians			
Learners can state examples and the characteristics of fish.			
Learners can differentiate between various types of fishes.			
Learners can state the importance of various life forms in the ecosystem			

Source: <https://lessons.rec.gov.bt/lesson/41c9dc22-1076-4612-9d92-2c81f3f0554b/>

LESSON PLAN 3**Class:** VI**No of students:** 30**Subject:** Science**Session:** 5 & 6**Date:****Time:** 90 minutes**Topic:** Birds**Teaching Strategy:** Mindful listening**Teaching Learning Materials:** Chalk, chalkboard, projector screen, laptop, posters of birds, chart, papers and markers.**Lesson Objectives:** By the end of the lesson, a child will be able to:

- Classify animals into birds based on their characteristics.
- Identify the differences and similarities in birds within the same group.
- Identify the sound made by some birds (rooster, hen, sparrow...)
- State characteristics of birds
- Name at least three birds

LESSON INTRODUCTION- 10 Minutes

Exchange greetings. Make the classroom comfortable for teaching and learning by letting children settle in the class.

Learner's prior knowledge.

- Learners already know birds can fly and saw birds like hens, sparrows, eagles, pigeons, roosters, etc.
- They already know birds lay eggs and have wings to fly.

Teacher will recapitulate the previous lesson taught by asking questions like:

- How is fish adapted to live in water?
- Name any two animals that can fly.
- What helps birds to fly?

After the discussion around learners' responses, the teacher introduces the lesson topic "Birds" to the class.

LESSON DEVELOPMENT

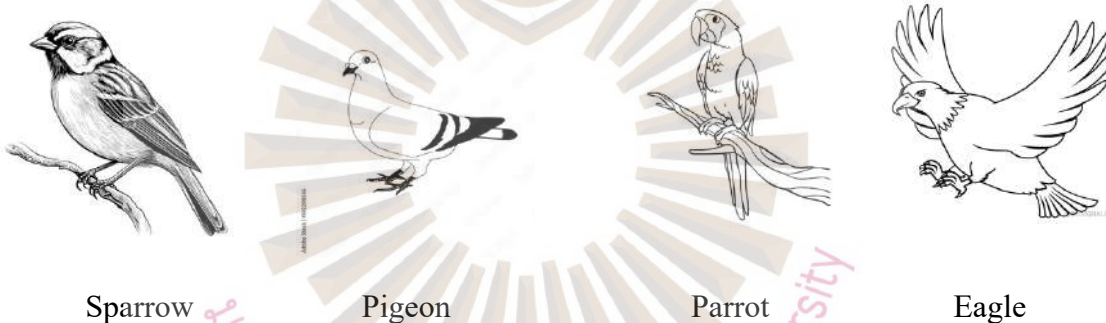
Lesson Input 20 minutes

Lesson Description:

This lesson intends the learners to gain scientific concepts of birds and their classification based on their characteristics with suitable examples. Learners are introduced to the unique features of birds (*Feathered body, warm blooded nature, ability to fly, presence of beaks*), and develop a deeper appreciation for the vast array of bird species found in the natural world.

To initiate the lesson and generate curiosity in learners, teacher will have learners explore scientific information about different types of birds and their characteristics by watching video from the link <https://rb.gy/qukiap>.

Teacher also displays picture of different birds as follows and ask them questions:



Source: <https://www.pinterest.com/pin/birds-name-list-of-a-bird-name-in-english>

- What helps them to fly?
- Which animals have feathers on their body?

Those animals that have feathers and wings are called birds.

Learning Experiences

This lesson comprises of experiential learning activity. In the activity, the learners will carry out experiential learning activity through mindful listening of sounds of different birds. Learners will carry out mindfulness practice by listening to the sounds of birds from the link [Nature Birds Noises](#) for a minute. The learners will listen to the sounds of different birds and get the idea about different sounds the birds make how different and similar their unique characteristics are?

Activity I: Mindful Listening Activity- 20 minutes

The teacher will ask learners to listen to the sounds of birds they make by closing their eyes and practicing mindful listening to recognize sounds of different birds being played from video link [Nature Birds Noises](#) for two minutes. **(Concrete experience)**

- After the mindful listening practice, the teacher asks the following questions to know more about “Birds” and “Mindful Listening Activity”.
 - ✓ What did you hear while doing mindfulness practice?
 - ✓ Are the sounds of birds same?
 - ✓ Can you make sounds of birds you know?
 - ✓ List some names of the birds
 - ✓ Mention a few characteristics of hens.
 - ✓ Do hens possess the same characteristics as pigeons? Explain

Learners further explore and write the characteristics of birds and their examples from the in the worksheet below and answer the questions that follow: **(Reflective Observation)**

Characteristics	Examples
<i>Eg. Birds have wings to fly</i>	<i>Sparrow</i>

Source: <https://lessons.rec.gov.bt/lesson/7e813b9d-6182-4598-9e75-a6702032847d/>

Learners discuss and write the similarities and differences between the birds (*Crow and Eagle*) in the worksheet provided below: (**Abstract Conceptualization**)

Distinct Features	Differences		Similarities
	Crow	Eagle	
Body size			
Feather colour			
Habitat			
Beak size/shape			

Source: <https://lessons.rec.gov.bt/lesson/7e813b9d-6182-4598-9e75-a6702032847d/>

Follow up of the Activity: 5 minutes

The learners will be asked to match (**Active Experiment**) the features of birds in the worksheet provided below:

Sl No	Column A (Features)	Column B (Functions)
1	Beak	- For fast movement
2	Feather	- To reproduce
3	Hollow Bones	- To feed on worms
4	Lays eggs	- To keep warm
5	Streamline Body	- To make body light for flying

Source: https://lessons.rec.gov.bt/lesson/7e813b9d-6182-4598-9e75-a6702032847d

LESSON CLOSURE- 5 mintues

Summarize the lesson. Teacher will ask following questions to check the understanding of the lesson:

- Which animals have feathers on their body?
- How do hollow bones help birds to fly?
- Why do birds have strong beaks?
- Why are birds classified as warm-blooded animals?
- How are birds able to fly in the air?

As a home work, teacher will ask the learners to find a books on *Bird of Bhutan*. Draw and name three birds of Bhutan in their notebook. State one distinctive characteristic of each bird they drew.

Assessment and Evaluation Criteria (Check List)

Areas of assessment	Yes	No	Remarks
Learners can state examples and the characteristics of birds			
Learners can differentiate between various types of birds			
Learners can state the similarities among various birds			
Learners can name atleast three different birds			
Learner can make sounds of few birds they know			
Learners can cite the importance of birds in animal kingdom			

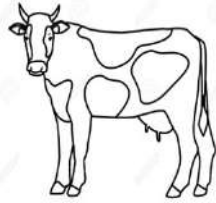
Source: <https://lessons.rec.gov.bt/lesson/7e813b9d-6182-4598-9e75-a6702032847d/>



PRE-TEST**Learning Achievement Test****Class Six****Subject: Science****Topic: Classification of Animals (Reptiles,Amphibians,Fish, Birds and Mammals)****Total: 20 Marks****Section I****(20 marks)****Part A*****Direction:*** Choose the correct answer and write it in the space provided. (1x5=5)

1. The animal whose body is covered with dry scales is
 - A. Cow
 - B. Dog
 - C. Snake
 - D. Donkey
2. The animal which can live both on land and in water is
 - A. fish
 - B. lizard
 - C. bat
 - D. frog
3. Amphibians absorb Oxygen from water through their
 - A. webbed feet
 - B. moist skin
 - C. gills
 - D. scales
4. The group of animals which can fly and have light hollow bones are
 - A. amphibians
 - B. reptiles
 - C. mammals
 - D. birds

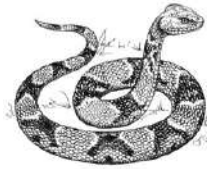
5. Study the figure given below. Identify the animal which suckles the young ones.



I



II



III



IV

- A. I
B. II
C. III
D. IV

Part B: True or False (5 marks)

Write **(True)** if the statement is correct and **(False)** if the statement is incorrect in the bracket against the statement. (1x5=5)

1. Animals which suckle their young ones are called mammals (.....)
2. Fish lives in water all the time. (.....)
3. Human beings are cold blooded animal.(.....)
4. Frogs and toad are best example of amphibians. (.....)
5. Birds use feather to keep them warm and wings to fly.(.....)

Part C: Fill in the Blanks (5 marks)

Read the questions carefully and write the correct answers in the space provided.
(1x5=5)

1. Animals that live in water are called _____
2. Dolphin is an example of _____
3. Fish uses _____ to breathe in water.
4. Animals whose body are covered with scales are called _____
5. Snake lays _____ to reproduce.

Section II: Short Answer Type (5 marks)

Answer all the questions and write your answer in the space provided. (1x5=5)

1. List down the name of two animals which belongs to mammal group.(1 mark)

.....
.....
.....
.....

2. Name two birds of Bhutan. (1 mark)

.....
.....
.....

3. Write down one difference between fish and birds. (1 mark)

.....
.....
.....
.....

4. List down two characteristics of amphibians. (1 mark)

.....
.....
.....
.....
.....

5. Animals like snake,lizard and turtles are examples of reptiles. Is the statement true? Justify with two points. (1 mark)

.....
.....
.....
.....
.....

TEST BLUE PRINT

Blooms Taxonomy Test Blue Print Class IV Science

Topics	Weighting	Remember	Understand	Apply	Analyze	Evaluate	Create
Reptiles & Amphibians	8	Sec I A Q1 (1)	Sec I A Q2 (1) Sec I C Q5 (1)	Sec I AQ3 (1)	Sec I B Q4(1)	Sec I C Q4 (1)	Sec II Q5 (1) Q4 (1)
Fish	4	-	Sec I B Q2 (1)	Sec I C Q3 (1)	Sec II Q3 (1)	Sec I C Q1 (1)	-
Birds	3	-		Sec I B Q5 (1)	Sec I A Q4 (1)	Sec II Q2 (1)	-
Mammals	5	Sec II Q1 (1)	Sec I C Q2 (1)	Sec I A Q5 (1)	Sec I B Q1 (1)	Sec I B Q3 (1)	-
Marks	20	2	4	4	4	4	2



APPENDIX E

SEMI STRUCTURED INTERVIEW QUESTIONS

Semi-structured Interview Questions

Student No: Date of interview:

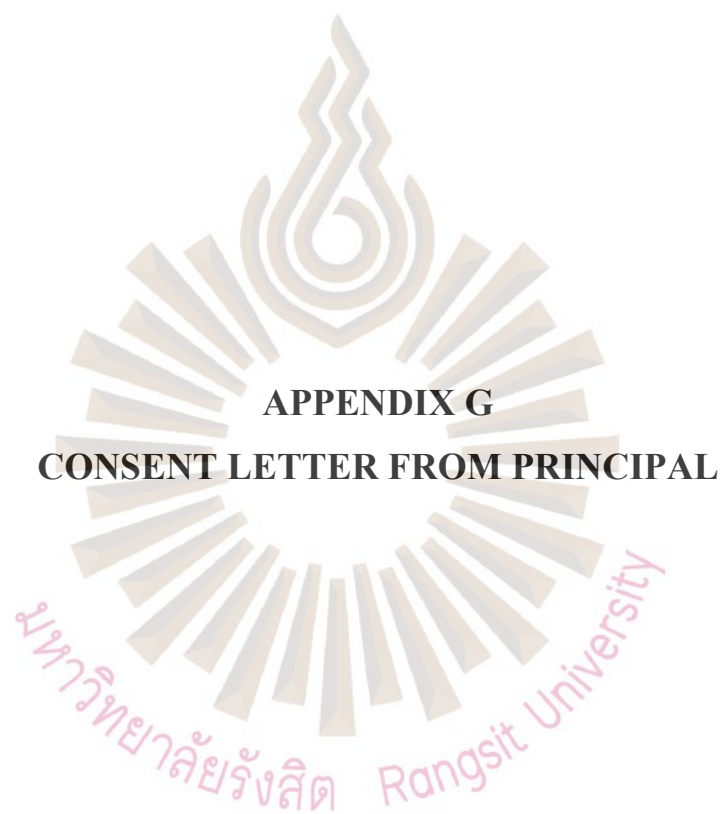
Venue: Gender: Male/Female Age:

Sl. No	Semi-Structured Interview Questions
	PART A: JOY IN LEARNING, UNITY AND COOPERATION
1	Do you like science?
2	Do you enjoy the class? How?
3	How did you feel about using Experiential learning approach to learn science?
	PART B: CLASS PARTICIPATION AND PERFORMANCE IMPROVEMENT
1	What did you enjoy the most while participating in classroom activities?
2	Do you think the use of experiential learning will help you learn science better? Why or why not?

Adapted from Tshering Pem, 2022







CONSENT LETTER

Respected Sir

I am currently pursuing my Master of Education in Curriculum and Instruction at Rangsit University, Thailand. I am conducting research on "**The Effectiveness of Experiential learning Approach on Science Learning Achievement for Grade 6 Bhutanese Students**". The main focus of this study is to develop authentic learning through hands on teaching and learning through Experiential learning. Also to develop interest in learning science. So I will be teaching four topics from class VI Science textbook for a period of one month. During this period, a pretest will be conducted before the lessons are being delivered and a posttest and an interview after the implementation of Experiential learning.

Therefore, I would like to seek your prior consent to let grade five students take part in this research. I assure you that the information of the participants, such as their names, identities, and school will remain anonymous, and all the information will be kept confidential.

I look forward to your great support.
Thanking you.

Yours Sincerely,

Chimi Seldon Dorji
Student

I give my consent to conduct the research with grade five students of my school. I confirm and acknowledge that I am being made clear about the content of the research and have read the letter provided by the researcher.


Principal
Principal
Jigme Losel Primary School
Thim Throm


Subject Teacher


Namsel Wanchel

มหาวิทยาลัยรังสิต Rangsit University

PARENT'S CONSENT LETTER

Dear Parents

I am currently pursuing Master of Education in Curriculum and Instruction at Rangsit University, Thailand. I am conducting research on "**The Effectiveness of Experiential learning Approach in learning Science of Grade 6 Bhutanese Students** " and I have chosen Jigme Losel Primary School as my research school.

To collect data for my research, I will be teaching four topics from class VI Science textbook for a period of one month. During this period, a pretest will be conducted before the lessons are being delivered and a posttest and an interview after the implementation of Experiential learning. A semi-structured interview will also be conducted at the end to determine the students' learning satisfaction towards the use of experiential learning in developing interest in learning science subject.

Since this research requires student participation, I would like to seek your permission to let your children participate in this study and as he or she is below 18 years, I would like to request you to sign on their behalf. I assure you that your children's names, identities, and information provided by them will remain confidential and anonymous at all times. I look forward to your cooperation in approving your child's participation in this research.

Thanking you

Yours Sincerely

Chimi Seldon Dorji
Researcher

Note:

I acknowledge that I have read the letter and agreed to let my
to participate in the above-mentioned research.

Name:..... Relation to the child

Signature:.....Date:



The image features a large, faint watermark of the Rangsit University logo in the background. The logo consists of a central flame-like symbol above a semi-circular arrangement of radiating lines. Below the logo, the university's name is written in Thai script and English: "มหาวิทยาลัยรังสิต Rangsit University".

APPENDIX H
TRANSCRIPTION OF INTERVIEW RESPONSES
(SAMPLE)

Group 1/ 5th June 2024**1) Do you like Science?**

Yes, I like Science because of the experiments we do so we tend to learn more about the facts in science. Also I get to learn about the environment, animals, human body and about different kinds of species. Science for me is very interesting and fun.

2) Did you enjoy the class?

I enjoyed the class as I was able to do fun activities such as quiz, drawings, mindful listening and going out to find out more about the animal topic we were taught with.

3) How did you feel about using Experiential learning approach to learn science?

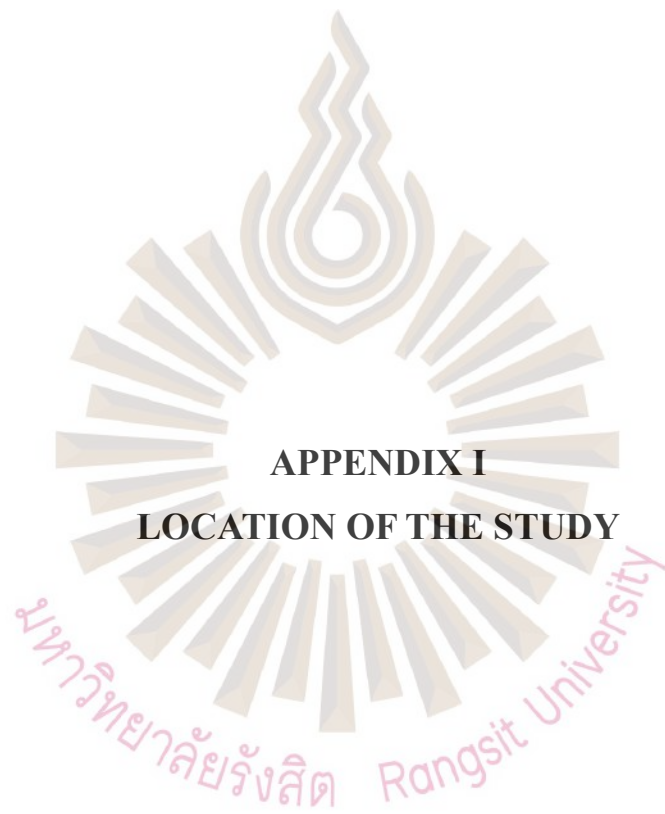
I felt excited when we learned fun facts about animals through quiz activity, when I drew the fish I got to know more about fishes also I could label the its parts on the diagram. Using experiential learning approach to learn science for me is great idea as students can go out and carry out different fun activities instead of staying inside the classroom.

4) What did you enjoy the most while participating in classroom activities?

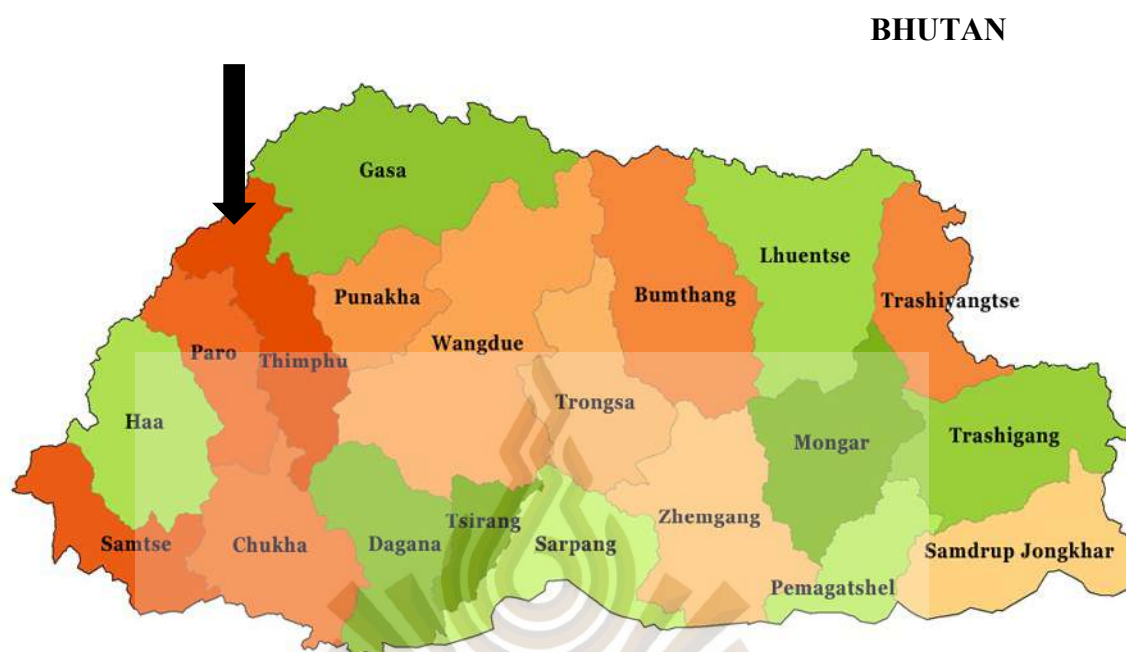
I enjoyed Quiz questions the most while participating in the classroom activities as it was interesting for me because it was a little challenging as we found out whether we were able to name the animals or not correctly which challenged my brain and made the lesson fun which in turn helped me learn better. It was so refreshing at times while we got change to go out and learn through campus tour.

5) Do you think the use of experiential learning will help learn science better?

Yes, experiential learning will help us learn better since it is interactive and it has more activities which makes the lesson most interesting to learn. It also make learning more easier to learn so we can perform better in academics.



Location of Sample School



Source: <https://www.mfa.gov.bt/pmbny/dzongkhags-at-a-glance/>



Jigme Losel Primary School

Source: <https://www.waze.com/en-GB/live-map/directions/jigme-losel-primary-school-thimphu?>



APPENDIX J
PAIRED SAMPLE T-TEST

Paired Sample T-Test

Paired Sample Statistics

One-Sample Test

Test Value = 0

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Pretest	13.159	39	.000	7.175	6.07	8.28
Posttest	42.367	39	.000	17.363	16.53	18.19

T-TEST PAIRS=Pretest WITH Posttest (PAIRED)
/CRITERIA=CI(.9500)
/MISSING=ANALYSIS.

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
	Posttest	17.36	40	2.592	.410

Paired Samples Correlations

		N	Correlation	Sig.

Paired Samples Test

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pretest - Posttest	-10.188	2.171	.343	-10.882	-9.493	-29.676	39	.000

BIOGRAPHY

Name	Chimi Seldon Dorji
Date of birth	February 12, 1989
Place of birth	Thimphu, Bhutan
Education background	Samtse College of Education, Bhutan Bachelor of Education, 2010 Rangsit University, Thailand Master of Education in Curriculum and Instruction, 2024
Scholarship	Trongsa Penlop Scholarship (TPS)
Address	Rinchengang Primary School, Wanduephodrang Ministry of Education and Skills Development, Bhutan
Email Address	csdorji@education.gov.bt

