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

Chimi Seldon Dorji* and Nipaporn Sakulwongs
Masters of Education in Curriculum and Instruction, Suryadhep Teacher's College
Rangsit University, Pathum Thani, Thailand

*E-mail: jia.li63@rsu.ac.th

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ABSTRACT

The study aimed to compare science learning achievement before and after using experiential learning approach and students learning satisfaction towards experiential learning approach of grade 6 Bhutanese students. It involved 40 participants from primary school and adopted a quasi-experimental design, employing both qualitative and quantitative methods. Lesson plans served as interventional tools, while learning achievement tests and semi-structure interviews were used for data collection. Quantitative data were analyzed using paired sample t-test, and qualitative data were analyzed using thematic analysis. The analysis of pretest and posttests scores revealed that the mean score of the posttest was greater than that of the pretest. The difference was statistically significance at 0.01 level, indicating a significant increase in the posttest scores as compared to the pretest ones. Semi-structure interviews indicated that participants demonstrated positive learning satisfaction towards science incorporating an experiential learning approach. Therefore, study recommends using experiential learning approach as a learning strategy to improve the science learning achievement for grade 6 Bhutanese students.

Keywords: Experiential learning Approach, Science Learning Achievement and Grade 6 Bhutanese students'

INTRODUCTION

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 with it. Without learning by doing, the child won't have any access to learning. Childs et al. (2012) reviewed that 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 methods. Nonetheless, this had established the groundwork for curriculum revision and systemic change in Bhutan's educational system.

Tenzin (2023) found out that the progressive education movement emerged in the 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. Additionally, Tenzin (2008) revealed that people from different social classes in Bhutan claimed that the localized primary science curriculum is out of date and has shallow material. 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.

Moreover, Dorji et al. (2022) stated that it is envisioned to provide learning experiences that are more enriching, challenging, and relevant to learners' needs for developmental appropriateness. Nidup et al. (2021) study shows that 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. 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. (New Normal Curriculum Instructional Guides – Royal Education Council, n.d.)

RESEARCH OBJECTIVES

1. To compare science learning achievement between before and after using experiential learning approach of grade 6 Bhutanese students.

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

LITERATURE REVIEW

1. Science Curriculum in Bhutan

Wangdi & Utha (2020) found that 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 its 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.

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 & Maxwell, 2008)

On the same note Dorji et al. (2022) also reported 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. At the core, 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. Many of them also opined that the reformed science curriculum is not only concise, experiential, inquisitive, and developmentally appropriate but also contextualized to suit Bhutan's emerging needs (Dorji, Jatsho, & Choden, 2022)

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. 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 idea (Bhutan Education Blueprint Rethinking Education, 2014).

2. Experiential Learning Approach

Morris (2020) stated that in experiential learning, learners are involved, active, engaged, and participants in the learning process. Learner participation is central, where "learning by doing", learners are placed physically, often in collaboration with others, in rich contextual learning environments that represent in the present moment uncontrived experience. Students are engaged socially, intellectually, and physically, which supports the embodied nature of experiential learning. Bates (2015), found out that according to Sigmond 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.

Giac et al. (2017) in their study states that experiential learning activities are usually organized in a cycle where at the beginning students use their own experience to solve problems and at the end of the day, students can use them. Knowledge and experience have been learned in order to solve the real issues of life in a society. Kolb's experiential learning model suggests four stages in this

process: The four stages include:1) Concrete Experience 2) Reflective Observation 3) Abstract Conceptualization and 4) Active Experimentation.

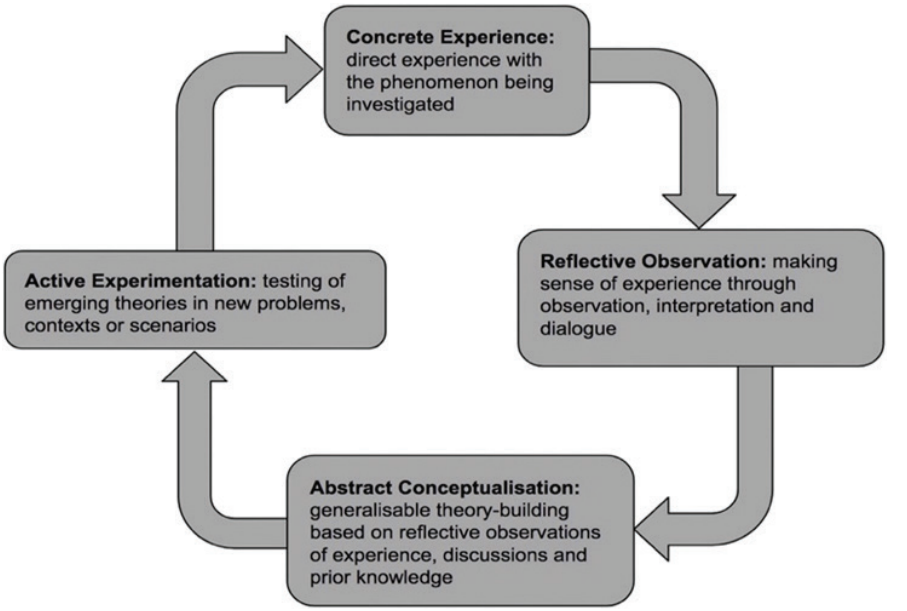

Figure 1 David Kolb's Model Experiential Learning Cycle

Source : Kolb, 1964

According to the Association for Experiential Education (2014), experiential learning has the following elements; Firstly experiences; The experiences are carefully chosen for their learning potential. Secondly, 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. Thirdly Abstract conceptualization: Throughout the experiential learning process, the learner is actively engaged in posing questions, investigating, experimenting, being curious, solving problems, assuming responsibility. Lastly application: Learners are engaged intellectually, emotionally, socially and physically, which produces that learning task is authentic. Experiential learning is based on the premise that having experiences is best way to learn. Incorporating experiential learning into classes can ensure students' success by equipping them with the necessary knowledge to complete the task.

CONCEPTUAL FRAMEWORK

The study consisted of two variables: independent and dependent variables. The independent variable was experiential learning approach and dependent variables were science learning achievement and students' learning satisfaction. With the approach used, students' learning achievement and their reaction towards experiential learning were expected to improve. The framework is illustrated below; classification of animals' concept was taught using experiential learning approach. A posttest and semi-structureinterview were conducted after the intervention to gather quantitative and qualitative data respectively to compare science learning achievement before and after using experiential learning approach.

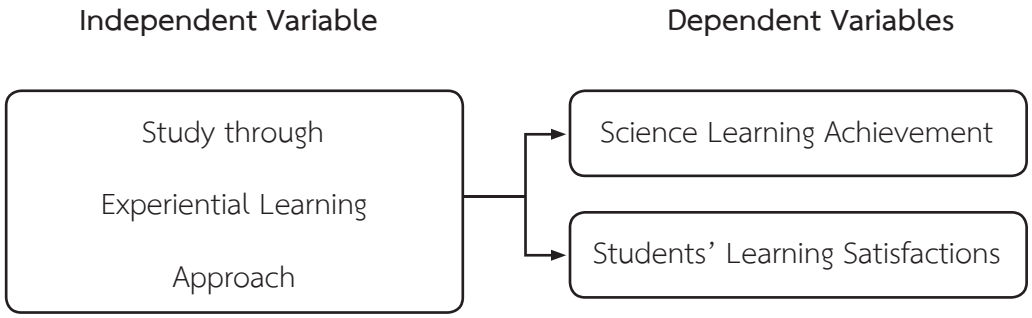

Figure 2 Independent and Dependent Variables

RESEARCH METHODOLOGY

A mixed-methods approach was adopted in this study, which integrates both quantitative and qualitative research techniques. Prior to using experiential learning approach, a pretest was administered, followed by a four-week instructional phase in which

1. Population and sample

To form a sample group for the study, a clustered random sampling method was employed by the researcher, involving 40 students aged 11 to 14 from a Primary school. The selected sample group exhibited a mix of abilities and gender. In alignment with the principle outlined by Hossan (2023), the concept of clustered random sampling was implemented. The researcher specifically chose one section, consisting of 40 students from three available sections in the sixth grade.

This method involved dividing the population into clusters, randomly selecting certain clusters and subsequently including all individuals within the chosen clusters in the study.

2. Research Instruments

2.1 Lesson Plan

The researcher designed four lessons in all of 90 minutes each. One lesson plan covered 2 sessions, and 1 session was a period of 45 minutes. These lessons were designed to teach four topics from prescribed science curriculum textbook for grade 6 Bhutanese students which were relevant to experiential learning approach. These lessons were taught twice a week. To form a sample group for the study, a clustered random sampling method was employed by the researcher, involving 40 students aged 11 to 14 from a primary school a period of four weeks. The main focus of the lessons was to implement an experiential learning approach on science learning achievement which guided the research participants towards science learning.

2.2 Pretest and Posttest

To ascertain the effectiveness of the experiential learning approach of the research participants, the researcher conducted a learning achievement test consisting of 5 marks of multiple-choice questions, 5 marks of true or false questions, 5 marks of fill in the blank's questions and 5 marks of short answer questions with a total of 20 marks. The researcher conducted the test before and after the intervention to analyze the learning achievement of research participants. The pretest and the posttest included the same test questions in order to ensure consistency with the evaluation.

2.3 Semi-Structured Interview

A semi-structured interview is qualitative research that prefers data collection method where researcher's goal is to better understand the participant's unique perspective rather than a generalized understanding of a phenomenon. A semi-structure interview guide often includes main open-ended questions with follow-up probe questions for the interviewer to refer to throughout the interview (Adeoye-Olatunde & Olenik, 2021). All the 40 participants were interviewed face to face to receive genuine responses towards the use of experiential learning approach in learning science. The interview consisted of 5 questions that the researcher has framed, focusing

specifically to gather insights into various aspects of student's experiences with experiential learning approach in learning science. The responses of each of them were recorded and later the researcher transcribed. Therefore, by using identical sets of questions, the researcher was able to conduct standardized analyses and facilitate the easier development of themes.

3. Validity and Reliability

3.1 Validity

Content validity was ensured through expert reviews, with all instrument's ratings above the acceptable threshold (IOC > 0.67). In this study all the instruments (lesson plans, learning achievement test and semi-structured interview form) were validated by three experts and had rated +1 which was above 0.67, it showed that the items were appropriate for the study as cited by Majid (2018).

3.2 Reliability

The reliability of achievement test was verified through a pilot test with 30 students from grade 7 yielding a Kuder-Richardson coefficient of 0.70, indicating reliable test items. The Kuder-Richardson (KR-20) formula was used to determine the learning achievement test's reliability coefficient. The KR-20 coefficient for the instruments must be equal to or greater than 0.70 to be considered reliable. From the pilot test conducted in grade 7, the coefficient obtained was 0.70 which indicated that test items were reliable as aligned by Middleton (2019).

4. Ethical Consideration

For ethical consideration, the researcher obtained consents from relevant authorities including the research and development institute of Rangsit University and the Ministry of Education and Skills Development (MoESD), Bhutan. The confidentiality and anonymity of the participants' views and opinions maintained.

RESEARCH RESULTS

Analysis of achievement test scores

A comparative statistical analysis using paired sample t-test showed a mean difference of 10.18 between pretest and posttest scores. The result of the analysis indicated that the mean score of the posttest was higher than the mean score of the pretest as displayed in table below:

Table 1 Paired T-test Analysis

Group		Mean	S.D.	Mean difference	t	P- Value
N=40	Pretest	7.18	3.44	17.36-7.18=10.18	29.67	.01
	Posttest	17.36	2.59			

According to Table 1, the pretest and posttest mean scores were 7.18 and 17.36, respectively. The data clearly showed that the mean score of the posttest was higher than the pretest score for the group being analyzed, with a mean difference of 10.18. This implies that implementing an experiential learning approach proved more effective as is evident from the higher posttest mean score in comparison to the pretest score. The significance value (p) was .01, which also indicated that there was a significant improvement in scores. The study discovered that using experiential learning approach in learning science had a substantial positive impact on students' science learning abilities after assessing scores.

The maximum and the minimum scores in pretest were 15 and 1 respectively, whereas the maximum and minimum scores in the posttest were 20 and 11 respectively. Overall, the results indicated that after using experiential learning approach, the grade 6 Bhutanese students significantly improved their learning achievement in science.

Semi-structured interview

The second objective of the study was to determine students' learning satisfaction of grade 6 students after using experiential learning. After the instructional sessions had concluded, the researcher conducted interviews with the sample group of students to further find out their satisfaction. A thematic analysis of the data obtained from semi-structure interviews led to the identification of four main themes: 1) Joy in learning, 2) Improved class participation and interaction, 3) Unity and cooperation and 4) Performance improvement. A vast majority of students expressed favorable feedback regarding the use of experiential learning approach in science learning.

1. Joy in Learning: Experiential learning promoted enjoyment in learning as students learned through hands on experience. Most of the learners expressed

their joy in carrying out the activities using an experiential learning approach. *"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)

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. *"We enjoyed the quiz the most while participating in classroom activities."* (Group 4) They were able to discuss the ideas in groups to collaborate on topics they were presented to discuss. Students were motivated to take part in activities associated with outdoor activities since they get a chance to explore their ideas.

3. Unity and cooperation: Unity and cooperation creates a supportive 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 their findings. They worked together to complete the topic. *"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."* (Student 6, Student 13, Student 30). Furthermore, the field visits allowed Students to see the advantage of teamwork.

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. *" 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) Before the scores of the students were found to be low but after the intervention of experiential learning approach they found that their academic scores improved drastically.

Discussion

The findings of the first objective found that experiential learning approach could help enhance science learning achievement of grade 6 Bhutanese

students. With a sample of 40 children, a pretest and posttest were conducted before and after using the experiential learning approach to compare the learning achievement of grade 6 students. This was demonstrated by the learning achievement test results which showed a mean difference between the pretest and posttest scores of the sample group of 10.18. Before the score for pretest were found to be 7.18, after using experiential learning approach the posttest score was found to be 17.36 with increased improvement score of 10.18 as a mean difference in which the study clearly highlighted the positive impact of use of experiential learning approach towards science learning achievement of grade 6 students.

This outcome aligns with Ali (2019) study; by actively participating in activities that directly relate to the subject matter, they can internalize concepts and apply them in practical situations. This approach emphasizes the importance of reflection and feedback to enhance the learning experiences. This conclusion is further reinforced by Alicia (2021) investigation, which found that experiential learning approach provides an avenue for students to explore their curiosity, make mistakes and learn from those mistakes in a low-risk environment. Through practicing experience 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.

The study's second major finding revealed that students exhibited positive learning satisfaction when experiential learning approaches were incorporated into science learning. The second objective was addressed in the structured interview with individual students. Thematic analysis was used to assess the data, and it became clear that students had a positive learning satisfaction towards experiential learning approach in science. The teaching learning session was enjoyable for the students because the classroom environment encouraged lively conversations and group interactions. The students described their learning experiences in experiential lessons throughout the interview.

Most students mentioned that

they had a chance to experiment and explore the knowledge they had learned from the lessons. As a result, a platform was developed where students could learn through art, campus tour, listening to sound through mindful meditations and quizzes, all of which improved their academic performance in science.

The results also demonstrated that the experiential learning approach improved students' understanding of science. Their knowledge of the subject matter and abilities to comprehend was enhanced by the experiential learning approach. Additionally, it demonstrated to them that learning can be enjoyable. Students also talked about how experiential learning made learning simple, which encouraged them to learn and be completely involved. Furthermore, students were more satisfied than those who sat in traditional lecture-based settings.

The findings were supported by the related research done by (Cloke, 2023), 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. 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 learning process. As per Wangdi (2015) it was found that majority of students are unable to understand core concepts and apply knowledge to real life situation across the grades and subjects. The ability to independently drive one's own learning, coupled with the appreciation of the value of lifelong learning.

Conclusion

The study highlighted the importance of incorporating experiential learning approach in science instruction to improve their student's learning achievement. The result of comparison of science learning achievement between before and after using experiential learning approach showed a significant improvement in students' performance, with mean scores increasing from 7.18 in the pretest to 17.36 in the posttest. This improvement, confirmed by a statistically significant paired sample t-test ($p < .01$), demonstrated that the experiential learning approach was effective in improving students' learning achievement on science learning. The result of the study on learning satisfaction towards using experiential

learning approach 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"*. Thus, the application of experiential learning generated positive students' learning satisfaction in learning science.

Limitations

This study's generalizability was limited due to its small sample of grade 6 students (40 participants). The study focused only on one section lacking controlled group to compare student performance results with other sections. Requires more time to cover up the lessons using the experiential learning approach which takes more time to conduct and cover up chapter while teaching.

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