UTS UNIVERSITY OF TECHNOLOGY SYDNEY

Pedagogical Practices: Triggering and Sustaining Students' Interest and Engagement in Bhutanese Science Lessons

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Under the supervision of Associate Professor Nick Hopwood and Dr Tracey-Ann Palmer

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Certificate of Original Authorship

I, Bijoy Kumar Rai declare that this thesis, is submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Education, Faculty of Arts and Social Sciences at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

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List of Abbreviations

AoI	Action of Interest
BCSEA	Bhutan Council for School Examination and Assessment
CoE	College of Education
FPMID	Four-Phase Model of Interest Development
GNH	Gross National Happiness
GoI	Government of India
HoL	Hands-on Learning
IL	Interactive Lectures
MoE	Ministry of Education
NAPE	New Approach to Primary Education
NEP	National Education Policy
NNSCF	New Normal Science Curriculum Framework
OECD	The Organisation for Economic Co-operation and Development
PISA	Program for International Student Assessment
POI	Person-Object Theory of Interest
REC	Royal Education Council
RGoB	Royal Government of Bhutan
SCF	Science Curriculum Framework
SGD	Small Group Discussion
SPP	Signature Pedagogical Practices

STEM	Science, Technology, Engineering, and Mathematics
UTS	University of Technology Sydney
VMSS	Vajra Middle Secondary School

Abstract

Securing future generations of scientists and scientifically literate citizens is vital for the economic development of Bhutan. But, the current teaching and learning of science does not seem to inspire Bhutanese students to take up science as they progress along the grades. Consistently, the benchmarking assessment in grade 10 has revealed that students' performance in science has been one of the lowest of all the subjects, while the performance in science in grade 6 is one of the highest. This study, pedagogical practices in triggering and sustaining students' interest and engagement in science, attempts to understand the current classroom practices in teaching school science despite many challenges. It was aimed at identifying those pedagogic practices that trigger and sustain students' interest and engagement in the Bhutanese school science lessons.

This study was guided by the conceptual framework of the Action of Interest (AoI) from Krapp's Person-Object Theory of Interest (POI). The relational construct between person and the object was adapted to identify interest being generated as students engaged with the science content during the lesson. In order to generate relevant data to enable the intended contribution to knowledge, the study adopted cross-sectional ethnographic case study design to elicit valid and justifiable meanings on the topic.

Data was generated from a middle secondary school in Bhutan through non-participant observation and semi-structured interviews. A class from each grade 6, 8 and 10 was identified. From each grade, four students and their science teacher(s) were recruited for the study. Following a two-part data generation process, the researcher spent initially two weeks in each grade video recording the lessons, audio recording the group discussions, and taking still photographs beside the note-taking, and this procedure was repeated for the second round. Each student participant was interviewed once a week focusing on the lesson they found most interesting and the teacher participants were interviewed twice (beginning and end) in the entire duration of the fieldwork. NVIVO 12 was used to organise the data, and a multi-stage progressive process with an in-built iterative approach was undertaken to analyse them.

The findings indicate that three approaches (interactive lecture, small group discussions and hands-on learning) were used in the teaching and learning of science in the school. These approaches in themselves were not found to be associated with triggering and sustaining students' high interest and engagement in science lessons. Rather, it was specific pedagogic practices embedded within each of them. Questioning technique in interactive lectures, variations and scaffolded autonomy in small group discussions, and distributed responsibilities in hands-on learning were key to triggering and sustaining students' interest and engagement. This was accomplished despite the constraints and challenges of teaching science in Bhutanese schools.

The findings have implications for practising teachers, teacher educators and the curriculum developers to enhance the teaching and learning to foster students' interest and engagement in Bhutanese science lessons. Furthermore, the study opens up new avenues for research building on these key findings. The first of its kind in Bhutan, this study contributes original knowledge, revealing how students' interest and engagement in science lessons can be triggered and sustained.