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Science Learning culture: An Ethnographic Study of a Public school in Nepal

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Abstract

Based on the rural Magar community area public school context, this paper aims to explore pedagogical strategies to empower indigenous learners, such as Magar students' science learning. In this ethnographic study, grade ten students and teachers who are involved in teaching in the same grade are purposively selected as the co-researchers for data generation. Fieldwork observation, interviews, and document analysis were research approaches, and a descriptive qualitative design was used to explore the reflections. The findings were four attributes: presage attribute, context attributes, process attributes, and product attributes. However, community observation (context attributes) and product attributes were skipped due to the research technical issues. The discussion of this study was framed by Habermas' theory of cognitive interests. Based on the discussion, the study concluded that the existing learning culture attributes are conventional and need to be upgraded through school infrastructural development, implementing policy provisions, and integrating culturally responsive STEAM approaches in teaching strategies to empower the learning culture of science education for marginalized learners.

Keywords: Conventional teaching, cognitive interest, one-size-fits-all, sits-and-gets classroom.

Introduction

Students learn best when their knowledge and interests are engaged and begin with emotional responses to behaviors, activities, and expressions in classroom teaching. They should be engaged in active learning inquiries that enable them to solve problems, reflect on their experiences, and create ideas (Grundy, 1987). The role of the teacher should be as a facilitator and the learning initiator rather than securing a position in the classroom. They learn and develop concepts, ideas, and understandings of their life through practices, experiences, and social interactions. Therefore, learning culture must be learner-friendly, inquiry-based, contextualized, epistemologically connected, and respect their backgrounds. Similarly, critical thinking, collaboration, interaction, communication, and integration of multiple pedagogical approaches foster a learning culture in science classrooms. The concern of this research is to explore whether these activities are practiced in the classroom oriented towards empowerment.

Although schools, especially institutional schools, often practice activity-oriented learning cultures, conventional approaches remain dominant in Nepal (Das, 2013). This

is primarily due to the inadequacy of physical infrastructure and the professional dedication of teachers (Rana et al., 2018). This impedes the creation of learner-oriented cultures in the context of Nepal. However, the government of Nepal has taken necessary initiatives to improve the learning culture for all. The School Sector Development Plan 2018 (SSDP-2018) focuses on the improvement of school infrastructure and the professional development of teachers to practice a meaningful and effective learning culture in classrooms. Similarly, other educational policies School Sector Reform Plan [SSRP] (2009), the National Education Policy [NEP] (2019), the National Curriculum Framework [NCF] (2019), and the Secondary Education Curriculum [SEC] (2020), have documented the essence of learner-oriented pedagogical practices, which are avenues to practice a better learning culture. Following the COVID-19 pandemic, government initiatives aimed to increase digital technology access and facilitate a shift to techno-learning classroom cultures. Furthermore, the Teacher Service Commission's (TSC) annual recruitment requires potential candidates to possess up-to-date teaching techniques and comprehensive subject knowledge before commencing their service. This illustration hopes for a purposeful and meaningful learning culture in the classroom.

Despite these efforts and decades of education reforms in Nepal, science education in public schools remains largely shaped by monolingual, textbook-driven, and examination-oriented practices that marginalized indigenous learners (Khanal, 2017). The dominant conventional teaching strategies privileged rote memorization and abstract concepts, detaching them from their lived experiences. Such a disconnect is particularly acute in the rural indigenous majority schools, where students navigate science classrooms that neither reflect their cultural knowledge system nor validate their ways of learning. There is a critical gap in understanding how learning is culturally mediated and engaged with scientific knowledge, with resistance, reproduction, or reimagination of dominant norms.

This ethnographic study addresses those gaps by investigating the science learning culture, foregrounding the voices, practices, and interactions of students and teachers. It seeks to explore how science is taught, learned, and practiced in multilingual and diverse settings. By doing so, the study abstract contributes to a decolonial reimagining of inclusive, relational, and responsive science education for the educators, curriculum designers, and policy makers. It provides a literature manifesto for the indigenous education researcher and a glimmer of hope for culturally and linguistically diverse learners.

Regarding the issue, Gautam and Acharya (2023) revealed that the trends of science teaching in Nepal are based on the dominance of teacher-centered approaches without planning, decontextualized, and detached from ICT.However, disaggregated information, the absence of translanguaging, no theorization of epistemic justice, and ignoring marginalized learners are the gaps of this study. Similarly, Nugroho and Ngabekti (2023) argued that presage variables, context variables, and process variables

as the key strategies of science teaching. However, the study is limited to discussing a multi-lingual/inclusive framework for the marginalized learners. In the same way, Sie and Chonga (2025) argued for three interrelated dimensions: qualification, teaching expertise, and teaching practices for quality teaching in the classroom. However, the study lacks the socio-cultural backgrounds of the learners for meaningful teaching, as noted in the gap of this study.

In this context, the literature lacks teaching strategies for the marginalized learners from rural public schools. It is essential to explore the science teaching strategies for the indigenous students, like Magar students, to enhance science learning in the classroom. Therefore, the mind evokes questions: what are the considerations to be aware of a science teacher teaching in such classrooms? How can a teacher engage indigenous students in the classroom actively? How can a science teacher encourage students' interactive teaching-learning culture in the classroom? clicked in my mind and germinated the concept of this paper.

Based on these research questions, the study aims to explore pedagogical strategies to empower indigenous learners like Magar students in public school science classrooms. However, the remote rural area Magar community public school setting, lack of comparative study among more schools, lack of product attributes and community observation (context attributes), and the study is limited to grade 10 science subject teaching-learning activities are the delimitations of this study.

Research Method

To achieve the proposed aim of this study, ethnographic field observation activities were carried out in Himalayan Secondary School (pseudonymous) from March to September 2024 at Mathagadhi Rural Municipality in Palpa District, Nepal. The three components: place (school/classroom), actors (grade 10 students and secondary level teachers), and activities (science teaching strategies) were observed (Nugroho & Ngabekti, 2023). The research site and participants were selected purposively to match with aim of the study as suggested by Marshal and Rossman (2014), and fieldwork observation, interviews, and documents were information sources. A descriptive qualitative design was used to interpret results and explore the reflections (Humphreys & Watson, 2009). The discussion was framed by Habermas' theory of cognitive interests (Habermas, 1972). In this study, ethical considerations were maintained by informed consent and confidentiality of participants. The cultural practices and rituals were sensitively responded to during the fieldwork.

Theoretical Framework

This study is framed by Jürgen Habermas' theory of cognitive interests (1972), which explains the knowledge production process through three fundamental lenses: technical interest, practical interest, and emancipatory interest, in teaching and learning practices in classrooms. According to the theory, technical interest refers to learning through objective experiment, observation, and hypothetico-deduction that generates law-like

and positivistic knowledge, aligns with the Eurocentric standardized curriculum and contents. It reflects science as a body of facts, a positivist teaching model, prioritizes standardized content over contextual relevance, and marginalizes the indigenous learners. Practical interest is a Hermeneutic model of teaching (Grundy, 1987) that foregrounds dialogic negotiations of meaning for marginalized learners, and culturally situated interactions between students, teachers, and community members. It emphasizes communicative interaction, subjective engagement of students, and mutual understanding of learners in the classroom. Whereas emancipatory interest emphasizes the dialogic pedagogy for problem posing, learning, and continues transformative teaching praxis. It prioritizes critical self-reflection, authentic insights, and dialectical critique in classroom teaching.

In this way, by leveraging Habermas' tripartite model, this study situates science learning not as a neutral transmission of facts but as a contested terrain of meaning-making, shaped by power, culture, and historical marginalization. It advocates a dialectical pedagogical strategy for science teaching that encourages engaged participation of the learners, open inquiry, critical questioning, and mutual recognition between teacher and students. This framework aligns with broader efforts to decolonize science teaching and construct pedagogical strategies that are radically inclusive, linguistically plural, and epistemologically situated.

Results and Interpretation

The results and interpretation of this study are based on four interaction attributes: presage, context, process, and product, which are interpreted in Table 1.

Table 1

Learning culture attributes of the science classroom

Attribute	**Interpretation**
Presage attributes (Teacher)	Academic qualifications, experiences, age, gender, and dedication.
Context Attribute (Student)	Bilingual, come from distant villages, lower-middle-class farming background families, rich in indigenous epistemology, and frequently absent from school.
Context Attribute (Classroom Facility)	Sustaining only subsistence, inadequate facilities for teaching activities.
Context Attributes (Community Observation)	Skipped
Process Attribute (Planning and teaching strategies)	Oral plan and personal note diary. conventional, One-way, exclusion, monolingual, and exam-oriented.
Product Attribute (Learning Achievements, learner, and parents' satisfaction)	Skipped

Out of the four major attributes, the researcher used three: the presage, context, and process (Except community observation). Whereas for community observation and product attribute, it was skipped due to the limited time boundary and technical issues. Each of these attributes has been observed more specifically and interpreted.

Presage Attribute

The component of the presage attribute is the qualification of teachers that determines teaching activities. Evidence shows that teachers who have obtained advanced degrees have a positive impact on students' achievement in secondary schools (Rice, 2003). The qualities of the teachers are displayed in the following table 2.

Table 2

Qualities of Secondary Level Teachers

NO	ACADEMIC QUALIFICATIONS	MALE	FEMALE	NATURE OF APPOINTMENT		COMMUNITY FAMILIARITY		TOTAL
				Permanent	Others	Yes	No	
1	Bachelor's Degree	1	2	1	2	-	3	**3**
2	Master's Degree	3	1	2	2	-	4	**4**
3	Research Level	-	-	-	-	-	-	**-**
	TOTAL	**4**	**3**	**3**	**4**	**-**	**7**	**7**

According to Table 2, there is a majority of males and postgraduate teachers, but no one has a research-level degree. Along with one female, around 43 percent of teachers were permanent. From the document, all the teachers have got minimum academic qualification for secondary level teaching, but a formal training opportunity was only for permanent teachers. Job security, as well as the classroom management skills of the teachers, play a significant role in classroom teaching. Furthermore, all the teachers were from outside, non-marginalized ethnic groups and unfamiliar with the students' background. This factor also influences teaching and learning strategies in the classrooms.

Another discourse of the teaching is gender influence. Bar et al. (2006) argue that a well-dressed, neat, and clean teacher produces a good first impression, draws the attention of the students very well, and facilitates the learning process. Generally, this quality is maintained by lady teachers. The authors claimed that many students preferred lady teachers, due to their sincerity, hard work, efforts taken in preparing lectures, politeness, a high-pitched, and audible voice quality. Regarding the issue, a girl student participant shared, "I feel more comfortable asking confused questions to the lady teacher, because I found her more kind, cooperative, and polite responses to me. She can understand female problems very well and can handle them" (Conversation, July 2024).

However, Shah and Udgaunkar (2018) revealed that there are no significant differences between ladies' and gentlemen's teachers; but, ladies' teachers are more preferable in secondary school because of emphasis on listening, being less aggressive in the classroom, and opposite sex attraction influences for boys and comfortable sharing feelings for girls.

Another presage attribute is the age of the teachers. From the school document, the youngest teacher was 26 years old, the oldest was 51, and the average was 36.4 years old. The age distribution of teachers is shown in the following table 3.

Table 3

Teacher Age distribution in school

No.	Age	Male	Female	Total
1	20-30	-	2	**2**
2	30-40	2	1	**3**
3	40-50	1	-	**1**
4	50-60	1	-	**1**
	Total	**4**	**3**	**7**

The teachers below 40 years were 71.42 percent and had teaching experience below 5 years. This data is not resonating with the suggestion by Goe and Stickler (2008) that teaching experience must be considered when recruiting teachers and determining appropriate assignments. It is a general thought that age and experience go hand in hand. Age is an asset. But Shah and Udgaunkar (2018) argue that as age advances and designation is promoted, teachers lose the enthusiasm to teach due to the boredom of teaching the same content over several years and added responsibilities as an academic personality. During a conversation, a student participant shared, "The young teachers actively perform presentations, have an interest in extra-curricular activities, and have technology skills" (Conversation, May 2024).

Diplomatically, I kept my curiosity regarding the teacher participants' stance related to response, and he shared, "Due to age, I feel physically tired, and the generation gaps which is challenging me to justify myself in classrooms, and I feel humiliated" (Conversation, June 2024).

Responses show that energetic and young teachers are fit for secondary schools for effective teaching. According to Bodhe et al. (2015), the age factor alone is not significant for enthusiastic teaching. They suggest that clarity of knowledge, confidence, explanation technique, command over the language and the subject, classroom control, and use of relevant audiovisual aids with recent information are more important attributes. The use of innovative and creative teaching techniques with students' engagement prevents boredom. However, these are supplementary, not a substitute for a teacher. Therefore, the discourse of teaching dedication and potentiality is more significant than teachers' age.

Context Attribute

Observations on this context attribute were conducted on two components: students and classroom facilities. According to the school document, there were 25 students in grade 10, but 3-4 students were frequently absent. The conversation with the teacher clarified that remaining absent is normal in the Magar community. He continued that there were so many unusual practices that made the students absent. During my

observation on any Tuesday in June 2024, a newly appointed class teacher from grade seven shouted and ordered more than half students in the whole class to align on the school ground. Waving a stick, she interrogated them as to why they were absent on Monday and did not complete the assignment. One of them, trembling with fright and low voice, explained the reason for absenteeism. I noticed that the teacher became extremely angry and went to another class, grade 8, warning them to stand in the sun all day. Later, I knew that yesterday (that Monday), the villagers had collectively slaughtered a pig in the neighborhood, while watching the meat distribution event, students remained absent from school, and were unable to complete their homework.

Another teacher added that during plantation and harvesting crops, students help their parents work in fields and farmlands. Many students who can attend school do not have time to study/complete homework because most of the time at home is also have to help their parents work.

In my study areas, helping with domestic work, being involved in cultural and ritual activities, and being absent from school are considered normal. One student participant shared that he supports parents during peak-hour farming seasons and remains absent. But on heavy rain, extremely hot, or cold days, there is a problem in class. And sometimes, the peer group's unwillingness, they stay hidden in the middle way, enjoying themselves in the forest, nearby places, swimming in a stream, and so on. Another student participant said,

I have a linguistic problem expressing what I know. The teacher scolds and forces me to speak fluently in Nepali. So, when he announces the question answer for the next day, I also bunk school and hide in the middle way with friends. (Conversation, September 2024)

She has a problem with excluded teaching strategies. In the same way, there are several causes of irregularities among students in this school. The absenteeism cases of students conveyed by the teacher were due to the unfavorable family conditions and the lack of awareness of the parents. However, the student's narrative indicated that poor classroom physical facilities and culturally insensitive teaching strategies were also responsible for absenteeism cases.

Figure 1

Seating Management of Class 10

Regarding the issue, Kuru Cetin & Taskin (2016) claimed that parents who have good socioeconomic status are more willing and active in the procedure to follow the educational process. But, in this study, due to the various factors, attendance depends upon the mentality of the students at a particular time. This kind of sociocultural backgrounds and unforeseen circumstances of the student affects student attendance at school and

study time at home, which in turn also affect student learning opportunities.

School classroom facilities are also significant for science learning activities at schools. As a human being, the physical facilities and a comfortable environment are essential to perform work. It needs safety, cleanliness, and creative learning environments for the students, which encourage students to perceive high achievements and outcomes (Nepal & Maharjan, 2015). According to Nugroho and Ngabekti (2023), a learning environment classroom demands learner-friendly pedagogical strategies, well-equipped laboratories, and well-facilitated libraries. Furthermore, well-furnished classrooms, appropriate seating arrangements, drinking water and toilet facilities, smart digital equipment for learning, open playgrounds, and other learning environments. However, based on observations, I found that the class was running in a dilapidated building with crumbling walls, nominal furniture, and no tables or chairs in the classroom (Figure 1). The internal scenario of the classroom is galvanized iron-sheet roofing, iron-framed old desk-benches, pan-less old-wooden window frames, ruptured classroom walls, and no power supply for electrical activities. During the conversation, a student participant shared, "Rainy days, water leaks from the roof, sound disturbs class, and winter season, it is too cold due to open windows. So in those days, it is a problem to attend class" (Conversation with student, August 2024).

The narrative reflects the problematic situation of the classroom and the poor school infrastructure. According to the School documents, the school does not yet have a separate computer laboratory, science laboratory, library, or internet connection for the computers, but is consolidated in a single room with ten computers, and science laboratory racks (a few charts, nominal chemicals, and equipment). Regarding the situation, the science teacher denied that the problem is as serious as claimed and seen, but it is being addressed. The head teacher explained his plans to solve them in the near soon. The cell phone signal was insufficient for communication in the school premises. To access the mobile network signal, cell phone users have to move up 50 meters above, to an open place outside the school.

Process Attributes

This study observed lesson plans prepared by science teachers and science teaching strategies as the process attribute components. Both processes play significant roles in meaningful teaching and learning activities and good learning achievements. Therefore, process attributes are considered the game-changer process.

Lesson planning is a crucial element of the quality teaching–learning process, supplying the teacher with a coherent framework of teaching and assisting with the smooth flow of the lesson. It aims to simplify and improve the quality of the teaching-learning process. It is considered a teacher's road map that guides a complete set of activities to perform effectively during class time (Sehweil et al., 2022). According to Burgul Adiguzel (2021), a lesson plan helps teachers to recognize and understand the

needs of their students, prepare an effective learning environment for addressing their needs, and perform the activities accurately. However, in my observation, no teachers prepared lesson plans for teaching. In my curiosity, the participant teacher replied:

I'm from an M.Sc. background, not much idea of it. Just see the book, set in mind, and smoothly flow the course. I'm not interested in a teaching career; I'm waiting for a platform. (Conversation teacher participant, July 2024)

The response indicates that preparing a lesson plan is not part of teaching. In his reflection, teaching is to complete the course on time and assist students in securing good marks in the exam. His response aligns with the findings of Gautam and Acharya (2023). Regarding the issue, the head teacher explained that it is the responsibility of teachers; there is no need for regular monitoring of such highly qualified teachers. During an informal conversation with other subject teachers shared that they prepare it on a particular occasion, but for regular class, notes are used in the classroom. It shows the teachers are still in confusion about the significance of the lesson plan and understanding that it is prepared only for promotion and to pass the relevant examination.

The teaching strategies employed by teachers in the classroom are directly associated with the learning outcomes of learners. In my observation, the teacher enters the classroom, opens the book pages, notes the topic and key points on the marker board, and explains. Students take out their books and note copy, copy the marker board notes, and listen to the teacher monotonously. Through the monolingual conventional method, the contents were delivered without connecting with the lived experiences of the learners, and no opportunities for interaction. This was the five-day weekly routine of the science class of grade 10. Friday, students were involved in different extracurricular activities as a "book-free day." Sharing my curiosity with a science teacher regarding the scenario of science teaching strategies, he tried to make an excuse to get out of the situation. His response was, lack of training, passivity of students, pressure to complete the course in time, the hesitant nature of students, and he was not interested in this field. So he could not update himself and shifted into a competent science teacher. Generally, a sit-and-get classroom environment and examination-oriented teaching strategies are dominant in the school (Thapaliya & Luitel, 2025). The scientific theories, laws, principles, and scientific facts are discussed in the classroom as a banking model of teaching (Freire, 1970) without incorporating the daily practices and experiences of the learners. The focus of teaching is securing good marks in exams rather than transforming learners into creative, critical, and change agents, and students are treated with a one-size-fits-all approach (Luitel, 2022).

Discussion and Insights

The three attributes above can provide a comprehensive picture of science teaching-learning activities of the school. Starting from the presage attribute, the qualities of the teachers, they are academically competent in their field. If viewed from a student's perspective, teachers who teach in grade 10 need to be updated in their fields. National Education Policy 2019 (NEP, 2019) has a provision of appointing the teachers who are

familiar with the local lingual and cultural background of students (p. 42). The local government unit is missing the provision, and it must be considered. This aspect of the teachers' impact on the process attributes of the education. The teachers are working based on the technical interests of the education system. So, quality training opportunities are needed for consistent motivation to continue the dedication and active performance in their responsibilities.

The second attribute is the context attribute, students and school facilities. Students were found to be hesitant to interact, bilingual, and frequently absent from the classroom. The geographical distance, technical approaches of classroom activities, monolingual knowledge delivery, teachers' behaviors regarding the lingual tone of the students, and overall classroom facilities are the root of such absenteeism of students. It seeks to establish such a classroom that is welcoming to and supportive of all students to study and grow with fun (Guberina, 2023). So, the students demand practical and emancipatory interest in the teaching classroom. This situation may be created by respecting and valuing their lingual fluency, culture, lived experiences, and local epistemologies in teaching. It is essential to upgrade the classroom facilities with digital technologies and climate-friendly classroom management.

The facilities owned by the school are insufficient to attract and motivate students for fruitful learning activities and need to be upgraded into a high-speed internet-connected computer laboratory, a well-equipped science laboratory, a well-facilitated library, well-furnished classrooms, and other essential facilities. These infrastructures are functioning as barriers to the attributes of science teaching in school. So the School needs to address such barriers in time. As a result of this context, a science teacher can perform his/her teaching activities at the best level, and students' absenteeism can be minimized. To reduce absenteeism during the pick-hour season, online classes can be conducted at a favorable time for students, and a learning module can be developed. In this way, to minimize absenteeism impacts in learning, collectively the school can upgrade teaching strategies from technical interest into practical and emancipatory interest in context-related strategies.

The last is the process attribute in the form of teaching strategies. This attribute observed three things, namely the existence of a lesson plan, teaching strategies, and student activity. Teachers at school are qualified, but their dedication is lacking due to motivational and managerial factors. The science teaching strategies conventional method, which needs to shift into a humanized paradigm through the theory of cognitive interest (1972). The nature of learners demanded inclusive teaching strategies, which are lacking among teachers. However, several obstacles, context attributes, and the process attributes themselves are hindering the quality of teaching. In the context attribute, geographical, psychological, lingual, cultural, school/classroom facilities, and other constraints are detaching students from learning opportunities. While in the process attribute, the conventional teaching strategy is the major problem. It is essential to transform process attributes into a culturally responsive

teaching approach (NEP, 2019; pp. 15 & 19) in the classrooms. The existing technical interest in teaching strategies should be shifted into practical interest and emancipatory interest to empower marginalized students. The pedagogical strategies outlined range from two-way communication to a transformative STEAM approach, representing epistemological interventions of science learning culture in Nepali public schools. It demands epistemic pluralism and dialogic praxis. Two-way communication (Guberina, 2023) fosters relational meaning-making and translanguaging. Similarly, contextual teaching (Luitel, 2022) anchors abstract concepts in lived ecologies, whereas culturally responsive pedagogy (Gay, 2018) resists curricular erasure and affirms indigenous epistemologies. In the same way, inquiry and place-based learning (Pantonah, 2018) mobilize local landscapes as cognitive terrains, and the pedagogy of way of knowing (Pant et al., 2023) legitimizes ritual-metaphoric reasoning and ecological sensing. Praxis-driven STEAM reframes science as humanizing, justice-oriented, and meaning-centered. Together, these approaches reconfigure classroom culture toward equity, authenticity, and epistemic dignity.

Concluding Remarks

Despite the competent presage attributes of teachers in the Himalayan secondary school, context attributes and process attributes are not satisfactory. The teachers and school administration need to be responsive towards the indigeneity of the students in the classroom. Due to the state's distance from reality, the rural public schools and their classroom facilities are in a subsidence of sustaining. The poor management of school and classroom facilities is creating resistance for both teachers and students. Students are not well motivated towards the classroom teaching and learning activities, and frequently remain absent from school. absenteeism. There are emergency needs of a science laboratory, computer laboratory, library, digital technologies, and other supporting facilities to enhance learning in the classroom. Furthermore, the conventional teaching strategies, monolingual knowledge delivery, one-way communication, and colonized process attributes are dominant in the school system, which need to be shifted into decolonized strategies. The observed attributes in this school were found to align with the technical interest of Habermas' theory of cognitive interest (1972). Updating teachers' education, implementing policy provisions in practice, and developing the physical infrastructure of school facilities, and integrating culturally responsive (STEAM) [Science, Technology, Engineering, Arts, and Mathematics] approaches in daily teaching strategies, process attributes can be enhanced. Through these strategies, the technical interest of existing teaching can be upgraded gradually into practical interest and then emancipatory interest. In this way, marginalized students from indigenous community area schools can be empowered through science education in the classroom, which is the notion of 21st-century education.

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