

Learner Participation in Science Learning: Creating a Humanized Science Classroom

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Abstract

As science learners, learners can learn science from their enriched cultural life world. However, the disempowering forces embedded in science pedagogical practices demotivate the learners to participate in the active science learning process. In this context, this research addresses the question: How have I explored learner participation in science learning to create a humanized science classroom? I applied auto ethnography as a research method and inquiry to portray the critical reflexive narratives I experienced in my science learning journey. The research shows that the learners' participation in science learning is in/directly influenced by the in/formal modes of science learning. The rigorous and unjust formal schooling cultures demotivate the learners to participate in science learning autonomously. The science teachers must know the learners' lived experiences and cultural worlds by creating a dialogic space between teachers and students. It can also support modifying and cultivating their internal selves through individual and collective participation. Therefore, the research also offers to know and value the learners' creativity and acknowledge the learners' learning experiences beyond the formal academic settings. Furthermore, science teachers need to view the learners through humanized lenses to motivate learners for their autonomous participation in science learning. It possibly counteracts the rigorous schooling cultures that emphasize the directed participation of learners and transform their dogmatic identities.

Keywords: Participation, autoethnography, cultural worlds, learning experiences, humanized science

Introduction

Education is a constructive agency through which we can reform society and nations. The teacher needs to apply culturally inclusive teaching strategies to be sensitive to the diverse cultural contexts of students (Pokharel, 2023). In the context of the community school of Nepal, Wagle et al. (2023) explore the possibilities of contextualized teaching and learning through participatory approaches that focus on participation and shift in perspectives. The research suggests reforming/transforming a bureaucratic schooling structure that may shift from linear closedness to ecological openness schooling design for sustainable pedagogical reforms. As a science learner and teacher educator, I realize the ignorance of the life-role perspective in science teaching and learning. Humanizing pedagogy acknowledges an individual awareness of students and ceases to perceive them as instrumental beings. In this regard, teachers refrain from manipulating students as objects for personal gain (Freire, 1996). The survey also shows that an autonomous self (for building the capacity to make independent judgments and interpretations); understands the context of human responses, actions, and relationships (especially on the ethical, aesthetic, and purposive) while meaning-making, indeterminacy in the subject matter of these judgments and

interpretations. The possibility of commonality (under the conditions of indeterminacy) is the general characteristic of the humanities, and they are central to the inquiry and science technology and society (STS) orientated curriculum development (Donnelly, 2004). Valuing and respecting the learners, facilitating meaningful and relevant science learning for their pursuit of personal wellness, and assisting the learners in addressing systemic injustices faced within their lifeworlds. It revives the soul of science education and makes it transformative, empowering, socially just, and humanizing (Elmesky, 2021).

Moreover, transformative outcome-based education emphasizes complex role performance or life-role /humanizing perspective. Such a pedagogical practice can shift from the traditional (i.e., structured task performance/discrete content skills) and transitional zones (i.e., complex unstructured task performance or higher order competencies) to transformational zones for preparing the students for life, not just for college or employment (Spady & Marshall, 1991). We connect the life-world and the academic world in science educational practice to create a humanized science classroom. In doing so, we could understand the learners' sociocultural context, beliefs, values, assumptions, experiences, and feelings through critical reflective practice (Thapaliya, 2023). In this reflective educational practice, the learners could actively cultivate their self by themselves and integrate the emancipatory and democratic views of society (Sjöström & Eilks, 2020). However, contextualized teaching and learning by using locally available resources has not been a priority of school education (Wagle et al., 2019).

In the context of science teaching, Koirala (2021) emphasizes exploring the science teaching-learning practices in a culturally diverse secondary science classroom of a community school. The research shows that secondary science teachers are also less able to make the effort to create a culturally relevant science classroom due to pedagogical, environmental, and institutional issues. The research calls for the participation of diverse learning communities to include their voices and teachers' own cultural-based science teaching styles in science teaching and learning. Therefore, this article aims to address the research question: How have I explored learner participation in science learning to create a humanized science classroom? I want to excavate the learners' involvement in science learning by articulating and discussing my childhood science learning-related personal narratives. I included the introduction, theoretical referent, methodology, discussion and meaning-making, and conclusion in the process of addressing my research agenda.

Theoretical Referent

Fundamentally, the constructivist theories of knowledge assume that the knowledge in which context it arises could function satisfactorily within that context (Bodner & Klobuchar, 2001). In this regard, Lev Vygotsky's (1978) social constructivist learning theory emphasizes individuals' interaction with their sociocultural context for knowledge construction. The child's cultural development appears at first inter-psychological (between people) and later on the intra-psychological (inside the child) level. So, it advocates the role of More Knowledgeable Others (MKO), like guidance of adults or collaboration with more capable peers for the learner's zone of proximal development (i.e., the distance between the actual development level and level of potential development), and problem-solving.

Within Vygotsky's sociocultural approaches, Stetsenko (2017) proposes a dialectical view of human development to overcome compartmentalization that emphasizes continuous dialogue and

participation, relatedness and interconnectedness, and the coming together of individuals and their world. I proposed to apply this theoretical lens to showcase the learner participation in science learning to create a humanized science classroom by excavating the historical and sociocultural context through my science learning experiences. The present (i.e., which is?) is connected and fused with the past (i.e., which was?) (Vygotsky, 1978). So, my childhood science learning experiences might reflect the science learning cultures in different sociocultural and spatiotemporal settings. Furthermore, my lived narratives possibly evoke the science learning communities to the relevant science learning practices and exclude the obsolete and disempowering practices through critical reflexive narratives. Likewise, I focused on viewing the narratives and conclusions through this theoretical praxis.

Methodology

I applied autoethnography as a research method to address my research question. The researcher needs to examine contradictions, dilemmas, and paradoxes embedded in their thinking and actions, beliefs and advocacy, personal and professional carrier, and transform their identities by employing various transformative research methods like ideology critique, narrative writing, art-based logic, and genres. It enables the development of a vision for an inclusive and agentic educational system (Luitel & Taylor, 2019). I portrayed some critical narratives from my childhood science learning. The narratives support transforming the practice (Brookfield, 2015). This methodology can be used to portray personal narratives and reflections for enhancing one's learning and professional development. It is a valuable and rigorous way of producing knowledge that can advance educational research and practice (Segú Odriozola, 2023). Moreover, it can enhance critical reflection, self-awareness, empathy, and social responsibility for enriching the educational experiences of students and teachers (Keles, 2022). Adams and Herrmann (2023) also notice autoethnography as a form of writing and inquiry that offers a critical and reflexive approach to accounting education for resisting the dominant paradigms and practices from their own experiences. However, autoethnographers need to be aware of their ethical responsibilities to embrace diversity and complexity. So, I proposed using this methodology to excavate the historical, sociocultural, and political dimensions related to my science learning to explore the deep-rooted un/justifiable science pedagogical cultures. Meanwhile, I consciously maintained the ethical part in my entire research journey.

Discussion and Meaning-making

I discuss my science learning-related narratives for exploring the learners' participation in science learning for humanized science learning. While engaging in the meaning-making process, I attempt to view those narratives through the transformative lens and generate meanings aligned with the spirit of the research question and methodology.

Demotivate from Rigorous and Unjustful Formal Schooling

It could be any day in the late 1990s. My brother and I were going to Shree Saraswoti Primary School in Syangdi. While crossing around two hundred meters from my home, my brother might have said, *"Today, I am not interested in going to school. If you agree with me, we will play different games and enjoy over a day."* I requested him to go to school to continue his studies. However, after walking around the one-kilometer journey, he was not ready to continue his

journey. He put his bag on the big black stone and sat there, and he could have said, *"I do not go to school. Most of the teachers bit me. They said to memorize the content. I could not memorize the contents and solve the problems they assigned Today."*

The teachers focused on controlling the students through crude punishment and conducted their classes as per their interest, even though corporal punishment negatively influenced the students learning (Mishra et al., 2010). I observed the punishment, like walking their knees around the ground four/five times in the simple mistake of my brothers' and other students through the window. I became emotional while observing the white bones in their knees with excessive bleeding that broke my concentration on learning. He had severe wounds on his elbows and knees, but he did not share them with our parents due to the fear of his mistake. The role of the teacher in the classroom is as a *controller* (Dougiamas, 1998) rather than a facilitator. Likewise, my parents also could give more attention to their children's learning. Although they saw the wounds, they did not consult with a related teacher. Oppositely, my father scolds him.

I agreed with his request because I could not go alone to school and realized his pain. Then he said, *"We need to hide from other friends. Otherwise, they will report to the teachers and our parents."* That is the best idea for escaping from the possible harm from others. Every day, we met another higher secondary school's English teacher on our way. We always greet him and ask, *"What time is it now?"* He replied to us, *"Quarter to nine."* We need to find out the meaning of it. So, we were interested in observing his watch. Every day, we met him and repeated the same way of greeting and questioning, *"Sir Namaskar! What time is it now?"* Listening to our same question, again and again, maybe he felt bored and started to reply, *"Same as yesterday."* One day, after greeting him, we humbly requested him to say the meaning of quarter to nine. That day, he asked to observe the time on his watch. There was no 1, 2, 3, ... so we were unable to read the time, but we were very excited by getting an opportunity to observe his watch.

Then we looked for a safe place. Suddenly, we saw a small cottage near the *Bar-pipal Chautari* (a resting place with banyan and ficus trees) made for adult education. Every evening, the adult people of the village came there for instruction. Then, we silently lived inside the cottage. Meanwhile, we listened to the walking sound, and we thought our regular English teacher was coming. We thought he would force us to go to school if he saw us in the cottage. Therefore, we lived silently until he passed from the cottage.

After this, we felt freedom. Then we started to play marble collecting fruit of bar and pipal. Suddenly, we saw *Kumalkoti* (mud dauber wasp) designing their nest by bringing mud. We calmly and enthusiastically observed their activities. After creating their house, they took insects like grasshoppers and spiders into the nest and sealed their door. Observing the *Kumalkoti's* activities, many curiosities arose in our minds. As I remember now, we could have asked ourselves, *"Why did Kumalkoti seal the spider inside their cage? What will the spider do inside their cage? Is the spider still alive?"* Then, we made a hole in their cage to observe the spiders' inner activity. We saw the spider was not entirely dead. After some time, the insect moved outside from the cage.

Likewise, my brother loved to play with insects, birds, and animals. Thus, he said, *"There are different kinds of birds in our village. Today, we observe their nest, eggs, and nestlings."* Then he climbed up in the ficus tree. He found a nest of doves having two eggs. He showed the nest to me and might have said, *"The dove is a too lazy bird. Their nest is not properly designed, and they have white color eggs. I requested him to show the egg, but he could have said, "We don't touch*

their eggs. If we touch it, their parent's dove cannot hatch those eggs and move away from that place." He climbed down without touching their nest.

Then, we again searched for other trees to explore the nest of new birds. Luckily, we saw the green-colored birds emerge from a small hole in the tree. My brother recognized its name: blue-throated barbet bird. Then, we were interested in observing their nest. Therefore, he climbed up in that tree and tried to observe their nest from the small hole. However, due to the lack of proper light, he could not observe the inner condition of the nest. Then he put his hand inside the nest, and small nestlings started to make a sound. He brought a nestling in his hand. We observed it interestingly. Their parents moved around my brothers' heads with a loud sound. We realized the love of parents for their babies. My brother kept the small bird in their nest and climbed down as usual. We observed their activities by living near the tree. They immediately entered the nest and lived with their nestlings.

My brother might have asked, *"What will the parents do if we exchange their nestlings? Can they easily detect their nestling or not?"* Meanwhile, we decided to change their nestlings and observe their reaction. In doing so, we need the nestlings of another bird. Then, we started to search for nestlings of different birds. Fortunately, we found the little pigeons on the roof of the nearest animal farm, and then my brother kept them in the blue-throated barbet birds' nest and climbed down. After that, we secretly lived inside the same cottage and observed their reaction. The parent blue-throated barbet bird came outside their nest but was not ready to go inside the hole for feeding and living. My brother might have said, *"They easily detect their nestlings, so they are not going inside their nest."* After that realization, he took the little pigeons in their own nest. We were thirsty and hungry. There was no tiffin with us. Then we went to the nearest water source for drinking water. We drank the water and came back towards the cottage. We saw a golden insect whose local name is the *Suntiki* (golden ladybird) on the leaf of a creeping plant. We brought them in our hands. The *Suntiki*, having a beautiful appearance, lived without motion. We put the *Suntiki* on our forehead, noticed the beauties by looking at each other, and returned to the cottage.

"It is a time to return our friends from school. So, we should live silently inside the cottage", my brother said. Meanwhile, we heard our friends' talking and walking sounds. They crossed the cottage and went home. After some time, my brother might have said, *"Our parents and other family members could not guess whether we go to school because it is our regular time to return home. Let us go back!"* Then we returned. In the evening time, we were helping our mother in the kitchen. We heard the sound of a Nepali teacher, Mr. Yam, who was talking with our father. We curiously listened to their conversation. Mr. Yam loudly told him about our absenteeism in school, which made us afraid. After the conversation, my father became angry. He scolded us and also beat my brother.

Experiencing such a learning environment at the very beginning of my formal educational journey, I aligned with the explanation of Mishra et al. (2010); they argued that for developing the pupils' talents, providing children with a caring environment is a challenge for Nepalese society so offer fertile soil to grow into the capable and confident personalities. Generally, the existence of corporal punishment and the apparent predominance of children by teachers or parents reflect the low social status of children in society, the family, and the classroom, severely impacting their physical, emotional, and social well-being. Koirala (2021) also explains the role of the school environment in creating and extending multicultural science knowledge. . *I aligned*

with Qutoshi's (2019) metaphorical ways of representing the classroom where he teaches and the family culture where he lives as a micro-culture, organizational culture as a 'macroculture', and national culture as a 'mega-culture' In this context, I also critically examined my science teaching-learning experiences in/formal settings (like in the classroom, family, and society). So, I also used such cultures as '*micro-culture*' metaphorically. While critically viewing my narratives, I realized that science learning is interconnected with the cultural world. Moreover, the teacher can engage the learners in a 'context-reflection' process for applying the constructed knowledge to address emerging issues (Dahal, 2023). In this regard, I realized the demands of self-cultural and contextual dimensions for transforming the *taken-for-granted assumptions* and motivating the learners to participate autonomously in science learning. We can transform the learners' dogmatic perceptions and offer a new explanation of their prior presumptions for exchanging their internal sense and feeling of the world (Mezirow, 2000). Therefore, science teachers need to view through a humanized lens that possibly counteracts the rigorous and unjust formal schooling that emphasizes the directed participation of learners and transforms their dogmatic identities.

Knowing and Valuing the Learners' Creativity

It might be any day in the late 1990s. My brother and I studied at Shree Saraswoti Primary School in Syangdi. After school time, we returned home, changed our uniforms, and had tiffin. Then, we planned to design a beautiful school garden using locally available materials. Then, we moved towards the yard and selected the place for creating the school garden. We collected the required materials, such as wooden pieces, bamboo, stones, bamboo beards, hoes, soil, and water. Then, my brother dug out the land and constructed our dream school. We used the collected materials for designing the building. We became happy while designing the beautiful school.

Unfortunately, the construction broke down after some time. We realized that we could not make a proper combination of ingredients. Then, we again began to construct our school building. To avoid repeating the previous mistakes, we expanded the foundation area. We mixed other ingredients such as hairs of goats, cow dung, and lady hair grass in the mud because my mother mixed these things while designing the *Chulo* (a traditional Nepali stove made from mud). We consciously arranged different shapes and sizes of the stone, wooden pieces, and bamboo and designed various shapes and sizes of the window and door. As a result, we succeeded in making a beautiful school. Moreover, we also designed a toilet, a water tap, and a beautiful garden by collecting locally available flowers, full-color stones, colored mud, bamboo, small plants, and small insects such as ants, butterflies, and grasshoppers. It looked beautiful. There needed to be proper management of the garden, sanitation, and drinking water in the school. I questioned, "*How could we feel if we had such a beautiful school garden?*" We smiled. After a few minutes, my older brother and sisters observed our design and might have said, "*Wow! You made such a beautiful school! How did you make it?*" They became excited.

While critically reflecting on this incident, knowing and valuing the learners' preexisting learning experiences, sociocultural life-world (Vygotsky, 1978), and creativity are also important in science learning for preparing the 21st century's skillful citizens. The Curriculum Development Centre (CDC, 2019) also aims to develop the learners' transversal skills like thinking skills (such as critical/creative thinking), multiliteracy skills (like basic/technical/visual literacy); and inter/intrapersonal and citizenship skills (like self-management, honesty, collaboration, respect, civic responsibility) of basic-level students for integrating the ethical, moral, social, and political dimensions in learning. In the revised Bloom's taxonomy of educational objectives, 'evaluating

and creating' are placed at the highest level of the cognitive domain for developing higher-order thinking (Anderson & Krathwohl, 2001). The science curriculum, pedagogy, and assessment require growing and applying the learners' creative minds and actions by critically reflecting on our professional practices. We can design and implement the trans-disciplinary STEAM approach sensitized curriculum, pedagogy, and assessment system that could support authentic, inclusive, and meaningful science learning (Thapaliya, 2023). For instance, we can apply innovative pedagogy like '3C-R' (i.e., Connect-Concept-Context-Reflections) to actively enfold the learners' pre-existing knowledge, involve them in hands-on and mind-on activities, and apply the constructed knowledge to address emerging issues. Here, reflection is a central part that may support knowing and understanding the learners' perceptions, practices, and emergent learning and develop their transversal skills (Dahal, 2023).

Create Dialogic Space in Science Classroom

It might be any day in the late 1990s. My older brother and sisters studied at Shree Janasewa Adarsha Higher Secondary School, around six kilometers away from our house. They returned from school and could have said, *"Our science teacher had told us, we can see the comet in the northeast part of the sky in the morning. It looks like a 'Babiyo ko Kuchho (the sweeping broom made from lady hair grass). It is rarely seen in the sky, so observe it."* We excitedly observed the comet in the morning.

My brother and sisters did several project work as suggested by the science teacher. For example, they designed and demonstrated the working function of the hydraulic press by using locally available improvised materials like pieces of pipe, sticks, slippers, and water. They generally spend more than half an hour critiquing a science teacher's and students' behaviors and actions inside the science classroom. They might have said,

"Our science teacher is strict and excellent. He makes pin-drop silent while teaching his lessons. No one can speak in his classroom. If anyone makes a sound and disturbs him, he scolds two/three periods to all students. So, all students have to stay disciplined in their periods. However, we could observe or/take part in ambitious scientific experiments and demonstrations and design the scientific equipment using our surroundings' low-cost and no-cost materials in his subject. He is more active than other teachers in the school, so the larger mass of students and parents understand as an excellent teacher as well."

He had a good reputation on the social level. So, I hurried to complete my primary level and shift to a new school where he taught. After three years, my dream came true. I also began to study in the same school. I was excited to take his science classes. I had already known him as a strict and excellent teacher. Therefore, I honestly followed the class rules for being a good student. Generally, students were staying in the high discipline in science class. He demonstrated many experiments related to science topics such as the electrolysis of water, designing a simple cell by using lemon, demonstrating the function of a lever, pulley, inclined plane, reflection and refraction of light, magnetic line of forces, and so on, and tried to connect with our everyday life.

While critically reflecting on the above incident, I realized that science education is interrelated with our lived world and academic world. The science teacher motivated the students to observe naturally occurring scientific phenomena or laboratory experiments, using locally available materials in science teaching-learning and designing improvised materials to fulfill the lack of standard scientific materials. Meanwhile, the science teacher perceived his science classroom milieu as normal and natural, although the students should strictly follow the teachers'

instructions without question. He might have thought I have been teaching well because I have enriching teaching and evaluating experiences. I am the best science teacher. I have the authority to control and run classes as per my interests.

Using the concept of '*strict and excellent teacher*' reflected the dualistic view of students toward the science teacher. He became an excellent teacher when he did several science experiments compared to other neighboring schools, enriched content knowledge; engaged students in designing improvised materials and project works, and connected with their daily life context (Dahal, 2023). Meanwhile, students noticed him as a '*strict teacher*' when he made pin-drop silence while demonstrating science experiments, delivering the science content, and punishing the students who were against his rules. While critically reflecting on my science teacher's pedagogical culture, I perceived that he frequently focused on the analytical knowing process. He loved to deliver the science contents and practical works in the pin-drop silence. Due to his strict discipline-based teaching culture, we could not raise questions while doing the experiments. Only a small number of students tagged as 'talented students' could raise the questions. Even though he did several scientific experiments and demonstrations, he was less conscious of participating in the learners' interactive discourse. He sometimes incorporated hermeneutic knowing by connecting science content with learners' every day supporting us in understanding the lesson. However, I realized the lack of critical knowledge in his pedagogical culture. He was less able to dig out the learners' prior knowledge, beliefs, values, assumptions, and feelings; hear the voice of middle and lower-level students by creating interactive classroom milieus like dialogic, dialectical, and trans-disciplinary collaboration; and act as a facilitator. Luitel and Taylor (2019) argued that education could and should prepare socially responsible and conscious citizens. I believe providing enriched scientific knowledge without understanding the students' emotions, experiences, values, beliefs, assumptions, and cultures is insufficient for making a socially responsible science education.

Before presenting the science lesson inside the classroom, the science teachers keep in mind that they are teaching human beings who might have their feelings, assumptions, values, beliefs, culture, experiences, and reflecting abilities (Thapaliya, 2023). True dialogue (Shih, 2018) and reflective practice in science education could support making sense of a complex world and transform the deep-rooted disempowering pedagogical practices for humanized science education (Schulz, 2009). Moreover, it cultivates the learners as holistic thinkers who can be able to complex role functioning (Spady, 1994) for building a just society.

Conclusion

The learners who grow up in an enriched cultural life-world could learn science in non-academic settings. They might have their feelings, assumptions, values, beliefs, culture, and learning experiences. However, formal schooling cultures are less able to know and value the learners' creativity and other humanized dimensions. Hence, science teachers need to be aware of these humanized dimensions in their science teaching journey. It could transform their demotivating identity into a motivating teaching identity. Metaphorically, the '*strict science teacher*' to '*excellent science teacher*.' This research also suggests that science teachers (typically, basic-level) need to give more effort to create a dialogic space, knowing and valuing the learner's creativity for being aware of learners' diverse learning experiences for autonomously participating in science learning. In doing so, science teachers need to view through a humanized lens. It

possibly counteracts the rigorous and unjust formal schooling cultures that emphasize the directed participation of learners and transform their dogmatic identities.

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