Counter-Knowledge in the Classroom: A Foucauldian Analysis of Indigenous Science in Bukidnon STEM Education

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Abstract

The Philippine K–12 science curriculum prioritizes, and highlights standardized Western scientific knowledge, often putting behind Indigenous Knowledge Systems (IKS) in regions like Bukidnon. Using Michel Foucault's theory of power–knowledge, this conceptual paper examines how Indigenous science practiced by the Higaonon, Talaandig, and Manobo communities is governed, marginalized, and selectively recognized in Junior and Senior High School STEM education. Using numerous policy documents, ethnographic literature, and critical science education scholarship, the paper argues that Philippine STEM normalizes Western science while treating Indigenous ecological knowledge, herbal medicine, agriculture, and climate adaptation as supplementary. Indigenous knowledge represents subjugated knowledges and offers potential for epistemic justice and decolonial STEM education. The paper recommends curriculum reform, teacher development, and community engagement to integrate Indigenous science as legitimate knowledge.

Keywords: Foucault, power–knowledge, STEM education, Indigenous science, Bukidnon, Philippines, subjugated knowledge

1. Introduction

Science education in the Philippines has undergone a major curriculum shift under the K–12 curriculum to develop students who are globally competitive and scientifically literate (DepEd, 2016; Bascos et al., 2021). This is emphasised in the Junior and Senior High School STEM tracks, which emphasise inquiry, research, and applied sciences. While this approach aligns with international standards, it often puts Western scientific knowledge in the spotlight and often discriminates Indigenous Knowledge Systems (IKS) in regions such as Bukidnon, where communities like the Higaonon, Talaandig, and Manobo thrive and possess empirical, culturally grounded knowledge in agriculture, ecology, and medicine (Tindowen et al., 2019; Paredes, 2018; Liu et al., 2020). Despite its scientific rigour, Indigenous knowledge is frequently tokenized in formal STEM curricula or presented as supplementary content rather than legitimate epistemology (Tarrayo et al., 2021). With this, Michel Foucault's concept of power–knowledge provides an explanation to fully understand this dynamic, emphasizing how schools function as disciplinary institutions that often normalise Western science while forgetting alternative knowledge systems (Foucault, 1977, 1980; Ball, 2013). This conceptual paper utilizes a Foucauldian framework to analyze the governance, recognition, and marginalization of Indigenous science in Bukidnon within STEM education. It investigates and

emphasizes how Indigenous knowledge can function as counter-knowledge, opposing prevailing epistemologies and advancing decolonial, culturally appropriate science education.

2. Foucauldian Framework: Power–Knowledge and Subjugated Knowledges

Michel Foucault's theory of power–knowledge emphasizes that knowledge production goes hand in hand with power structures, shaping what is considered true and legitimate in society (Foucault, 1977, 1980)A. Curricula, instructional methods, and assessment systems are examples of educational components that function as technologies of power, defining what information is valued and what is marginalized (Ball, 2013; Bernardo, 2020). Indigenous Knowledge Systems in Bukidnon are examples of subjugated knowledges, systems that have historically been disregarded or ignored. Despite their empirical rigor, these systems are frequently made invisible in conventional STEM education. The way that schools regulate behavior and internalize standards that are consistent with prevailing epistemologies is further explained by Foucault's concept of governmentality (Foucault, 1991). This viewpoint sheds light on the structural and epistemological factors that govern inclusion, validity, and authority in Philippine STEM education by portraying Indigenous science as subordinated knowledge.

3. Indigenous Knowledge in Bukidnon

There are numerous Indigenous communities in Bukidnon, including the Higaonon, Talaandig, and Manobo. Each of these maintains rich and empirically grounded knowledge systems. In terms of herbal medicine, Higaonon healers (babaylan) often prepare plant-based remedies for varied digestive, respiratory, and dermatological conditions and problems, showing understanding of pharmacological principles (Paredes, 2018; Liu et al., 2020). The Talaandig tribe is also known for their agricultural practices, including soil management, crop rotation, and integrated agroforestry systems, showing ecological and environmental science principles known and used for local microclimates (Paredes, 2018; Tindowen et al., 2019). Additionally, Manobo and Higaonon communities also engage in biodiversity monitoring and climate adaptation. They do this by tracking flowering cycles, observing wildlife behaviour, and maintaining and creating seed banks to respond to any possible environmental variability (Liu et al., 2020). Despite being a valid and valuable scientific knowledge, these practices are not recognized and acknowledged as true science in formal STEM curricula and are often presented only as cultural or supplemental knowledge (Tarrayo et al., 2021).

4. Governance and Marginalization of Indigenous Knowledge

In the Philippine educational system, the K–12 curriculum focuses on standardized competencies anchored in Western frameworks of science literacy. Assessment systems, such as national performance assessments and STEM competitions, also reinforce Western epistemologies, creating a hierarchy that underrates Indigenous knowledge and traditions (DepEd, 2016; Ronda, 2019). As noted, teachers face limitations in incorporating local knowledge into their lessons, as they must follow set curricula standards and are monitored by administrators (Bernardo, 2020). When Indigenous science is incorporated, it is often superficial, appearing in cultural heritage modules or project-based activities without acknowledgment as a valid epistemology (Tindowen et al., 2019). These mechanisms exemplify Foucauldian concepts of power–knowledge and governmentality, wherein educational institutions both generate and govern the definition of acceptable knowledge,

thereby influencing the subjectivities of students and teachers to align with prevailing scientific paradigms.

5. Indigenous Knowledge as Counter-Power

Indigenous knowledge in Bukidnon serves as a counterpower to the predominance of Western scientific epistemology. In fact, Indigenous communities demonstrate the practicality and scientific validity of their knowledge through empirical methodologies grounded in local contexts (Battiste, 2013; Smith, 2012). In addition, student-led experiments and initiatives, such as integrating herbal medicine, agroecology, or biodiversity monitoring, provide avenues for validating Indigenous traditions within educational contexts. These projects advocate for epistemic pluralism by acknowledging diverse learning methods and challenging the Western science system as the exclusive, legitimate paradigm. Furthermore, Indigenous perspectives, alongside other forms of scientific literacy, provide students and educators with awareness of their learning processes, thereby fostering the adoption of culturally sensitive and decolonial methodologies in STEM education (Foucault, 1978).

6. Integrating Indigenous Knowledge in STEM Education

Teaching STEM subjects without racial bias requires equal acknowledgment of Indigenous knowledge to Western science methods. Indigenous elders, local scientists, and teachers should collaborate with curriculum designers to develop learning competencies that use community-based knowledge. Empirical evidence for Indigenous science can be found in community-based study projects that teach ethnobotany, agroforestry, and biodiversity monitoring. Indigenous epistemologies should be taught in schools by giving teachers the traditional knowledge and skills they need through professional development programs (Bernardo, 2020; Tindowen et al., 2019). There is also a need to change the testing systems to include Indigenous practices as measured skills. Hence, schools should allocate resources to garden projects, herb labs, and fieldwork programs that foster student learning through hands-on activities. For continuous implementation, local governments, NGOs, and universities need to work together to create a supportive environment for culturally relevant STEM education.

7. Policy and Teacher Training Implications

Policy changes should recognize Indigenous backgrounds as valid scientific knowledge and ensure they are meaningfully included in the curriculum. Programs that train teachers should emphasize culturally responsive pedagogies and provide teachers with real-world applications that draw on local knowledge in STEM lessons. Indigenous knowledge and skills need to be measured in evaluation systems, and schools need to work with communities to ensure authenticity in blending. Henceforth, these measures significantly contribute to the decolonization of STEM education and the advancement of Indigenous communities.

8. Conclusion

In the Philippines, STEM education is generally structured based on standardized curricula and assessments that emphasize Western science as the prevailing epistemology. According to the Foucauldian perspective, educational institutions function as regimes of power-knowledge that shape students' and teachers' understandings through considered, legitimate knowledge. Nevertheless, Indigenous knowledge remains as a form of counter-knowledge capable of challenging dominant paradigms and creating opportunities for culturally responsive STEM

education. Henceforth, incorporating Indigenous science into formal education promotes epistemic diversity, reinforces community empowerment, and fosters scientific literacy that is both contextually relevant and globally informed.

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