DEVELOPING AN INTEGRATED SCIENCE FRAMEWORK:

An audit of Indigenous Knowledge in Papua New Guinea Grade 9 Science Curriculum

RESEARCH AIM

Examine how Indigenous Knowledge (IK) can be meaningfully integrated into Grade 9 Science teaching and learning in Papua New Guinea.

1. THE PROBLEM

- IK is not consistently or meaningfully represented in the Grade 9 Science curriculum.
- A disconnect remains between local knowledge systems and school science.

2. RESEARCH FOCUS

1. How is IK represented in the curriculum?
2. What gaps exist in depth and integration?
3. How can a framework support meaningful inclusion?

3. RESEARCH APPROACH & KEY FINDINGS

95% | 38/40
Surface-level or absent IK representation.

0% | 0/40
Reached Banks' Transformative or Social Action levels.

65% | 26/40
Showed active epistemological tension.

0 REFERENCES
To Tok Ples or PNG's 800+ vernacular languages.

4. INDIGENOUS KNOWLEDGE–SCIENCE INTEGRATION FRAMEWORK | TWO-EYED SEEING MODEL

CURRICULUM STRAND & TOPIC	WESTERN SCIENCE CONCEPT	INDIGENOUS KNOWLEDGE (TEK) ANCHOR	BRAIDED PEDAGOGICAL STRATEGY (TWO-EYED SEEING)	TARGET DEPTH OUTCOME (BANKS' SCALE)
CLUSTER 1 Spatial & Physical Units 9.2, 9.7	Navigation, coordinates, vectors, inertia, momentum, forces and fluid resistance.	Star paths, seamarks, Tok Ples spatial terms; Kenu canoe momentum; carrying poles and timber hauling	Compare compass bearings with elder navigation; use canoe paddling and load dynamics to calculate force vectors and analyse mechanics.	**DEPTH 3 Transformative (Braided spatial & physical science)**
CLUSTER 2 Acoustic Physics Unit 9.8	Wave velocity, frequency, pitch, resonance and sound transmission.	Garamut acoustic engineering, timber density, hollow-cavity resonance and village signalling.	Analyse Garamut resonance with audio-frequency tools and tuning forks; calculate wave velocity and investigate acoustic craftsmanship.	**DEPTH 3 Transformative (Indigenous acoustic physics)**
CLUSTER 3 Applied Chemistry Units 9.4, 9.6	pH, neutralisation, diffusion, indicators and concentration gradients.	Kambang slaked lime; hibiscus and turmeric indicators; botanical dyes.	Test Kambang with local botanical indicators and digital meters; investigate soil samples and relate local descriptors to IUPAC terminology.	**DEPTH 3–4 Transformative to**
CLUSTER 4 Biological & Earth Systems Units 9.3, 9.5, 9.10/9.11	Tissues, adaptations, ecological niches, weather patterns and orbital mechanics.	Animal anatomy, seasonal bio-indicators, elder TEK, fishing calendars and Sambu ecological taboos.	Document elder ecological knowledge; map seasonal indicators against weather patterns; develop community resource-management plans.	**DEPTH 4 Social A (Episte**

RESEARCH APPROACH
Transformative paradigm • Two-Eyed Seeing • qualitative document-based comparative audit
11 units | 4 strands | 40 excerpts

INTENDED CONTRIBUTION
An integrated framework to strengthen IK recognition and guide meaningful Grade 9 Science integration.

OVERARCHING GOAL
Bridge Indigenous and Western scienti
culturally relevant, inclusive science ed



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