

Core Template - 1

T-NPI-Design (Inferential Project Design)

From Data to Intervention: Design as Inference

The T-NPI-Design template represents a decisive shift in the conceptualisation of project design, moving it from a domain of heuristic creativity into a domain of *epistemically grounded inference*. In conventional approaches, project design is frequently driven either by normative frameworks or by iterative experimentation, as seen in design thinking methodologies. While such approaches are valuable for generating solutions, they often lack a systematic account of *why* a particular intervention should produce a given outcome. The T-NPI-Design framework addresses this limitation by situating design within the logic of *anumāna*, where interventions are derived from empirically validated relations between conditions and outcomes.

The methodological progression within T-NPI-Design unfolds through a series of interconnected phases. The first phase involves the *epistemic clarification of the problem domain*, corresponding to the Tantrayukti principle of *nirvacana*. At this stage, the phenomenon to be addressed is defined with conceptual precision, ensuring that subsequent analysis is not compromised by ambiguity. This aligns with contemporary methodological emphasis on construct validity, where clarity of definition is a prerequisite for meaningful inquiry.

The second phase consists of *empirical grounding through exemplar extraction*, or *pramāṇa-saṃgraha*. Here, the researcher assembles a corpus of cases drawn from credible sources such as policy documents, evaluation reports, and institutional datasets. Unlike exploratory qualitative methods that prioritise openness, this phase is guided by the objective of identifying structurally comparable cases that can support inferential reasoning. The Tantrayukti principles of *apadeśa* and *samuccaya* ensure that the evidence base is both authoritative and systematically organised.

The third phase involves *analytical structuring through C–H–S coding*, where each exemplar is decomposed into conditions, indicators, and outcomes. This phase parallels coding procedures in qualitative analysis, yet it differs in its inferential orientation. Rather than generating categories inductively, the coding process is directed toward identifying the components of causal configurations. In Nyāya terms, the indicator (*hetu*) is examined in relation to the outcome (*sādhyā*), while conditions provide the contextual grounding necessary for establishing *vyapti*.

The fourth phase is *cross-exemplar comparison*, corresponding to *bhūyo-darśana*, or repeated observation. Through systematic comparison, the researcher identifies recurring patterns in which specific configurations of conditions and indicators are associated with particular outcomes. This phase aligns with

comparative case analysis in modern methodology, where causal inference is strengthened through the examination of multiple instances.

The fifth phase constitutes the *formulation of vyāpti*, the inferential rule linking conditions to outcomes. This is the epistemic core of the T-NPI-Design template. The relation must be non-accidental, repeatedly observed, and free from limiting conditions (*upādhi*). This requirement introduces a level of rigor that distinguishes T-NPI from approaches based on correlation or anecdotal evidence. It aligns with mechanism-based explanations in contemporary philosophy of science, where causality is understood as contingent but structured.

The sixth phase involves the *formal articulation of inference through the pañcāvayavī structure*, ensuring that the reasoning underlying the design is transparent and logically coherent. This step transforms the inferred relation into a structured argument, making explicit the link between empirical evidence and proposed intervention.

The final phase is the *translation of inference into design*, where the identified conditions are operationalised as components of a project intervention. At this stage, the project is no longer an intuitive construct but a *reproduction of empirically validated conditions*. The success of the design is therefore grounded in the principle of *pravṛtti-sāmarthyā*, where knowledge is validated through its capacity to produce effective action.

In its entirety, the T-NPI-Design template establishes design as an inferential process, where interventions are justified through structured reasoning rather than speculative creativity. It thus provides a robust methodological bridge between empirical analysis and practical application.

Phase 1: Domain Definition (*Nirvacana*)

The design problem is defined as:

“Improving foundational learning outcomes in public education systems.”

This aligns with global concerns articulated in the World Bank’s education programs, which emphasize learning outcomes rather than enrolment metrics.

Phase 2: Evidence Compilation (*Pramāṇa-Saṃgraha*)

Using open-access World Bank sources:

- The *STARS program (India)* identifies teacher training, assessment systems, and governance as core components of improving learning outcomes
- Education data platforms highlight cross-country variation in learning outcomes, reinforcing the need for structural interventions

These sources constitute authoritative *pramāṇa*.

Phase 3: Analytical Coding (C–H–S)

From STARS documentation:

- **Conditions (C):**
 - Teacher training systems
 - Assessment infrastructure
 - Governance decentralisation
- **Indicators (H):**
 - % teachers trained
 - Assessment system operationalisation
 - Governance index improvements
- **Outcomes (S):**
 - Improvement in grade-level proficiency
 - Increased completion rates

These correspond directly to measurable indicators defined in the program .

Phase 4: Cross-Exemplar Observation (*Bhūyo-darśana*)

Across multiple states and programs, repeated observations show:

- Improvement in learning outcomes is consistently linked with:
 - teacher capacity
 - assessment reform
 - governance strengthening

This reflects *pattern matching in comparative case research* (George & Bennett, 2005).

Phase 5: Vyāpti Formulation

From repeated evidence:

Where teacher training, assessment systems, and decentralised governance co-exist, learning outcomes improve.

This aligns with mechanism-based explanation in critical realism (Sayer, 2000).

Phase 6: Argument Construction (Pañcāvayavī)

- Proposition: Integrated reform improves learning
- Reason: It aligns teaching, assessment, and governance
- Example: STARS program outcomes
- Application: Applicable to other Indian states
- Conclusion: Integrated intervention is necessary

Phase 7: Design Translation

The inferred relation becomes a *project blueprint*:

- Teacher training platform (digital + in-service)
- State-level assessment cells
- Decentralised governance dashboards

This reflects *design science artifact creation* (Hevner et al., 2004).

Methodological Insight

T-NPI-Design demonstrates that:

Project design can be derived as a reproduction of empirically validated causal structures.

This moves beyond:

- Grounded theory (descriptive)
- Design thinking (intuitive)

toward *inferentially justified intervention design*.

References

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