A-TYPICAL
Diagnostic Pattern Extraction from Authentic Student Work

1. **Executive Summary**
   A-TYPICAL is a diagnostic intelligence module designed to extract observable, task-conditional patterns from authentic student work without converting those observations into grades, levels, labels, rankings, or prescriptions. It separates

(a) what is visible in student responses (evidence) from

(b) what an adult decides to do instructionally with that evidence.

This separation reflects validity-first assessment logic: diagnostic evidence loses value when interpretation is prematurely collapsed into judgment and consequential labelling. [1][2]

2. **The Problem It Solves**
   Most school diagnostics drift into two failure modes:

2.1 **Judgment-first diagnostics**
Systems attach performance labels early (weak, average, advanced). Those labels can shape teacher attention and decision-making, contaminating how subsequent evidence is interpreted. [1]

2.2 **Score-as-diagnosis**
Scores compress heterogeneous response behaviours into a single number, masking differences between misconception, representation breakdown, language decoding issues, and task-demand overload. This reduces instructional usefulness because the evidence no longer preserves what actually varied in student performance. [2]

A-TYPICAL targets these failures by constraining output to descriptive evidence only.

3. **Methodology and Controls**

3.1 **Evidence-first handling**
A-TYPICAL treats student work as a source of observable features, not as a basis for claims about ability, levels, or labels. Outputs remain descriptive and task-conditional, aligning with validity as an argument about defensible inferences and consequences. [1]

3.2 **Interpretation boundary**
A-TYPICAL explicitly avoids evaluative language and does not prescribe remediation. Instructional decisions remain the teacher's responsibility and are made outside the diagnostic evidence output. [1][2]

3.3 **Coverage limits and uncertainty visibility**
A-TYPICAL makes limits explicit by reporting what evidence was available, what task types were observed, and where evidence is insufficient to support stable generalizations. This reduces overreach and prevents a diagnostic from becoming a disguised report card.

3.4 **Consistency and constraint reporting**
A-TYPICAL reports what appears consistent versus what shifts when task demands change, including constraint-linked breakpoints. This supports instructional decision-making without compressing evidence into scores. [2]

4. Design Principles Grounded in Research

4.1 **Validity-first evidence handling**
Validity is an argument about what inferences are defensible from observed performances and what consequences follow. A-TYPICAL avoids invalid inference by design: it does not claim "ability," "understanding," or "needs improvement," and it does not prescribe remediation. [1]

4.2 **Formative assessment depends on usable evidence, not scores**
Formative assessment emphasizes frequent evidence that supports instructional adjustment. Evidence must remain interpretable and should not be overridden by ranking labels. A-TYPICAL generates evidence meant to be acted upon by teachers without becoming a grading instrument. [2]

4.3 **Cognitive demand is treated as observable structure**
Higher-order thinking is operationalized through visible markers in student output, not claimed as intent. A-TYPICAL reports structure use, representation shifts, explicit justification markers, and task-conditional variability. This aligns with cognitive-demand approaches while keeping claims grounded in what is observable. [3][4]

5. Output Contract

A-TYPICAL returns exactly **nine sections**.

i. Evidence Coverage and Limits
ii. Task Demand Profile
iii. Consistent Observable Patterns
iv. Task-Conditional Variability
v. Representation Use
vi. Language and Symbol Use
vii. Explicit Causality Markers
viii. Constraint-Linked Breakpoints
ix. Summary of Observed Stability vs Shift

The intent is diagnostic discipline: uncertainty is explicit, evidence boundaries are visible, and the output cannot collapse into a disguised report card.

6. NEP and Board Relevance

6.1 NEP 2020 alignment

The National Education Policy 2020 emphasizes competency-based learning and formative assessment practices. A-TYPICAL supports this direction by producing diagnostic evidence that can inform teaching without becoming a grading substitute. [5][6]

6.2 Board-aligned classroom fit (example: CBSE)

For board-aligned classrooms (for example, CBSE), the value is tighter evidence:

- what students did,
- how it changed across task demands
- where constraints produced breakpoints
- what remained stable versus what shifted across tasks

References

[1] Samuel Messick (1995). Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning.
[2] Paul Black and Dylan Wiliam (1998). Assessment and Classroom Learning. Assessment in Education: Principles, Policy and Practice, 5(1), 7 to 74. DOI: 10.1080/0969595980050102
[3] Norman L. Webb (1997). Depth of Knowledge framework and cognitive demand.
[4] ERIC indexing for Depth of Knowledge and cognitive demand resources.
[5] Ministry of Education, Government of India. National Education Policy 2020.
[6] Ministry of Education, Government of India. PARAKH competency-based assessment roadmap.