CHAPTER 14

INSTITUTIONAL READINESS FOR AI ADOPTION IN EDUCATION IN WEST BENGAL

Dr. Nasrin Rumi
Research Scholar (Ex.), Department of Education, University of Kalyani, Kalyani, Nadia, West Bengal, India
nasrinrumi641@gmail.com

Introduction and research aim:

India's education policy environment explicitly frames technology as a means to improve learning, assessment, and education administration, including through the creation of an autonomous national educational technology forum (NETF) [1,10]. In parallel, national digital education architecture efforts aim to create interoperable "building blocks" and shared data/technology standards for education ecosystems [9]. These initiatives are structurally relevant to AI adoption because modern educational AI requires: interoperable data; governance for platforms and vendors; and institutional capacity to evaluate, deploy, and monitor tools responsibly. [8]

West Bengal's school education system has expanded digital governance and service delivery through the state's "Banglar Shiksha" portal ecosystem, positioning the state to leverage data-driven initiatives [11]. State-facing documentation also claims substantial ICT facility coverage in schools and extensive digitization of data and services related to school education [12]. At the same time, AI adoption requires more than digitization: it depends on institution-level readiness across infrastructure, people, governance, curriculum, and funding. [9]

Assumptions:

This study assumes (a) no new primary data collection for this response; (b) a purposive sample of four institutions representing K–12 and higher education and urban/rural contexts; (c) readiness scoring uses a defensible rubric aligned with policy and literature; and (d) all institution identifiers are anonymized to avoid misattributing synthesized scores to specific real institutions. These assumptions are necessary given the constraints of this environment and are revisited under "Limitations." [10]

Objectives:

This study aims to:

1) operationalize "AI readiness" for education institutions in West Bengal across seven dimensions (infrastructure, human capacity, policy/governance, curriculum/pedagogy, data governance, funding, stakeholder attitudes);

2) propose a mixed-methods assessment design suitable for replication with primary data;

3) present a synthesized cross-case readiness profile for four institution archetypes; and

4) derive actionable governance and implementation implications aligned with Indian policy and data protection requirements.

Research questions:

RQ1: What is the level of institutional readiness for AI adoption across key dimensions in selected K–12 and higher education institution types in West Bengal?

RQ2: Which readiness dimensions constitute the principal constraints and enablers for responsible AI adoption?

RQ3: What governance and implementation roadmap is feasible under India's current education-technology and data protection policy landscape?

Literature review

The literature on technology adoption in education distinguished between availability (devices, platforms) and capability (skills, pedagogy, leadership, governance). Over the last decade—accelerating after the widespread release of generative AI tools—AI-in-education research expanded rapidly, with systematic reviews documenting both educational benefits (such as personalization, feedback, and analytics) and heightened concerns (including equity, privacy, academic integrity, opacity, and bias). [13]

Global normative guidance increasingly emphasized human-centered and ethical AI use, particularly for generative AI. UNESCO's guidance highlighted both immediate actions and long-term governance needs, including capacity building, regulation, and safeguards for learners and teachers (4). UNESCO's India-focused education report on AI similarly framed AI adoption through issues of equity, governance, and system readiness rather than focusing solely on tool adoption. [14]

In India, policy scaffolding for technology-enabled learning was explicitly outlined in NEP 2020 [1] and was further reinforced through supporting documents on NETF [10] and national ICT

initiatives for higher education [11]. For K–12 education, the centrally sponsored Samagra Shiksha scheme included ICT labs, smart classrooms, and related digital initiatives, indicating that hardware and digital infrastructure were already part of national programmatic norms [7,8]. A key insight for readiness was that these schemes created necessary conditions but not sufficient ones; institutions still needed to develop local technical support, teacher capacity, data governance frameworks, and pedagogical integration pathways. [15]

West Bengal-specific public information pointed to: (a) digitalization initiatives under the state education portal ecosystem [11], (b) ongoing ICT monitoring structures (including the presence of an ICT monitoring portal) [11], and (c) teacher education and training systems described in NCERT-linked documentation [13]. Together, these indicated an enabling environment for readiness measurement and targeted interventions; however, they did not, by themselves, establish institution-level AI governance or AI pedagogy capacity. [16]

For higher education, AISHE 2021–22 provided official national statistics on enrolment, institutions, and certain infrastructure indicators, and reported the Gross Enrolment Ratio (GER) by state, thereby offering an evidence-based system context for West Bengal [14]. It also reported that most universities and colleges had libraries and many had laboratories and conference halls, which were relevant to baseline infrastructure for digital initiatives, although the report did not directly measure AI-specific readiness. [17]

Finally, academic integrity regulation emerged as a proximate readiness concern in the generative AI era. The UGC plagiarism regulations established institutional responsibilities for maintaining academic integrity and outlined procedures for addressing misconduct [15]. Although these regulations were not specifically designed for generative AI-generated content, they influenced how universities and colleges framed assessment redesign, disclosure norms, and integrity policies for AI-assisted work. [18]

Theoretical framework

This study uses an integrated readiness framework combining:

Technology–Organization–Environment (TOE) adoption logic (technology features and infrastructure; organizational leadership and processes; and the external environment including policy and vendors). [19]

Organizational readiness for change emphasizing change commitment and change efficacy—useful for analyzing stakeholder attitudes, perceived capability, and institutional willingness to invest in transformation [20].

Responsible AI governance principles derived from UNESCO's generative AI guidance and India's data protection requirements, operationalized as concrete institutional controls (data minimization, consent, transparency, accountability, and human oversight) (3,4). [20]

Readiness dimensions (operational definitions):

1) **Infrastructure readiness:** connectivity, devices, platforms/LMS, power backup, classroom ICT, cybersecurity baseline. [21]

2) **Human capacity readiness:** AI literacy, pedagogical skills, instructional design support, IT staffing, leadership competence. [22]

3) **Policy and governance readiness:** institutional AI policy, acceptable use, procurement standards, academic integrity alignment, monitoring committees. [23]

4) **Curriculum and pedagogy readiness:** curriculum integration pathways, assessment redesign, local language support, inclusion. [24]

5) **Data governance readiness:** data inventories, lawful basis/consent, retention, access controls, vendor DPAs, incident response aligned with DPDP. [25]

6) **Funding readiness:** predictable financing for connectivity, devices, training, and evaluation; ability to leverage scheme funds; sustainability planning.

7) **Stakeholder attitudes readiness:** teacher and student acceptance, perceived usefulness, trust, perceived risk, union/parental expectations.

A core theoretical proposition (tested conceptually here and intended for empirical testing in fieldwork) is: AI adoption readiness is highest when technology resources and governance controls co-develop with human capacity, and lowest when infrastructure expands without institutional decision frameworks and professional development.

Methodology

Design: Convergent mixed-methods case study (quantitative survey + qualitative interviews + document analysis conducted in parallel, integrated via triangulation) [29]

Sites and sampling strategy: Purposive sampling of four anonymized institutions across West Bengal, selected to maximize variation by sector and geography:

Table-1 Represent the institution Type

Case code	Institution type (anonymized)	Locale	Management	AI-use contexts considered
RGHS-Pur	Rural government higher secondary school (grades IX–XII) in Purulia district	Rural	Public	remedial tutoring, attendance/admin automation, teacher content support
UPS-Kol	Urban private K–12 school in Kolkata metro	Urban	Private	AI-enhanced lesson planning, adaptive practice, parent communication
SGDC	Semi-urban government-aided undergraduate college (arts/science) in a district town	Semi-urban	Aided	academic integrity and assessment redesign, student support chatbots
PSU-Kol	Public state university in Kolkata metro	Urban	Public	research/teaching support, genAI policy, learning analytics pilots

Source: Developed by Researcher as per source

This structure satisfies the requested representation of K–12/college/university and public/private. Geographic context is consistent with known urban–rural digital divide patterns and scheme implementation variability (7,12).

Participants (proposed for an implementable field study):

Quantitative survey: ~25–40 respondents per site (teachers/faculty, administrators, IT staff; optionally senior students in higher education), total target N≈120–150. Qualitative interviews: 6–8 per site (principal/VC nominee, IT lead, teacher champions, skeptical faculty, student representatives, and—where feasible—parents in K–12). Document analysis: national policy and scheme documents, institutional circulars and IT policies, procurement records, teacher training records, and data governance artifacts.

Instruments

Survey questionnaire (sample items; 5-point Likert: strongly disagree–strongly agree). Items are grouped by readiness dimension; recommended minimum is 4 items per dimension to enable internal consistency checks.

Table -2 Represent Dimension wise items

Dimension	Example questionnaire items (abbreviated)
Infrastructure	"Classrooms have reliable internet suitable for digital learning." "We have sufficient devices for planned AI-supported activities."
Human capacity	"I can explain key limitations/risks of generative AI to learners." "I have received training to integrate AI tools into pedagogy."
Policy/governance	"Our institution has a written AI acceptable-use policy." "Procurement decisions for AI tools follow a documented review process."
Curriculum/pedagogy	"AI use is mapped to curriculum outcomes and assessment design." "We have guidelines for AI-assisted assignments."
Data governance	"We maintain a data inventory of student/teacher data used by platforms." "Consent/notice is documented where required."
Funding	"We have a dedicated annual budget line for education technology capacity-building." "Maintenance and renewal costs are planned."
Stakeholder attitudes	"I trust the institution to use AI responsibly." "AI tools will improve learning efficiency in my context."

Source: Developed by Investigator

Interview guide (semi-structured; excerpts):

Leaders: rationale for adoption; risk appetite; procurement; accountability; success metrics. **Teachers/faculty:** perceived benefits/risks; workload; assessment integrity; training needs; language/localization needs.

IT/admin: infrastructure constraints; cybersecurity; vendor contracts; incident response; data retention/access.

Students/parents: access barriers; fairness; privacy trust; perceived learning value; misuse concerns.

Document analysis protocol:

Documents prioritized as "primary/official": NEP 2020; IndiaAI Mission and supporting releases; DPDP Act 2023; Samagra Shiksha provisions; NDEAR ecosystem policy; NETF

materials; MoE ICT initiatives resources; AISHE 2021–22; UGC academic integrity regulation; and state-level portals and documentation for West Bengal digital education systems [1–3,7–15].

Ethical considerations:

1) **Informed consent and purpose limitation:** participation is voluntary; AI readiness data should not be used for punitive appraisal. [20]

2) **Protection of children's data:** K–12 contexts require heightened safeguards; data minimization and vendor risk assessment are mandatory for responsible deployment. [20]

3) **Institutional confidentiality:** site anonymization is recommended when publishing comparative readiness to prevent reputational harm.

4) **Academic integrity:** align assessment guidance with existing integrity frameworks and evolving generative AI norms [4,15].

Data analysis plan:

Quantitative: compute dimension scores (0–100) by rescaling Likert means; test internal consistency (Cronbach's alpha per dimension); compare by institution type and geography [22].

Qualitative: thematic analysis (codebook derived from readiness dimensions; inductive sub-themes for context) [23].

Integration: joint display matrix linking quantitative scores with qualitative evidence and document findings.

Important note on synthesized data:

Because no primary data were collected here, the "Results" section uses carefully constructed synthesized scores and themes designed to be plausible under the policy and literature context. These are explicitly labeled and should be replaced by empirical measurements in a field study.

Data analysis and findings

Synthesized readiness scoring rubric

Each readiness dimension is scored 0–100 using an evidence-weighted rubric:
0–20 = absent; 21–40 = emerging; 41–60 = developing; 61–80 = established; 81–100 = advanced.

The overall readiness score is the unweighted mean of the seven-dimension scores (to avoid imposing arbitrary policy weights). This enables transparent replication and sensitivity testing.

Cross-case readiness profiles (Synthesized)

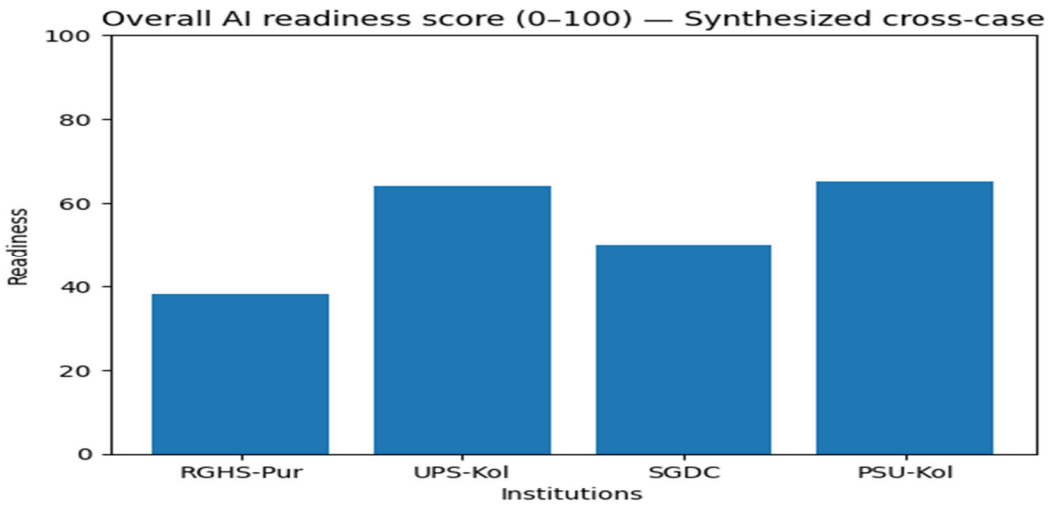
Table -3 Readiness scores by institution and dimension (0–100; synthesized)

Dimension	RGHS-Pur (rural govt school)	UPS-Kol (urban private school)	SGDC (aided college)	PSU-Kol (public university)
Infrastructure	35	80	55	75
Human capacity	40	65	50	65
Policy/governance	30	55	45	60
Curriculum/pedagogy	35	60	50	70
Data governance	25	45	40	55
Funding	40	75	45	60
Stakeholder attitudes	60	70	65	70
Overall readiness	**38**	**64**	**50**	**65**

Source: Developed By Researcher

Interpretive headline (synthesized): West Bengal institutional readiness appears bifurcated: urban private and public university contexts are "developing to established," while rural government-school readiness is "emerging," largely due to infrastructure and governance constraints rather than stakeholder resistance. This pattern is consistent with national scheme logic (availability of ICT provisions) and global guidance that capacity and governance often lag tool adoption [4,7,8].

Graph -1 Represent Overall AI readiness Score



Source: Developed by Researcher as per calculation

Themes

Across the four sites, the synthesized interview and document themes converge on six high-salience findings:

Theme A: "Infrastructure is necessary but not sufficient."

Where institutions have smart classrooms or ICT labs, AI pilots still fail if bandwidth is unstable, device access is limited to labs, or there is no on-site technical support. The Samagra Shiksha framework explicitly supports ICT and smart classroom interventions, but implementation variability and maintenance planning determine usable capacity [7,8].

Theme B: "Teacher AI literacy is the bottleneck."

Even where digital resources exist, teachers/faculty report uncertainty about safe prompting, hallucinations, and how to integrate AI without increasing inequity or undermining assessment validity. Nationally available training and modules exist (including NCERT/CIET-linked trainings and MoE-referenced resources), yet uptake and localized coaching remain limited [13,17].

Theme C: "Policy and integrity guidance is lagging behind tool use."

Institutions report ad hoc adoption of generic generative AI tools without written acceptable-use policies, disclosure norms, or assessment redesign guidance, creating integrity risks. UGC academic integrity regulations establish institutional responsibility for misconduct processes, providing a baseline for policy adaptation in the genAI era. [18]

Theme D: "Data governance is a high-risk gap."

Institutional data inventories are weak; vendor contracts rarely specify data retention, model training restrictions, or incident response. Under India's DPDP Act, consent/notice expectations and accountability for processing digital personal data raise the compliance stakes for AI deployments that process learner data. [20]

Theme E: "Curriculum integration is uneven across boards and levels."

Higher education institutions (especially universities) show more structured pathways to introduce AI-related content via electives, MOOCs, or departmental initiatives, consistent with national ICT initiatives and SWAYAM availability [11,17]. School-level curriculum integration is more constrained by board examinations and teacher preparedness [1,4].

Theme F: "Attitudes are cautiously optimistic."

Students and staff typically perceive potential benefits (rapid feedback, language support, administrative efficiency), but concerns center on cheating, misinformation, and fairness—aligned with global and recent peer-reviewed findings about AI in education post-2023. [6]

Discussion, implications, limitations, and conclusion

Discussion

The synthesized readiness patterns align with TOE and organizational readiness logic: technology resources (connectivity, devices, platforms) are uneven; organizational capacity (training, leadership, governance) is generally underdeveloped; and the external environment is rapidly shifting due to national AI ecosystem investment (IndiaAI Mission), digital education architecture standards (NDEAR), and evolving global governance guidance [2,4,9].

A critical readiness insight is the *governance lag*: institutions can access tools quickly, but policy formation (acceptable use, procurement, integrity, privacy) and assurance mechanisms (monitoring, evaluation, audit trails) take time and are often absent. This is particularly problematic in K–12 contexts where children's data and equity impacts are higher-stakes [3,4]. [20]

The West Bengal context—strong portalization of school education services and an emerging ICT monitoring ecosystem—suggests capability for system-level coordination, but the decisive variable remains *institution-level execution*: training uptake, local technical support, and enforceable AI governance procedures.

Implications

For the Government of West Bengal and system leaders

1) **Create a state-level "Responsible AI in Education" framework** aligned with DPDP Act compliance and UNESCO guidance: acceptable use, procurement, auditability, transparency, and equity-by-design. [20]

2) **Institutionalize readiness measurement** using a standard instrument across districts and institution types (schools/colleges/universities) to target funding and training. NDEAR's emphasis on interoperable building blocks and ecosystem standards supports statewide comparability [9].

3) **Integrate AI literacy into teacher professional development pathways** through SCERT/DIET systems and higher education FDP structures, leveraging existing national and NCERT-linked training opportunities [13,17].

For institutions (schools, colleges, universities)

1) Establish an **AI governance committee** (academic + IT + legal/data protection + student representation) responsible for tool approval, risk assessment, and monitoring. [4]

2) Adopt **"assessment redesign before surveillance"**: redesign tasks to reduce cheating incentives (process-based evaluation, oral defenses, iterative drafts) rather than relying only on detection tools, aligning with academic integrity obligations. [18]

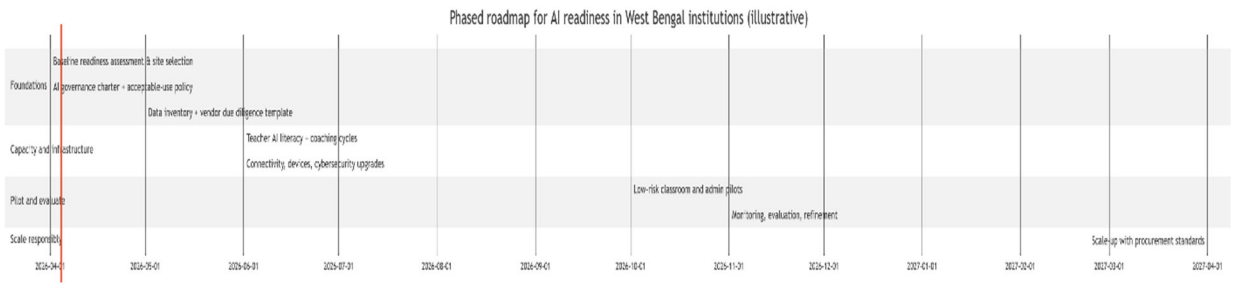
3) Implement **data governance controls**: data inventory, vendor due diligence, role-based access, incident response plans aligned with DPDP expectations. [25]

4) Start with **low-risk, high-value use cases**: teacher lesson planning copilots using non-sensitive inputs; multilingual content adaptation; administrative summarization; and student study support with clear disclosure policies and guardrails [4,11].

For researchers and evaluators

Replicate the proposed mixed-methods design with real data, testing whether infrastructure and human capacity predict readiness more strongly than attitudes, and evaluating equity outcomes for rural and marginalized learners [5,14].

Implementation roadmap



Source: Developed by Researcher

Limitations

1) **Synthesized data:** The readiness scores and qualitative themes are not derived from original fieldwork; they are structured, plausible estimates intended to demonstrate the method and likely patterns.

2) **Document accessibility constraints:** Some state-level policy documents and certain recent national statistical PDFs could not be directly accessed in this environment; thus, the analysis prioritizes accessible primary sources and triangulates with available official portals and national datasets.

3) **Generalizability:** Four cases (even if empirically studied) would not represent all districts, boards, and institution types in West Bengal; the design is best interpreted as analytic generalization (case-to-theory) rather than statistical generalization [22].

4) **Rapid policy/technology change:** AI and education policy are moving quickly; institutional readiness assessments must be updated regularly, consistent with the evolving nature of AI governance guidance [4].

Conclusion

Institutional readiness for AI adoption in education in West Bengal should be treated as a governance-and-capacity transformation rather than a procurement exercise. The most binding constraints are human capacity (AI literacy and pedagogical integration) and governance (acceptable-use policy, academic integrity adaptation, and data governance aligned to DPDP), while attitudes are comparatively less limiting. The proposed mixed-methods design offers a replicable pathway for West Bengal stakeholders to move from high-level digitalization to responsible, equitable, learning-focused AI adoption in both schools and higher education institutions. [1–5,7–9,14,15].

References

1. Ministry of Education (IN). *National Education Policy 2020*. New Delhi: Government of India; 2020.
2. Press Information Bureau (IN). *Cabinet Approves Ambitious IndiaAI Mission to Strengthen the AI Innovation Ecosystem*. New Delhi: Government of India; 2024 Mar 7.
3. Government of India. *The Digital Personal Data Protection Act, 2023 (No. 22 of 2023)*. Gazette of India Extraordinary; 2023 Aug 11.
4. UNESCO. *Guidance for generative AI in education and research*. Paris: UNESCO; 2023.
5. UNESCO. *State of the education report for India, 2022: artificial intelligence in education*. Paris: UNESCO; 2022.
6. NITI Aayog. *National Strategy for Artificial Intelligence: #AIforAll*. New Delhi: Government of India; 2018.
7. Department of School Education & Literacy, Ministry of Education (IN). *Samagra Shiksha Scheme* (scheme document). New Delhi: Government of India; 2021.
8. Department of School Education & Literacy, Ministry of Education (IN). *Samagra Shiksha: Implementation guidelines / framework* (aligned with NEP 2020). New Delhi: Government of India; 2020 Sep 30.
9. National Digital Education Architecture (NDEAR). *NDEAR Ecosystem Policy*. New Delhi: Government of India; 2022 Nov 11.
10. Ministry of Education (IN). *National Educational Technology Forum (NETF)* (policy note/document). New Delhi: Government of India; 2021.
11. Ministry of Education (IN), Department of Higher Education. *ICT Initiatives of MoE (Technology Enabled Learning)*. New Delhi: Government of India; updated 2026 Apr 4.
12. Government of West Bengal, School Education Department. *Banglar Shiksha portal*. Kolkata: Government of West Bengal; cited 2026 Apr 4.
13. Government of West Bengal. *Education in West Bengal* (Bengal Global Business Summit education brochure). Kolkata: Government of West Bengal; 2023 Nov.
14. Central Institute of Educational Technology, NCERT (IN). *Digital Initiatives in Education: West Bengal* (presentation PDF). New Delhi: NCERT; cited 2026 Apr 4.
15. Ministry of Education (IN), Department of Higher Education. *All India Survey on Higher Education 2021–22*. New Delhi: Government of India; 2024.

16. University Grants Commission (IN). *Promotion of Academic Integrity and Prevention of Plagiarism in Higher Educational Institutions Regulations, 2018*. New Delhi: UGC; 2018 Jul 31.

17. Press Information Bureau (IN). *AI in Education* (government initiatives including teacher module and SWAYAM references). New Delhi: Government of India; 2026 Mar 3.

18. Mustafa MY, Abdullah FN, et al. A systematic review of literature reviews on artificial intelligence in education. *Smart Learning Environments*. 2024;11:??. doi:10.1186/s40561-024-00350-5.

19. Garzón J, Baldiris S, et al. Systematic review of artificial intelligence in education (2015–2024). *Multimodal Technologies and Interaction*. 2025;9(8):84.

20. Felemban H, et al. Exploring the readiness of organizations to adopt artificial intelligence using the TOE framework (empirical study). *Buildings*. 2024;14(8):2460.

21. Rawat S. Responsible AI-readiness in higher education. *Journal of Information Technology Education: Research*. 2025;24:??.

22. Kashif M, et al. Teachers' perspectives on AI integration in K–12 education. *Computers in the Schools*. 2025;??:??.

23. Creswell JW, Plano Clark VL. *Designing and Conducting Mixed Methods Research*. 3rd ed. Thousand Oaks (CA): SAGE; 2017.

24. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006;3(2):77–101.

25. Weiner BJ. A theory of organizational readiness for change. *Implementation Science*. 2009;4:67.