Teacher Readiness for AI-Assisted Formative Assessment: Repurposing Telegram in Low-Resource ESL Contexts

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Abstract

This paper introduces a conceptual framework for understanding how English as a Second Language (ESL) teachers develop readiness to use Telegram for AI-assisted formative assessment in low-resource contexts. It draws on Self-Determination Theory (SDT), Technological Pedagogical Content Knowledge (TPACK), Sociocultural Theory (SCT), and Metacognition to create an integrated model that moves beyond single-lens explanations of digital readiness. The framework presents two new constructs: **Multi-Use Educational Repurposing (MUER)** and **AI-Assisted Formative Repurposing (AAFR)**. MUER explains how teachers creatively adapt Telegram's features, such as polls, channels, and pinned posts, to support continuous formative assessment. AAFR focuses on the use of automation and bots to provide scalable and efficient feedback in low-bandwidth environments. The model conceptualises readiness as a dynamic and reflective process shaped by motivation, knowledge, collaboration, and metacognitive regulation. It contributes both theoretical insight and practical guidance for teacher professional development, particularly in resource-constrained ESL

settings. The study positions teachers as active designers who repurpose everyday communication platforms for equitable and sustainable formative assessment.

Keywords**:** teacher readiness, formative assessment, AI-assisted learning, Telegram, metacognition, low-resource ESL

Introduction

Ms. Lee is an ESL teacher in a rural area of Vietnam where she teaches classes of up to seventy students with limited facilities and unstable internet access. In order to cope, she uses Telegram polls and quizzes to check learning progress and to send reminders or homework tasks. These tools provide her with an overview of learners' progress and prompt her to reflect on what needs to be assessed. This leads her to adjust her teaching accordingly (Tran, 2021). This study tracks the effect of these actions using concrete indicators such as feedback turnaround time and the proportion of students receiving weekly formative responses. Mr. Ade is a secondary school English teacher in Rwanda and works in a context where policy reforms emphasise formative assessment, but professional support is inadequate. He uses a Telegram bot to collect short written responses from his students and monitors the system to ensure each answer receives meaningful feedback (Cameron, 2021). Here, gains are quantified by examining changes in the coverage of feedback across a class and the reductions in teacher time spent on marking routine items. Ms. Dewi Sari teaches conversational English to a large group of adult learners in a remote Indonesian town with weak internet coverage. She relies on Telegram's audio messages instead of video calls to gather spoken English tasks, which allows her to identify priority issues such as pronunciation and to provide targeted feedback (Kidwell, 2021). Impact is captured through simple pre–post checks embedded in Telegram and by monitoring participation rates from learners with intermittent connectivity.

This paper endeavours to address this dual gap by proposing a framework that integrates SDT, TPACK, SCT and Metacognition. This study introduces two operational constructs which

translate the framework into classroom routines. Multi-Use Educational Repurposing focuses on creative, multi-use adaptation of polls, channels and pinned messages for ongoing checks. AI-Assisted Formative Repurposing leverages automation for targeted, scalable feedback that remains workable under bandwidth constraints. Readiness is conceptualised as an ongoing negotiation rather than a fixed state, extending static "digital readiness" accounts by centring teacher appropriation of general apps for formative purposes under constraint. This study is underpinned by four guiding questions:

- How do teachers in low-resource ESL contexts plan, monitor and regulate their use of Telegram for formative assessment? How do these practices affect measurable outcomes such as feedback timeliness, coverage and short cycle learning gains?
- To what extent can Multi-Use Educational Repurposing and AI-Assisted Formative Repurposing support teacher readiness? What changes occur in motivation (SDT) and digital competence (TPACK) and how large are reductions in routine assessment workload?
- What are the implications for teacher training, professional development and equitable assessment practices in under-resourced settings? Here, equitable assessment is defined as timely, actionable feedback reaching all learners, including those with shared devices or intermittent internet; equity will be monitored through participation and feedback coverage across access-constrained subgroups.
- What risks or unintended consequences arise when relying on Telegram and AI-assisted methods in low-resource contexts and how can these be mitigated (e.g., data privacy, teacher workload from tool management or uneven access)?

Literature Review

Formative Assessment

Sadler defines formative assessment as using feedback to close the gap between current performance and intended goals, with assessment treated as an ongoing process rather than a final judgement (Sadler, 1989). In under-resourced ESL settings, this ideal collides with crowding, fragile infrastructure and limited professional development (Bailey & Christian, 2021). These challenges are the same ones introduced earlier: Ms. Lee in Vietnam manages classes of 60–70 learners, which makes individual checks hard (Tran, 2021) and Mr. Ade in Rwanda faces policy aspirations for formative assessment against thin training support (Cameron, 2021). In such conditions, teachers often lean on whatever tools they have to keep feedback moving, even when full formative assessment remains out of reach.

Despite its recognised value, formative assessment remains underdeveloped precisely where it could be most transformative and where English proficiency is tied to wider opportunity (Bailey & Christian, 2021). To be workable, formative principles need adapting to the realities of low-resource classrooms. Digital messengers offer a possible route when used with clear pedagogical intent. As set out below, the focus on Telegram's affordances as one such route and specify the kinds of measurable improvements that adapted use should aim to deliver (e.g., shorter feedback cycles, broader participation and more consistent progress tracking), which the methodology later proposes to examine.

Digital Tools and Telegram in ESL Contexts

Mobile tools have spread quickly in low-resource contexts because they are already in teachers' and learners' hands (Kukulska-Hulme & Shield, 2008; Godwin-Jones, 2017). Yet adoption often stops at delivery rather than systematic assessment (Bailey & Christian, 2021). Telegram is notable here because it is widely available across basic smartphones and is commonly reported as workable in low-bandwidth conditions, which underpins its familiarity

in many classrooms (Iksan & Saufian, 2017; Citrawati et al., 2021; Utomo et al., 2021). To keep claims proportionate, these attributes are treated as commonly noted in the literature rather than as universal technical guarantees.

Current studies show early steps rather than full assessment systems. Shojaee, Abdimoghaddam and Ashraf (2020) use Telegram for explicit/implicit grammar instruction with engagement gains and Çakmak, Ismail and Karami (2023) explore learning-oriented assessment with a focus on self-assessment and motivation. In practice, teachers like Ms. Lee already uses polls to check understanding and adjust teaching accordingly which is an adaptive and reflective move rather than a simple "engagement" tactic (Tran, 2021). Even so, most reports still emphasise participation and content sharing, not structured formative assessment.

By structured formative assessment, is defined as a repeatable, evidence-carrying cycle that: (a) elicits responses at planned intervals; (b) provides timely, specific feedback; (c) records progress at learner and group levels; and (d) informs the next teaching move. On Telegram this can include scheduled micro-checks (polls/quizzes), pinned criteria, short audio tasks for speaking and basic analytics from bot logs, which are each linked to explicit decisions about what to reteach, group or extend. When used in this way, Telegram is no longer just a delivery pipe; it becomes a lightweight mechanism for continuous feedback and decision-making that can plausibly shorten feedback turnaround, widen participation in checks and make progress more visible. These are the kinds of measurable outcomes the study proposes to track.

This shift depends on teacher readiness across four dimensions that existing reports seldom treat together: **motivation** (Self-Determination Theory; Ryan & Deci, 2017), integrated knowledge for technology-pedagogy-content fit (TPACK; Mishra & Koehler, 2006), social mediation of learning and tools (Sociocultural Theory; Lantolf & Thorne, 2006) and reflection for planning, monitoring and regulating assessment practice (Metacognition; Teng, 2025).

Addressing these together moves Telegram from a delivery tool to a genuine platform for formative assessment.

Theoretical Orientations

Self-Determination Theory (SDT) explains why teachers adopt and sustain new practices when autonomy, competence and relatedness are supported (Ryan & Deci, 2017). In under-resourced contexts those conditions are often fragile, which can blunt long-term motivation; yet some teachers still adapt, as earlier vignettes show, highlighting the role of agency and local support (Bailey & Christian, 2021). TPACK clarifies the knowledge needed to blend tools with pedagogy and content (Mishra & Koehler, 2006). In many low-resource ESL settings, TPACK development has amounted to basic skills training rather than assessment design, which leaves features like Telegram's polls, channels and bots underused for feedback purposes (Aisyah et al, 2021; Drajati et al., 2018).

Sociocultural Theory frames learning as socially mediated through tools and context (Lantolf & Thorne, 2006). That lens helps explain why, in crowded, unevenly supported classrooms, lightweight**,** dialogic interactions (even via text or short audio) can still sustain participation and peer help (Bailey & Christian, 2021). It also reminds us that a messenger's group/channel ecology can host collaborative assessment moves, though the medium may limit richer multimodal cues unless tasks are deliberately designed. Metacognition adds the reflective layer: teachers plan what to check, monitor responses and regulate next steps (Teng, 2025). Ms. Lee's sequence (poll → scan results → re-teach a weak sub-skill) is a clear metacognitive cycle; so are Mr. Ade's bot audits and Ms. Dewi Sari's prioritising of audio submissions (Tran, 2021; Cameron, 2021; Kidwell, 2021).

Taken alone, each theory explains part of readiness; taken together, they form a working account of why adapted Telegram use can become structured rather than ad-hoc. The literature, however, tends to treat these lenses separately, which fragments support for teachers and leaves

the theoretical foundation for low-resource, digital formative assessment under-developed (cf. Bailey & Christian, 2021; Teng, 2025).

The Dual Gap

Two linked problems emerge. First, formative assessment remains thin in many under-resourced ESL contexts, even when its value is understood, because teachers face overcrowding, weak infrastructure and limited training (Bailey & Christian, 2021; Tran, 2021; Cameron, 2021). Second, where Telegram is present, studies often report delivery or general engagement rather than structured, continuous assessment (Shojaee et al., 2020; Çakmak et al., 2023). Ms. Lee's use of polls and Ms. Dewi Sari's audio tasks show promise but systematic progress tracking, timely feedback and planned reteaching cycles are seldom the centre of analysis.

Bridging this dual gap calls for a framework that integrates SDT (motivation), TPACK (integrated knowledge), SCT (social mediation), and Metacognition (reflection), and then operationalises them as classroom-ready moves. The next section develops two complementary constructs, **Multi-Use Educational Repurposing (MUER)** and **AI-Assisted Formative Repurposing (AAFR)**, which translate these lenses into repeatable practice in low-resource ESL settings with clear targets for measurable improvement that the methodology will assess.

Theoretical Framework

Overview and Theoretical Lenses

This study develops a multi-lens framework that combines Self-Determination Theory (SDT), Technological Pedagogical Content Knowledge (TPACK), Sociocultural Theory (SCT) and Metacognition to examine teacher readiness for digital formative assessment in low-resource ESL contexts. While each of these theories has been applied individually to aspects of digital learning (Ryan & Deci, 2017; Mishra & Koehler, 2006; Vygotsky, 1978; Flavell, 1979; Teng, 2025), they are rarely integrated into a single framework. Existing research typically

treats readiness as separate domains of competence (e.g., motivation or technical skills), which results in fragmentation and limited explanatory power (Bailey & Christian, 2021). This study addresses that gap by offering a unified framework that reflects the interplay of motivation, pedagogical knowledge, social interaction and reflective capacity.

The novelty of this framework lies not only in combining theories but also in applying them to the repurposing of a general-purpose messaging platform, Telegram, for structured formative assessment. Previous studies have explored how teachers adapt digital tools for classroom purposes (e.g., Shojaee et al., 2020), yet few have considered how readiness can be understood as a dynamic, holistic process shaped by multiple dimensions simultaneously. By integrating these theories, the framework provides predictive and explanatory strength that surpasses any single perspective. It identifies how teachers in low-resource settings regulate their own motivation, adapt digital tools for assessment, foster collaboration through mediated interaction and engage in reflective practice to refine their approaches (Lantolf & Thorne, 2006; Teng, 2025).

This section introduces each theoretical component and explains its contribution to the framework. The analysis demonstrates how the integration of SDT, TPACK, SCT and Metacognition generates new insights into teacher readiness for formative assessment in challenging environments. It also establishes the foundation for the operational constructs of Adaptive Telegram Engagement and Bot-Supported Learner Feedback, which will be developed in later sections.

Construct Development and Integration

Teachers in low-resource settings often rely on communication tools not designed for pedagogy. Telegram, while primarily a messaging platform, has features that can be adapted for structured formative assessment. Multi-Use Educational Repurposing is defined here as the creative adaptation of Telegram's polls, quizzes, pinned posts and file-sharing functions into

systematic processes that support assessment beyond casual engagement. This construct differs from prior uses of instant messaging apps that focus on content delivery or social presence, because it emphasises structured, repeatable and measurable assessment practices (Çakmak et al, 2023; Shojaee et al, 2020).

The novelty lies in the repurposing of general communication features into assessment engines. For example, Ms. Lee in Vietnam adapts Telegram polls not simply as an icebreaker but as a mechanism for monitoring student comprehension at scale in classes of sixty or more. Her reflective use of polls has been associated with up to a 15 percent increase in participation in feedback tasks, mirroring engagement gains documented in mobile-assisted learning studies (Shojaee et al., 2020; Andujar, 2020). Such outcomes illustrate how routine features can be transformed into structured assessment processes when teachers apply them strategically.

Table 1. Challenges and Responses

Challenge (Source)	Theoretical Lens	Construct Response
Large classes (Tran, 2021)	SCT	Multi-Use Educational Repurposing
Wi-Fi issues (Cameron, 2021)	TPACK	AI-Assisted Formative Repurposing
Weak internet (Kidwell, 2021)	Metacognition	AI-Assisted Formative Repurposing
Limited training (Şahan & Sahan, 2021)	SDT	Multi-Use Educational Repurposing with Support Systems

Note. This table summarises challenges identified in the literature and the theoretical

Current literature recognises Telegram's accessibility, low bandwidth requirements and high user familiarity (Çakmak et al., 2023), yet most studies stop at describing involvement rather than structured assessment outcomes. Multi-Use Educational Repurposing extends this work by conceptualising Telegram as a flexible platform for continuous assessment loops, where teachers systematically plan, deliver and adapt formative tasks. In this way, the construct provides a bridge between TPACK's technical–pedagogical dimension and the motivational and reflective demands captured by SDT and Metacognition (Ryan & Deci, 2017; Teng, 2021).

construct addressing each.

This repurposing directly addresses gaps identified in the literature. Prior studies treat Telegram cases as isolated instances rather than part of a replicable framework (Çakmak et al, 2023). By defining multi-use repurposing as a transferable construct, this study contributes an operational pathway for teachers in low-resource ESL contexts to transform general digital tools into systematic formative assessment practices. This positions the framework as a theoretical refinement and a practical solution to the underdeveloped state of formative assessment in such settings.

Synthesis, Application and Transition

Sociocultural Theory (SCT), grounded in Vygotsky's concept of the Zone of Proximal Development (ZPD), provides a powerful lens for examining how teachers and learners co-construct knowledge through mediated interaction (Vygotsky, 1978; Lantolf & Thorne, 2006). In low-resource ESL contexts, Telegram's social features such as channels, groups and message sharing create opportunities for collaborative learning that align closely with SCT principles. These affordances position the platform not merely as a conduit for communication but as a potential space where mediation and scaffolding take place.

Applying SCT to this study highlights how the act of repurposing Telegram for assessment transforms ordinary digital exchanges into structured opportunities for collaborative meaning-

making. For example, group discussions or peer-feedback threads can become assessment events where learners negotiate understanding and teachers scaffold development. This perspective distinguishes the approach from prior uses of messaging apps that focus largely on content delivery (see Kukulska-Hulme & Shield, 2008). By framing interaction itself as assessment, the proposed constructs of *multi-use educational repurposing* and *AI-assisted formative repurposing* draw directly on SCT's emphasis on mediation through tools.

At the same time, Telegram's reliance on primarily text-based or short audio exchanges may limit the richness of sociocultural interaction compared with more multimodal environments (Lantolf & Thorne, 2006; Kukulska-Hulme & Shield, 2008). This constraint raises important questions about how teachers design activities to maximise sociocultural learning within such parameters. Teachers might structure tasks that encourage extended dialogue, integrate multimodal supplements such as shared images or recordings or use bots to prompt reflective peer interaction. These adaptations can strengthen the sociocultural depth of learning even when bandwidth and resources are constrained.

Future research should investigate how Telegram-based collaborative assessment can balance these strengths and limitations. Specific attention should be given to whether structured designs can approximate richer forms of mediation and to how teacher readiness for repurposing shapes these outcomes. In doing so, SCT is not only applied to explain interactional patterns but also extended to understand the innovative repurposing of non-educational platforms for systematic formative assessment in low-resource settings.

Methodology

This study adopts a mixed-methods design to investigate teacher readiness for formative assessment through Telegram in low-resource ESL contexts. This choice is not only pragmatic but theoretically essential: the multi-lens framework requires both quantitative and qualitative data to capture its full scope. Quantitative surveys are necessary to measure motivation (Self-

Determination Theory, Ryan & Deci, 2017) and digital skills (Technological Pedagogical Content Knowledge, Mishra & Koehler, 2006). Qualitative interviews and artefact analysis are indispensable for exploring collaborative practices (Sociocultural Theory, Lantolf & Thorne, 2006) and reflective processes (Metacognition, Teng, 2025). A single method could reveal either broad patterns or personal strategies but not the dynamic interplay across these dimensions. By integrating strands, this design allows Multi-Use Educational Repurposing and AI-Assisted Formative Repurposing to be tested as systematised, pedagogical strategies rather than isolated app features.

The study will involve 50–100 ESL teachers from rural Vietnam, urban Rwanda and remote Indonesia, where overcrowded classrooms, fragile infrastructure and limited institutional support are common (Tran, 2021; Cameron, 2021; Kidwell, 2021). Purposive sampling will focus on teachers with at least weekly educational use of Telegram, even informally, confirmed by a brief screening survey. This survey will check whether teachers use features such as polls, channels or bots for instructional purposes. Within this group, a deliberate mix of novice and experienced teachers will be included, as research shows novices often face workload stress whereas veterans demonstrate adaptability (Şahan & Sahan, 2021). Stratified sampling will ensure balanced representation across contexts and experience levels and sample size is justified by its capacity to capture diverse perspectives while remaining feasible for subgroup analyses.

Three instruments will generate data:

- **Surveys** will map readiness to the four lenses. Example items include:
    - SDT: “I feel confident that my students engage more when I use Telegram polls.”
    - TPACK: “I can integrate Telegram polls with lesson objectives to check comprehension.”

- SCT: “I collaborate with colleagues on how to use Telegram effectively.”
- Metacognition: “I plan my Telegram use to monitor and adjust lessons in real time.”

- **Semi-structured interviews** (45 minutes with 15–20 participants) will unpack how teachers make decisions, such as when to run polls, how they interpret bot feedback or how they adjust to unstable internet.
- **Artefact analysis** will examine Telegram outputs (poll data, pinned tasks, bot responses, audio clips), providing evidence of how constructs appear in practice.

Impact assessment will measure whether constructs improve teaching efficiency and learning outcomes. Student engagement will be gauged from Telegram response rates and analytics. Learning will be tracked through pre- and post-task performance scores linked to Telegram-based quizzes or bot exercises. Teacher workload reduction will be captured in interviews (self-reported time saved) and log analysis (e.g., response turnaround time). These measures allow Multi-Use Educational Repurposing to be assessed for its effect on comprehension gains and AI-Assisted Formative Repurposing for its contribution to timely, personalised support.

Ethical safeguards respect teacher workload and privacy. Participation is voluntary, with informed consent and freedom to withdraw. Surveys are mobile-friendly and low-bandwidth, interviews are scheduled flexibly and artefacts will be anonymised. These measures account for the realities of shared devices and unstable internet, supporting fairness and trustworthiness (Bailey & Christian, 2021).

Data analysis will integrate quantitative and qualitative strands through a convergent parallel design (Creswell & Clark, 2018). Survey data will be analysed descriptively, followed by multiple regression to test how SDT, TPACK, SCT and Metacognition predict readiness.

Dependent variables will include readiness composite scores, while independent variables will cover experience (novice/experienced) and teaching context (rural/urban/remote). Interview and artefact data will undergo reflexive thematic analysis, with comparative coding to highlight differences between novice and experienced teachers. Inter-coder checks will ensure consistency. Triangulation will occur during interpretation by comparing statistical patterns with qualitative themes, identifying convergence and divergence.

Limitations of the mixed-methods approach are acknowledged. Integration is complex, resource-intensive and prone to bias, especially in low-resource contexts. To mitigate these issues, iterative analysis, phased data collection and transparent integration procedures will be employed. Finally, by selecting only current Telegram users, the sample introduces bias: findings may not extend to non-users or hesitant adopters. This boundary is noted and future research should include broader adoption groups to map initial barriers.

Conceptual Implications and Practical Applications

The integration of the four theories into this framework provides a holistic model of teacher readiness. This approach addresses the fragmentation observed in past research, where SDT, TPACK, SCT and metacognition were often applied in isolation. By unifying them, the framework offers teachers a more adaptive and context-sensitive guide for digital formative assessment in low-resource environments.

The framework introduces two constructs: multi-use educational repurposing and AI-assisted formative repurposing. These constructs operationalise the theories by focusing on adaptive use of Telegram features and the use of automation for scalable feedback. Together, they reduce divides in technology, pedagogy and workload, contributing to more equitable assessment opportunities. Here, equity means consistent access to timely, meaningful feedback for students regardless of device, connectivity or location.

Policy implications are significant. Supporting teacher-led adaptation of existing tools, rather than imposing new systems, empowers educators while making efficient use of limited resources. Yet political and administrative resistance may challenge this approach, especially in centralised systems.

The constructs also point to testable pathways for future research. Although this is a conceptual paper, the framework identifies measurable directions such as improved student participation, workload reduction and enhanced teacher confidence. These pathways will guide empirical validation in diverse low-resource contexts.

Conclusion and Future Directions

This study introduced the constructs of multi-use educational repurposing and AI-assisted formative repurposing as a framework for teacher readiness in low-resource ESL contexts. They highlight how repurposing Telegram's features can support formative assessment through adaptive engagement and scalable feedback. The conclusion emphasises that teacher readiness is a process of negotiation shaped by context. This framework offers a holistic design that addresses motivational, technological, social and reflective dimensions, moving beyond isolated skills.

Equity remains central. Equitable assessment here means ensuring students, regardless of digital access or location, receive timely and meaningful feedback. Future research should establish indicators such as improved participation rates and reduced workload disparities. Policy implications suggest support for teacher-led adaptation rather than top-down imposition. This requires training opportunities and infrastructural support, though administrative resistance in centralised systems may challenge adoption.

Future research should test the framework empirically across diverse contexts (e.g., Vietnam, Rwanda, Indonesia) to measure outcomes such as student learning gains, teacher workload reduction and digital literacy development. Transferability to other platforms like

WhatsApp, Instagram and AI-driven tools will also be explored to determine whether the principles of repurposing are platform-agnostic.

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