EMBEDDING REAL-TIME FORMATIVE TELEMETRY USING H5P

SUBJECT MATTER EXPERT DETAILS

Name: Dr. Atul Bamrara
Designation: Assistant Teacher
Organisation: GPS Chaunrkhal, Pabau, Pauri Garhwal
Email / Contact: atulbamrara@gmail.com
Area of Expertise: Educational Technology, AI in Literacy, Cyber Security Education, FLN

1. PROBLEM STATEMENT & PEDAGOGY ALIGNMENT

Traditional digital resources (static PDFs, one-way video streams) trap students in passive consumption, producing low retention and zero diagnostic telemetry. Browser-native, interactive micro-modules built with H5P that provide immediate formative feedback, gamified reinforcement, and standards-compliant telemetry (xAPI). From a pedagogical framework perspective, this prototype aligns with the SAMR Model by elevating instructional delivery from simple Substitution (such as passively browsing a digital textbook PDF) to Modification and Redefinition through branching learning pathways, interactive phonics tasks, and multimodal listening checkpoints. Simultaneously, it operationalizes the core objectives of the NIPUN Bharat / FLN Mission[1] by breaking down foundational literacy and numeracy competencies into targeted, bite-sized learning activities - ranging from letter-sound association and word decoding drills to immediate self-correcting numeracy challenges that ensure real-time remediation and active student agency.

2. INTRODUCTION

H5P (HTML5 Package) represents a paradigm shift in modern educational technology by providing an entirely open-source, modular, and browser-native authoring ecosystem that democratizes the creation of interactive multimedia without demanding software engineering expertise. Operating entirely on open web standards - specifically HTML5, CSS3, and JavaScript - H5P eliminates the historical reliance on proprietary browser plugins like Adobe Flash or rigid, heavy authoring software, thereby ensuring seamless cross-platform responsiveness across smartphones, tablets, and desktop workstations. Under the hood, every learning asset is stored within an extensible and portable `.h5p` archive containing declarative JSON configurations, modular asset libraries, and bundled multimedia assets that can be freely shared, adapted, or migrated across distinct platforms through the global Open Educational Resources (OER) Hub. Furthermore, because H5P natively implements the Experience API (xAPI) specification, every user interaction - from pauses in an interactive video and keyword selections in a passage to drag-and-drop placements and quiz submissions - is captured as rich learning telemetry that directly maps to Gradebooks across mainstream Learning Management Systems such as Moodle, Canvas, Blackboard, and Brightspace, as well as Content Management Systems like WordPress and Drupal. By seamlessly blending formative assessment, non-linear instructional branching,

[1] https://sites.google.com/view/fln2024/home

and multimodal pedagogical scaffolds into a reusable format, H5P empowers educators to transform passive digital consumers into active participants within intuitive, accessible, and self-paced digital learning environments.

3. UNDERSTANDING THE H5P ARCHITECTURE

Before building, understand where H5P content lives and how it runs:

- **File Format (**.h5p**):** An H5P package is a standard ZIP archive containing JSON configuration files, asset libraries (JavaScript/CSS), and media files (images, audio, video).
- **The H5P Hub:** A built-in repository interface that lets you search, download, and update over 50+ content types directly from within your authoring dashboard.

Authoring Platforms:

- **Evaluation & Testing:** H5P.org (free community sandbox for experimentation; not meant for production hosting).
- **LMS Integration:** Native plugins for Moodle, Canvas, Brightspace, and Blackboard.
- **CMS Integration:** Plugins for WordPress and Drupal.
- **Standalone / Cloud:** H5P.com (managed SaaS edition) or desktop tools like Lumi (builds offline .h5p files).
- **Standards & Tracking:** All interactions emit xAPI (Experience API) statements out of the box, allowing completion rates, question scores, and learner progress to flow directly into your LMS Gradebook.

4. CHOOSING THE RIGHT CONTENT TYPE

Match your instructional goals to the right H5P interaction model:

Learning Objective	Recommended H5P Content Types
Active Video Watching	Interactive Video (overlays, bookmarks, mid-stream quizzes)
Structured Instruction & Slides	Course Presentation, Interactive Book, Column
Decision-Making & Simulations	Branching Scenario, Virtual Tour (360)
Knowledge Retrieval & Testing	Question Set (Quiz), Drag and Drop, Fill in the Blanks, Find the Hotspot
Vocabulary & Concept Drills	Dialog Cards, Flashcards, Agamotto (image scrubber)
Summaries & Documentation	Documentation Tool, Summary, Accordion

5. DEVELOPING YOUR FIRST E-CONTENT

We will construct two core interactive formats: Course Presentation and an Interactive Video.

A. BUILDING AN INTERACTIVE VIDEO

A1 Add Video Source

In the H5P Hub, select Interactive Video. Give your module a descriptive title. Under the Video Sources panel, either upload an MP4 file (keep under 50 MB for performance) or paste a direct YouTube/Vimeo streaming link.

A2 Set Up Navigation & Bookmarks

Open the video player editor. Play the video to key transition points and click Add Bookmark. Label chapters (e.g., *"Introduction," "Core Concept," "Case Study"*). These appear in the scrubber menu, allowing learners to jump across sections.

A3 Add Mid-Stream Interactions

Drag interactive widgets onto the video timeline:

- **Text/Table:** Clarify technical terms or highlight formulas.
- **Multiple Choice / True-False:** Add quick comprehension checks.
- **Choose display mode:** Button (subtle icon learner clicks) or Poster (pauses the video automatically and displays on-screen).

A4 Configure Adaptive Branching

In the question settings, expand Adaptivity

- If answered **Correctly:** Resume playback or skip ahead to the next section.
- If answered **Incorrectly:** Check *Require full score* and set *Action on failure* to rewind to the timestamp where the concept was explained.

A5 Build Submit Screen & Grade Thresholds

Navigate to the end of the video track. Enable the Submit Screen interaction. Under Behavioral Settings, define passing grade cutoffs and toggle whether learners can retry missed checkpoints.

B. BUILDING AN INTERACTIVE COURSE PRESENTATION

B1 Design Slide Layout & Visual Theme

Select Course Presentation in the Content Hub. Set slide dimensions (default 4:3 or modern 16:9 widescreen) and apply a clean background color or branded slide template.

B2 Add Interactive Instructional Content

Use the top toolbar to insert media elements:

- **Rich Text & Images:** Introduce core concepts.
- **Audio Narration:** Add pronunciation guides or voiceovers.
- **Links & Pop-ups:** Include external resources or glossaries.

B3 Embed Integrated Activities

Add formative interactions directly on slides:

- **Fill in the Blanks:** Use asterisks to designate blank words (e.g., H5P stands for *HTML5 Package*).
- **Drag the Words:** Define target drop zones within sentences.
- **Image Hotspots:** Place clickable radar pins revealing deeper technical descriptions.

B4 Add Slide Jumping & Continuous Flow

Add anchor buttons configured with Go to Slide actions to create interactive menus, glossary links, or self-remedial pathways.

B5 Set Scoring & Summary Slide

Enable the automatic Summary Slide at the end. It aggregates all points earned across the presentation into a cumulative percentage score for the learner.

6. KEY CONFIGURATION PARAMETERS

Every H5P content author should calibrate these three global settings tabs:

6.1 Behavioral Settings

- **Retry Button:** Enable for low-stakes practice; disable for formal examinations.
- **Show Solutions:** Allow learners to see answers immediately, or restrict until all questions are completed.
- **Instant Feedback:** Toggle immediate question-by-question scoring vs. delayed submission.

6.2 Adaptivity & Feedback Ranges

- Create segmented score ranges (e.g., 0%–50%: *"Review module 2 and try again"*; 51%–85%: *"Good job! Keep practicing"*; 86%–100%: *"Mastery achieved"*).

6.3 Metadata & Copyright

- Click **Metadata** next to any media upload.
- Fill in license details (e.g., *Public Domain*, *CC BY-NC 4.0*, *All Rights Reserved*) and credit original authors to ensure institutional compliance.

7. PUBLISHING, EXPORTING, AND LMS DEPLOYMENT

Once your content is saved and reviewed, deploy it using one of three workflows:

1. **Native Moodle Integration:** In your course, go to Content Bank → Add / Upload your .h5p file. Add an activity → select H5P Activity. Point to the Content Bank item. Grades will automatically log in the Moodle Gradebook.
2. **WordPress / Drupal Embedding:** Use shortcodes (e.g., [h5p id="4"]) or the native Gutenberg block to embed responsive containers.
3. **Canvas / Blackboard / D2L Brightspace:** Add H5P via LTI external tool integration to track student attempts and calculate final marks automatically.

8. AUTHORING BEST PRACTICES

- **Keep file sizes small:** Compress background images (use WebP or optimized JPEG) and stream large video files via external hosts (Vimeo/YouTube) rather than uploading massive local files.
- **Design for accessibility:** Provide alt-text on all images, ensure sufficient color contrast, and provide closed-caption SRT files for interactive videos.
- **Chunk interactions:** Avoid front-loading all questions at the end. Insert a 1-question check every 2–3 minutes of media playback to maximize cognitive retention.
- **Always backup:** Use the **Reuse** button at the bottom left of any H5P activity to download the raw .h5p file and archive your learning modules locally.

9. REFERENCES

- Advanced Distributed Learning (ADL) Initiative. (2020). *Experience API (xAPI) specification overview and learning analytics standards*. U.S. Department of Defense. https://adlnet.gov/projects/xapi/
- FLN Hub. (2024). *Foundational Literacy & Numeracy (FLN) digital resource repository and pedagogical interventions*. https://sites.google.com/view/fln2024/home
- H5P Group. (2024). *H5P authoring guide, xAPI implementation, and open content documentation*. https://h5p.org/documentation
- Ministry of Education, Government of India. (2021). *NIPUN Bharat: National initiative for proficiency in reading with understanding and numeracy guidelines*. Department of School Education and Literacy. https://dsel.education.gov.in/nipun-bharat