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VIDHAN: A Gamified Approach to Learning the Indian Constitution with AI Assistance

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***Abstract* - The Constitution of India is difficult for many students and citizens to understand due to its complex legal language. This paper presents VIDHAN, a web-based platform that improves constitutional learning through simplified content, gamified activities, and an AI-powered chatbot. The system uses a React-based frontend, a Spring Boot backend, and a Python chatbot employing spaCy, Sentence-Transformers, and FAISS for intent-aware semantic question answering. It provides simplified explanations, tracks user progress with points and badges, and enhances engagement through interactive learning. A pilot study with 50 users demonstrated over a fourfold increase in average session time, higher repeat visits, and chatbot accuracy exceeding 80% for article-specific queries. The results show that combining content simplification, gamification, and conversational AI effectively enhances constitutional literacy.**

Keywords: constitutional literacy; gamification; conversational AI; intent detection; semantic search; FAISS; civic education; e-learning; distributed web architecture.

I. INTRODUCTION

The Constitution of India forms the foundation of the country's democratic and legal system, yet its complex legal language makes it difficult for many students and citizens to understand. Traditional methods of learning, such as textbooks and classroom instruction, often fail to provide engaging and interactive experiences, limiting awareness of constitutional rights, duties, and governance.

To address this challenge, this paper presents VIDHAN, a web-based educational platform that combines simplified constitutional content, gamified learning, and an AI-powered chatbot. The platform uses a React frontend, a Spring Boot backend, and a Python-based chatbot employing spaCy, Sentence-Transformers, and FAISS for intent-aware semantic question answering. Users can explore constitutional articles in simplified language, practice through quizzes and mini-games, and receive context-aware answers to their queries. The modular architecture enables independent deployment and scalability of the learning portal, chatbot, and game modules, allowing future enhancements without affecting the overall system. The proposed platform aims to improve constitutional literacy by making learning interactive, accessible, and engaging for users of different age groups and educational backgrounds.

II. RELATED WORK

Existing platforms have explored constitutional education, digital legal resources, and gamified learning, but most focus on only one aspect. Constitution Connect [1] provides searchable access to constitutional articles, while LawKey [3] demonstrates the use of AI chatbots for simplifying legal information. Studies on gamification in education [2], [4], [5] show that features such as badges, points, and leaderboards improve learner engagement and knowledge retention. Similarly, ConstitutionofIndia.net [8] serves as a comprehensive constitutional reference, whereas exam-oriented mobile applications primarily offer static quizzes with limited conceptual explanations.

Despite these contributions, current systems generally lack an integrated approach that combines simplified constitutional content, interactive learning, and AI-assisted guidance. VIDHAN addresses this gap by unifying simplified article explanations, gamified quizzes and mini-games, an intent-aware semantic-search chatbot, and progress tracking within a single modular platform, making constitutional learning more engaging and accessible for students and citizens.

III. SYSTEM DESIGN AND ARCHITECTURE

A. Architectural Overview

VIDHAN is organised as several cooperating parts rather than one monolithic application. The Vidhan platform itself a

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React + Vite frontend styled with Tailwind CSS, backed by a Java Spring Boot service and a MySQL database hosts the article library, quizzes, user dashboard, games catalog, and administrative tools. Individual games are built and deployed as separate sites; each receives a short-lived, scoped launch token from the platform when opened, and reports its outcome back through a callback endpoint, which keeps a game's codebase, hosting, and release cycle independent of the core platform. A standalone chatbot service, exposed through a FastAPI POST /chat endpoint, answers natural-language questions about the Constitution and is likewise deployed and versioned independently of the rest of the system.

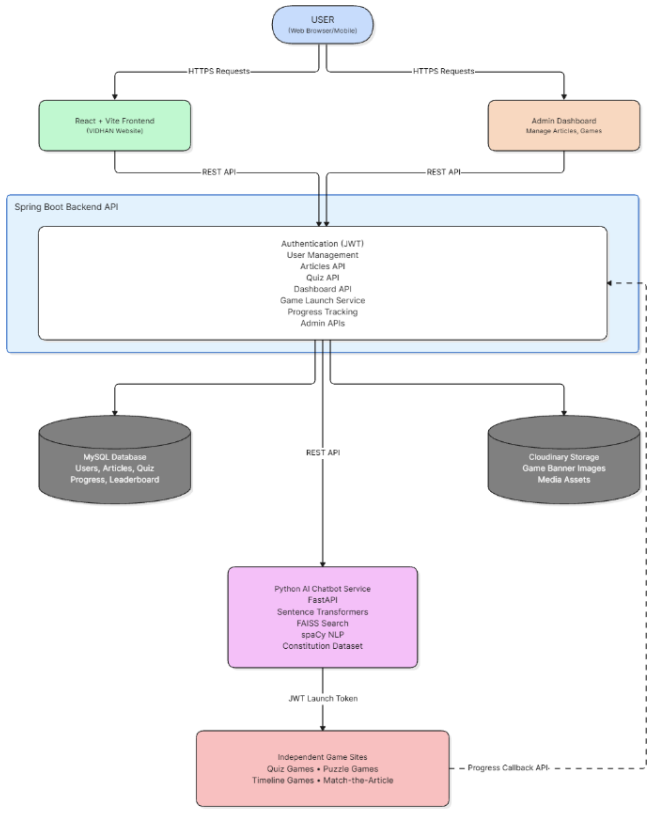

Figure 1: System Architecture

B. Article and Content Model

Each constitutional article is stored with its original legal text alongside a simplified explanation tuned for three audience bands — ages five to twenty, ages twenty to fifty, and an advanced tier intended for law students and researchers — together with a short relatable example, a brief note on why the provision matters in everyday life, and a small glossary of unfamiliar terms. This lets the same article serve a school student and an advanced reader without maintaining two separate content libraries, and lets the reading experience scale in depth as the learner's familiarity grows. As described in Section III-C, this same multi-field structure is also what allows the chatbot to give a different, intent-specific answer from a single stored record.

C. Conversational Pipeline: Corpus Construction and Embedding Index

The chatbot builds its knowledge base at service start-up by combining constitutional articles and approximately 992 curated question-answer pairs into a unified searchable corpus. Each constitutional article includes the title, original text, simplified explanation, law-student explanation, and importance note, while each QA entry combines its question and answer into a single document.

The corpus is preprocessed using spaCy [11] for tokenization, stop-word removal, and lemmatization, then converted into 768-dimensional embeddings using the all-mpnet-base-v2 Sentence-Transformers model [12]. The embeddings are L2-normalized and indexed using FAISS IndexFlatIP [9], enabling efficient semantic similarity search. This approach allows the chatbot to retrieve relevant information based on meaning rather than exact keywords, while precomputing embeddings at start-up ensures low response latency during user queries.

D. Hybrid Intent Detection and Retrieval Strategy

The chatbot first identifies the user's intent before retrieving information. Seven intent categories DEFINE, EXPLAIN, WHY, EXAMPLE, FUN, LAW, and KIDS are represented by example phrases embedded using the same Sentence-Transformers model as the knowledge corpus. The user's query is compared with these embeddings, and the most semantically similar intent is selected.

The system then checks for an explicit article number using text normalization and regular expressions. If an article number is detected, the corresponding record is retrieved directly from the dataset. Otherwise, the query is embedded and matched against the FAISS index using semantic similarity search. A confidence threshold of 0.55 filters out low-confidence matches, reducing incorrect responses.

Finally, the detected intent determines which field of the retrieved article is returned, such as the simplified explanation, law-oriented explanation, real-life example, importance note, or fun fact. For curated question-answer records, the stored answer is returned directly. This hybrid strategy combines intent-aware response generation with semantic retrieval, enabling accurate and context-specific answers.

E. Gamification and Progress Model

Learner motivation is sustained through experience points, levels, daily streaks, badges, and a leaderboard, all of

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which update automatically as a user reads articles, completes quizzes, or finishes a game. Each article page surfaces the mini-games linked to it, so a concept introduced in the text can immediately be reinforced through play; conversely, a game's completion event feeds back into the same dashboard that tracks reading and quiz activity, giving the learner one consistent picture of progress across all three channels rather than three disconnected scores.

F. Security Model

Because the system spans several independently deployed parts, identity and authorisation have to travel safely between them. User sessions are authenticated with JSON Web Tokens issued after Spring Security validates credentials hashed with BCrypt. When a user launches a game, the backend mints a separate, short-lived JWT scoped to that specific user, article, game, and session; the game site uses this token only to report progress through its callback, and the token cannot meaningfully be reused outside that narrow context.

Banner images for the games catalog are uploaded directly from the browser to Cloudinary using a signature signed by the backend, so binary uploads never have to pass through the application server itself.

IV. CHATBOT ALGORITHM AND COMPLEXITY ANALYSIS

Algorithm 1 consolidates the decision flow described in Section III-D into a single procedure: the system always attempts a deterministic, number-based lookup first, and only falls back to embedding-based semantic search when no article number is stated, after which the chosen record is rendered through the field selected by the detected intent.

Algorithm 1: Hybrid Article Retrieval with Intent-Aware Formatting

Formatting

```
Input:  user query q
Output: answer text and confidence score

 1.  q' ← normalize(q)
 // clean and lower-case
 2.  intent ← detect_intent(q')
 // compare to intent exemplars
 3.  num ← extract_article_number(q')
 // regex + word-to-number map
 4.  if num is found:
 5.      record ← direct_lookup(num)
 // exact match in article table
 6.  else:
 7.      e ← embed(q')
 // sentence-transformer encoding
 8.      (record, score) ← faiss_search(e)
 // top-1 cosine similarity
 9.      if score < 0.55:
10.          return "outside knowledge scope"
11.   answer ← format(record, intent)        //
select field by intent
12.  return { answer, confidence }
```

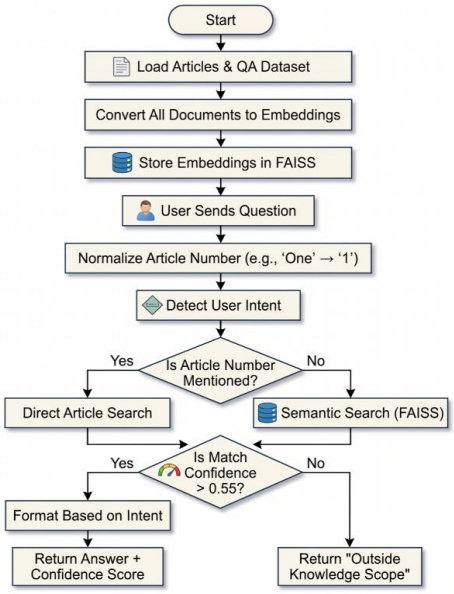

Figure 2: Chatbot Architecture

Table I reports the asymptotic cost of each stage of the pipeline, where N is the number of documents in the combined corpus, D is the embedding dimension (768), and I and P are the number of intent categories and example phrases per category, respectively.

Table I: Algorithmic Complexity of the Chatbot Pipeline

Pipeline Stage	Complexity	Notes
Dataset loading & embedding generation	O(N)	Performed once, at service start-up
Direct article lookup	O(N)	Linear scan; reducible to O(1) with a dictionary
Intent detection	O(I × P)	Small, fixed set — effectively constant
FAISS semantic search (IndexFlatIP)	O(N × D)	Exhaustive inner-product search
End-to-end query (no article number)	O(N × D)	Dominated by semantic-search fallback

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The only stage flagged as a near-term optimisation opportunity is the direct article lookup: because it currently scans the loaded article list rather than indexing it by number, it costs O(N) even though the lookup is logically exact-match. Replacing the list with a dictionary keyed by article number would reduce this to O(1) without changing the rest of the pipeline. The semantic-search path, by contrast, is already close to optimal for the dataset's current size; an approximate-nearest-neighbour FAISS index would only become necessary if the corpus grew by one or two orders of magnitude.

V. IMPLEMENTATION

The technology choices summarised in Table II were driven by the need to keep each module independently deployable while sharing a common, JWT-based authentication scheme across REST APIs.

Table II: Technology Stack Summary

Module	Technology Used
Vidhan Platform – Frontend	React + Vite, Tailwind CSS, JavaScript
Vidhan Platform – Backend	Java Spring Boot, Spring Security (JWT, BCrypt)
Database	MySQL (single managed instance)
Chatbot Service	Python, FastAPI, spaCy, sentence-transformers, FAISS
Game Sites	HTML5 / SVG / JavaScript, chosen per game
Image Storage	Cloudinary (signed, direct browser upload)
Hosting	Cloud-agnostic; Render Web Service with managed MySQL

Cross-module communication relies on three mechanisms. First, the session JWT issued at login authenticates every request a logged-in user makes to the Vidhan backend. Second, a short-lived launch JWT, scoped to a single user, article, game, and session combination, is generated at the games-launch endpoint and appended as a query parameter to the redirect URL when a game is opened. Third, the game site reports the outcome of play through a REST callback carrying the launch token in its Authorization header; the backend validates the token before recording the progress and updating the dashboard and leaderboard. The chatbot is reached directly from the frontend through its own POST endpoint, decoupling it entirely from the authentication and session logic of the main platform. All inter-service traffic uses HTTPS and JSON in production, with CORS configured on the backend to permit only registered origins.

VI. TESTING METHODOLOGY

The system was verified at five levels — unit, integration, acceptance, cross-deployment communication, and GUI testing — covering both the Vidhan platform and the chatbot service, with particular attention to boundary cases such as expired or tampered launch tokens and chatbot queries that fall below the confidence threshold. All recorded test cases across these stages passed, including negative-path scenarios such as rejecting a tampered progress callback with an unauthorised response and gracefully surfacing an "outside the knowledge scope" message for irrelevant questions. Beyond this functional verification, a two-week pilot study was conducted with fifty participants drawn from school students, college students, and general citizens, comparing engagement with VIDHAN against participants' prior experience with conventional, text-based constitutional material.

VII. RESULTS AND DISCUSSION

The average session time increased from 4 minutes with conventional reading to 18 minutes on VIDHAN. Similarly, the average number of articles read per session increased from 1.2 to 4.5, while voluntary repeat visits increased from 15% to 72%, indicating improved user engagement.

Table III presents the performance of quizzes, the chatbot, and mini-games. Average quiz scores across five topics ranged from 71% to 88%. The chatbot achieved 85% accuracy for article-specific queries, 70% accuracy for concept-based queries, and correctly identified 62.5% of out-of-scope queries.

Table III: Quiz, Chatbot, and Game Performance Summary

Category	Measure	Result
Quiz performance	Average score across five topics	71% – 88%
Chatbot accuracy	Article-specific queries (direct lookup)	85%
Chatbot accuracy	Concept-based queries (semantic search)	70%

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Category	Measure	Result
Chatbot accuracy	Out-of-scope queries (correctly declined)	62.5%
Game completion	Average across four mini-games	80% (72%–88%)

Taken together, these results suggest that the combination of simplified, audience-tuned content, game-based reinforcement, and an intent-aware, narrowly scoped conversational assistant measurably increases the time and attention learners give to constitutional material, without requiring them to first work through dense legal language unaided. The modular, independently deployable architecture also proved practical during development: new games could be registered through the admin panel and made available on the public catalog without redeploying the core platform, and the chatbot's natural-language pipeline could be iterated on — for instance, adding new intent categories or retraining the embedding model — without affecting the rest of the system. The lower chatbot accuracy on out-of-scope and broadly conceptual queries are a deliberate trade-off rather than a weakness to be eliminated outright: a system that declines to answer when it is not confident is preferable, in a civic-education setting, to one that answers fluently but incorrectly.

VIII. CONCLUSION

This paper presented VIDHAN, a distributed web-based platform that enhances constitutional learning through simplified content, gamification, and an AI-powered intent-aware chatbot. By integrating semantic search, interactive quizzes, mini-games, and progress tracking, the platform makes constitutional education more engaging and accessible. Pilot evaluation demonstrated a more than fourfold increase in average session time, higher user retention, and chatbot accuracy exceeding 80% for article-specific queries, highlighting the effectiveness of the proposed approach.

IX. FUTURE SCOPE

Future work includes adding multilingual support, expanding the chatbot's intent categories, improving retrieval efficiency, and introducing collaborative features such as discussion forums and shared leaderboards. A dedicated portal for teachers and educational institutions can further extend the platform's adoption in classrooms and formal learning environments.

REFERENCES

[1] S. Naveen, M. Salmaan, and E. Sivamuthu, "Constitution Connect — A Digital Platform for Promoting Constitutional Literacy using MERN Stack," *International Journal of Progressive Research in Engineering, Management and Science*, vol. 4, no. 12, 2024.

[2] P. Halachev, "Gamification as an E-learning Tool: A Literature Review," *E-Learning Innovations Journal*, 2024.

[3] "LawKey — Law & Constitution Chatbot," *in Proc. 2024 8th SLAAI International Conference on Artificial Intelligence (SLAAI-ICAI)*, 2024.

[4] S. A. Triantafyllou, C. Georgiadis, and T. Sapounidis, "Gamification in Education and Training: A Literature Review," *International Review of Education*, 2025.

[5] M. H. A. Kalana and S. N. Junaini, "Gamification and Technology Acceptance Model: A Systematic Review and Future Research Directions," *Journal of Education and Learning*, 2025.

[6] A.Souza and Z. Zarnow, "Court Chatbots: How to Build a Great Chatbot for Your Court's Website," *National Center for State Courts*, 2021.

[7] The Constitution of India (as amended), Government of India, Ministry of Law and Justice, Legislative Department.

[8] "Constitution of India," Centre for Law & Policy Research. [Online]. Available: https://www.constitutionofindia.net/read/

[9] J. Johnson, M. Douze, and H. Jégou, "Billion-scale similarity search with GPUs," *IEEE Transactions on Big Data*, 2019.

[10] National Education Policy 2020, Ministry of Education, Government of India, 2020.

[11] M. Honnibal and I. Montani, "spaCy: Industrial-strength Natural Language Processing in Python," 2017.

[12] N. Reimers and I. Gurevych, "Sentence-BERT: Sentence Embeddings using Siamese BERT-Networks," *in Proc. EMNLP-IJCNLP*, 2019.

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