AI-Powered Personalized Learning Path Generator

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Date: 21/06/25

Abstract

This project introduces an AI-powered solution designed to generate personalized learning paths for individual users based on their learning objectives, prior knowledge, and learning pace. The platform leverages intelligent assessment and content recommendation to provide structured, goal-oriented study plans. Designed as a web-based tool, the system aims to improve engagement, retention, and the effectiveness of digital learning through adaptive and curated educational experiences.

1. Problem Statement

In today's digital age, many people prefer to learn online. However, a common problem faced by learners is the lack of proper guidance and structure. With too much content available on the internet, students often feel lost and unsure about where to begin or what to study next. This project aims to solve that problem by developing an AI-powered system that creates a personalized learning path for each user based on their current knowledge and learning goals. The system is especially useful for subjects like coding, artificial intelligence, and data science, and can be expanded to other areas in the future. Our main objective is to build a user-friendly website that uses AI to assess the learner's level, suggest a step-by-step study plan, recommend high-quality learning materials, and provide regular progress updates. This approach will help learners stay focused, motivated, and on the right track throughout their learning journey.

2. Market and Customer need Assessment

2.0 Customer Needs Assessment

Learners often face confusion while studying online — they don't know where to begin, which content to trust, or how to track their progress. Based on surveys and interviews, the key needs identified are:

- A starting-level test
- A step-by-step, personalized learning plan
- Trusted and relevant content

- Feedback and progress tracking
- A simple and mobile-friendly interface

Most users wanted an adaptive system that changes the learning path based on their performance and goals.

2.1 Market Assessment

The global EdTech market is growing rapidly and is expected to cross $400 billion by 2030. Personalized learning powered by AI is one of the most in-demand features. Current platforms like Coursera or Udemy offer good content but lack true personalization. Our project fills this gap by offering an AI-based system that creates custom learning paths, adapts in real time, and guides users with feedback. This makes it highly relevant and competitive in today's education technology market.

3. Target Users and Key Features

Users:

- School and college students
- Job aspirants (e.g., NEET, UPSC, GATE)
- Teachers and mentors
- EdTech companies

Key Features:

- Users enter their goal, current level, and available study time
- AI generates a daily/weekly plan
- Includes links to the best free resources
- Works in English and Indian languages
- Mobile and web versions, with offline support

4. External Research

We studied popular tools like:

- Coursera, LinkedIn Learning
- Unacademy and BYJU's
- Research on intelligent tutoring systems (ITS)

We found that:

- Most platforms are not personalized
- They do not support Indian languages
- They need full-time internet and don’t offer local content planning

5. Benchmarking of Alternate Tools

Tool	**Limitations**
Coursera	No personal planning, only full courses
Unacademy	One-size-fits-all courses
LinkedIn	Only for professionals, limited to English
Khan Academy	No smart planning or progress tracking

What Makes Our Tool Unique:

- Fully personalized plans
- Works offline and on mobile
- Supports regional languages
- Designed for students and competitive exams

6. Applicable Patents

Most of the existing patents we found are for general recommendation systems and learning tools made mainly for English users. We did not find any Indian patent for a tool that creates personalized learning paths based on a person’s goals and current knowledge, while also working in Indian languages and without needing the internet. This means our project is unique and has a good chance of getting a patent in the future

7. Rules and Legal Requirements

Our tool follows:

- **IT Act** for data safety
- **NEP 2020** for adaptive and inclusive learning
- **Accessibility rules** (for visually impaired learners)
- **Privacy policies** (no personal data sharing)

8. Practical Challenges and Solutions

Challenge	Solution
No internet	Offline version with light AI models
No internet	Offline version with light AI models
Different languages	Auto language detection and translation
Privacy & data storage	Local storage and user-level control

9. Business Model

To make the tool accessible to everyone—from individual learners to large institutions—we offer three flexible plans:

1. Free Plan

Perfect for individual users who want to get started.

- Plan support for one learning goal
- Access in English + one Indian language
- Basic paragraph-style learning path

2. Premium Plan – ₹199/month

Ideal for serious learners who want full control and customization.

- Support for multiple goals and subjects
- Daily reminders and progress tracking
- Downloadable schedules in PDF or Word formats
- Access to more languages and personalized suggestions

3. Enterprise Plan

Designed for schools, coaching centers, and EdTech companies.

- Custom learning tools tailored for each organization
- Teacher dashboard for monitoring student performance
- Integration with online classrooms and existing LMS platforms
- Option for private hosting and API access

This flexible model ensures that learners of all backgrounds and institutions of all sizes can benefit from the tool, according to their needs and budget.

10. Concept Generation

We talked to:

- Students from classes 9–12 and B.Tech
- Teachers handling exam coaching
- Parents and mentors

They said:

- They feel lost about where to begin
- Students waste time jumping between videos
- Teachers struggle to give custom plans to every student

We also looked at Google Trends — “How to study for X exam” gets high search volume during exam seasons.

This helped us design the core idea — a tool that generates a smart, simple, and personal learning path.

11. Concept Development

The system is designed as a modular tool with the following key components:

1. User Input Module

Captures essential information to start the personalized planning process.

- Learning Goal: e.g., *"Learn Python"*, *"Prepare for NEET"*
- Available Study Time: e.g., *1 hour per day*
- Current Knowledge Level: Beginner, Intermediate, or Advanced

2. AI Engine

Processes the inputs and creates a personalized learning plan.

- Conducts a short quiz or self-assessment to understand the user’s level
- Builds a topic-wise structured plan

- Uses AI-based recommendation algorithms to suggest the best order of topics, inspired by learning patterns of similar users

3. Resource Finder

Selects high-quality learning materials from trusted platforms.

- Suggests relevant videos, articles, and notes for each topic
- Prioritizes free and credible sources like *NCERT, YouTube EDU, or government portals*
- Ensures resources match the learner's level and language preferences

4. Output Generator

Delivers the final learning path in an accessible and actionable format.

- Creates a day-wise or weekly study schedule
- Offers downloadable formats (PDF, Word) or calendar integration for reminders
- Includes optional text-to-speech output to support accessibility for visually impaired users

5. Teacher/Admin Panel :

- Track student progress
- Make manual edits or assignments

12. Prototype and Architecture

Prototype (Web + Mobile):

- Frontend: React for web, Flutter for app
- Backend: FastAPI (Python), Firebase for login
- AI: Scikit-learn, NLP for topic detection
- Storage: Firestore + SQLite

Flow:

- User enters goal and level
- AI generates topic map
- Study plan is created and shown
- User downloads, shares, or follows the plan

13. Final Product Details with Schematic Diagram

Inputs Accepted:

- Study goal
- Time per day/week
- Starting level or subject

Languages Supported:

- English, Hindi, Marathi, Tamil (more in progress)

Tech Stack:

- AI: T5, BERT for NLP
- Mobile/Web: Flutter and React
- Storage: Firebase, SQLite
- Offline AI: TFLite, ONNX for mobile deployment

Performance:

- Plan created in 1–2 seconds
- Mobile version under 50MB
- Supports 1,000+ users per day

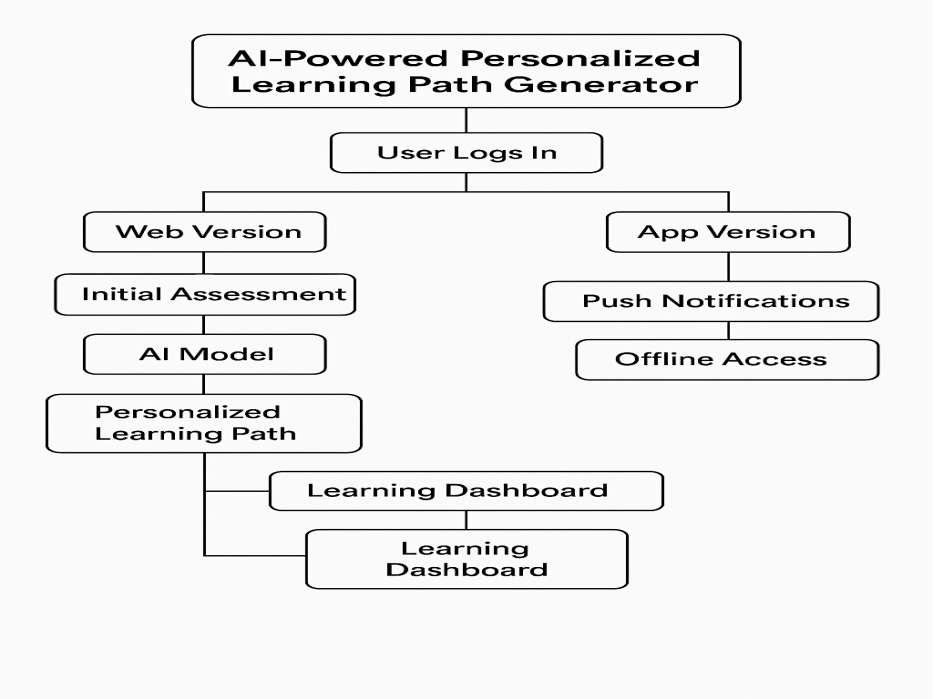

Figure 1: System Architecture of AI Powered Learning Path Generator

14. Conclusion

The AI-Powered Personalized Learning Path Generator helps users learn smarter, not harder. It creates a clear plan based on what they want to learn, how much time they have, and what they already know.

It is perfect for:

- Students preparing for exams
- Professionals learning new skills
- Teachers guiding multiple students

With regional language support, offline access, and smart planning, this tool can make education more effective and accessible for everyone in India.

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