Flash-a-card: An Interactive Flashcard Quiz Website for Student Review

Problem Statement:
Many students struggle to study effectively because passive review methods like rereading notes lead to weak retention and disorganized learning. Research shows that active recall and spaced repetition, the core techniques behind flashcards, significantly improve long-term memory and test performance (Pass, 2025). Flash-a-card addresses this gap by providing an interactive flashcard system with explanations and targeted retry loops, helping students focus on weak areas and retain information more efficiently. Additionally, most learners do not consistently apply these techniques and often lack tools that provide structured practice, clear feedback, and organized question tracking. Traditional review methods also make it difficult for students to identify weak areas, leading to wasted time and unfocused studying. This is why our idea in this project aims to help students further in their academics.

Project Objectives:
- Provide an interactive flashcard session for any selected subject/topic.
- Show explanations after every answer, regardless if the user is correct or not.
- Sort questions into correct and incorrect piles.
- Allow users to retry questions they got wrong.
- Offer session analytics: total cards, correct/incorrect counts, accuracy %, time spent, avg time per card.
- Help students improve knowledge efficiently through repeated practice.
- Enhance study efficiency and engagement.
- Encourage long-term learning and spaced repetition.

Planned Features:
1. Card presentation
   - Front: prompt/question.
   - Back: short answer + explanation (shown immediately after the user submits an answer — regardless of correctness).
   - Optional media: image/audio/formula support on front or back.
2. Immediate feedback & explanations
   - User answers (multiple choice or true-false).
   - Immediately show: correct answer, short explanation, and a short tip
   - Correct / Incorrect piles
   - Each card flows into either the Correct pile (mastered) or Incorrect pile (needs practice).
   - Cards in the Incorrect pile are available to retry during the session (user toggles retry now / later).
3. Retry workflow
   - Option after a session: "Retry incorrect cards" — runs a focused mini-session with only Incorrect pile cards.

● After each retry, the card can be moved to Correct if answered correctly twice
4. Categorization & navigation
    ● Browse by Subject or search across Topics.
5. Shuffle & ordering
    ● Shuffle the entire deck or session for variety.
6. Progress summary & analytics
    ● Session summary at end: total cards, correct, incorrect, accuracy %, time spent, avg time/card.
7. Usability & UI elements
    ● Minimalist card view with large progress bar, counters for Correct/Incorrect, and prominent Next/Flip buttons.
8. Session persistence & resume
    ● Sessions auto-save; user can pause and resume later.
    ● When resuming, show a short recap of what was completed and remaining incorrect cards.
9. Accessibility & mobile-first
    ● High-contrast theme, screen-reader labels, and large touch targets.
    ● Responsive layout for phones and tablets
10. Study Timer
    ● Built-in study timer modeled after the Pomodoro technique.
    ● Timer can run alongside flashcard sessions.

Removed Features from initial plan

1. Keyboard Shortcuts (space to flip, 1/2/3 to answer, R to retry)
    ● Reason: Too many technical steps needed to detect key presses. There's too much going on, and it isn't necessary for our project.
2. Per-topic streaks, long-term accuracy graphs, "Next Review" suggestions
    ● Reason: Requires saving data across sessions and generating graphs. This is advanced, and we decided to only include the stats after each session.
3. Filter by difficulty, tags, or date added
    ● Reason: Needs a bigger database and more complex sorting. We want a more simple program, and not essential.
4. Confidence Rating (easy / medium / hard)
    ● Reason: Adds extra logic, variables, and decision-making rules. There's too much happening for something that isn't necessary.

Planned Inputs and Outputs:

A. Inputs
    ● Select subject
    ● Select topic
    ● Choose question type (multiple choice/ true-false)

- Answer a question
- Mark question as complete
- Start, pause, or reset Pomodoro timer
- Request next question
- Retry wrong questions
- Shuffle questions
- Save or resume session

B. Outputs
- Display list of available subjects
- Display list of topics for the selected subject
- Load quiz questions for selected topic
- Show flashcard question/prompt with choices
- Show correct/incorrect feedback + explanation
- Update correct/wrong pile
- Display all questions answered incorrectly
- Show questions in random order
- Display Pomodoro timer
- Display session summary (accuracy %, time spent, avg time per card)

Logic Plan (Pseudocode)
Start Program

Display list of subjects
User selects a subject
Display list of topics within that subject
User selects a topic
Load quiz questions for the selected topic
Initialize CorrectPile = 0
Initialize WrongPile = 0

Initialize PomodoroTimer = OFF
Initialize GroupSession = OFF

Ask user: Start Pomodoro timer? (Yes/No)
If Yes:
    Start Focus Timer

Repeat for each question:
  Display question
  Wait for user answer

  If answer is correct:
    Show explanation

Add question to CorrectPile
        Else:
            Show explanation
            Add question to WrongPile

    If Pomodoro Focus time ends:
        Prompt user to take Short or Long Break

End Repeat

 Display Session Summary:
    Total cards answered
    Number of correct cards
    Number of incorrect cards
    Accuracy percentage
    Time spent

Ask user: Retry incorrect cards?

If user selects Yes:
    Set RetryDeck = IncorrectPile
    Reset IncorrectPile
    For each card in RetryDeck:
        Display card question
        Wait for answer

        If answer is correct twice:
            Move card to CorrectPile
        Else:
            Add card back to IncorrectPile

End if

Save session progress

End Program

References

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