



International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435 (Online) Volume 15, Issue 03, March 2026)

Inclusive Resource Hub: A Web-Based Platform for Accessible and Collaborative Learning

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Abstract—In today's educational landscape, special educators and learners with disabilities face significant challenges in accessing, organizing, and sharing adapted teaching materials. Resources suitable for diverse learning needs are often scattered across multiple platforms, difficult to locate, or unavailable in inclusive formats. This lack of centralized, disability-friendly content creates barriers to effective teaching and limits the learning opportunities of students with special needs. The Inclusive Resource Hub addresses these issues by providing a unified, accessible, and user-centred web platform designed specifically for inclusive education.

The system allows teachers to browse, search, and download a wide range of inclusive teaching materials such as visual aids, worksheets, flashcards, assistive learning videos, stories, and interactive content tailored for various disabilities. Resources are organized through categories, tags, and filters to simplify navigation.

The platform is developed using HTML, CSS, and Bootstrap for the responsive frontend, while Node.js and Express.js power the backend. MongoDB Atlas serves as the cloud-based database for flexible and scalable resource storage. Secure user authentication and role-based access control allow administrators and teachers to manage resources responsibly. Additionally, a built-in community forum enables educators to share best practices, exchange insights, and collaboratively enhance teaching strategies.

By centralizing inclusive educational materials and promoting teacher collaboration, the Inclusive Resource Hub significantly reduces the workload of special educators, improves teaching efficiency, and enhances accessibility in learning environments. This system contributes to equitable education by ensuring that high-quality, disability-friendly resources are readily available to support diverse learners.

Keywords— Inclusive Education, Special Educators, Teaching Resources, Disability-Friendly Materials, Web-Based Platform, Node.js, Express.js, MongoDB Atlas, Community Forum.

I. INTRODUCTION

The Inclusive Resource Hub centralizes disability-friendly teaching materials into a secure, easy-to-navigate web platform designed specifically for special educators.

The system provides an intuitive interface where users can browse, search, and organize pre-uploaded adapted learning resources based on disability type, subject, learning level, and content format. This centralized structure enables educators to quickly locate appropriate materials for learners with diverse needs.

The platform is built using HTML5, CSS3, and Bootstrap for a responsive and accessible frontend, while Node.js and Express.js handle backend operations. All learning materials and metadata are stored in a scalable MongoDB Atlas database, where descriptive tags and categories enhance search accuracy and resource discovery.

Secure login is implemented using traditional role-based access control (RBAC). Administrators manage user accounts, uploaded materials, and moderate community interactions. Special educators and general users can access and download pre-approved learning resources, while upload privileges are restricted to administrators to ensure quality and consistency of content.

Key platform features include advanced resource filtering, a collaborative community forum, resource approval workflow, downloadable teaching packs, and category-based browsing for disability-specific materials. By integrating modern web technologies, and structured resource management, the Inclusive Resource Hub streamlines access to inclusive teaching materials, reduces educator workload, and supports equitable learning opportunities for students with disabilities in diverse educational environments.

II. RELATED WORKS

Specialized Accessible Digital Libraries: Specialized accessible digital libraries are platforms created to centralize educational resources while ensuring they are usable by learners with disabilities. These libraries provide learning materials in formats that work with assistive technologies, helping remove barriers and support equal learning opportunities. For example, the DAISY Consortium [1] offers accessible e-books with features like synchronized text and audio, easy navigation, and screen-reader compatibility.



Similarly, Bookshare [2] provides books in accessible formats such as audio, braille, and large print for individuals with print disabilities including dyslexia, blindness, or physical limitations.

Accessibility-Centric LMS Extensions: Accessibility-centric LMS extensions are tools integrated into Learning Management Systems (LMS) to enhance the usability of course materials for students with disabilities. These plugins make sure digital content meets accessibility standards and works well with assistive technologies. For instance, Blackboard Ally supports instructors by analysing course materials and offering suggestions to improve accessibility. It also provides students with alternative content formats such as audio, Braille, and HTML, allowing them to access learning materials according to their individual needs.

Collaborative or Curated Teaching Resource Platforms: Some educational platforms offer pre-approved and curated resources, allowing educators to easily access high-quality, verified content without having to create materials themselves. These platforms often rely on community feedback and moderation to maintain the accuracy and relevance of the resources, making it simpler for teachers to find dependable teaching materials. For example, Teachers Pay Teachers [4] provides a free resources section where educators can share and download reviewed materials, helping teachers adopt creative ideas without starting from scratch. Similarly, the Edmodo Library [5] enabled teachers and students to upload, organize, and share educational content such as documents, links, videos, and files.

III. PROPOSED SYSTEM

The Inclusive Resource Hub is a web-based platform created to give students of all skill levels better access to instructional materials. In order to better assist special educators and students with disabilities, it emphasizes accessibility, flexibility, and teamwork.

A. Software and Hardware Requirements

The frontend uses React.js along with HTML5, CSS3, Bootstrap, and Material-UI for a responsive interface, while Node.js and Express.js handle backend operations and APIs. MongoDB Atlas provides cloud-based data storage, and Git supports version control. The system runs on standard devices such as PCs, laptops, or tablets with at least 2 GB RAM and requires a stable internet connection.

B. Modules

Role-based access, login, and registration are managed by the User Management Module. Learning materials can be uploaded, arranged, searched, and downloaded using the Resource Management Module. The Accessibility Module makes it simple to navigate through categories, tags, and filters. While the Admin Module oversees users, content, and system upkeep, the Community Module enables educators to exchange knowledge.

C. Technologies Used

The frontend uses HTML5, CSS3, Bootstrap, and Material-UI. Node.js and Express.js are used by the backend for secure API handling and server-side processing. Git is used for collaborative development and version control, while MongoDB is used for scalable data storage.

IV. IMPLEMENTATION

The Inclusive Resource Hub is a web-based platform designed to centralize, personalize, and enhance access to teaching resources for learners with diverse abilities. Unlike traditional repositories, which provide static content, the proposed system emphasizes adaptability, accessibility, and collaboration to meet the specific needs of special educators and students with disabilities.

A. Workflow

The implementation of the Inclusive Resource Hub follows an Agile methodology with iterative development cycles to ensure continuous improvement and responsiveness to user needs. The workflow consists of the following phases:

- 1) *Requirements Gathering:* Surveys and interviews were conducted with neurodivergent learners and educators to identify essential features and accessibility requirements.
- 2) *Design Phase:* Wireframes and prototypes were created with a focus on accessibility, usability, and user experience.
- 3) *Development Phase:* Modules were incrementally developed with continuous testing to ensure functionality, performance, and compliance with accessibility standards.
- 4) *Testing Phase:* Accessibility audits, usability testing with target users, and bug fixing were performed to ensure a reliable and inclusive platform.

5) *Deployment Phase*: A beta version was launched to gather community feedback, enabling iterative improvements and refinements before full-scale deployment.

B. Database Design

MongoDB, a NoSQL database, is used by the Inclusive Resource Hub to effectively manage user data, educational materials, community engagement, and content classification. The database's collections, which divide people, resources, comments, and categories, offer flexible storage and retrieval options along with a clear data organization. The platform can manage an increasing number of users and a variety of instructional content while retaining dependability and responsiveness thanks to its design's seamless scaling, effective querying, and high-performance operation.

V. RESULTS AND DISCUSSIONS

The Inclusive Learning Resource Hub received thorough testing and review following system creation. Functional accuracy, performance, usability, accessibility, and security of the system were evaluated. This section offers the evaluation results, illustrating how the platform achieves project objectives and enables inclusive, accessible learning settings.

A. Testing Methodology

A multi-phase testing process covering functionality, usability, accessibility, and performance was used to assess the Inclusive Learning Resource Hub. Unit testing confirmed backend modules for CRUD operations and frontend components for responsiveness and cross-browser compatibility. The UI, backend, and MongoDB database all communicated smoothly thanks to integration testing. System testing verified WCAG accessibility compliance while validating the platform's general functionality, including file uploads, login/logout, AI-assisted content creation, search, and resource sharing. Special educators carried out crucial tasks and offered input on resource organization and usability during User Acceptance Testing (UAT). Role-based authentication's efficacy and system stability under concurrent use were validated by performance and security testing.

B. Performance Results

Testing confirmed that the Inclusive Learning Resource Hub meets functional and design requirements. Every module worked as planned.

Teachers noted clear interaction, easy navigation, and well-organized resources when reporting high usability. WCAG-compliant interfaces, customizable fonts, and keyboard-friendly navigation are examples of accessibility features that improved inclusivity. Secure permissions were guaranteed by role-based access control, and the system-maintained stability under moderate loads without experiencing any security problems. Users experienced dependable and smooth performance thanks to the speedy completion of resource searches and retrieval.

C. System Advantages

Compared to conventional educational resource systems, the platform has a number of benefits. It makes inclusive resources easier to create, distribute, and access by centralizing learning materials. While collaborative features promote peer sharing and educator contributions, its design accommodates a range of learning needs. Scalability is made possible by the cloud-based architecture and secure permissions are guaranteed by role-based access control. All things considered, the platform exhibits both support for inclusive education and operational efficiency.

D. Limitations

The platform has a number of drawbacks despite its advantages. Since real-time analytics are still unavailable and AI-generated content needs to be verified for accuracy and relevance, teachers must manually track students' progress. There is incomplete implementation of advanced accessibility features like real-time captioning, sign language support, and speech-to-text. Use in rural or underdeveloped areas may be restricted by reliance on dependable internet access. Because early resource diversity depends on community contributions, content variety may initially be limited. Lastly, ongoing attention is needed to ethical and privacy issues related to AI and student data management.

E. Future Scope

There is much room for growth in the Inclusive Learning Resource Hub to improve inclusive education. Mobile apps would increase accessibility in places with poor connectivity, even though AI-based analytics might monitor student progress and provide personalized learning paths. Combining AR and VR could result in interactive experiences that enhance comprehension of difficult ideas. Expanding the resource library in partnership with governmental, non-governmental, and special education institutions would increase content diversity.



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Eventually, the platform might develop into an all-encompassing ecosystem that links teachers, therapists, parents, and students for immersive, flexible, and inclusive learning.

VI. CONCLUSION

The system addresses long-standing issues with accessibility, consistency, and resource availability by centralizing flexible learning resources and providing special educators with tools for organization and customization. Its user-friendly interface and well-organized taxonomy allow teachers to focus on pedagogical rather than administrative or technological tasks. The platform enhances the quality of instruction in a range of educational environments by fostering professional development and teamwork through information exchange, in addition to offering personalized classroom help. Future enhancements like analytics, customized recommendations, and AI-assisted features might boost its impact even more.

All things considered, the platform demonstrates the value of web technology in creating excellent, equitable, and inclusive learning environments.

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