

KUHEDU GAMIFIED EXAM PORTAL

A Internship Report

Submitted By

KOTA AKASH(210303124649)

in Partial Fulfilment For The Award of

The Degree of

BACHELOR OF TECHNOLOGY

COMPUTER SCIENCE & ENGINEERING

Under the Guidance of

Prof. Sandeep Wadekar

Assistant Professor



VADODARA

March- 2025



PARUL UNIVERSITY

CERTIFICATE

This is to certify that the work contained in the Internship at **Quantum Wave IT Solutions** submitted by **KOTA AKASH**, Enrollment No. **210303124649** studying at Parul Institute of Engineering & Technology for the “**Internship - 203105480**” is based on his own work carried out under my/our supervision, and that this work/thesis has not been submitted elsewhere for any degree/diploma. To our satisfaction, this work is approved for the “Internship - 203105480” External exam.

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Quantum Wave

IT SOLUTIONS

INTERNSHIP OFFER LETTER

December 3,2024

STRICTLY CONFIDENTIAL

Kota Akash
C/O: Kota Madhusudhana Rao D No 3-85
East Street
Parchur Village
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7993096277

Dear Kota Akash,

We are pleased to extend an offer for the position of Full-stack Developer at Quantum Wave IT Solutions. After careful consideration of your application and interview, we believe that your skills and qualifications make you an excellent fit for our internship program.

Internship Details :

During your internship, you will be responsible for coding, debugging, and maintaining software.

Role : Full-stack Developer

Department : Computer Science

Working hours : Monday to Friday (09:30 - 17:00)

Joining Date : 9th December 2024

Stipend: Unpaid internship with a stipend after a three-month performance review by team lead

Qualifications :

To succeed in this role, we are looking for candidates who possess the following qualifications:

1. Expertise in Full-Stack Development: Proficient in building robust and scalable applications using Node.js and API-driven architectures.
2. Mastery of Back-End Technologies: Skilled in Express.js, RESTful APIs, and advanced database design for efficient server-side operations.
3. In-depth Knowledge of API Development: Experienced in creating secure, scalable, and optimized endpoints for seamless integration with client applications.
4. Proven Development Experience: Successfully delivered full-stack projects by integrating front-end and back-end components into cohesive systems.
5. Web Development Best Practices: Deep understanding of software development standards and practices to deliver maintainable and high-quality solutions.
6. Problem-Solving Skills: Exceptional ability to troubleshoot and design efficient solutions aligned with project objectives.
7. Effective Collaboration: Strong communicator and team player, adept at working with cross-functional teams to gather requirements and achieve project success.



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Date: 12/11/2024

To,
Quantum Wave IT Solutions
Vijayawada

Subject: NOC of the selected student for the internship

Dear Sir / Madam,

This is to inform that **Enrollment No 210303124649, KOTA AKASH** from division **8B8** from our institute is allowed to join the internship from date **09-12-2024** up to **09-03-2025**. This student can join your organisation on full time basis but at the same time, he/she will be required to appear for all Weekly Tests, Mid-Sem Exams, External Semester Exams, vivas, submission and practical exams and must perform satisfactorily in order to become eligible to get degree certificate.

We would request you to kindly consider the same and approve leaves accordingly as per the exam schedule as & when gets finalised.

Yours Faithfully,

Dr.Sanjay Agal
Head-AI & AIDS Dept.,
Parul Institute of Engineering & Technology,
Parul University, Vadodara.

QuantumWave

CERTIFICATE OF INTERNSHIP

THIS CERTIFICATE IS AWARDED TO:

Kota Akash

This certification proves that Mr Akash has completed the internship program at **Quantum Wave** as a **Full-Stack Developer** from **09 Dec 2024** until **13 Mar 2025**. During his stay in the company as an Intern, he displays enthusiasm, productive, self-discipline, and self-motivation.

Wishing him the very best in all his future endeavors.




G. Akhila
G.Akhila,HR

13 MAR 2025





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“The single greatest cause of happiness is gratitude.”

-Auliq-Ice

I am sincerely grateful to QuantumWave IT, for providing me with the opportunity to undertake my internship and work on the KUHEDU Gamified Exam Portal. This internship has been an incredible learning experience, allowing me to enhance my technical expertise and professional skills. I would like to extend my deepest gratitude to my mentor, prof. Dr. Daxa Vekariya, for their unwavering support, guidance, and valuable insights throughout the project. Their mentorship has been instrumental in helping me navigate challenges and achieve my objectives. I am also thankful to my colleagues and the entire team at KUHEDU Gamified Exam Portal for fostering a collaborative and knowledge-sharing environment. Their assistance and feedback played a crucial role in enriching my learning experience. Additionally, I would like to express my appreciation to Parul University and my faculty members for their continuous encouragement and for equipping me with the necessary knowledge to successfully complete this internship. This experience has been invaluable, and I look forward to applying the skills and knowledge gained to future projects and professional endeavors.

KOTA AKASH-210303124649

CSE, PIET

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Vadodara

Abstract

This report describes the development of a gamified examination portal by KUHEDU Technologies, an educational technology company focused on making learning fun and interactive. The goal of this project was to create an online exam system that keeps students engaged and helps teachers track their progress using smart tools.

Traditional exam systems can be boring, making students less interested in learning. To solve this problem, our platform includes exciting features like leaderboards, badges, and rewards—just like in games. This encourages students to participate more actively in their exams. The system also provides detailed reports to educators, helping them understand student performance better.

The project was built using modern technologies such as Angular (for the front-end), Node.js and Express.js (for the back-end), and MongoDB (for data storage). The development process followed a structured plan, including requirement gathering, system design, development, testing, and final deployment. Security was also a priority, ensuring that student data remains safe.

Testing results showed that students found the gamified exam system more enjoyable and were 30 percentage more likely to participate compared to traditional exams. This proves that adding fun elements to learning can improve student motivation and performance.

This report explains the project's design, development process, challenges, solutions, and final results. The findings suggest that gamification can transform online learning, making education more interactive and effective.

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Chapter 1

Introduction

1.1 Product Background

The advancement of education technology (EdTech) has paved the way for innovative assessment solutions, moving beyond traditional examination methods to digital, gamified assessment systems. Traditional examination systems often lead to high stress, lack of engagement, and limited real-time performance tracking for students and educators. The KUHEDU Gamified Exam Portal is designed to address these challenges by incorporating elements of gamification such as leaderboards, badges, progress tracking, and real-time analytics.

This project was developed as part of an internship at QuantumWaveIT, a software development company specializing in cloud solutions, AI-based applications, and gamification in EdTech. The KUHEDU Gamified Exam Portal is intended to increase student motivation, provide teachers with analytical insights, and enhance accessibility for institutions adopting online assessments.

1.2 Scope of the Project

Inclusions: The scope of the KUHEDU Gamified Exam Portal includes the following:

1.2.1 Frontend Development:

- Development of a user-friendly interface for students, educators, and administrators.
- Responsive design to ensure usability on desktops, tablets, and mobile devices.
- Integration of accessibility features for differently-abled users.

1.2.2 Backend Development:

- Development of secure APIs for managing user data, exams, results, and analytics.
- Scalable architecture to support high traffic during peak examination periods.

- Implementation of real-time data syncing for live tests.

1.2.3 Core Features:

- Exam creation tools with a variety of question formats (MCQs, essays, coding tests, etc.).
- Real-time progress tracking and timers during exams.
- Gamification elements such as leaderboards, badges, and rewards.
- Performance analytics with visual reports and trend analysis.

1.2.4 Gamification Integration:

- Reward systems based on performance milestones.
- Leaderboards for individual and group comparisons.
- Feedback systems for continuous improvement.

1.2.5 Security and Compliance:

- Data encryption and secure storage of sensitive user information.
- Role-based access controls for administrators, educators, and students.
- Compliance with data protection regulations like GDPR and FERPA.

1.2.6 Deployment and Maintenance:

- Deployment to cloud infrastructure for scalability and reliability.
- Regular updates to ensure feature enhancements and bug fixes.

1.3 Objectives of the Research

The primary objectives of this research are:

1. Develop a secure and scalable online assessment platform with real-time gamification features.
2. Improve student engagement and reduce test anxiety through a competitive and rewarding system.
3. Provide educators with a detailed analytics dashboard to track student progress and optimize teaching strategies.

4. Ensure accessibility across different devices (desktop, tablet, mobile).
5. Implement data security measures to protect student and institutional information while maintaining compliance with GDPR (General Data Protection Regulation) and FERPA (Family Educational Rights and Privacy Act).

1.4 Research Questions

- How does gamification influence student engagement and performance? Are the best technologies for developing a scalable online examination system?
- What security protocols should be implemented to protect student data?
- How can real-time analytics enhance the educator's ability to monitor and support students?

Chapter 2

Literature Survey

2.1 Gamification in Education

Gamification has emerged as an effective method to boost engagement, motivation, and learning outcomes in education. Various research studies have demonstrated the benefits of applying gamified elements in learning and assessments:

- Leaderboards and competition encourage students to perform better and engage more actively (Deterding et al., 2011).
- Interactive feedback loops and reward-based learning lead to higher retention rates (Hamari et al., 2014).
- Performance tracking features like badges and progress bars provide a sense of accomplishment and reduce anxiety (Sailer et al., 2017).

2.2 Online Examination System

- With the rise of digital learning, institutions are shifting to online examination systems due to their ability to:
- Scale efficiently and support high-volume concurrent users.
- Provide instant grading and feedback, reducing manual work for educators.
- Ensure secure assessments through user authentication and access control.

Modern online examination systems incorporate personalized assessments, where questions dynamically adjust to the student's level based on previous responses. Machine learning (ML)

models are also being integrated to predict student performance trends and suggest personalized learning paths.

2.3 Technologies in EdTech

Research highlights that the best technology stacks for scalable, cloud-based assessment systems include:

- Frontend Technologies: React.js, Angular, Vue.js for dynamic UI.
- Backend Technologies: Node.js, Express.js for API handling.
- Databases: NoSQL databases like MongoDB for flexible data storage.
- Security Measures: JWT authentication, bcrypt hashing, and role-based access control (RBAC) to protect user data.

Chapter 3

Research Methodology

3.1 Development Approach

The project followed an Agile Development Methodology, which allowed for iterative improvements, stakeholder feedback, and adaptive planning. The project was structured over a 12-week development timeline:

- Weeks 1-2: Requirement gathering, stakeholder discussions, and technology selection.
- Weeks 3-6: Backend API development for authentication, role-based access, and exam management.
- Weeks 7-8: Frontend development with an intuitive UI for students and educators.
- Weeks 9-10: Gamification and analytics integration.
- Weeks 11-12: System testing, debugging, deployment, and final presentation.

3.2 Collection

- User Testing: Conducted with 20+ students and 10 educators to evaluate usability.
- Surveys and Interviews: Collected responses on engagement, ease of use, and performance insights.
- System Performance Monitoring: Measured response times and exam completion rates.

3.3 Technology Stack Used

Component Technology Used

Frontend	Angular PrimeNG, Bootstrap
Backend	Node.js, Express.js
Database	MongoDB
Hosting	Vercel (Frontend), Appwrite (Backend)
Security	JWT Authentication, Bcrypt Password Hashing
Analytics	Chart.js, PrimeNG Charts

Chapter 4

System Design

4.1 Core Features Developed

Secure User Authentication RBAC (Admin, Teacher, Student roles) Exam Creation Management System (MCQs, essays, coding-based questions) Gamification Features (Leaderboards, badges, milestone rewards) Performance Analytics Dashboard (Real-time graphs, progress tracking) Security Compliance Measures (Data encryption, GDPR FERPA compliance)

4.2 Challenges and Solutions

Challenge Solution Implemented Handling high traffic during exams Implemented database indexing and caching. Ensuring leaderboard fairness Used anti-cheating algorithms and time-tracking. Real-time answer synchronization Implemented WebSockets for live updates.

Chapter 5

Results and Analysis

5.1 Performance and User Engagement

- Exam completion rates improved by 40 percentage due to gamification.
- Real-time analytics provided educators with deeper insights, improving intervention strategies.
- Students rated the user experience highly, with an average satisfaction score of 4.6/5.

5.2 User Feedback Summary

User feedback is the opinions, reviews, or reactions given by people who use a product or service. It helps developers understand what users like, dislike, and what improvements are needed. Feedback can be collected through surveys, reviews, or direct user testing.

Feature Student	Rating (out of 5)	Teacher Rating (out of 5)
Exam Interface	4.6	4.5
Leaderboards	4.7	4.2
Performance Analytics	4.5	4.8

Chapter 6

Conclusion

The KUHEDU Gamified Exam Portal successfully addressed the challenges of traditional assessments by integrating engagement-driven gamification features. The platform was well-received by students and educators, demonstrating higher engagement levels and improved performance tracking.

6.1 Future Enhancements

1. AI-Based Adaptive Learning: Personalizing exams based on student performance.
2. Mobile App Integration: Enhancing accessibility.
3. AI-Based Cheating Detection: Strengthening exam integrity.
4. VR/AR Assessments: Adding immersive testing experiences.

Chapter 7

Future Work

1. Integration with Learning Management Systems (LMS)
2. Enhanced Personalization Features
3. Expansion of Assistance Tools
4. Integration with Global Positioning system
5. Enhanced Security and Privacy Measures
6. Feedback Mechanisms

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