

**A web-based matchmaking application that can accurately identify the requirement of a academic program and a suitable lecturer**

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# Introduction

## Background

The academic sector in Sri Lanka includes both public and private universities, which together cater to a diverse student population. Public universities, predominantly funded by the government, are known for their rigorous admission processes and are highly competitive, admitting only the top-scoring students from national examinations (Perera, 2019). These universities hold high prestige, particularly in fields such as engineering, medicine, and law, and tend to focus on research and theory-based learning. However, their limited capacity means many qualified students cannot gain admission, leading them to private universities, which are gaining popularity for their accessibility and focus on fields like business and information technology (Nanayakkara, 2020). Private institutions, some of which are affiliated with international universities, offer alternative pathways for higher education but vary significantly in quality. Although some maintain robust academic standards, others struggle to deliver high-quality education consistently due to factors like resource limitations and regulatory challenges (Fernando, 2021).

The quality of academic delivery in both public and private universities faces several challenges. Public institutions often contend with issues like outdated infrastructure, staff shortages, and limited funding, which can impact the overall learning experience for students (De Silva, 2022). In response to facility shortages, private universities frequently rely on part-time or visiting lecturers, many of whom are industry professionals rather than experienced educators. This reliance can result in inconsistent academic delivery, with students sometimes experiencing a curriculum lacking in rigor or practical relevance (Wickramasinghe & Jayasinghe, 2023). Additionally, the prevalence of large class sizes, outdated curriculum, and inadequate access to practical training have led to concerns about students’ preparedness for the workforce, with graduates often requiring additional training to meet industry standards (Jayawardena, 2023). Although the higher education sector in Sri Lanka is growing, addressing these quality concerns, and producing industry-ready graduates remains a critical challenge.

## Problem Statement

In Sri Lanka, both the academic sector and the broader industrial sector have talented lecturing professionals. These individuals possess not only strong academic knowledge but also valuable real-world experience. However, there is a notable gap between the availability of these skilled professionals and the ability of academic institutions to recruit them, particularly in private universities. Many private academic institutions face challenges in sourcing quality lecturers who can bring both academic and industry relevance to the classroom. Due to this shortage, these institutions often struggle to deliver content that meets high educational standards, affecting the quality of student learning and their preparedness for future careers.

This shortage of qualified lecturers also places a heavy burden on full-time academic staff, who often end up overworked and exhausted. Many lecturers are stretched out, juggling extensive teaching hours, administrative tasks, and research responsibilities, which can lead to burnout and reduced teaching effectiveness. To address these issues, a dedicated tool or platform that connects academic institutions with top-quality lecturing professionals from both academic and industry backgrounds could make a significant impact. Such a tool would allow institutions to access a pool of qualified, skilled lecturers on demand, improving the overall quality of education while relieving the workload of full-time academic staff.

## Research Question

How can a dedicated platform effectively connect academic institutions with high-quality lecturing professionals from academia and industry to enhance educational standards and relieve lecturer workload in private universities?

## Research Aim

The aim of this research is to develop and evaluate a platform that connects private academic institutions with qualified lecturing professionals from both academia and industry, with the goal of enhancing educational quality and reducing the workload on full-time lecturers in resource-constrained environments.

## Motivation

Motivation for this research stems from the growing demand for high-quality education in private academic institutions, which often struggle to maintain rigorous academic standards due to limited access to qualified lecturing resources. Many private universities face challenges in recruiting educators who possess both academic credentials and practical industry experience, resulting in a teaching environment that may not fully meet students' needs or prepare them effectively for the job market. Additionally, the reliance on a limited pool of full-time lecturers often leads to staff burnout, which can further compromise educational quality.

By creating a platform that connects institutions with skilled lecturers from both academia and industry, the research seeks to address these challenges by providing institutions with access to a broader network of qualified professionals. This platform has the potential to improve the delivery of course content, reduce the strain on full-time staff, and ultimately raise the standard of education. The research is motivated by the potential impact of such a tool in bridging the gap between academia and industry expertise, creating a more dynamic, sustainable, and effective educational ecosystem.

## Research Objectives

* To identify the key qualities and competencies that academic institutions seek in lecturing professionals, including both academic and industry expertise.
* To analyze the current challenges faced by private academic institutions in sourcing and retaining qualified lecturers and the impact of these challenges on educational quality and staff workload.
* To design a platform that facilitates the connection between academic institutions and qualified lecturing professionals, incorporating features that address the specific needs of both parties.
* To evaluate the effectiveness of the developed platform in improving educational standards, reducing staff workload, and enhancing student satisfaction in private academic institutions.

## Resource Requirements

|  |  |
| --- | --- |
| Hardware Requirements | Software Requirements |
| Laptop for software development   * + Specification - Intel core i7, 8th generation, 16GB RAM, Nvidia GPU | Backend using Java Springboot microservices architecture. Front end using React and Typescript, MySQL for Database. |

Table 1: Hardware and Software Requirements

## Data Management

Data management in this research will focus on the systematic collection, storage, and analysis of information related to lecturer qualifications, institutional needs, and user feedback on the developed platform. Data on lecturers’ academic credentials, industry experience, and availability will be securely stored, allowing institutions to filter and access relevant profiles easily. Likewise, data from institutions on their specific needs and challenges in lecturer recruitment will guide platform design and functionality.

To ensure reliability, production data will be anonymized and stored on secure servers, with access restricted to authorized personnel only. Regular audits and data validation checks will be conducted to maintain accuracy, enhance security, and support informed decision-making throughout the project.

## Legal, Ethical, Social and Professional impacts

This research will consider legal, ethical, social, and professional impacts when designing and implementing the platform. Legally, the platform must comply with data protection laws, ensuring that all personal and professional information about lecturers and institutions is securely handled and stored. Consent will be obtained from all parties involved, and privacy policies will be clear and transparent.

Ethically, the research will aim to ensure fairness and transparency in matching lecturers with institutions, avoiding any form of discrimination. Socially, the platform can create equitable access to quality education by bridging gaps in resource-constrained academic institutions, potentially improving educational outcomes. Professionally, it could enhance collaboration between academia and industry, leading to more industry-relevant education.

# Draft Literature Review

## Domain of concern

The selected domain is the higher education sector, particularly focused on private and public academic institutions that offer a variety of programs and qualifications. These institutions cater to diverse academic and professional needs through programs such as Bachelor of Science (BSc), Master of Science (MSc), Postgraduate Diploma (PGD), and Higher National Diploma (HND), among others. Programs are structured to address both foundational and advanced learning across various levels, helping students achieve the necessary qualifications for career advancement or further studies. Disciplines offered in these institutions cover a broad spectrum to meet the demands of different industries, including fields like Business Management, Computer Science, Information Technology (IT), Economics, Marketing, and Health and Safety. This diversity allows students to pursue specialized fields of interest that align with their career goals while providing academic staff the opportunity to bring interdisciplinary knowledge to their teaching. The aim is to ensure a well-rounded, industry-relevant education that equips students for the evolving job market.

## Existing systems

Existing platforms like LinkedIn, Fiverr, and Upwork play crucial roles in connecting professionals with job opportunities, freelance work, and collaborative networks. LinkedIn, a globally recognized professional networking platform, which is designed to facilitate professional connections and job opportunities, enabling users to create detailed profiles that showcase their skills, experience, and endorsements from colleagues. It is widely used by recruiters and companies to find suitable candidates for roles, making it a valuable resource for both job seekers and employers (Johnson, 2019). LinkedIn also allows for industry-specific networking through groups and posts, fostering a community where professionals can share knowledge, seek advice, and stay updated with industry trends (Smith & Kumar, 2020).

Fiverr and Upwork, by contrast, are more specialized for freelancers, allowing users to offer specific services, often called “gigs,” to clients around the world. Fiverr allows freelancers to post detailed descriptions of their services, rates, and packages, which clients can then select based on their needs. It is structured to support short-term, task-oriented projects, with a wide range of categories from graphic design and digital marketing to consulting and writing (Wilson, 2021). Upwork, while similar, supports more long-term project-based work and allows clients to post detailed job listings to which freelancers can apply. These platforms prioritize transparency by including profiles, ratings, and reviews, helping clients to make informed choices based on freelancers’ past work and feedback (Brown & Li, 2022).

These platforms highlight the importance of streamlined connectivity between clients and skilled professionals. However, they are general-purpose tools, catering to various industries without necessarily focusing on academia or education. Although LinkedIn does serve as a resource for connecting educators and industry professionals, it lacks the specialized features that an academic-focused platform might offer, such as course-specific qualifications, teaching experience, or scheduling flexibility required for lecturing roles (Chen, 2023). This gap in functionality suggests an opportunity for a more focused platform designed to connect academic institutions with lecturing resources, thereby providing a tailored solution for higher education needs.

Existing platforms like LinkedIn and Fiverr, though effective for general professional networking and freelancing, lack the specialization needed for the academic industry, particularly for connecting qualified lecturers with institutions in Sri Lanka, especially in the Colombo suburbs. These platforms do not cater to specific teaching skills or academic requirements essential for local education needs.

## Algorithms, Design and Classifiers

### Microservices Architecture

A microservices architecture enables modular and scalable implementation of this platform, where distinct functionalities (e.g., user profiles, matching, scheduling, payments) are managed as independent services. Each service, built with Spring Boot, functions as a standalone REST API, facilitating independent deployment and maintenance. MySQL databases tables are separately allocated for each entity (e.g., institute, lecturer), following a database-per-entity model that ensures data integrity and minimizes cross-service dependencies. React on the frontend interacts with each backend service, providing a responsive UI. This architecture enhances flexibility and scalability, allowing individual services to evolve without impacting others, making it ideal for dynamic user needs.

### Match Making Algorithms

LinkedIn, Fiverr, and Upwork each apply unique matchmaking algorithms tailored to their respective platforms. LinkedIn uses machine learning models that analyze skills, job experience, engagement metrics, and network connections to recommend jobs and potential connections. Its algorithm also considers the influence of mutual contacts to enhance the relevance of recommendations (Brown, 2022).

Fiverr relies on search algorithms to match clients with freelancers, assessing keyword relevance, ratings, delivery times, and pricing. It uses ranking models that prioritize well-rated freelancers with specialized expertise in specific categories (Smith, 2021).

Upwork matches clients with freelancers by assessing project requirements, freelancer skills, reviews, and hourly rates. Its algorithms utilize predictive analytics to prioritize freelancers with relevant expertise and strong reputations, balancing quality recommendations for both new and established freelancers (Jones & Lee, 2023).

## Reflection

This project underscores the potential of a specialized platform to connect academic institutions with qualified lecturing professionals, offering a solution to the challenges in Sri Lanka's higher education sector. Through this work, the researcher gained insights into the difficulties academic institutions face in sourcing educators with industry expertise and maintaining high teaching standards. Implementing a microservices architecture provided valuable experience in balancing independent service deployment with data consistency and integration. Overall, the project highlights the importance of developing tailored solutions to enhance educational quality and meet specific institutional needs in the academic field.

## Conclusion

In conclusion, this project addresses a pressing need within the Sri Lankan academic sector by proposing a platform to connect institutions with qualified lecturing professionals from both academia and industry. The shortage of skilled educators impacts the quality of education, especially in private institutions. By using a microservices architecture with tools like Spring Boot, MySQL, and React, the proposed platform is designed to be scalable, modular, and responsive to evolving academic requirements. This architecture allows each component to operate independently, ensuring flexibility and easy adaptation as the platform grows. Ultimately, the project highlights the value of a specialized, technology-driven solution in bridging resource gaps, enhancing educational standards, and relieving overburdened staff. Moving forward, this platform has the potential to significantly improve educational delivery, supporting institutions and students in achieving high academic and professional outcomes.

# Methodology

## Research paradigm

The research paradigm for this study follows a pragmatic approach, emphasizing practical solutions to real-world problems. It combines qualitative and quantitative methods to explore the challenges faced by academic institutions in sourcing qualified lecturers and to design a platform that addresses these issues. This mixed-methods approach allows for a comprehensive understanding of institutional needs and lecturer availability, while also enabling the development and testing of a technology solution tailored to these requirements.

## Research Approach

The research approach for this study adopts a design and development methodology, focusing on creating a platform that connects academic institutions with qualified lecturers. This mixed-methods approach includes both qualitative and quantitative data collection, such as surveys and interviews with stakeholders, to identify key challenges and needs in the education sector. Based on the findings, a platform will be developed using a microservices architecture. Two hypotheses are proposed:

Null Hypothesis (H0): The implementation of a platform connecting academic institutions with qualified lecturers does not improve the quality of education.

Alternative Hypothesis (H1): The implementation of a platform connecting academic institutions with qualified lecturers improves the quality of education.

These hypotheses will be tested to evaluate the platform's effectiveness in enhancing educational standards and supporting academic staff. The approach enables iterative development and data-driven validation of the platform's impact.

## Fact collection

Collection of facts for this research will be conducted using questionnaires and formal interviews. Questionnaires will gather quantitative data from a larger sample, while formal interviews will provide in-depth qualitative insights. These methods will help identify the key challenges faced by academic institutions and lecturers in Sri Lanka.

### Questionnaire

Questionnaires will be used in this project to gather detailed requirements from both academic institutions and lecturers. They allow for standardized data collection, providing insights into the needs, challenges, and expectations of both parties. By capturing a wide range of responses, questionnaires will help in designing a platform that addresses the core issues faced by both groups. Here are five key points to include:

* Lecturer Availability and Expertise: Questions will focus on the types of subjects lecturers are available to teach, their qualifications, professional experience, and preferred working hours. This helps identify the pool of qualified professionals available for different academic disciplines.
* Recruitment Challenges for Institutions: Institutions will be asked about the difficulties they face in sourcing qualified lecturers, such as lack of expertise in specific subjects, limited availability, and the challenge of balancing full-time staff with industry-experienced professionals.
* Platform Feature Expectations: Both lecturers and institutions will be asked about their expectations from a platform, such as ease of use, scheduling, communication tools, and payment methods.
* Impact on Teaching Quality: Questions will explore how lecturer workload and qualifications influence educational outcomes, and how a platform might help improve teaching quality.
* Technological and Adoption Barriers: The questionnaire will investigate potential obstacles in adopting the platform, such as technological limitations, concerns over usability, or reluctance from institutions or lecturers to engage with new systems.

### Formal Interviews

Formal interviews will be an essential tool for gathering in-depth qualitative insights from both academic institutions and lecturers, providing a more nuanced understanding of their needs, challenges, and expectations. While questionnaires collect broad data, interviews offer the opportunity for open-ended discussions that can reveal complex issues and provide detailed context. Here are three key points to include in the interviews:

* In-depth Challenges in Lecturer Recruitment: Interviews with institutional administrators will explore the specific barriers they face in recruiting qualified lecturers, such as difficulty finding professionals with both academic credentials and industry experience. This can uncover deeper issues such as competition with other institutions, financial constraints, or the limitations of existing recruitment channels.
* Lecturer Workload and Impact on Quality: Interviews with lecturers will focus on understanding their workload, including how overutilization affects their teaching quality and job satisfaction. This allows for identifying pain points that the platform can address, such as providing more flexible working arrangements or helping them balance teaching with industry commitments.
* Platform Usability and Features: Both lecturers and institutions will be asked about their expectations for the platform, delving into desired features like ease of scheduling, payment systems, communication tools, and customization options. These insights will directly inform platform design, ensuring it meets the practical needs of users.

## Analysis

The gathered data from both questionnaires and interviews will be analyzed using a mixed-methods approach. Quantitative data from the questionnaires will be analyzed statistically to identify trends, patterns, and correlations regarding the needs and challenges faced by institutions and lecturers. Qualitative data from interviews will be collated and thematically analyzed to extract key insights and deeper understandings of user needs. This combined analysis will help inform the design and features of the proposed platform, ensuring it addresses identified issues effectively.

## Design

### High-level architectural Diagram

The layered architecture diagram for this project includes entities like Institute, Program, Subject, Lecturer, and Qualification. The Institute layer connects to various Programs, which are linked to specific Subjects. The Lecturer entity is associated with Qualifications, ensuring lecturers are matched to relevant subjects and programs. This structure enables efficient management of academic resources and faculty assignments, ensuring scalability and flexibility.

A diagram of a company

Description automatically generated

Figure 1: High Level Architectural Diagram

## Evaluation

The effectiveness of the system can be evaluated using a combination of quantitative and qualitative evaluation techniques to test the two hypotheses. To evaluate the Null Hypothesis (H0), a pre- and post-implementation comparison can be conducted. Data can be collected on the quality of education from institutions before and after using the platform, through metrics such as student performance, faculty workload, and teaching quality assessments. Surveys and interviews with students, academic staff, and administrators can assess perceived improvements in teaching quality, workload distribution, and lecturer qualifications. Statistical tests, such as paired t-tests, can be used to analyze differences in these metrics before and after platform implementation. If no significant improvements are observed, the null hypothesis would be supported.

To test the Alternative Hypothesis (H1), a similar approach can be employed, but with a focus on identifying improvements linked directly to the platform’s usage. Key performance indicators (KPIs) such as lecturer availability, subject expertise, and academic satisfaction will be tracked. Additionally, user feedback regarding platform usability and effectiveness in matching lecturers to programs will be gathered through surveys and interviews. If the data demonstrates a significant increase in teaching quality, student engagement, and lecturer satisfaction, the alternative hypothesis would be supported. This comprehensive evaluation approach ensures a well-rounded assessment of the system’s impact.

## Gannet chart

Figure 2: Gannet Chart

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